



EZT-570L

Technical Manual



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1. Overview

This technical manual has been written to aid in the installation, wiring and troubleshooting of the EZT-570L and associated chamber operational issues and/or malfunctions. Note that not all options and/or features discussed in this guide may be available or applicable to the particular chamber that is being serviced. It is highly recommended that you read this material thoroughly prior to performing any diagnostic service in order to better assist you in locating the section(s) that apply to your situation.

1.1 Safety Information

Notes, cautions and warnings appear throughout this manual to draw your attention to important operational and safety information.

A “**NOTE**” marks a short message to alert you to an important detail.

A “**CAUTION**” appears with information that is important for protecting your equipment and insuring performance.

A “**WARNING**” appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.



This symbol (an exclamation point in a triangle) precedes a general CAUTION or WARNING statement.



This symbol (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.

1.2 Technical Assistance

If you encounter a problem with your chamber, review all of your EZT-570L configuration information to verify that your selections are consistent with your test application, i.e., alarms, limits, etc. If the problem persists after checking the above, you can get technical assistance by dialing +1 (513) 719-3300 or by faxing your request to +1 (513) 326-5258, Monday thru Friday, 8:00 a.m. to 5:00 p.m. Eastern Standard Time. You can also email your request to support@cszproducts.com.

Please have the following information available:

- Complete Model #'s and/or Serial #'s for Chamber(s) in Question
- Complete Software Version #'s
- All Configuration Information
- All User Manuals

2. Installation

All EZT-570L components are pre-loaded with all operating software and firmware. Before beginning installation, completely read through this section as well as the following section 3 Power and Wiring to gain an understanding of the entire installation process.



WARNING:

- To avoid potential electric shock and other hazards, all mounting and wiring for the EZT-570L must conform to the National Electric Code (NEC) and other locally applicable codes.
- Special expertise is required to install, wire, configure and operate the EZT-570L controller. Personnel without such expertise should not install, wire or operate the EZT-570L.



CAUTION:

- Prevent metal fragments and pieces of wire from dropping inside the housing of any EZT-570L component. If necessary, cover the component during installation and wiring. Ingress of such fragments and chips may cause a fire hazard, damage or malfunction of the device.
- When handling the B42, PCM and HLM series control boards, use proper ESD (electro-static discharge) handling procedures to prevent damage to board components.

2.1 Environmental Considerations

Do not subject the EZT-570L control system components to operating temperatures below 0°C (32°F) or above 50°C (122°F). Minimum and maximum relative humidity levels are limited between 10% and 90% (non-condensing). Permitted storage temperature extremes for the EZT-570L control system components are limited to -10°C (14°F) and 60°C (140°F).

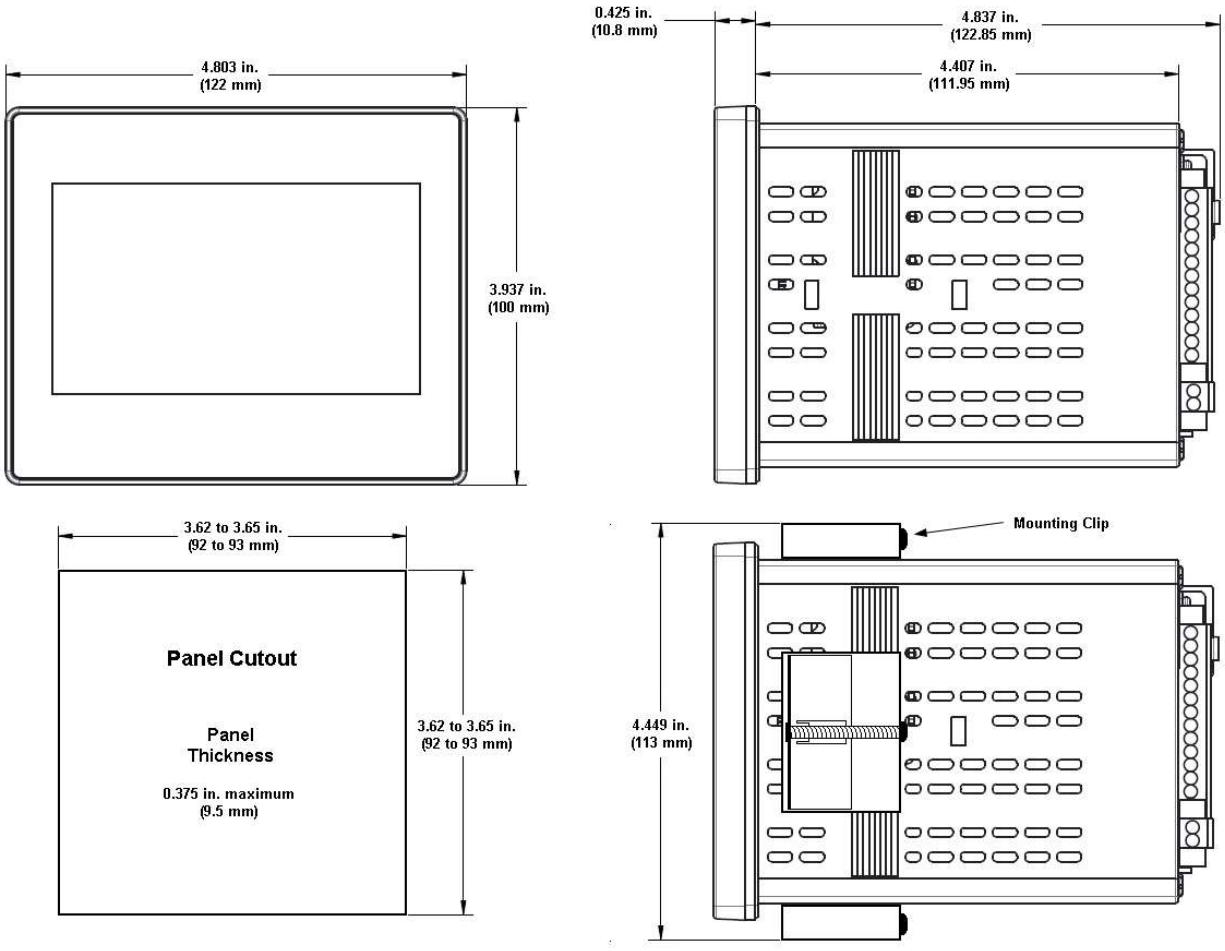
2.2 Mounting Dimensions

The EZT-570L controller comes in two different hardware platforms. One consists of a ¼ DIN integrated touch screen and loop control configuration, and the other consists of an individual touch screen HMI (human machine interface) and individual loop control boards.

Both platforms are compatible with the separate expansion IO module and monitor input module. The use of these components is dependent upon options provided on the individual chamber the EZT-570L is installed on.

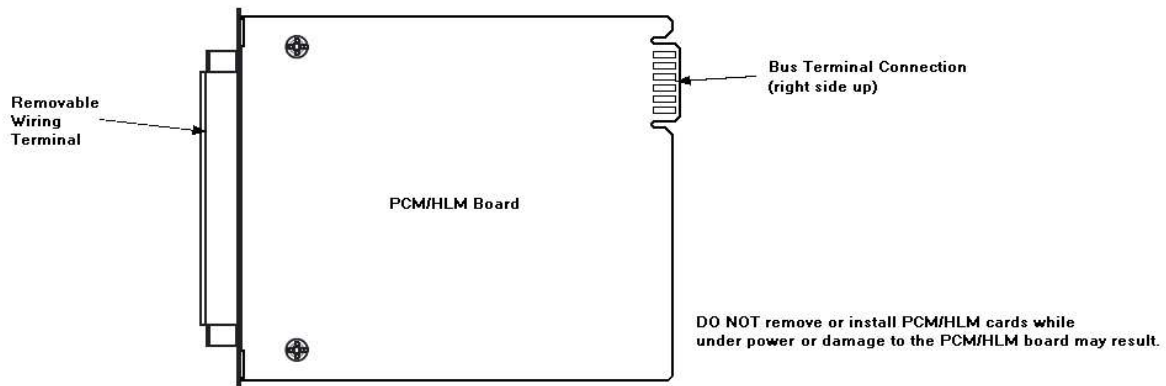
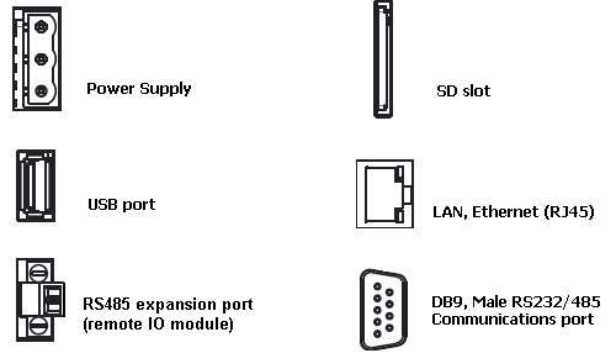
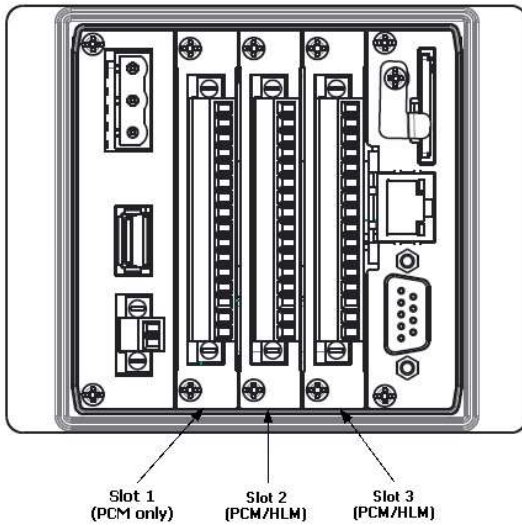
2.2.1 EZT-570L ¼ DIN Hardware with 4.3” Touch Screen

The EZT-570L ¼ DIN base unit is supplied with four mounting clips. All four clips must be installed and properly tightened to insure the IP66 protective rating. Failure to install all mounting clips may also affect touch screen operation. Be sure to tighten each mounting clip evenly so as not to flex the case of the unit. DO NOT over tighten the mounting clips. The clips should be tightened just enough to compress the gasket so that the bezel is parallel with the mounting surface.



2.2.1.1 Process Loop/Limit Boards

One PCM control board is required for each process control loop. Each PCM must be installed in sequential order beginning with slot 1 up through slot 3. Only one HLM limit board can be installed in the EZT-570L base unit. The HLM must be installed after all of the PCM cards in the next open slot.

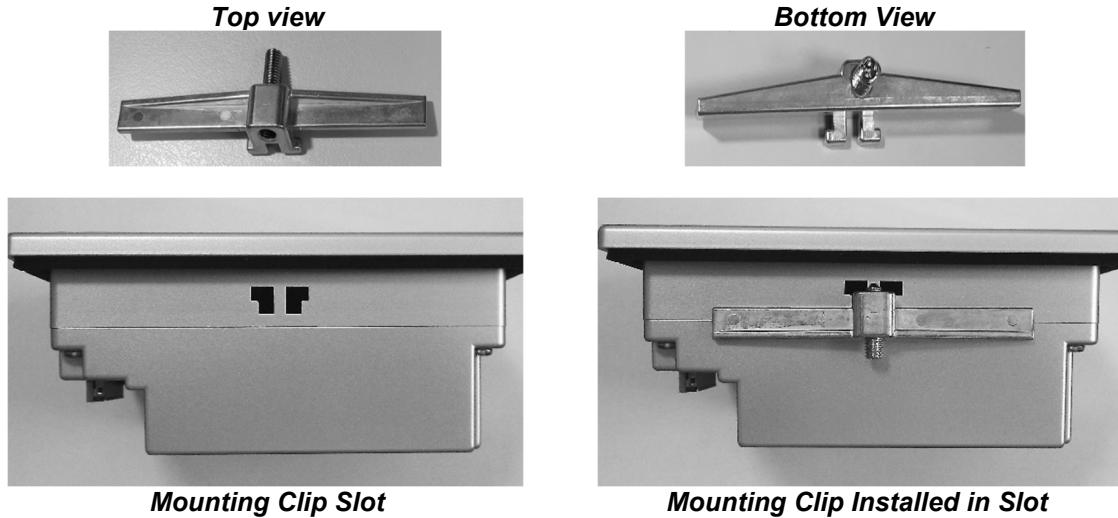


NOTE: The EZT-570L will not operate properly without the SD card installed into the SD card slot on the back of the unit. The SD card is preloaded with all software required for 'Auto-Boot' operation. The slot on the back of the interface is 'keyed' so the card can only be installed in one direction. If the card is removed, take care when inserting the SD card and DO NOT force it into the slot. The card MUST be installed prior to application of power.

2.2.2 EZT-570L 4.3" and 7" HMI Hardware

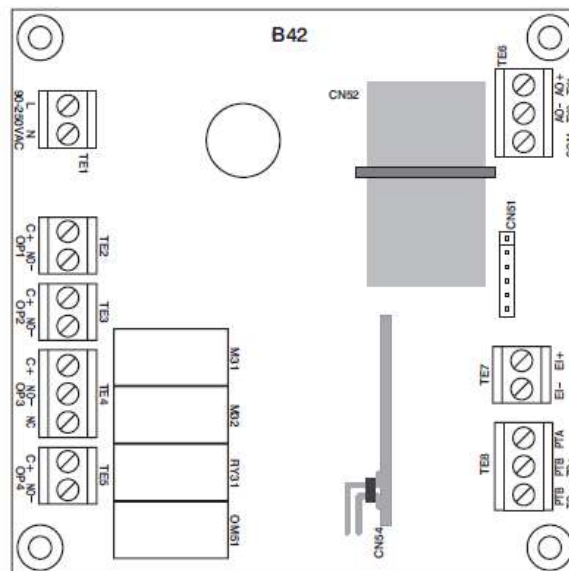
The quantities of certain components vary depending upon the application. Make sure that you have all components required for your application prior to installation. The 4.3" touch screen interface is supplied with four mounting brackets and the 7" touch screen interface is supplied with six.

All brackets must be installed and properly tightened to insure the IP65 protective rating. Failure to install all mounting brackets may also affect touch screen operation. DO NOT over tighten the mounting brackets. The brackets should be tightened just enough to fully compress the gasket so that the bezel is parallel with the mounting surface. The maximum torque used should be applied evenly on all sides and not exceed 1N-m (8.9 in lb) to prevent the LCD panel from flexing.

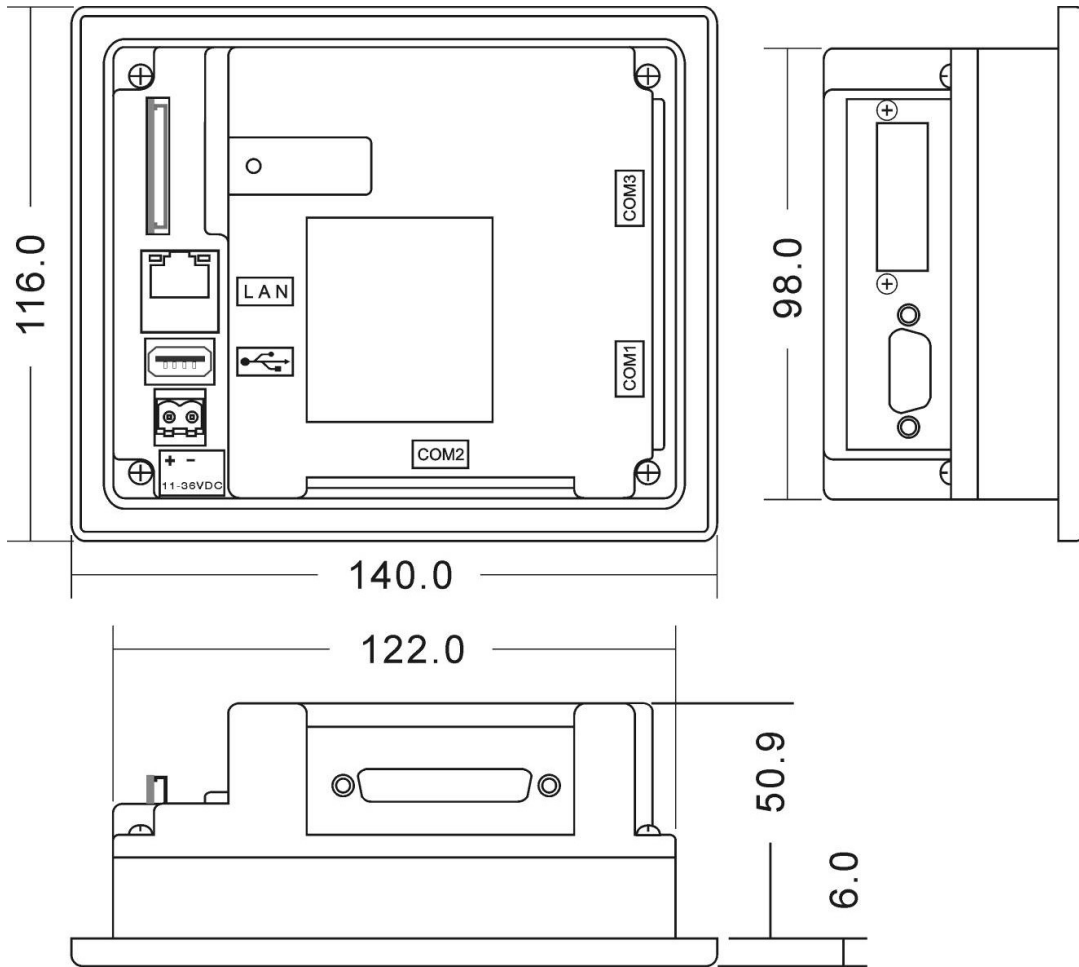


2.2.2.1 B42 Process Loop Control Boards

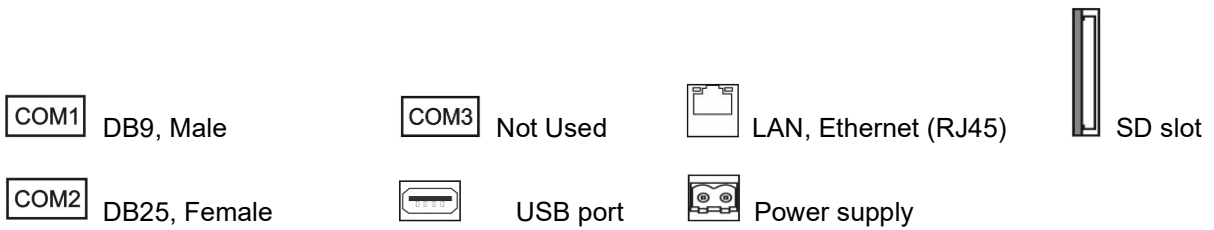
One PID loop control is required for each process control loop in the system. The EZT-570L utilizes the Future Design Controls B42 board level control. Please refer to the FDC B42 User's Manual for dimensions, appropriate mounting and installation instructions.



2.2.2.2 4.3" Touch Screen Interface

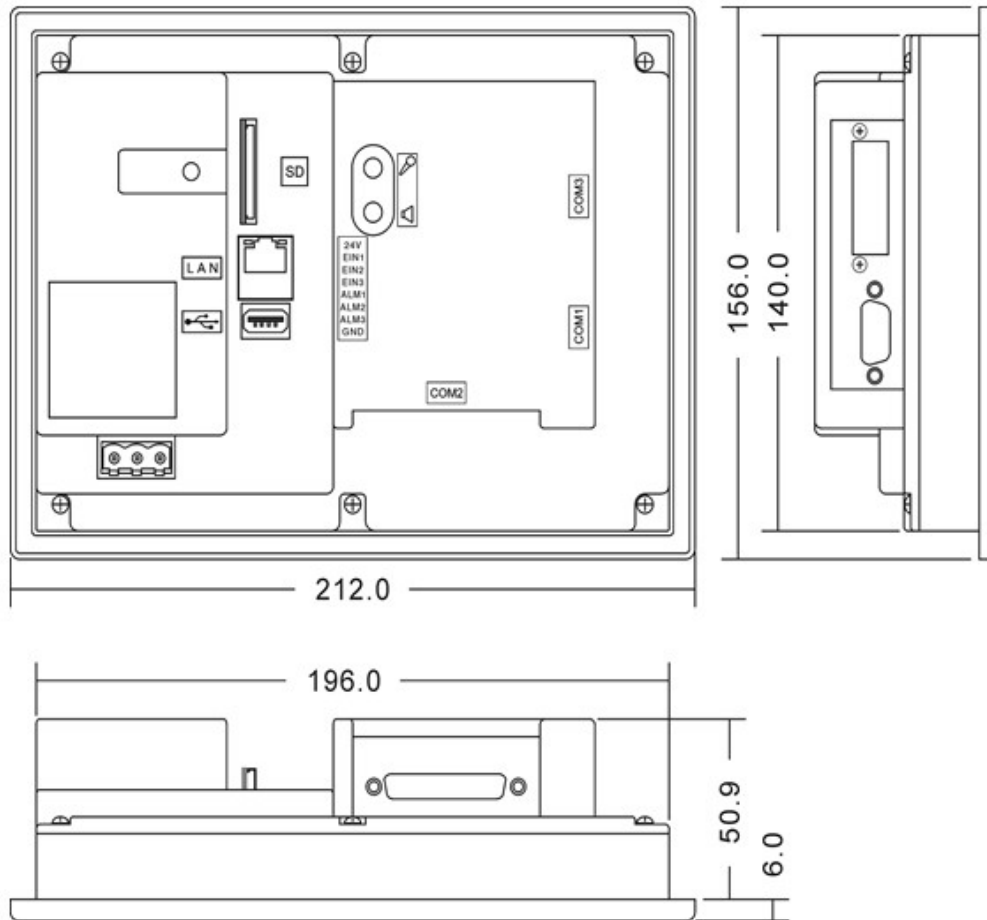


All dimensions are in mm. Tolerance +/- 1 mm.
Panel cutout: 123⁺¹ x 99⁺¹

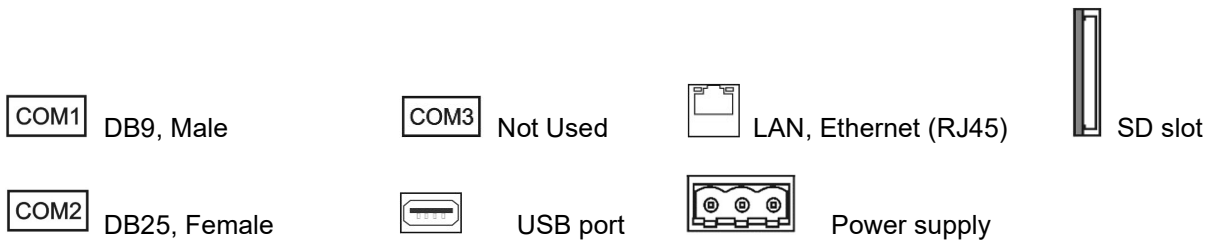


NOTE: The EZT-570L will not operate properly without the SD card installed into the SD card slot on the back of the unit. The SD card has all software required, loaded onto the card for 'Auto-Boot' operation. The slot on the back of the interface is 'keyed' so the card can only be installed in one direction. If the card is removed, take care when inserting the SD card and DO NOT force it into the slot. The card MUST be installed prior to application of power.

2.2.2.3 7" Touch Screen Interface



All dimensions are in mm. Tolerance +/- 1 mm.
 Panel cutout: 197⁺¹ x 141⁺¹

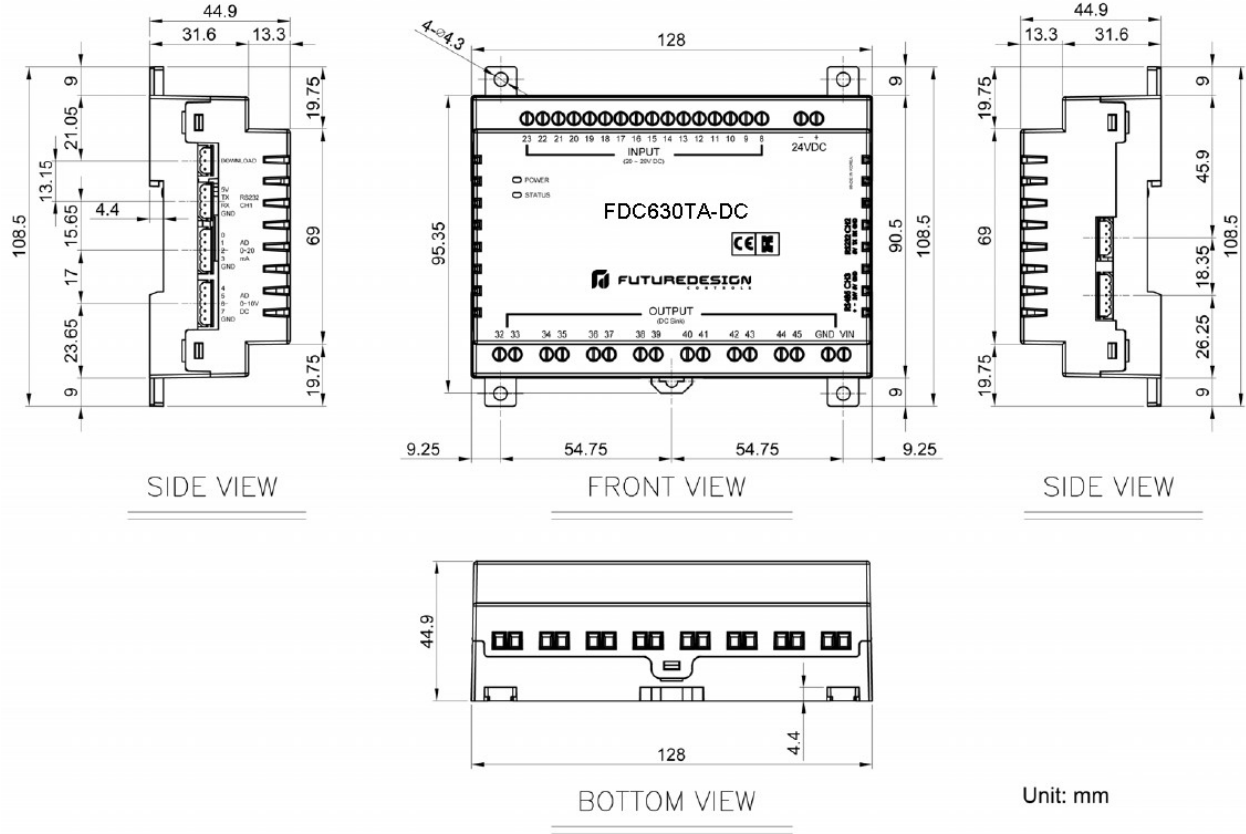


NOTE: The EZT-570L will not operate properly without the SD card installed into the SD card slot on the back of the unit. The SD card has all software required, loaded onto the card for 'Auto-Boot' operation. The slot on the back of the interface is 'keyed' so the card can only be installed in one direction. If the card is removed, take care when inserting the SD card and DO NOT force it into the slot. The card MUST be installed prior to application of power.

2.2.3 Expansion IO Module

The expansion I/O module (FDC630TA-DC) provides an additional 16 digital inputs and 14 digital outputs to the EZT-570L control system. The inputs and outputs can be utilized as alarms, events, or for any number of uses within math/logic functions. The expansion IO module operates on 24VDC power and within an operating temperature range of -30 to 75°C (-22 to 167°F). Humidity limitations range from 10 to 90% non-condensing.

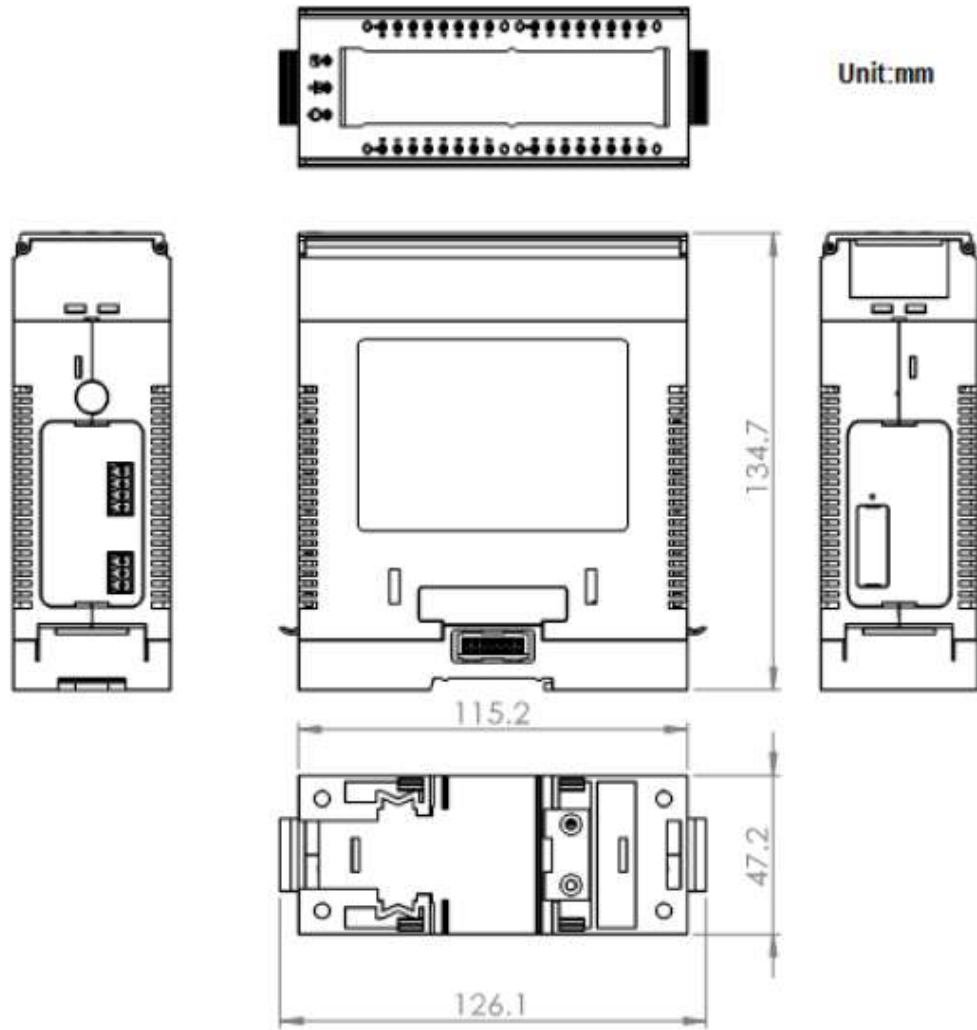
The inputs have a voltage range of 20-28VDC (24VDC nominal). The outputs are transistor (NPN) with an operating range of 5-30VDC with maximum of 0.15A per output (10mA minimum).



Unit: mm

2.2.4 Smart IO Monitor Module

The Smart series SIO-8AIU(-H) remote I/O module provides the option of adding eight monitor input points to the EZT-570L. Each input is individually configurable for an array of different thermocouple, voltage and current types. The stand-alone module provides a wide input power range of 10-60VDC and an operating temperature range of -25 to 70°C (-13 to 158°F). Humidity limitations range from 5 to 95% non-condensing.



3. Wiring

This section describes the methods and precautions for wiring the EZT-570L system components.

**WARNING:**

- Turn off power to the chamber before starting installation, removal, wiring, maintenance and inspection of the EZT-570L controller. Failure to turn off power may cause electric shock, create a fire hazard or cause damage to the EZT-570L.
- Emergency stop and interlocking circuits **MUST** be configured outside of the EZT-570L control system. If such circuits are made through the EZT-570L, failure of the control system may cause uncontrollable operation, damage to equipment or accidents.

**CAUTION:**

- This section presents recommended installation practices and procedures. Since no two applications are identical, these recommendations should be considered as guidelines.
- Electrical interference in an operator interface can lead to equipment start-up, which could result in property damage and/or physical injury to the equipment operator.

If the application requires an operator or attendant, you should be aware that this potential safety hazard exists and take appropriate precautions. Consult NEMA ICS 3-304 for more information regarding safety for the installation of solid-state programmable control devices.

The EZT-570L control system touch screen operates on a nominal 24VDC supply voltage with an allowable range of 11 to 36VDC. The B42 loop controls can either be DC (11-26VDC) or AC (90-250VAC) powered. When replacing a B42 control board, be sure to replace with the same model and matching supply rating.

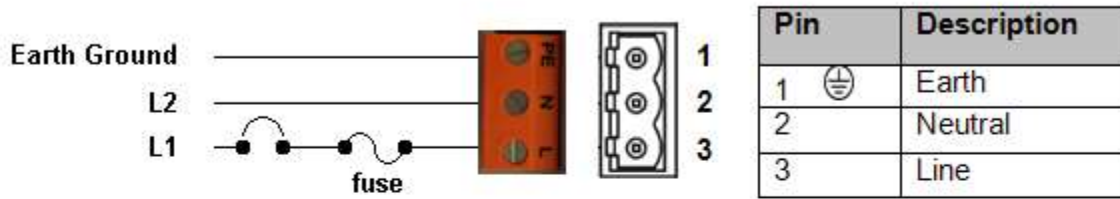
The EZT-570L ¼ DIN control base unit can also be either 11-26VAC/VDC or 90-250VAC (47-63Hz) powered. Thus, when servicing or replacing the base unit, be sure to connect the proper supply voltage.

3.1 Connecting to the EZT-570L ¼ DIN Control

Power connections should be made using 14 AWG copper conductors rated for at least 90°C (maximum wire size = 12 AWG). To make a connection, strip about ¼" of insulation off the end of the wire, turn the connector screw counterclockwise until the gap is wide open, insert the wire all the way in, and turn the screw clockwise until it's tight (maximum torque rating = 0.51 N-m).

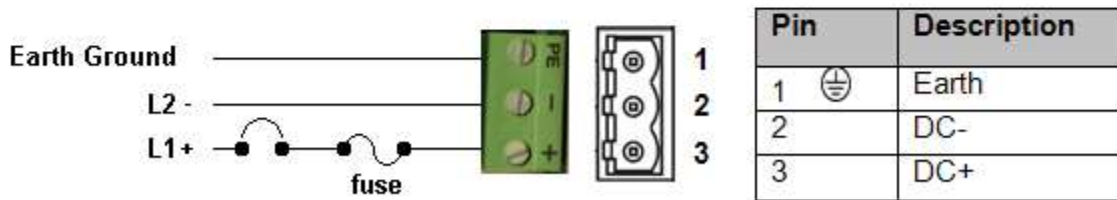
NOTE: Upon application of power, if the EZT-570L does not come on within 2 seconds, remove power. Check wiring to ensure proper connections and try to power up again. An Internal fuse will prevent damage for over voltage conditions; however, it isn't guaranteed.

AC Power, 90-250 V AC, 47~63Hz



Note: Orange color terminal supplied for AC

DC Power, 11-26 V AC/DC



Note: Green color terminal supplied for DC

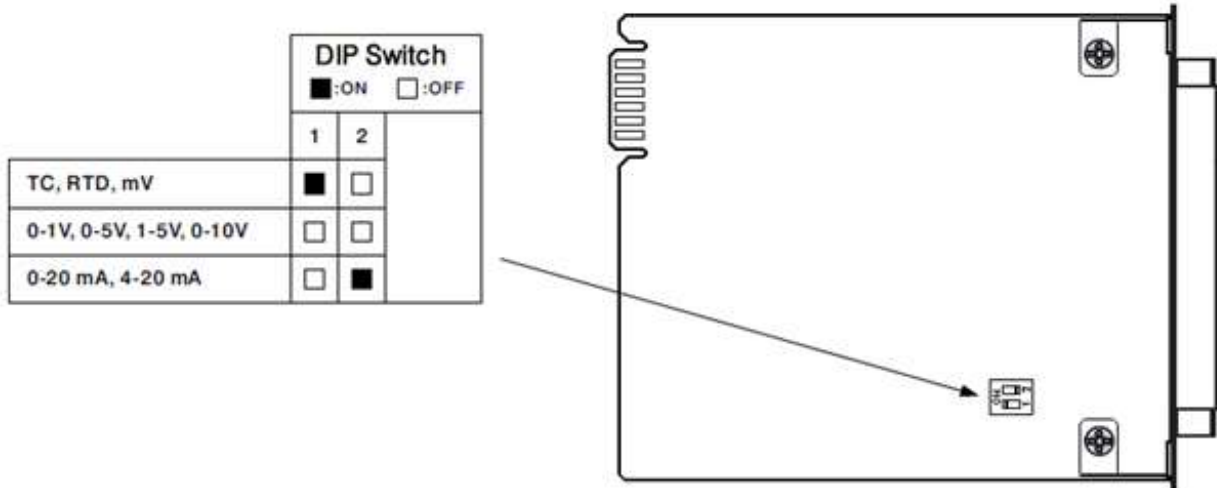
3.1.1 Process Control Module (PCM)

The EZT-570L can support a maximum of three PCM boards installed. The PCM boards must be installed beginning with slot 1 up to slot 3 for the maximum. DO NOT remove or install PCM boards while the EZT-570L is under power or damage to the PCM or base unit may result.

PCM screw terminals are rated for up to 14 AWG wire and a maximum torque of 0.19 N-m.

3.1.1.1 Sensor Input

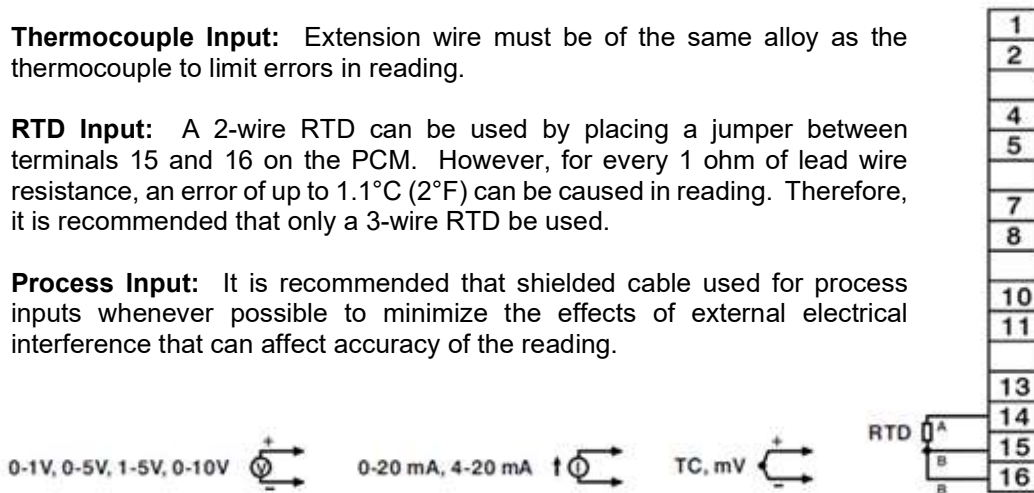
The PCM provides a universal input via DIP switch and software selections to choose from the available input types. During installation, the DIP switch setting should be verified to ensure that it matches the type of sensor used. The DIP switch is located on the component side of the PCM board.



Thermocouple Input: Extension wire must be of the same alloy as the thermocouple to limit errors in reading.

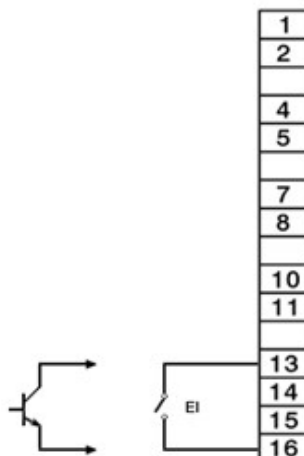
RTD Input: A 2-wire RTD can be used by placing a jumper between terminals 15 and 16 on the PCM. However, for every 1 ohm of lead wire resistance, an error of up to 1.1°C (2°F) can be caused in reading. Therefore, it is recommended that only a 3-wire RTD be used.

Process Input: It is recommended that shielded cable used for process inputs whenever possible to minimize the effects of external electrical interference that can affect accuracy of the reading.



3.1.1.2 Event Input

The Event input accepts a digital type signal via a dry contact (switch/relay) closure. The input can also be activated via an open collector/TTL source.

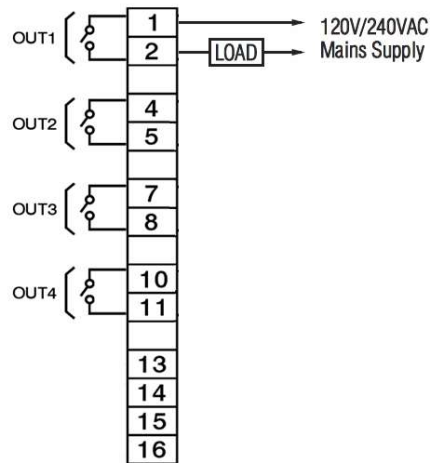


3.1.1.3 Control Outputs

Each PCM can provide up to four outputs. The output type (if present) is based upon the PCM ordering code. Verify that the required output is supplied on the PCM prior to connecting it to the load.

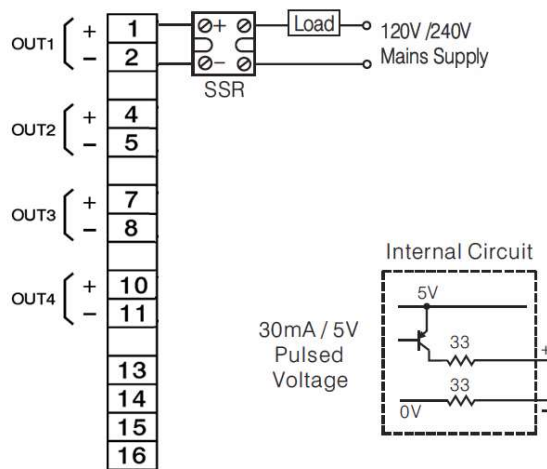
Relay Outputs

Contacts rated 240VAC (30VDC), maximum 2A resistive.
 Maximum 1A inductive load $\cos\Phi = 0.4$ (L/R = 7ms).
 Minimum 100,000 operations at 20 times/minute (resistive load).



Pulsed Voltage Outputs

Source Voltage: 5V at 30mA, current limiting resistance 66 ohms
 14V at 40mA, current limited at 70mA (recommended for driving 3 phase SSR)

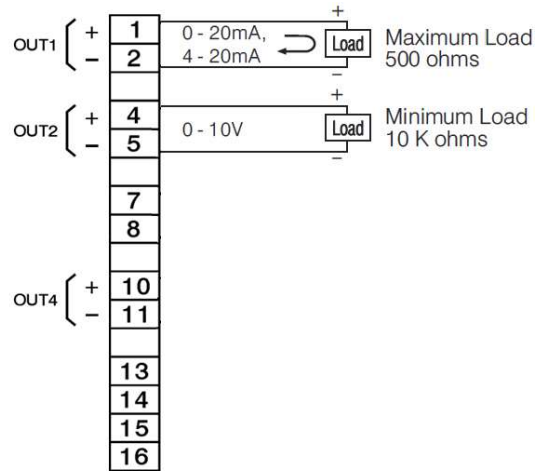


Isolated Linear Outputs

Output 1 and 2 are capable of providing linear outputs for control operation, i.e., heat/cool.

Output 3 does not provide a linear output option.

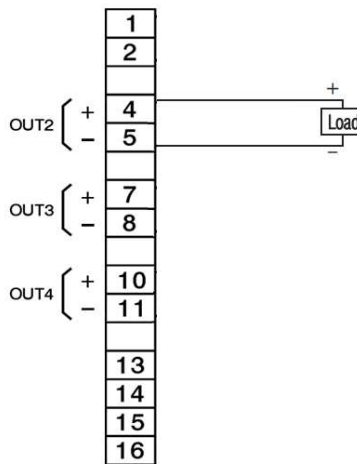
Output 4 is capable of providing a linear output for process value (PV) or set point (SP) retransmission.



Transmitter Power Supply

Output 1 does not provide a power supply option. It is for control operation only.

Outputs 2, 3 and 4 each provide options for a 5VDC/80mA, 12VDC/40mA or 20VDC/25mA power supply.



3.1.2 High Limit Module (HLM) Connections

The EZT-570L can support a maximum of one HLM board. The HLM must be installed after all PCM boards in the next open slot. If only one PCM is installed, the HLM would be installed in slot 2. If a PCM is installed in both slots 1 and 2, the HLM would be installed in slot 3. At least one PCM must be installed in the EZT-570L base unit for proper operation.

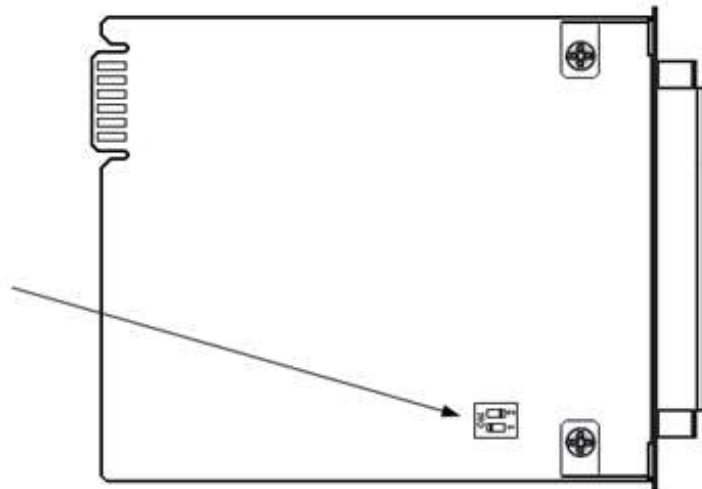
HLM screw terminals are rated for up to 14 AWG wire and a maximum torque of 0.19 N-m.

3.1.2.1 Sensor Input

The HLM provides input type selection via DIP switch and software selections. During installation, the DIP switch setting should be verified to ensure that it matches the type of sensor used. The DIP switch is located on the component side of the HLM board.

DIP Switch		
	1	2
TC, RTD, mV	<input checked="" type="checkbox"/>	<input type="checkbox"/>
0-1V, 0-5V, 1-5V, 0-10V *	<input type="checkbox"/>	<input checked="" type="checkbox"/>
0-20 mA, 4-20 mA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

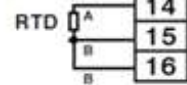
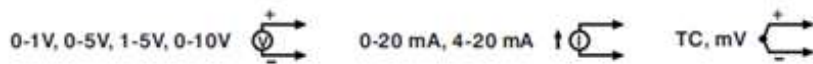
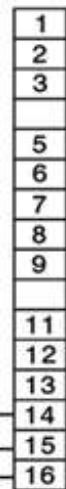
**0-1V and 0-5V/1-5V input types are special order. HLM units ordered with either input type cannot be programmed for any other type.*



Thermocouple Input: Extension wire must be of the same alloy as the thermocouple to limit errors in reading.

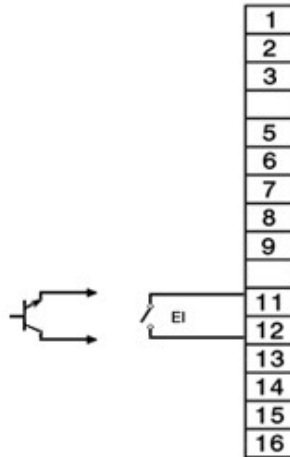
RTD Input: A 2-wire RTD can be used by placing a jumper between terminals 15 and 16 on the PCM. However, for every 1 ohm of lead wire resistance, an error of up to 1.1°C (2°F) can be caused in reading. Therefore, it is recommended that only a 3-wire RTD be used.

Process Input: Linear voltage and current inputs are *NOT* FM approved. It is recommended that shielded cable used for process inputs whenever possible to minimize the effects of external electrical interference that can affect accuracy of the reading.



3.1.2.2 Event Input

The Event input accepts a digital type signal via a dry contact (switch/relay) closure. The input can also be activated via an open collector/TTL source.

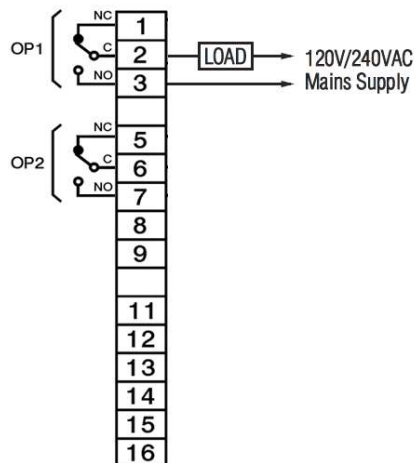


3.1.2.3 Limit Outputs

The HLM provides one limit output as well as an optional programmable output. The output type is based upon the HLM ordering code. Verify that the required output is supplied on the HLM prior to connecting it to the load.

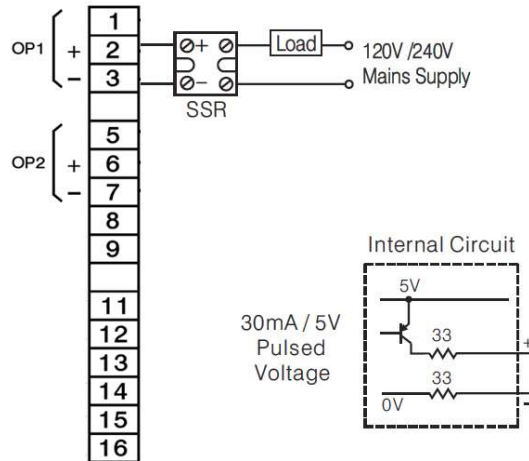
Relay Outputs

Contacts rated 240VAC (30VDC), maximum 2A resistive.
Maximum 1A inductive load $\cos\Phi = 0.4$ (L/R = 7ms).



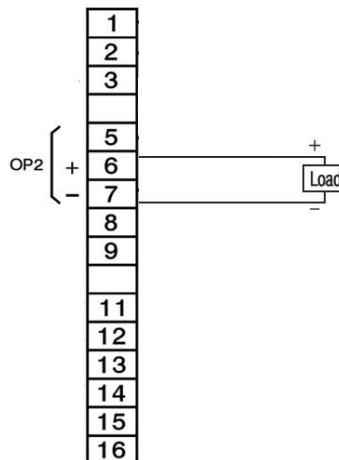
Pulsed Voltage Outputs

Source Voltage: 5V at 30mA, current limiting resistance 66 ohms
14Vat 40mA, current limited at 70mA (recommended for driving 3 phase SSR)



Transmitter Power Supply

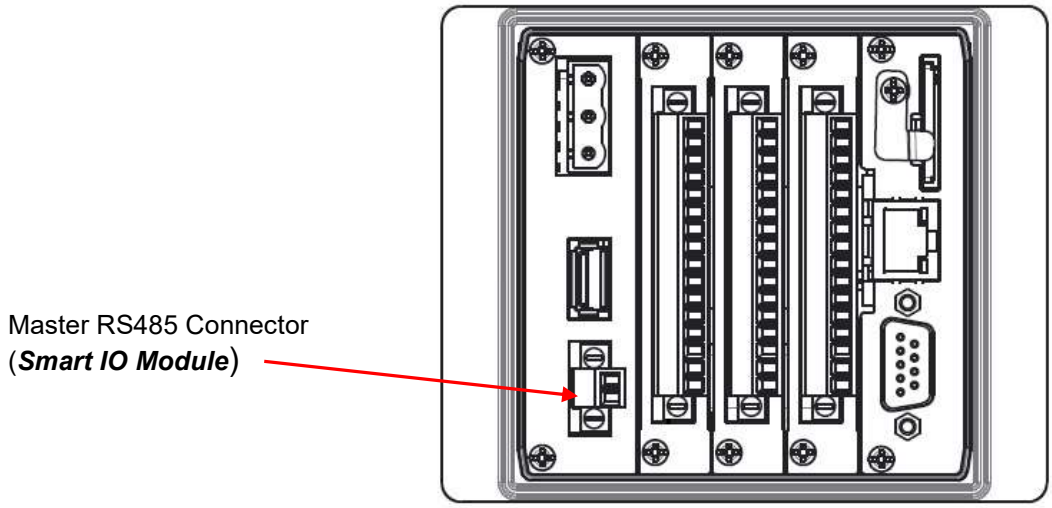
Output 1 is for high/low limit operation only. Output 2 provides options for a 5VDC/80mA, 12VDC/40mA or 20VDC/25mA power supply.



3.1.3 Communication Connections

The EZT-570L base unit provides an RS232/485 serial interface, 10/100 base-T Ethernet port and USB port. The serial port and Ethernet port provide user communication options for remote monitoring and control of the chamber. The USB port provides data file options for copy/backup of internal files as well as simple import/export configuration utilities.

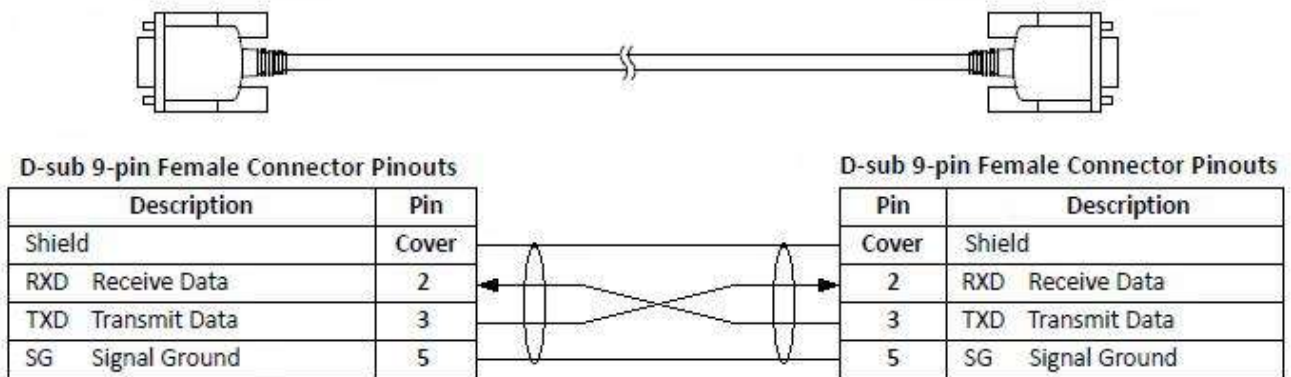
The base unit also provides a “Master” RS485 communication connection. This connection is utilized for the Expansion IO and Smart series remote IO modules only.



3.1.3.1 RS232/485 User Serial Communications

The unit is equipped with a DB9 male serial port that provides both RS232 and RS45 communication options. Only one hardware interface can be used at a time. In order to connect the EZT-570L to a PC running software such as CSZ’s EzView software a cable must be fashioned according to the following diagrams.

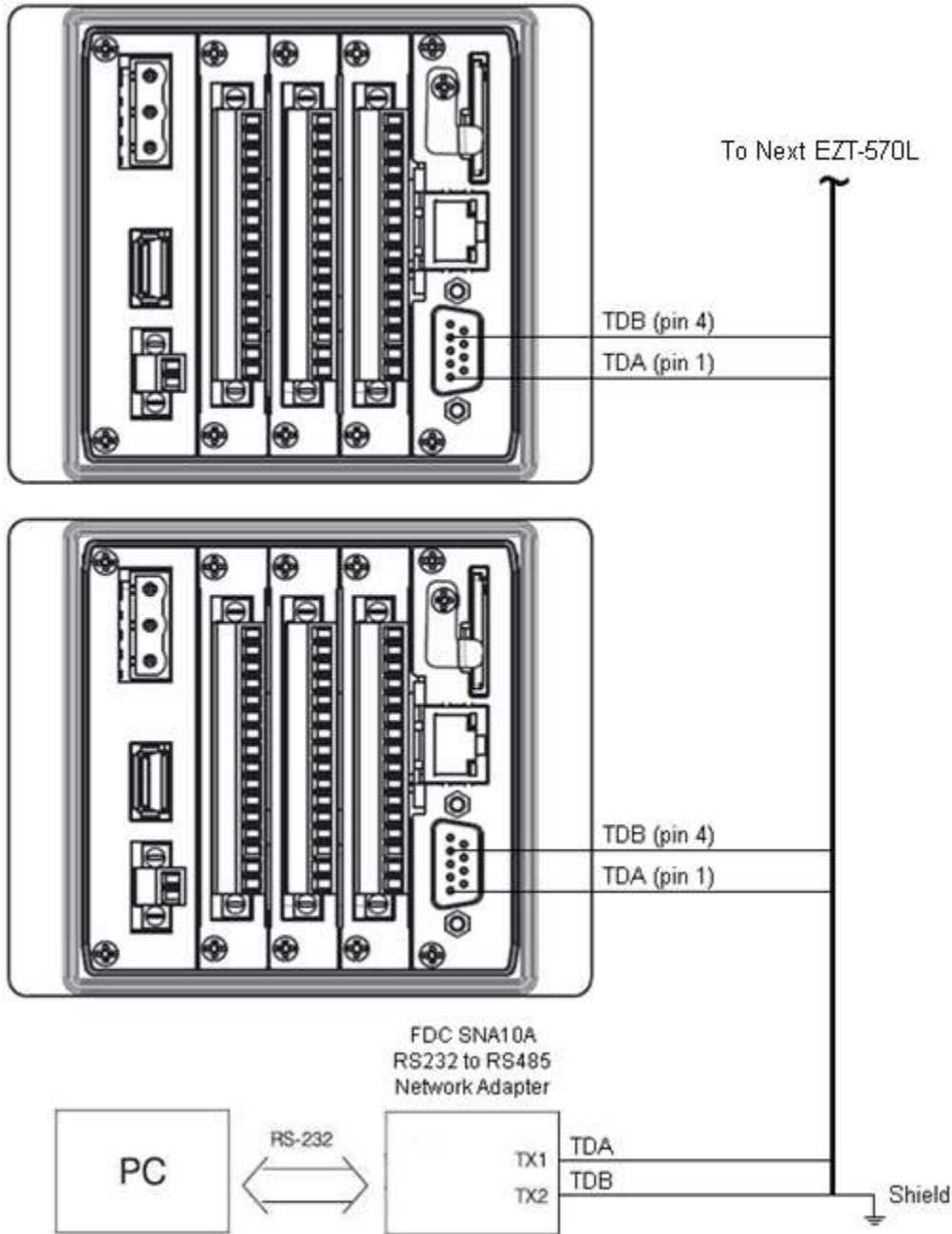
RS232



NOTE: DO NOT use a standard null-modem cable to connect the unit to a PC. Most computers do not provide a standard serial port and a USB to serial converter must be used. Incompatibilities may exist between the EZT-570L and certain USB to serial adapters which may cause the unit to malfunction when connected using a standard null-modem cable.

RS485

If more than one EZT-570L controller is to be placed on the communication link with a PC or the distance between the PC and the unit exceed the recommended maximum of 30 feet for RS232, an RS485 converter is required at the PC in order to utilize the RS485 connection.



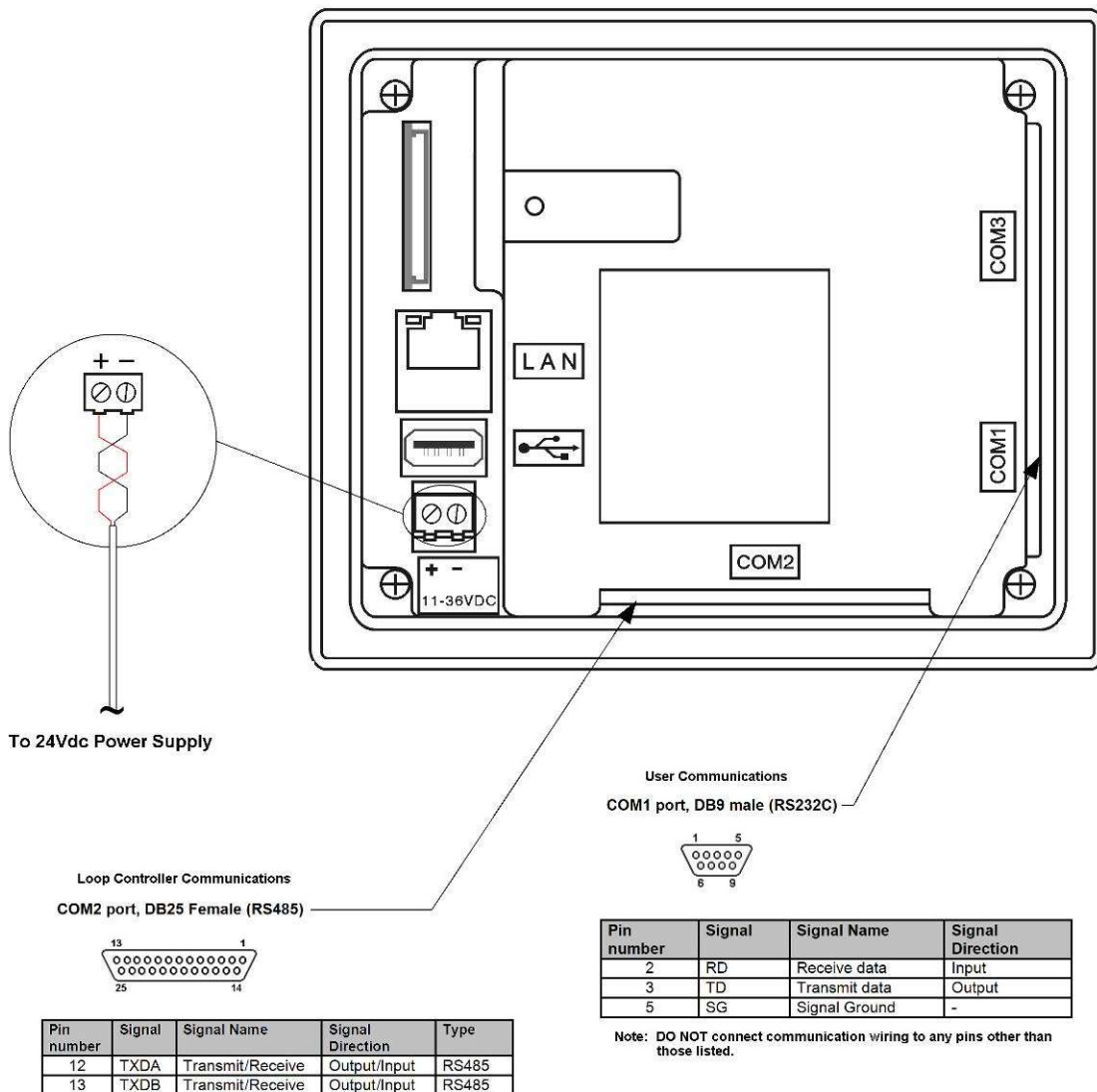
NOTE: The connection requires a single twisted-pair cable that is daisy-chained from one unit to the next. When using shielded twisted-pair cable, be sure to ground only one end of the cable, preferably at the RS232 to RS485 network adapter. Allowing any other portion of the cable shield to come in contact with ground, or grounding both ends, will cause ground loop currents to flow in that section of the cable which can cause communication errors.

3.2 Connecting to the EZT-570L HMI

Power wiring lengths should be kept to a minimum, and it is preferable to have the power wiring run using a minimum of 18/2 twisted shielded cable. This keeps the “hot” and “common” wires paired to minimize the effects of external noise.

To make a connection, strip about ¼” of insulation off the end of the wire, turn the connector screw counterclockwise until the gap is wide open, insert the wire all the way in, and turn the screw clockwise until it’s tight. Connect positive DC line (hot) to the ‘+’ terminal and the negative DC line (common) to the ‘-’ terminal. The other end of the cable should be properly terminated at the 24VDC power source, and the shield connected to the main earth ground.

NOTE: Upon application of power, if the display does not come on within 2 seconds, remove power. The interface is reverse polarity protected. Check wiring to ensure proper connections and try to power up again. An Internal fuse will prevent damage for over voltage conditions; however, it isn’t guaranteed. DC voltage sources should provide proper isolation from main AC power and similar hazards.



3.2.1 Process Loop Controller Communication Connections

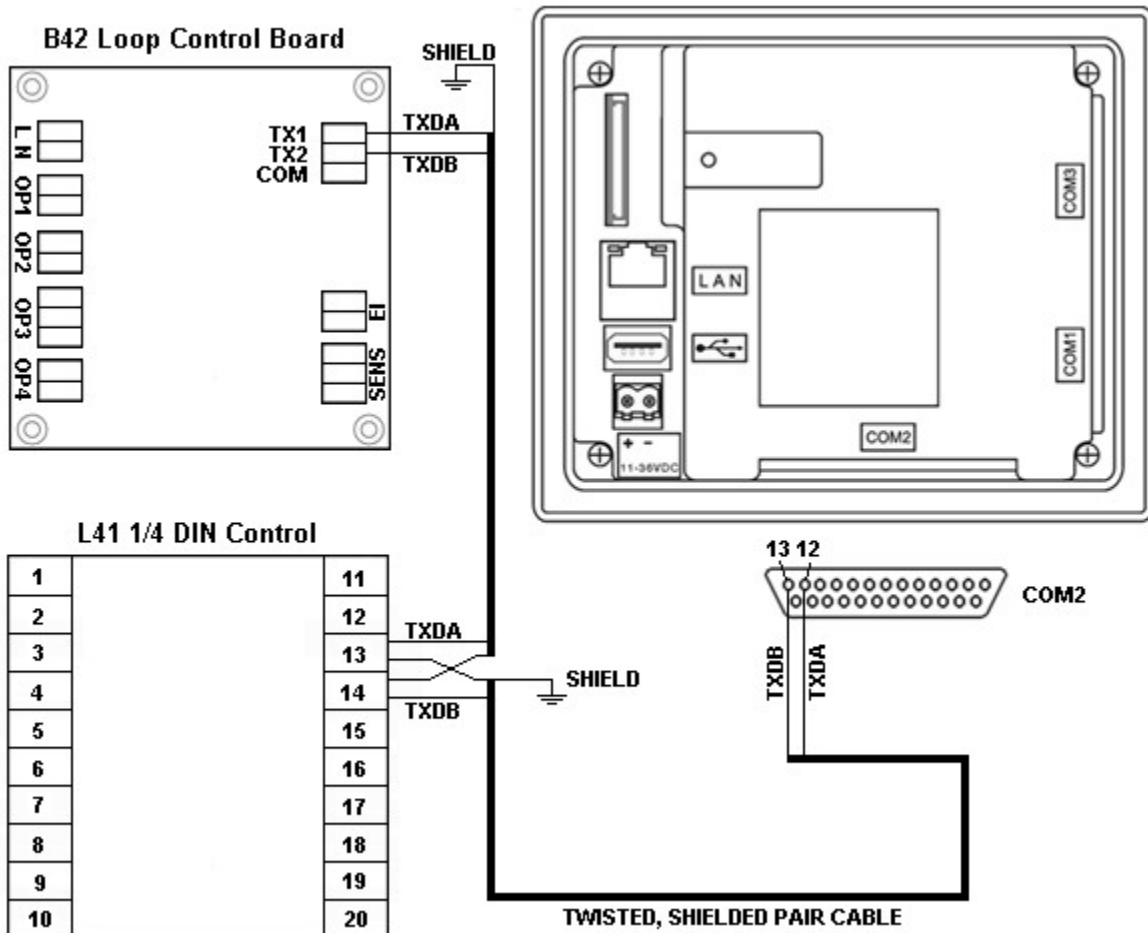
The loop/limit controls communicate with the EZT-570L touch screen using the RS485 communications port. This allows up to three B42 boards (or two B42 boards and one L41 limit control) to be connected using one 2-wire link. The controllers are wired in parallel with each one having their own communications address of 1, 2 and 3 (corresponding to loops 1, 2 and 3 or loops 1, 2 and L41 limit).

Communication wiring should be run using a minimum of 24 AWG twisted-pair, copper conductors. For short runs (< 10 feet total), non-shielded wiring can be used as long as proper separation from power/control conductors is maintained. For communications wiring where the total length will exceed 10 feet, shielded twisted-pair should be used.

NOTE: It is important to keep the power/control and sensor/communications wiring separated from one another. Relay and/or high voltage outputs can interfere with the sensor and communication wiring as they cycle on and off, which can cause erroneous sensor readings or communications errors.

CSZ recommends the use of shielded wire for all installations in order to maintain optimum performance and minimize the possibility of communications errors.

When using shielded twisted-pair, be sure to ground only one end of the cable, preferably at the loop controller. Allowing any other portion of the cable shield to come in contact with ground, or grounding both ends, will cause ground loop currents to flow in that section of the cable shield which can disrupt communications.

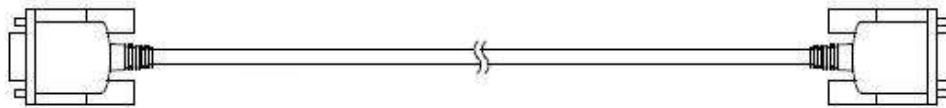


3.2.2 Connecting to the Process Loop/Limit Controls

The EZT-570L utilizes Future Design Controls B42 board level process loop controls and the L41 ¼ DIN limit control. The input and output wiring to the individual loop(s) and limit control is dependent upon options ordered on each device as well as the intended application. For detailed information on input and output wiring, refer to the user manual for the type of control used.

3.2.3 User Serial Communications

The EZT-570L touch screen provides an RS232C user communications port for connecting the unit to a PC running software such as CSZ’s EzView software. In order to connect the unit to a PC, a cable must be fashioned according to the diagram below.

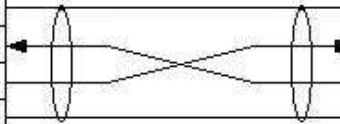


D-sub 9-pin Female Connector Pinouts

Description	Pin
Shield	Cover
RXD Receive Data	2
TXD Transmit Data	3
SG Signal Ground	5

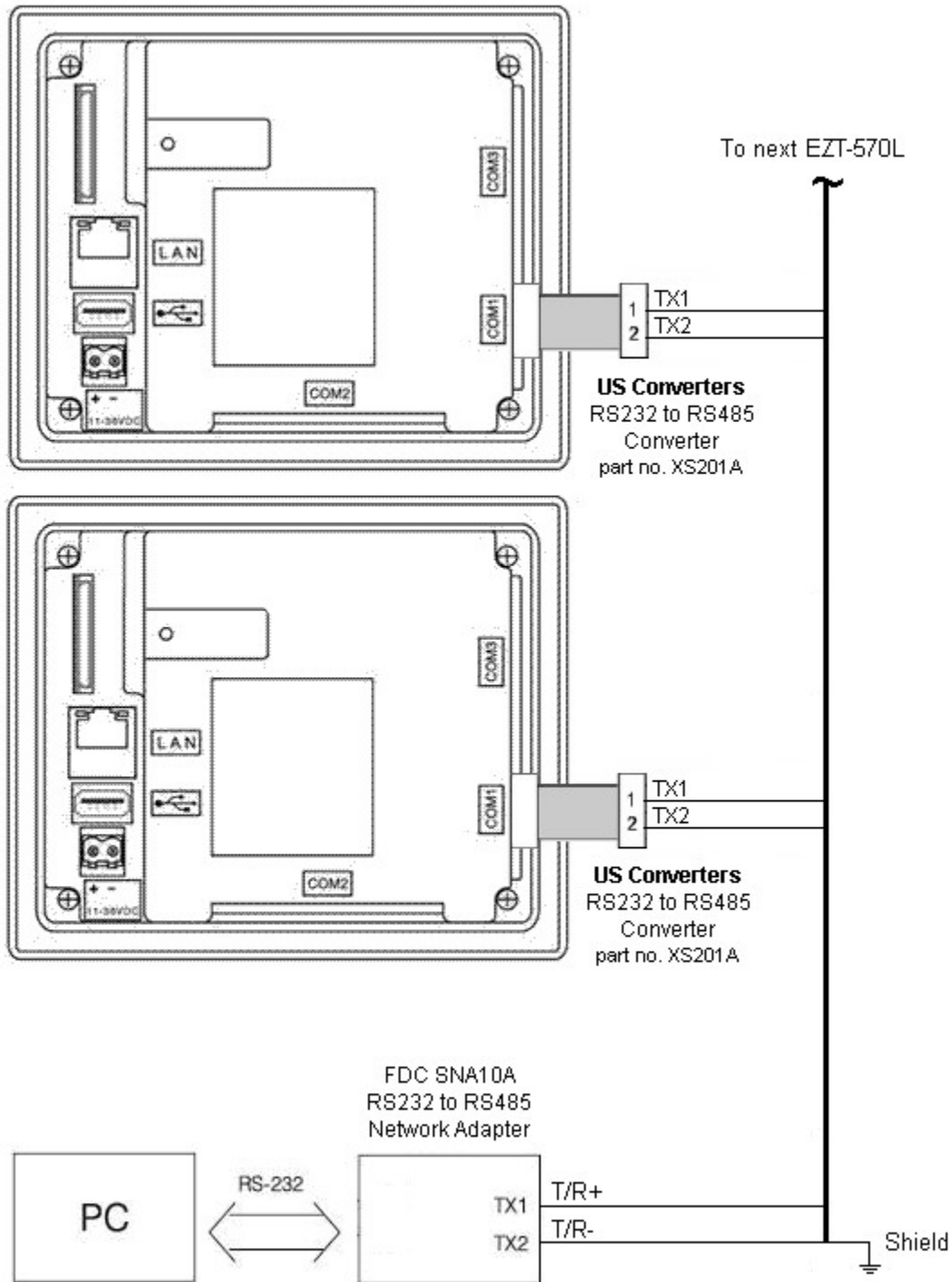
D-sub 9-pin Female Connector Pinouts

Pin	Description
Cover	Shield
2	RXD Receive Data
3	TXD Transmit Data
5	SG Signal Ground



NOTE: DO NOT use a standard null-modem cable to connect the unit to a PC. Most computers do not provide a standard serial port and a USB to serial converter must be used. Incompatibilities may exist between the EZt-570L and certain USB to serial adapters which may cause the unit to malfunction when connected using a standard null-modem cable.

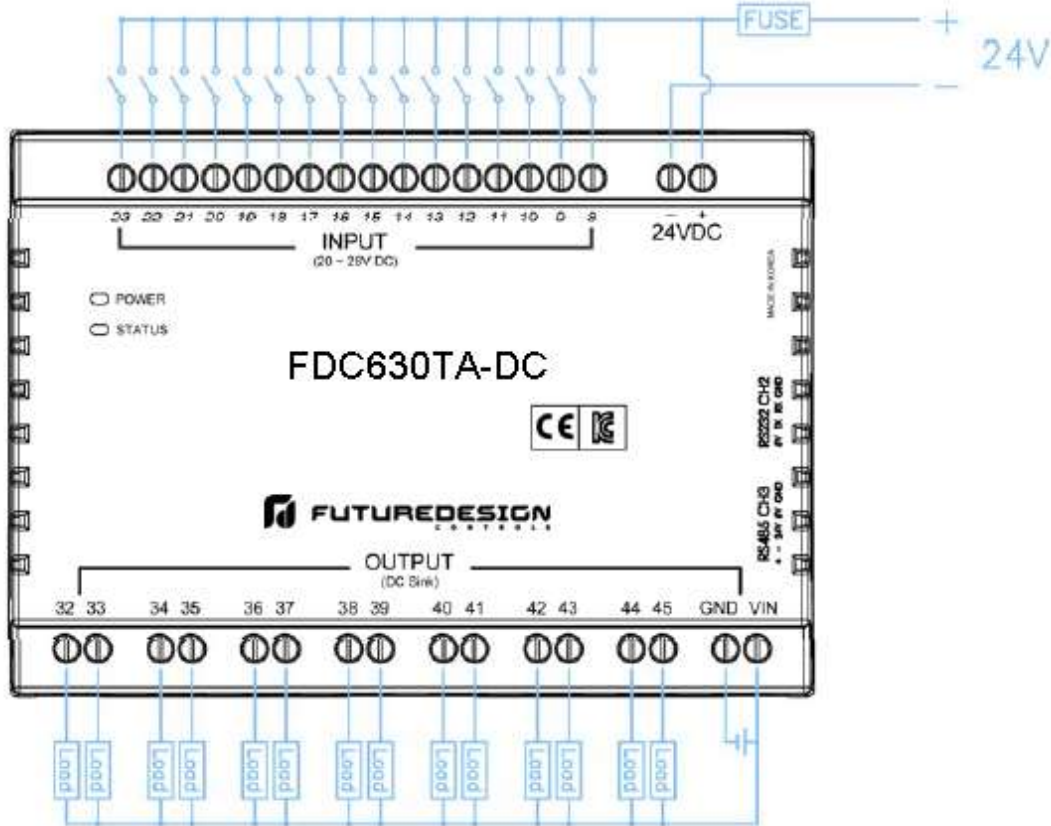
If more than one EZT-570L controller is to be placed on the communication link with a PC, an RS232/485 converter is required for each EZT-570L in order to convert the RS232 communications port to RS485, multi-drop communications for connecting multiple units on the same PC communications link.



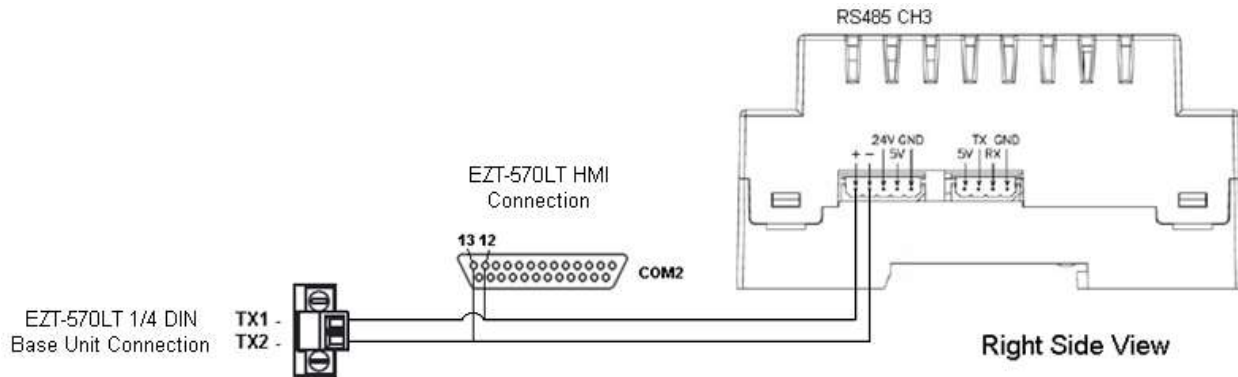
NOTE: The connection requires a single twisted-pair cable that is daisy-chained from one unit to the next. When using shielded twisted-pair cable, be sure to ground only one end of the cable, preferably at the RS232 to RS485 network adapter. Allowing any other portion of the cable shield to come in contact with ground, or grounding both ends, will cause ground loop currents to flow in that section of the cable which can cause communication errors.

3.3 Connecting to the Expansion IO Module

Power and IO connections should be made using minimum 18 AWG copper conductors (maximum wire size = 14 AWG). To make a connection, strip about 1/4" of insulation off the end of the wire, turn the connector screw counterclockwise until the gap is wide open, insert the wire all the way in, and turn the screw clockwise until it's tight.

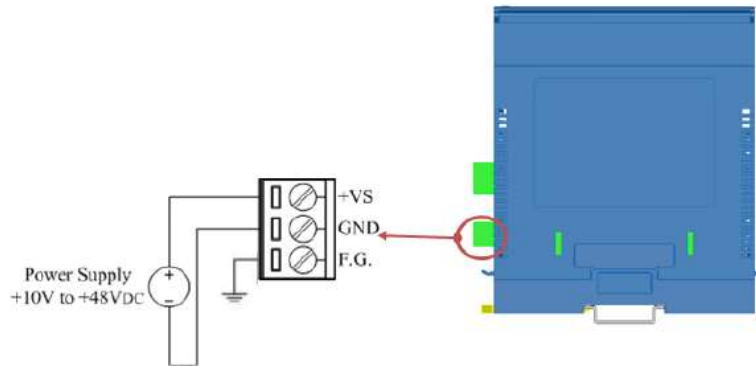


The communication connection to the EZT-570L is made via the 5-pin connector on the right side of the expansion module. Connectors are provided with pig-tail leads (TX1=gray, TX2=orange). Lead length is ~18" and can be extended if necessary. When extending the leads, it is recommended that shielded, twisted-pair cable is used.

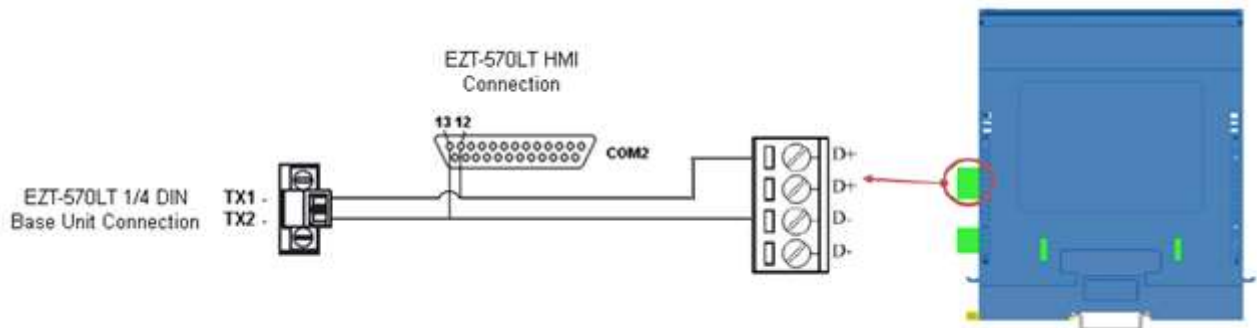


3.4 Connecting to the Smart IO Monitor Module

Power connections should be made using minimum 18 AWG copper conductors (maximum wire size = 14 AWG). To make a connection, strip about 1/4" of insulation off the end of the wire, turn the connector screw counterclockwise until the gap is wide open, insert the wire all the way in, and turn the screw clockwise until it's tight.



The communication connection to the EZT-570L requires a single twisted-pair cable. When using shielded, twisted-pair cable, be sure to ground only one end of the cable, preferably at the module. Allowing any other portion of the cable shield to come in contact with ground, or grounding both ends, will cause ground loop currents to flow in the cable which can cause communication errors.



In order for the EZT-570L to be able to communicate with the monitor module, the communications address must also be properly set. To do this, remove the cover located on the bottom of the module to access the rotary switches. Adjust both rotatory knobs to a value of one. Replace the cover after the settings have been made.

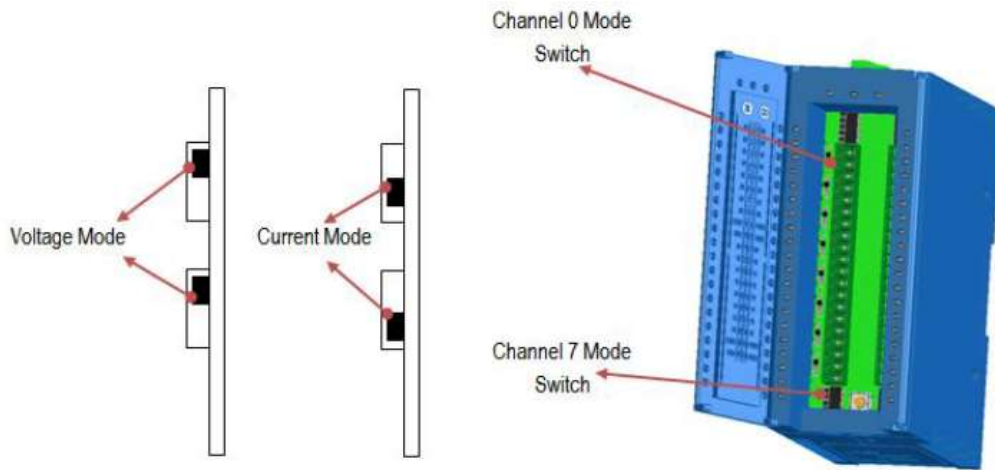


IMPORTANT: See section 4.15 Smart IO Communication Utility to complete the monitor card installation process. This utility must be run in order to set the proper communication parameters in the monitor card prior to use.

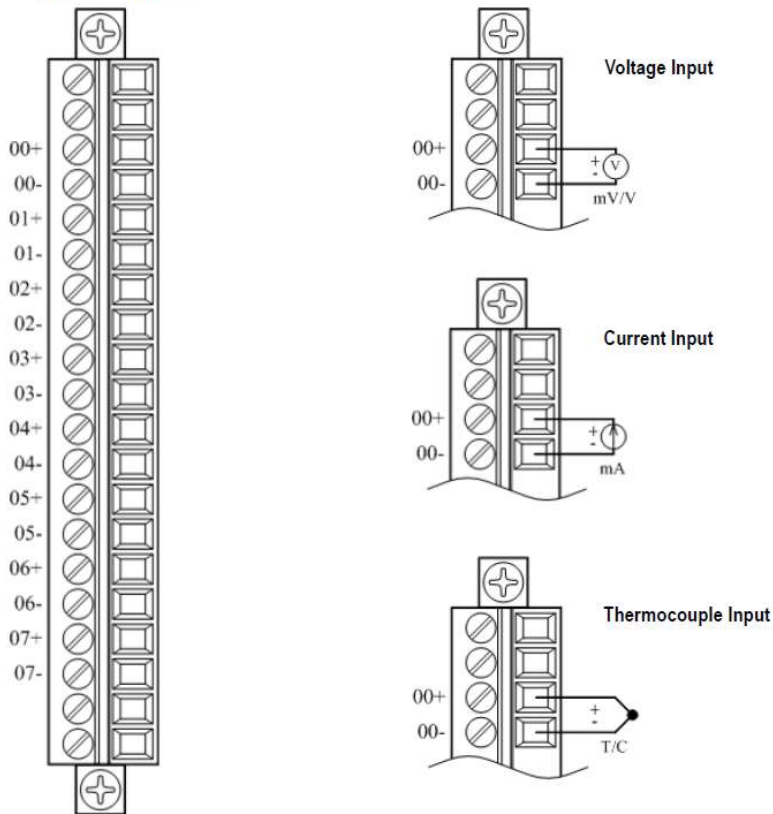
3.4.1 Sensor Wiring

Each input of the Smart series monitor module can be configured for a variety of thermocouples, voltage and current ranges. Thermocouple types include J, K, T, E, R, S, B and N. Voltage ranges include $\pm 100\text{mV}$, $\pm 500\text{mV}$, $\pm 1\text{V}$, $\pm 5\text{V}$, $\pm 10\text{V}$, $0\sim 100\text{mV}$, $0\sim 500\text{mV}$, $0\sim 1\text{V}$, $0\sim 5\text{V}$ and $0\sim 10\text{V}$. Current ranges include $\pm 20\text{mA}$, $4\sim 20\text{mA}$ and $0\sim 20\text{mA}$.

NOTE: When the input is to be used for a current input, the slide switch for the input must be set to current mode. For thermocouple and voltage inputs, the slide switch must be set for voltage mode.



Terminal Assignment



4. Adjusting EZT Configuration Options

The EZT configurator is used to set the functionality of the EZT to match the available options on the chamber. The settings contained in the configurator affect the control of chamber components and systems. Modifications should only be made by or under the supervision of CSZ authorized service personnel.



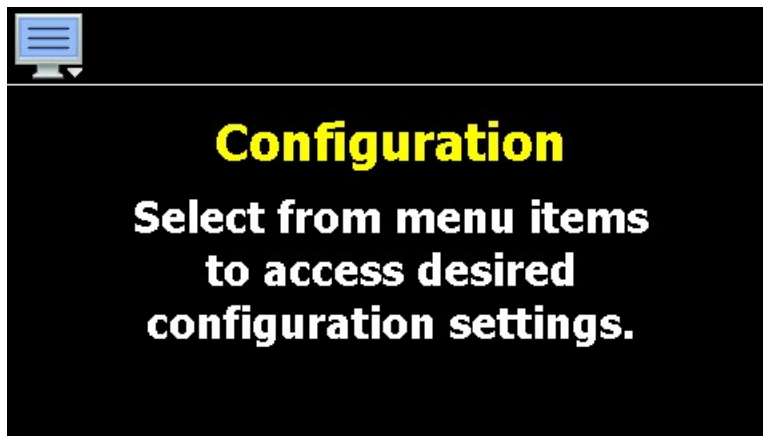
Changing certain configurator settings to values other than those listed on the EZT Configuration sheet provided with the chamber can cause damage to the chamber and present hazards to personnel. Modifications to any configurator settings may only be done with the consent of an authorized CSZ representative. Failure to comply with this WARNING will void the chamber's warranty.

The Configurator program does not run at the same time as the main runtime software. To access the EZT configurator, you must quit the EZT-570L application and start the configurator program. To do this, you must have the proper security access. All chambers leave the factory with a default user name and password. Select "Login" under the security menu and enter the default password information:

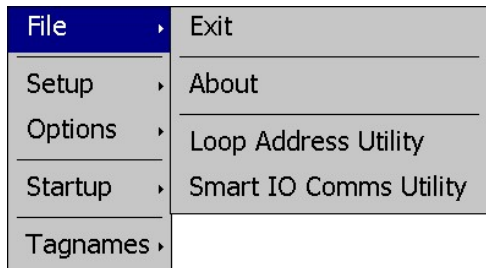
User: FACTORY
Password: CONTROL

Once you are logged in as "Factory", you have the ability to exit the EZT-570L application:

1. From the runtime application, press the "Home" icon to make sure you are on the main view.
2. Press the "Menu" icon (monitor) and select Device and then Settings.
3. From Settings, press the "Menu" icon (monitor) and select Offline and then Offline. Press "Yes" at the prompt to go offline.
4. From Offline, press the "Menu" icon (monitor) and select System and then Exit.
5. On the Exit Application screen, press the "Exit Application (configuration mode startup)" button. Press "Yes" at the prompt to exit the application.
6. Once the runtime application quits and the desktop is shown (black screen with the words "System Startup Please Wait..."), cycle power to the EZT-570L. Once the EZT-570L finishes its boot sequence, the Configurator application will be automatically started.

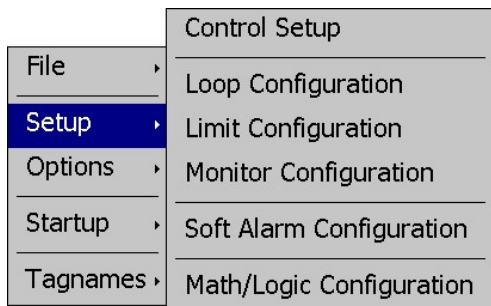


The Configurator menu is accessed by pressing the “Monitor” icon at the top left of the screen.

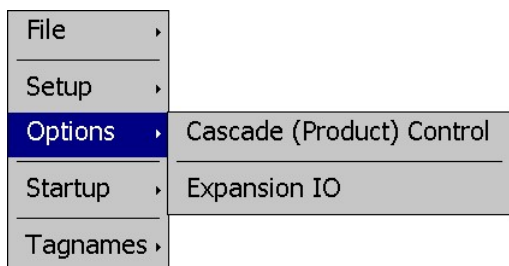


The **File** menu provides selections of “Exit” and “About”. The exit function for the Configurator saves all settings and closes the Configurator application. The about selection displays version information for the Configurator application and configured control devices.

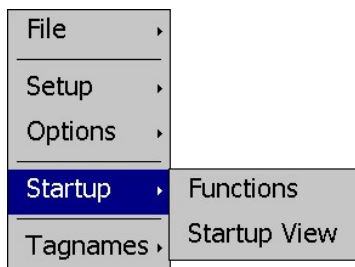
It also includes selections for accessing the Loop Address Utility and Smart IO Comms Utility for use in setting up and connecting to B42 loop controls and the remote monitor module.



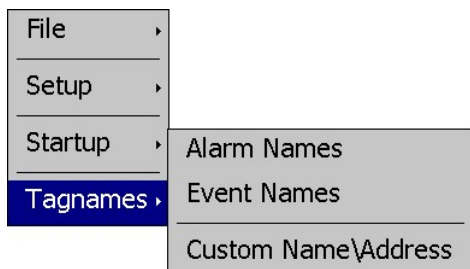
The **Setup** menu provides access to the control setup options. These options include the controller type (single loop, dual loop, cascade, etc.), the process loop and limit settings, soft alarm settings, monitor point settings and math/logic equation entry.



The **Options** menu provides access to Cascade (Product) Control and Expansion IO configuration settings.



The **Startup** menu provides access to enable and disable EZT-570L runtime screens/menus and set the desired startup view selection.



The **Tagnames** menu provides access to the text editing functions of the Configurator which allow the event and alarm names to be changed to match their use in the system. The menu also provides access to edit the splash screen information that is shown when the runtime application starts.

From the Configurator, it is possible to then set up all process loop/limit controls, monitor points (if installed) as well as choose from a long list of standard features to provide in the runtime application. During setup, the output control functions of each device can be changed, so any equipment being controlled by the outputs should be placed in an “off” state, so that any modifications to output functions will not cause an unsafe condition or damage to equipment.

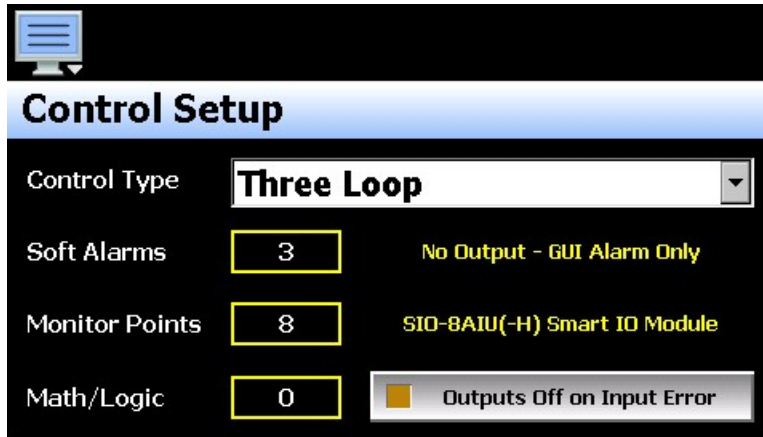
IMPORTANT: *Once all configuration settings are made, you must select “Exit” from the File menu to exit the Configurator prior to cycling power to the EZT-570L. All configuration files are written upon exiting the Configurator. Do not cycle power prior to exiting the Configurator or settings will be lost and the EZT-570L will not operate properly once the runtime application starts.*



Upon exiting the Configurator application and cycling power to the EZT-570L, the runtime application will be automatically started on the next boot sequence.

4.1 Control Setup

The Control Setup screen is accessed from the Setup menu. It provides access to select the control type, and set the number of soft alarms, monitor points and math/logic equations.



The **Control Type** drop down menu is used to define the mode of operation for the EZT-570L. The number of process loop boards and limit control (if required) are set automatically and dependent upon the control type selected. The selections include:

Single Loop When single loop is selected, the EZT-570L will be configured as a single loop controller. A process loop control must be attached and set to a communications address of 1 for proper operation.

Single Loop + Limit When single loop + limit is selected, the EZT-570L will be configured as a single loop controller with limit. A process loop control must be attached and set to a communications address of 1 and a limit control must be attached and set to a communication address of 2 for proper operation.

Dual Loop When dual loop is selected, the EZT-570L will be configured as a dual loop controller. Two process loop controls must be attached and set for communications addresses of 1 and 2 for proper operation.

Dual Loop + Limit When dual loop + limit is selected, the EZT-570L will be configured as a dual loop controller with limit. Two process loop controls must be attached and set for communications addresses of 1 and 2 as well as a limit set for a communications address of 3 for proper operation.

Three Loop

When three loop is selected, the EZT-570L will be configured as a three-loop controller. Three process loop controls must be attached and set for communications addresses of 1, 2 and 3 for proper operation.

The **Soft Alarms** field is used to enter the number of soft alarms that will be provided on the system. A soft alarm is an alarm without a physical control output. It is a software-based alarm that can be used to alert an operator that a process has exceeded desired operating conditions. The EZT-570L is capable of providing up to 11 soft alarms. When at least one soft alarm is entered, the Soft Alarm Configuration menu item is enabled and the mode of operation for the soft alarm(s) can be specified.

NOTE: *The soft alarms are the alarms assigned to the communications interface of the EZT-570L, the alarms associated with each loop and optional monitor input. Thus, the number of soft alarms must match the number of loops and limits, and also must be configured in sequential order in order for the communications interface to operate properly. See section 4.5 Soft Alarm Configuration.*

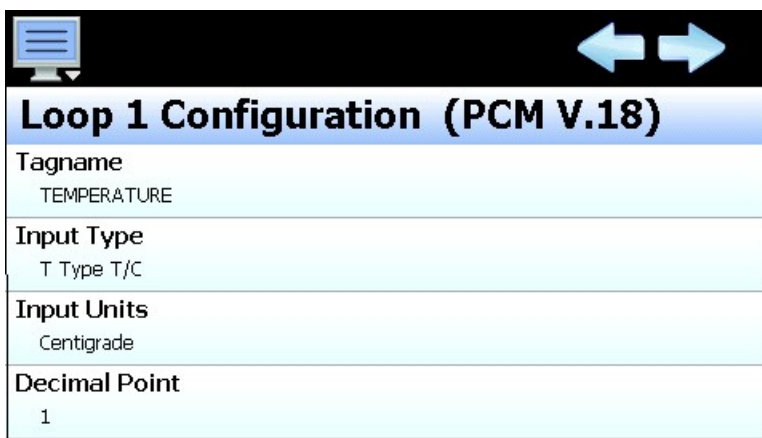
The **Monitor Points** field is used to enter the number of monitor points that will be provided on the system. The EZT-570L is capable of providing up to eight monitor points via the external Smart IO module. When at least one monitor point is entered, the Monitor Configuration menu item is enabled and the input(s) can be defined. See section 4.4 Monitor Configuration.

The **Math/Logic** field is used to enter the number of math/logic equations that are to be used. The EZT-570L is capable of providing up to 20 user configurable equations (10 when the expansion IO module is utilized with EZT Logic mode enabled). When at least one math/logic equation is entered, the Math/Logic Configuration menu item is enabled and the equations can be entered. See section 4.5 math/Logic Configuration.

The **Outputs Off on Input Error** selection button is used to disable logic outputs of all configured logic equations if any input to the system is in a fault condition, i.e. loop, limit or monitor point. The selection is a global selection, meaning it affects all logic equations even if they do not use the specific input that is in an error condition.

4.2 Loop Configuration

The Loop Configuration screen is accessed from the Setup menu. The screen provides access to all loop control board settings. When the selected control type requires more than one loop control, the left/right scroll buttons will be provided at the top right of the screen. These buttons can be used to scroll through all available loop controls in order to view/edit settings for each.



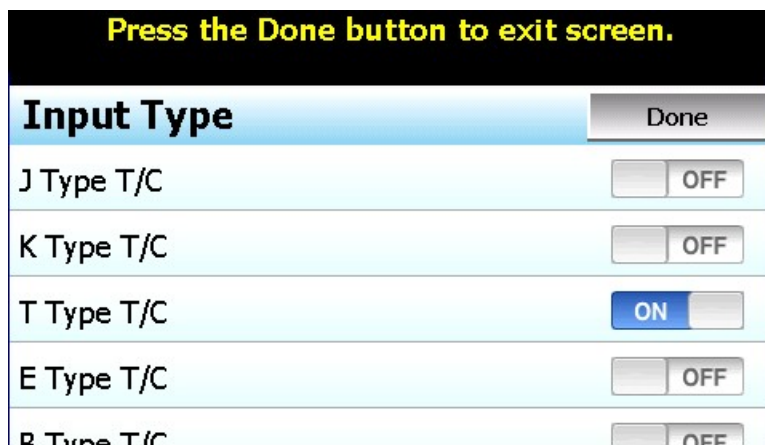
The model and version of the loop control attached will be shown in the scroll list header. To view all of the available settings, simply swipe up or down on the screen to scroll through the list items. To edit a value, tap the row for the desired item. If the entry is a simple numeric value, the number entry pad will be shown. If the item has multiple selections to choose from, a list of individual selections for the item will be shown.

4.2.1 Tagname

The Tagname entry is used to assign a specific name for each control loop, i.e., Temperature, Humidity, etc., up to 11 characters in length. This name will be used throughout the EZT-570L runtime application.

4.2.2 Input Type

The Input Type entry is used to select the type of sensor that will be connected to the loop control. The input type can be a temperature input (thermocouple or RTD) or a linear input type (VDC or mA).



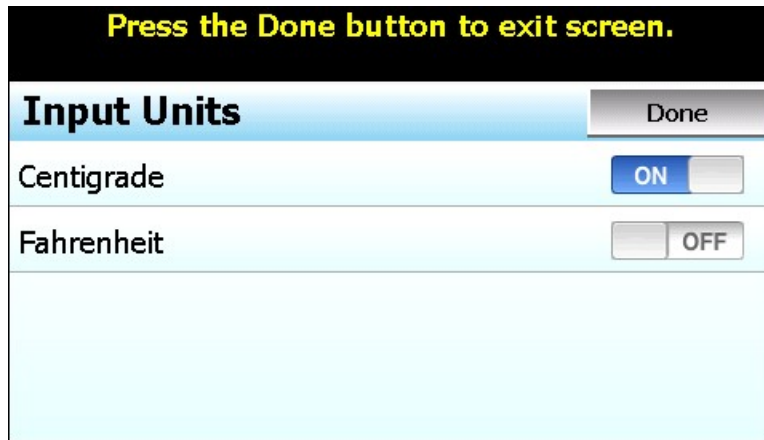
The input type selections are mutually exclusive, i.e., selecting one input will turn all other selections off. Once the desired input type has been selected, press the “Done” button to set the input type for the loop control board and return to the main Loop Configuration screen.

NOTE: *The B42 loop control board is equipped with either a standard input for thermocouples and RTD’s, a voltage input or a milliamp input. The selected input type must be set to match the type of input supplied on the loop control board or the unit will not operate correctly.*

The PCM is equipped with DIP switches on the component side of the board. The DIP switches must be set properly according to the input type selection made. See section 3.1.1.1 Sensor Input for details on sensor wiring and DIP switch settings according to selected sensor type.

4.2.3 Input Units

The Input Units entry is used to select the temperature units for temperature input types (thermocouple or RTD). If the selected input type for the loop is a linear input (VDC or mA), the Input Units entry will display the text entry keypad allowing entry of user defined engineering units up to 4 characters.



The input unit selections for temperature are mutually exclusive, i.e., selecting one will turn off the other. Once the desired temperature units have been selected, press the “Done” button to set the input units for the loop control board and return to the main Loop Configuration screen.

4.2.4 Decimal Point

The Decimal Point entry allows the input precision to be adjusted between zero and one decimal digits for temperature input types, between zero and two for a 0-60mV input and from zero to three for VDC and mA input types.

IMPORTANT: *Once the loop control board has been configured with a specific decimal point, changing the decimal point will require the loop control board to be reconfigured in order to maintain previous control settings. Automatic programs, alarm set points, set point limits, input low/high scale, etc., DO NOT automatically scale. An entry of 100.0 becomes 1000 when changing the decimal point to zero (not 100) and must be re-entered to set the proper value.*



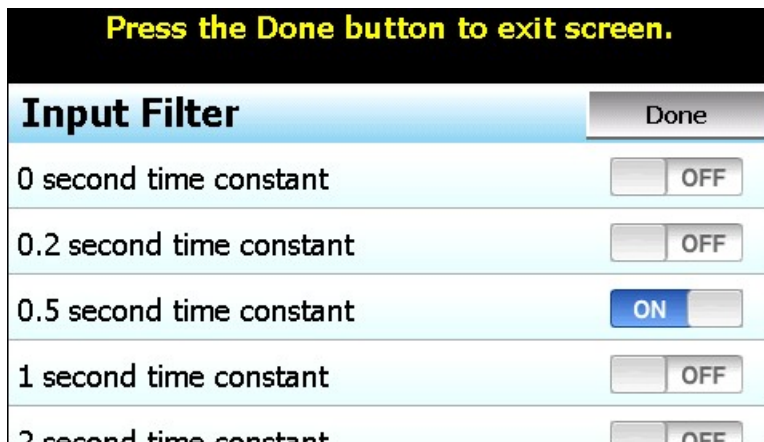
4.2.5 Input Low/High Scale

The Input Low Scale and Input High Scale entries are used to set the input range for linear input types (VDC or mA). The entries are not available for temperature input types since they utilize a fixed range based on the sensor type. The input low scale value can be set from -32768 up to the high scale value minus 50. The high scale value can be set from the low scale value plus 50 up to 32767.

NOTE: *The minimum and maximum scale values are limited by the decimal point selection. For a decimal of 0, the values are -32768 and 32767 respectively. For one decimal point, the values are -3276.8 and 3276.7. For two decimal digits, the values are -327.68 and 327.67 and for three decimal digits the values are -32.768 and 32.767.*

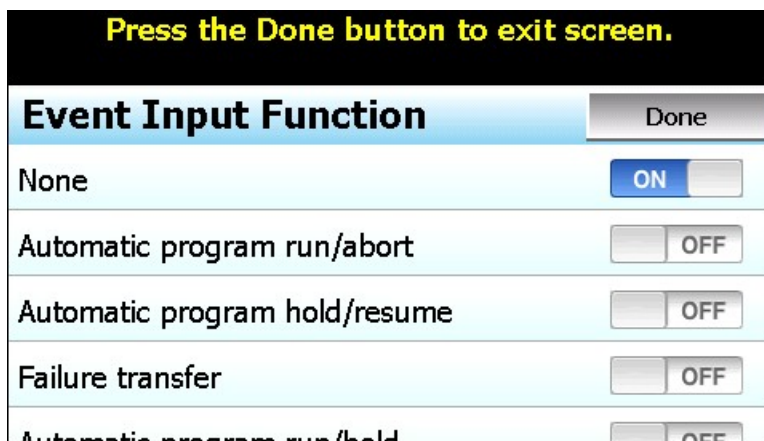
4.2.6 Input Filter

The Input Filter entry is used to select the time constant used for filtering the process input. The time constant selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired filter constant has been selected, press the “Done” button to set the input filter for the loop control board and return to the main Loop Configuration screen.



4.2.7 Event Input Function

The Event Input Function is used to select the desired mode of operation for the digital input of the loop control board. The event input selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the event input function for the loop control board and return to the main Loop Configuration screen.



The **Automatic program run/abort** function will start the currently loaded program from step 1 if not already running, upon activation of the input (an off to on transition). Deactivating the input (an on to off transition) will stop the program if it is currently running.

The **Automatic program hold/resume** function will place a currently running program into hold when the event input is activated (an off to on transition). The program will resume operation and return to the run mode when the input is deactivated (an on to off transition).

The **Failure transfer** function puts the loop control outputs into failure transfer mode when the input is activated. The output will then go to the percent output value set for failure transfer. The loop control outputs will return to normal PID control when the input is deactivated.

NOTE: *If an automatic ramp/soak program is in operation and the loop is under program control, placing it in failure transfer via the event input will cause the program to be placed into hold. When the event input is then turned off and failure transfer is disabled, the program will have to be manually resumed by either a separate event input or by selecting “Run” from the Program Operation window.*

The **Automatic program run/hold** function will start the currently loaded program from step 1 if not already running, upon first activation of the input (an off to on transition). Deactivating the input (an on to off transition) will then cause the program to go into hold. The input must then be reactivated in order for the program to resume operation.

The **Loop status input** function provides a visual indication on the Loop View screen in the runtime application. When the input is activated, the border around the loop is highlighted blue. When the input is deactivated, the border around the loop returns to the default dark gray color. This can be used as a means for alerting the user of an operating condition, such as the equipment the loop is controlling is in operation.

The **Alarm input** function allows the event input to be used for alarm indication. When the input is activated, the Event Input Alarm Message/Annotation (see following section 4.2.8) is displayed on the alarm screen in the runtime application and the audible alarm sounds.

The **Data logging annotation** functions allows the event input to be used to write an annotation (operator event) to the running data log file. When the input is activated, the Event Input Alarm Message/Annotation (see following section 4.2.8) is written to the data file.

The **Math/logic input only** function allows the event input to be used as an input for math/logic equations only. See section 4.6 Math/Logic Configuration.

NOTE: *In order for the alarm and annotation input functions to operate properly, the input must be activated for at least five seconds. If the input is not activated for the minimum time period, the input status may not be captured and the alarm or annotation will not be posted. In order for the input to reset and capture the next input status, the input must also remain off for at least five seconds.*

4.2.8 Event Input Alarm Message/Annotation

When the event input function is set to alarm input or data logging annotation, the Event Input Alarm Message/Annotation entry allows a fixed message to be entered that will then be shown on the alarm screen in the runtime application for alarm operation, or the operator event that will be written to the data log file for annotation operation. The message can be up to 25 characters long.

4.2.9 Low/High Limit Setpoint

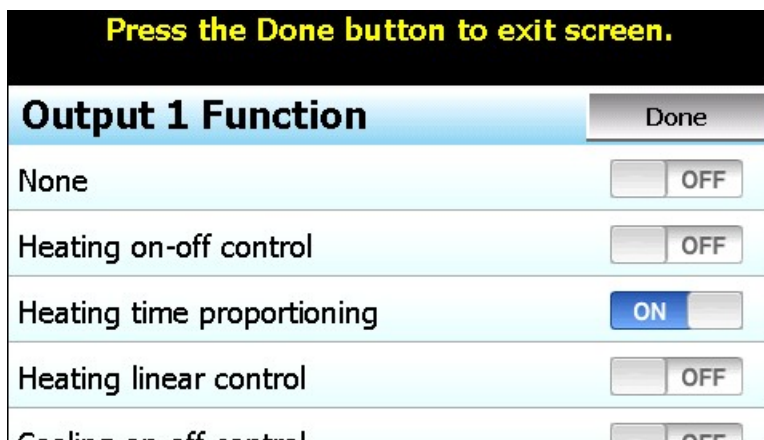
The low and high limit set points are used to set the minimum and maximum allowed set points that can be entered for the loop control. These are set by CSZ to limit the control range to within the safe operating range of the chamber.

NOTE: *The runtime application provides additional user low and high set point limits that can be adjusted to further limit the allowable set point range within the band defined by the CSZ low and high limit set points.*

4.2.10 Output 1 Function

The Output 1 Function is used to set the mode of operation for the primary control output of the loop control board. The output can be set for heating or cooling on/off control, time proportioning or linear control. The output selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the "Done" button to set the output function for the loop control board and return to the main Loop Configuration screen.

NOTE: *The output function must be set to match the type of output ordered on the loop control board. Relay, triac and SSRD output types are used for on/off and time proportioning control. The isolated VDC and mA output types are used for linear control.*



The **Heating on-off control** function will turn on the output when the process value is below set point. When the process value rises above the set point plus the on-off control hysteresis, the output will turn off.

The **Heating time proportioning** function uses the PID settings to cycle the output on and off according to the percentage of heating required using the cycle time configured for output 1. For example, if the percentage of output is 50% and the cycle time is 18 seconds, the output will repeat on/off cycles of 9 seconds each. If the output was only 25%, the output would be on for 4.5 seconds and off for 13.5 seconds of the 18 second cycle time.

The **Heating linear control** function uses the PID settings to vary the VDC or mA output from the minimum to the maximum range of the output as a direct percentage of the heating output.

The **Cooling on-off control** function will turn on the output when the process value is above set point. When the process value falls below the set point minus the on-off control hysteresis, the output will turn off.

The **Cooling time proportioning** function uses the PID settings to cycle the output on and off according to the percentage of cooling required using the cycle time configured for output 1. For example, if the percentage of output is 50% and the cycle time is 6 seconds, the output will repeat on/off cycles of 3 seconds each. If the output was only 25%, the output would be on for 0.75 seconds and off for 5.25 seconds of the 6 second cycle time.

The **Cooling linear control** function uses the PID settings to vary the VDC or mA output from the minimum to the maximum range of the output as a direct percentage of the cooling output.

NOTE: *Linear heating and cooling outputs are either 0-20mA or 0-10VDC. If a non-zero based or less than the maximum value output is required i.e., 4-20mA or 1-5VDC, the output low/high limit values must be set accordingly; refer to section 4.2.14 Output 1 Low/High Limit Values.*

4.2.11 Output 1 Failure Transfer

The output 1 failure transfer setting is used to set the value the output should go to if there is an input failure, i.e., sensor break. The output can be set for bumpless (-1) operation or a fixed percentage of output (from 0 to 100%) if proportioning or linear control is selected for the output function. When failure transfer is set to bumpless, the output will remain at its previous percentage of output until the input condition is corrected. Note that this should not be used for extended periods of time as a runaway condition could occur if separate limit devices are not installed to ensure safe limits of operation by turning off the system should a limit be exceeded.

If the output function is set for on-off control, the failure transfer can be set to have the output turn on (1) or turn off (0) when a sensor break occurs.

4.2.12 Output 1 ON-OFF Control Hysteresis

The output 1 on-off control hysteresis can be set when the output 1 function is set for heating or cooling on-off control. It is used to eliminate rapid cycling of the control output by applying a safe-sided dead band to the control output. When the control set point is exceeded, the output will turn on. The output will not turn off until the process rises above (for heating) or falls below (for cooling) the set point by the hysteresis value.

The hysteresis can be set from a minimum of 0.1 to a maximum of 50.0 for units of degrees Centigrade and to a maximum of 90.0 for units of degrees Fahrenheit and when a linear input type is used.

4.2.13 Output 1 Cycle Time

The output 1 cycle time can be set when the output 1 function is set for heating or cooling time proportioning control. The cycle time can be adjusted from 0.1 to 90.0 seconds.

4.2.14 Output 1 Low/High Limit Values

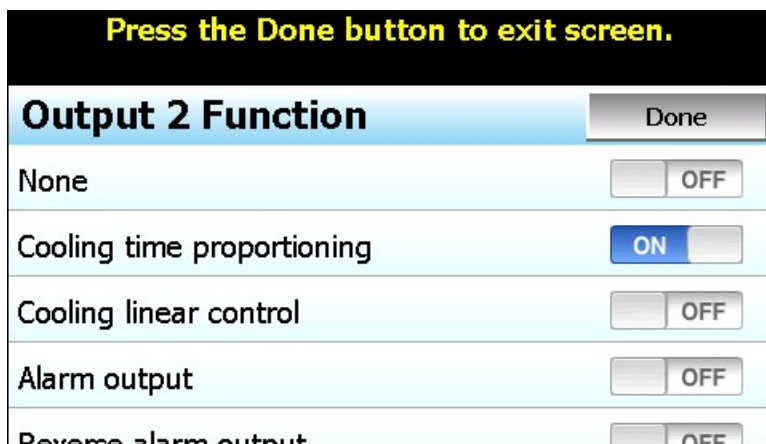
The output low and high limit values can be set when the output 1 function is set for heating or cooling time proportioning or linear control. They are used to set the minimum and maximum percentage of the output range for the installed output type.

For example, the standard range of the mA output is 0-20mA. In order to use the output as a 4-20mA output, the low limit value would need to be set to 20% (20% of 20ma = 4ma). For the voltage output, the default range is 0-10VDC. In order to achieve a 1-5VDC output, the low limit would have to be set to 10% (10% of 10VDC is 1VDC). The high limit would then have to be set to 50% in order cut the output span in half to get a maximum output of 5VDC.

4.2.15 Output 2 Function

The Output 2 Function is used to set the mode of operation for the secondary control output of the loop control board.

NOTE: *The output function must be set to match the type of output ordered on the loop control board. Relay, triac and SSRD output types are used for proportioning control, alarm or event outputs. The isolated VDC and mA output types are used for linear control.*



The output can be set for cooling time proportioning or linear control, an alarm or an event. The output selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the output function for the loop control board and return to the main Loop Configuration screen.

The **Cooling time proportioning** function uses the PID settings to cycle the output on and off according to the percentage of cooling required using the cycle time configured for output 1. For example, if the percentage of output is 50% and the cycle time is 6 seconds, the output will repeat on/off cycles of 3 seconds each. If the output was only 25%, the output would be on for 0.75 seconds and off for 5.25 seconds of the 6 second cycle time.

The **Cooling linear control** function uses the PID settings to vary the VDC or mA output from the minimum to the maximum range of the output as a direct percentage of the cooling output.

NOTE: *The linear cooling output is either 0-20mA or 0-10VDC. If a non-zero based or less than the maximum value output is required i.e., 4-20mA or 1-5VDC, the output low/high limit values must be set accordingly; refer to section 4.2.18 Output 2 Low/High Limit Values.*

The **Alarm output** function activates the Alarm 1 configuration settings for assigning the type of alarm logic to apply to output 2. When the alarm condition is active, the output will turn on.

The **Reverse alarm output** function activates the Alarm 1 configuration settings for assigning the type of alarm logic to apply to output 2. The output will be normally “on” when this function is selected. When the alarm condition is active, the output will turn off.

The **Event output** function allows the output to be turned on and off via an automatic program or manually through the EZT-570L runtime application to act as a “soft” switch to turn system components on and off.

The **DC power supply output** function must be selected when the output type ordered for the loop control board output 2 is a transmitter power supply.

The **Manual event output only** function is similar to the Event output function above as it allows the output to be turned on manually through the EZT-570L runtime application to act as a “soft” switch to turn system components on and off. However, the output cannot be controlled via an automatic program which allows the output to be controlled separately regardless of program operation.

The **Math/Logic event output only** function allows the output to be controlled only by a logic equation (see section 4.6 Math/Logic Configuration). The output will not be accessible through the runtime application as a “soft” switch like the event/manual event only selections.

4.2.16 Output 2 Failure Transfer

The output 2 failure transfer setting is used to set the value the output should go to if there is an input failure, i.e., sensor break. The output can be set for bumpless (-1) operation or a fixed percentage of output (from 0 to 100%) if proportioning or linear control is selected for the output function. When failure transfer is set to bumpless, the output will remain at its previous percentage of output until the input condition is corrected. Note that this should not be used for extended periods of time as a runaway condition could occur if separate limit devices are not installed to ensure safe limits of operation by turning off the system should a limit be exceeded.

If the output function is set for on-off control, the failure transfer can be set to have the output turn on (1) or turn off (0) when a sensor break occurs.

4.2.17 Output 2 Cycle Time

The output 2 cycle time can be set when the output 2 function is set for heating or cooling time proportioning control. The cycle time can be adjusted from 0.1 to 90.0 seconds.

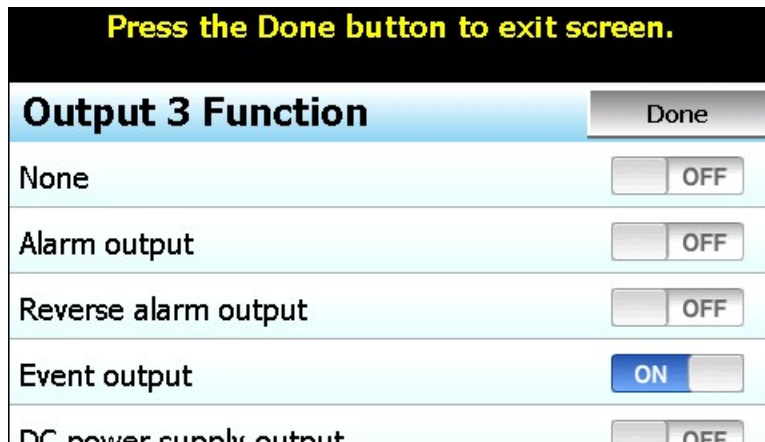
4.2.18 Output 2 Low/High Limit Values

The output low and high limit values can be set when the output 2 function is set for cooling time proportioning or linear control. They are used to set the minimum and maximum percentage of the output range for the installed output type.

For example, the standard range of the mA output is 0-20mA. In order to use the output as a 4-20mA output, the low limit value would need to be set to 20% (20% of 20ma = 4ma). For the voltage output, the default range is 0-10VDC. In order to achieve a 1-5VDC output, the low limit would have to be set to 10% (10% of 10VDC is 1VDC). The high limit would then have to be set to 50% in order cut the output span in half to get a maximum output of 5VDC.

4.2.19 Output 3 Function

The Output 3 Function selection is used to configure the loop control board output as an alarm or an event. The output selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the output function and return to the main Loop Configuration screen.



The **Alarm output** function activates the Alarm 2 configuration settings for assigning the type of alarm logic to apply to output 3. When the alarm condition is active, the output will turn on.

The **Reverse alarm output** function activates the Alarm 2 configuration settings for assigning the type of alarm logic to apply to output 3. The output will be normally “on” when this function is selected. When the alarm condition is active, the output will turn off.

The **Event output** function allows the output to be turned on and off via an automatic program or manually through the EZT-570L runtime application to act as a “soft” switch to turn system components on and off.

The **DC power supply output** function must be selected when the output type ordered for the loop control board output 3 is a transmitter power supply.

The **Manual event output only** function is similar to the Event output function above as it allows the output to be turned on manually through the EZT-570L runtime application to act as a “soft” switch to turn system components on and off. However, the output cannot be controlled via an automatic program which allows the output to be controlled separately regardless of program operation.

The **Math/Logic event output only** function allows the output to be controlled only by a logic equation (see section 4.6 Math/Logic Configuration). The output will not be accessible through the runtime application as a “soft” switch like the event/manual event only selections.

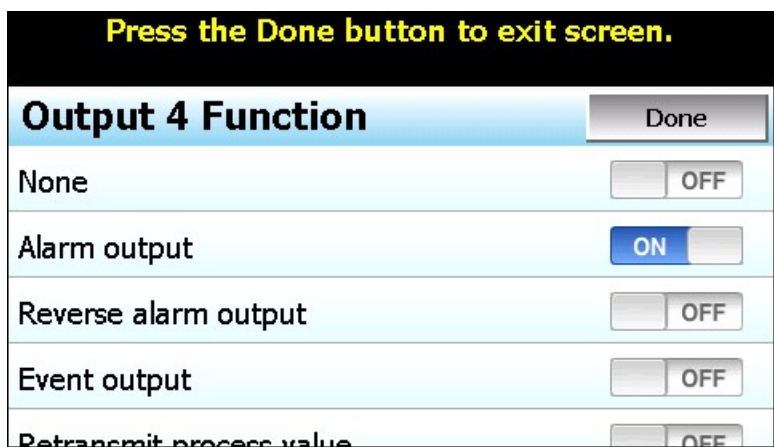
4.2.20 Output 3 Failure Transfer

The output 3 failure transfer setting is used to set whether the output should be on (1) or off (0) when there is an input failure, i.e., sensor break. The setting applies to alarm output functions only.

4.2.21 Output 4 Function

The Output 4 Function selection is used to configure the loop control board output as an alarm, event or retransmit output. The output selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the output function and return to the main Loop Configuration screen.

NOTE: *The output function must be set to match the type of output ordered on the loop control board. Relay, triac and SSRD output types are used for alarm or event outputs. The retransmission VDC and mA output types are used for process value or set point retransmit.*



The **Alarm output** function activates the Alarm 3 configuration settings for assigning the type of alarm logic to apply to output 4. When the alarm condition is active, the output will turn on.

The **Reverse alarm output** function activates the Alarm 3 configuration settings for assigning the type of alarm logic to apply to output 4. The output will be normally “on” when this function is selected. When the alarm condition is active, the output will turn off.

The **Event output** function allows the output to be turned on and off via an automatic program or manually through the EZT-570L runtime application to act as a “soft” switch to turn system components on and off.

The **Retransmit process value** and **Retransmit setpoint value** functions allow the loop control board output to retransmit the current input value or control set point to remote devices such as a chart recorder.

The **DC power supply output** function must be selected when the output type ordered for the loop control board output 4 is a transmitter power supply.

The **Manual event output only** function is similar to the Event output function above as it allows the output to be turned on manually through the EZT-570L runtime application to act as a “soft” switch to turn system components on and off. However, the output cannot be controlled via an automatic program which allows the output to be controlled separately regardless of program operation.

The **Math/Logic event output only** function allows the output to be controlled only by a logic equation (see section 4.6 math/Logic Configuration). The output will not be accessible through the runtime application as a “soft” switch like the event/manual event only selections.

4.2.22 Output 4 Failure Transfer

The output 4 failure transfer setting is used to set whether the output should be on (1) or off (0) when there is an input failure, i.e., sensor break. The setting applies to alarm output functions only.

4.2.23 Output 4 Low/High Limit Values

The output low and high limit values can be set when the output 4 function is set for retransmit process or setpoint value. They are used to set the minimum and maximum percentage of the output range for the installed output type.

For example, the standard range of the mA output is 0-20mA. In order to use the output as a 4-20mA output, the low limit value would need to be set to 20% (20% of 20ma = 4ma). For the voltage output, the default range is 0-10VDC. In order to achieve a 1-5VDC output, the low limit would have to be set to 10% (10% of 10VDC is 1VDC). The high limit would then have to be set to 50% in order cut the output span in half to get a maximum output of 5VDC.

4.2.24 Output 4 Retransmit Low/High Scale

The output retransmit low and high scale can be set when the output 4 function is set for retransmit process or setpoint value. They are used to set the retransmit range of the output. The low scale value corresponds to the output low limit value and the high scale value corresponds with the output high limit value.

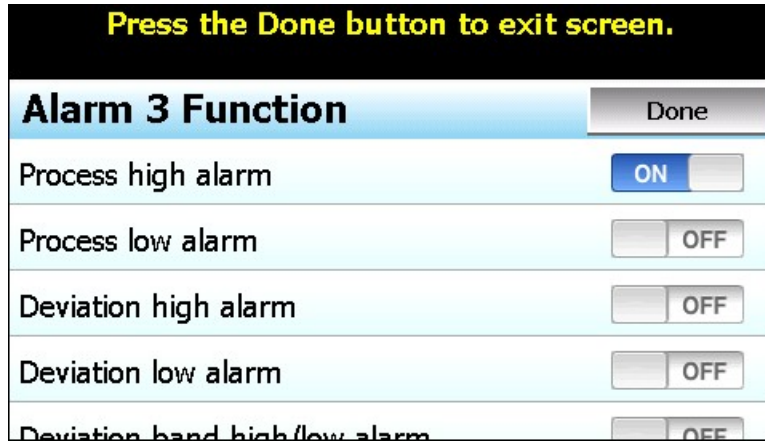
For example, if the output function is set for “Retransmit process value”, setting the low scale to -100 and the high scale to 100, would produce a linear output between the output low limit and output high limit as the process value varies between -100 and 100. If the output low and high limit values scaled the output to a 4-20mA signal, as the process value varied between -100 and 100, the output would vary linearly between 4ma and 20mA.

4.2.25 Alarm (1-3) Function

The Alarm 1, 2 and 3 Functions are used to select the alarm type for outputs 2, 3 and 4 respectively if the output function is configured as alarm or reverse alarm. The alarm selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired alarm type has been selected, press the “Done” button to set the alarm function for the loop control board output and return to the main Loop Configuration screen.

NOTE: *These alarms are referred to as “hard alarms” as they provide direct outputs. These alarms are not accessible over the communications interface of the EZT-570L, i.e., they alarm status and set points cannot be viewed or altered. To provide alarms for the loop input, utilize the soft alarms (see section 4.5 Soft Alarm Configuration).*

For the following alarm descriptions, PV = process value, SV = the control set point value, ASP is the alarm set point and AHY is the alarm hysteresis.



A **Process high alarm** is independent of set point. When the process value is higher than the alarm set point ($PV > ASP$), a process high alarm occurs. When the process value is lower than the alarm set point minus the alarm hysteresis ($PV < ASP - AHY$), the alarm is off.

A **Process low alarm** is independent of set point. When the process value is lower than the alarm set point ($PV < ASP$), a process low alarm occurs. When the process value is above the alarm set point plus the alarm hysteresis ($PV > ASP + AHY$), the alarm is off.

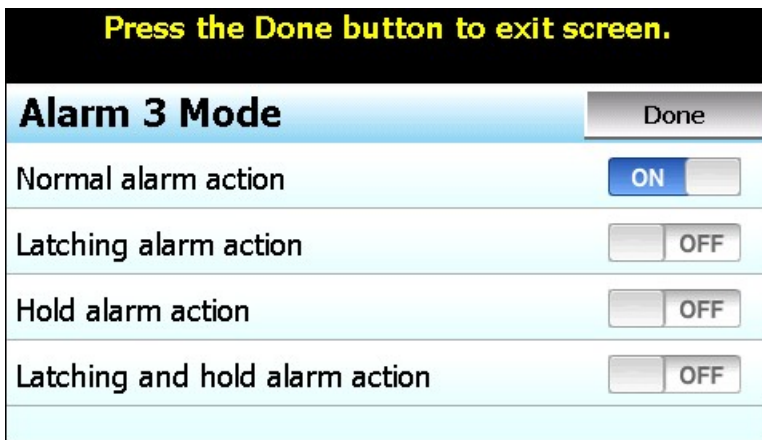
A **Deviation high alarm** is dependent upon the control set point and alerts the operator when the process value deviates too high over the set point value. For deviation high alarms, the alarm set point is entered as a positive value. When the process is higher than the control set point plus the alarm set point ($PV > SV + ASP$), a deviation high alarm occurs. When the process value falls below the control set point plus alarm set point minus the alarm hysteresis ($PV < SV + ASP - AHY$), the alarm is off.

A **Deviation low alarm** is dependent upon the control set point and alerts the operator when the process deviates too far below the set point value. For deviation low alarms, the alarm set point is entered as a negative value. When the process is lower than the control set point plus the alarm set point ($PV < SV + ASP$), a deviation low alarm occurs. When the process value rises above the control set point plus alarm set point plus the alarm hysteresis ($PV < SV + ASP + AHY$), the alarm is off.

A **Deviation band high/low alarm** sets two trigger levels relative to the control set point value. For deviation band alarms, the alarm set point is entered as a positive value. The two alarm trigger levels are then defined as $SV + ASP$ and $SV - ASP$ for the high and low alarm values. When the process value is greater than the high alarm value ($PV > SV + ASP$) or less than the low alarm value ($PV < SV - ASP$), a deviation band alarm occurs. When the process value is within the high and low trigger levels by the value of the alarm hysteresis ($PV < SV + ASP - AHY$ and $PV > SV - ASP + AHY$), the deviation band alarm is off.

4.2.26 Alarm (1-3) Mode

The Alarm 1, 2 and 3 Modes are used to select the mode of operation for outputs 2, 3 and 4 respectively if the output function is configured as an alarm or reverse alarm. The mode selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired alarm mode has been selected, press the "Done" button to set the alarm operation for the loop control board output and return to the main Loop Configuration screen.



Normal alarm action has the alarm output off in the non-alarm condition and on in the alarm condition. The output state is inverted for a reverse alarm output.

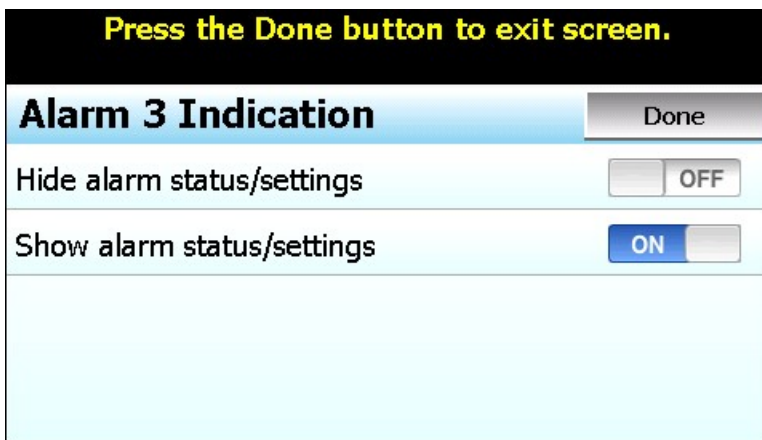
Latching alarm action will keep the alarm output on even if the alarm condition has cleared until the alarm is reset by the user. The output state is inverted for a reverse alarm output.

Hold alarm action prevents the alarm from activating on power up even when an alarm condition is present. The alarm will be blocked until the alarm condition clears. Once cleared, the alarm will then operate normally and activate when an alarm condition occurs.

The **Latching and hold alarm action** combines both the latching and hold alarm actions listed above.

4.2.27 Alarm (1-3) Indication

The Alarm 1, 2 and 3 Indication settings are used to select whether the alarm will be shown in the EZT-570L runtime application or be hidden from the user. This allows the OEM to configure an alarm to perform a specific control function while preventing the user from adjusting the set point or seeing the activation state of the alarm.



When the alarm indication is set for **Hide alarm status/settings**, the alarm will be removed from the EZT-570L runtime application. The user will not be able to edit the alarm message or adjust the alarm set point. When the alarm activates, there will be no indication or message on the alarm screen and the audible alarm will not sound. The alarm operates as a “silent” alarm with no indication to the user.

When the alarm indication is set for **Show alarm status/settings**, the user will be able to access and change the alarm set point and alarm message under the device settings. When the alarm occurs, the alarm message will be displayed on the Alarm screen and the audible alarm will sound.

The indication selections are mutually exclusive, i.e., selecting one will turn off the other. Once the desired alarm indication has been selected, press the “Done” button to set the alarm operation and return to the main Loop Configuration screen.

NOTE: *If the alarm is hidden but its mode is set for latching, the user will not have any indication that the alarm requires manual reset. When an alarm is hidden, it is recommended that the normal or hold mode be used so that the alarm output automatically resets when the alarm condition is no longer present.*

4.2.28 Alarm (1-3) Setpoint

The alarm set points can be set when the alarm function is set for a process or deviation type of alarm. If the alarm indication is set to “show” the alarm status and settings, the set point will also be available in the EZT-570L runtime application. If the alarm indication is set for “hide” alarm status and settings, the alarm set point will not be available in the EZT-570L runtime application and can only be changed in the Configurator.

4.2.29 Alarm (1-3) Hysteresis

The alarm hysteresis can be set when the alarm function is set for a process or deviation type of alarm. It is used to eliminate rapid on/off cycling of the alarm output by applying a safe-sided dead band to the alarm. When the alarm set point is exceeded, the alarm will activate. The alarm will not deactivate until the process rises above (for low alarm) or falls below (for high alarm) the alarm set point by the hysteresis value.

The hysteresis can be set from a minimum of 0.1 to a maximum of 50.0 for units of degrees Centigrade and to a maximum of 90.0 for units of degrees Fahrenheit and linear input types.

4.2.30 Alarm (1-3) Delay

The alarm delay is used to delay the activation of the alarm for a specified period of time. The delay is entered in minutes and seconds and can be set with a minimum of zero (00.00) to a maximum of 99 minutes and 59 seconds (99.59).

For non-latching alarms (normal or hold mode), the programmed time delay is activated (timing begins) when the alarm setpoint is exceeded. The alarm delay will stop timing (and reset) if the $PV = (Alarm\ SP - HY)$ (hysteresis). If the time delay times out and alarm setpoint is still exceeded, the output associated with the alarm will actuate.

For latching alarms (latching or latching and hold mode), the programmed time delay is activated (timing begins) when the alarm setpoint is exceeded. When time delay starts the internal alarm circuit is latched (not output but internal time circuit). After the delay expires, the output associated with the alarm will actuate. The alarm delay does not stop timing when $PV = (Alarm\ SP - HY)$. This means programming an alarm delay when using the latching type of alarm acts as a “delay on” contact since the latching circuit is set immediately when the alarm setpoint is exceeded, but the output is not actuated until the delay times out.

4.2.31 Loop Mode

The Loop Mode selection is used to set the behavior of the loop and how the operator can interact with it.

IMPORTANT: Loops that are to be used under program control (Program Ramp/Soak mode) must be set in order, i.e., 1...2...3. If a loop is set to Monitor Only or Static Only, all following loops must also be set to either Monitor Only or Static Only.

Press the Done button to exit screen.

Loop Mode	Done
Program Ramp/Soak	<input checked="" type="checkbox"/> ON <input type="checkbox"/>
Monitor Only	<input type="checkbox"/> OFF <input type="checkbox"/>
Static Only	<input type="checkbox"/> OFF <input type="checkbox"/>

The **Program Ramp/Soak** mode is the default selection. It allows the loop to be controlled by an automatic ramp/soak program as well as by the operator in the static (single set point) mode when a program is not running.

The **Monitor Only** selection turn the loop into a monitor point in which the loop set point and percentage of output in the EZT-570L runtime are hidden so only the process value is shown. This provides an easy method for adding another input to the system for monitoring the value of a process, while also providing additional outputs that could be used as events, sensor power supply, etc. The loop will not appear under the time/set point entry list when entering a ramp/soak program; however, any outputs of the loop programmed as events will be able to be selected in the program and/or controlled manually by the operator.

The **Static Only** selection turns the loop into a single set point control only. It will appear as a standard control loop; however, it will not appear under the time/set point entry list when entering a ramp/soak program; however, any outputs of the loop programmed as events will be able to be selected in the program and/or controlled manually by the operator.

4.3 Limit Configuration

The Limit Configuration screen is accessed from the Setup menu. The screen provides access to all limit control settings.

Limit Configuration (L41 V.12)	
Tagname	LIMIT
Input Type	T Type T/C
Input Units	Centigrade
Decimal Point	1

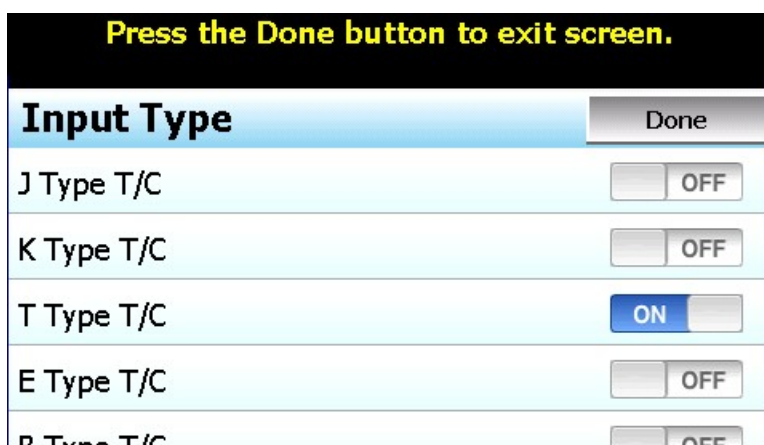
The model and version of the limit control attached will be shown in the scroll list header. To view all of the available settings, simply swipe up or down on the screen to scroll through the list items. To edit a value, tap the row for the desired item. If the entry is a simple numeric value, the number entry pad will be shown. If the item has multiple selections to choose from, a list of individual selections for the item will be shown.

4.3.1 Tagname

The Tagname entry is used to assign a specific name for the limit, up to 11 characters in length. This name will be used throughout the EZT-570L runtime application.

4.3.2 Input Type

The Input Type entry is used to select the type of sensor that will be connected to the loop control. The input type can be a temperature input (thermocouple or RTD) or a linear input type (VDC or mA).



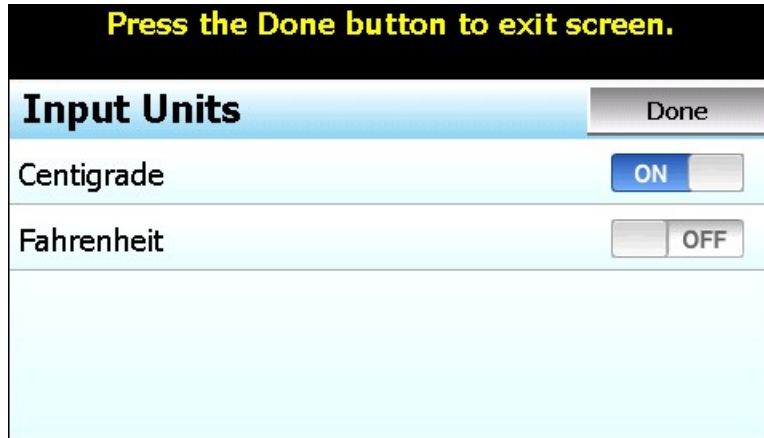
The input type selections are mutually exclusive, i.e., selecting one input will turn all other selections off. Once the desired input type has been selected, press the “Done” button to set the input type for the loop control board and return to the main Limit Configuration screen.

NOTE: The limit control is equipped with DIP switches to set the input type. The DIP switches must be set properly according to the input type selection made. For temperature (RTD and T/C) and mV input, DIP switch 1 must be set to on and DIP switch 2 set to off. For a linear voltage input, DIP switch 1 must be off and DIP switch 2 set to on. For linear mA inputs, both DIP switches 1 and 2 must be set to on.

Input type selections of 0-1V, 0-5V and 1-5V requires a special limit control. Only the 0-10V input selection is compatible with standard units. If a 0-1V, 0-5 or 1-5V input is required, it must be ordered accordingly. Linear inputs, current and voltage, are not FM approved.

4.3.3 Input Units

The Input Units entry is used to select the temperature units for temperature input types (thermocouple or RTD). If the selected input type for the loop is a linear input (VDC or mA), the Input Units entry will display the text entry keypad allowing entry of user defined engineering units up to 4 characters.



The input unit selections for temperature are mutually exclusive, i.e., selecting one will turn off the other. Once the desired temperature units have been selected, press the “Done” button to set the input units for the limit control and return to the main Limit Configuration screen.

4.3.4 Decimal Point

The Decimal Point entry allows the input precision to be adjusted between zero and one decimal digits for temperature input types and between 0 and 3 for a 0-60mV input and VDC and mA input types.

IMPORTANT: *Once the limit control has been configured with a specific decimal point, changing the decimal point will require the limit control to be reconfigured in order to maintain previous control settings. Alarm set points, set point limits, input low/high scale, etc., DO NOT automatically scale. An entry of 100.0 becomes 1000 when changing the decimal point to zero (not 100) and must be re-entered to set the proper value.*



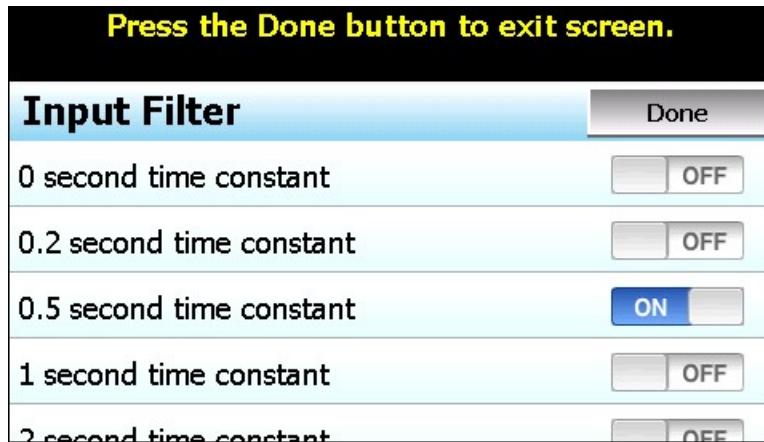
4.3.5 Input Low/High Scale

The Input Low Scale and Input High Scale entries are used to set the input range for linear input types (VDC or mA). The entries are not available for temperature input types since they utilize a fixed range based on the sensor type. The input low scale value can be set from -19999 up to the high scale value. The high scale value can be set from the low scale value up to 45536.

NOTE: *The minimum and maximum scale values are limited by the decimal point selection. For a decimal of 0, the values are -19999 and 45536 respectively. For one decimal point, the values are -1999.9 and 4553.6. For two decimal digits, the values are -199.99 and 455.36 and for three decimal digits the values are -19.999 and 45.536.*

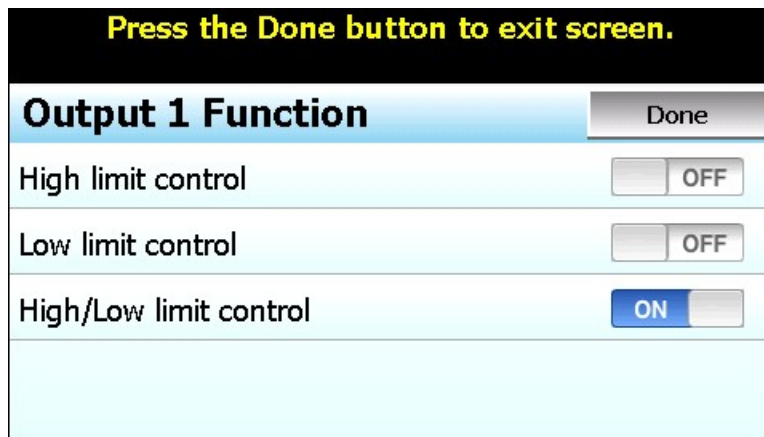
4.3.6 Input Filter

The Input Filter entry is used to select the time constant used for filtering the process input. The time constant selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired filter constant has been selected, press the “Done” button to set the input filter for the loop control board and return to the main Limit Configuration screen.



4.3.7 Output 1 Function

The Output 1 Function is used to set the mode of operation of the limit control output. The output can be set for high limit control, low limit control or high/low limit control. The output selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the limit output function and return to the main Limit Configuration screen.



The **High limit control** function will turn off the output when the process value exceeds the high limit set point. Once the process value is below the high limit set point and the alarm is reset, the output will turn on.

The **Low limit control** function will turn off the output when the process value exceeds the low limit set point. Once the process value is above the low limit set point and the alarm is reset, the output will turn on.

The **High/Low limit control** function will turn off the output when the process value exceeds the high or low limit set point. Once the process value is within the high and low set point and the alarm is reset, the output will turn on.

NOTE: *If a sensor break occurs, the PV value is driven to a value above the maximum of the selected input type. Therefore, the limit will not go into alarm if configured for “Low limit control”. If this circumstance creates a safety issue, it is recommended that the output be configured as a “High/Low limit control”.*

4.3.8 Output 1 Hysteresis

The output 1 hysteresis is used to create a safe-sided dead band around the high/low limit set point to prevent the alarm from being reset and then immediately reactivating if the process is hovering around the alarm set point. In order to reset the high or low limit alarm, the process value must fall below the high limit set point or rise above the low limit set point by the hysteresis value.

4.3.9 Lower/Upper Limit of High Setpoint

The lower and upper limits of high set point are used to set the minimum and maximum allowed value that can be entered for the high limit alarm set point. These entry fields are active when the output 1 function of the limit control is set to high limit control or high/low limit control. These values are set by CSZ to ensure that the user can not adjust the high limit set point beyond the maximum safe operating limits of the chamber.

4.3.10 Lower/Upper Limit of Low Setpoint

The lower and upper limits of low set point are used to set the minimum and maximum allowed value that can be entered for the low limit alarm set point. These entry fields are active when the output 1 function of the limit control is set to low limit control or high/low limit control. These values are set by CSZ to ensure that the user can not adjust the low limit set point beyond the maximum safe operating limits of the process.

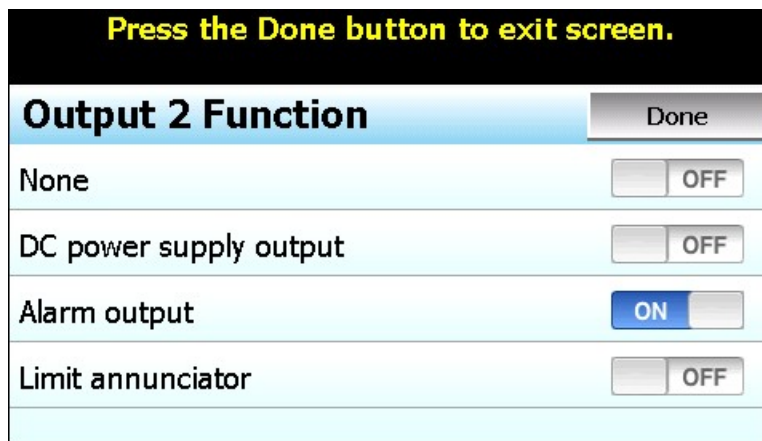
4.3.11 High/Low Limit Setpoint

The high and low limit set points are the alarm points at which output 1 of the limit control will open when the process value exceeds the entry. The high set point entry is available when the output 1 function of the limit control is set to high limit control or high/low limit control and the low set point entry is available when the output 1 function of the limit control is set to low limit control or high/low limit control. The set points are also available on the Alarm screen in the EZT-570L runtime application.

4.3.12 Output 2 Function

The Output 2 Function is used to set the mode of operation for the secondary control output of the limit control. The output selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the output function for the limit control and return to the main Limit Configuration screen.

NOTE: The output function must be set to match the type of output supplied on the limit control.



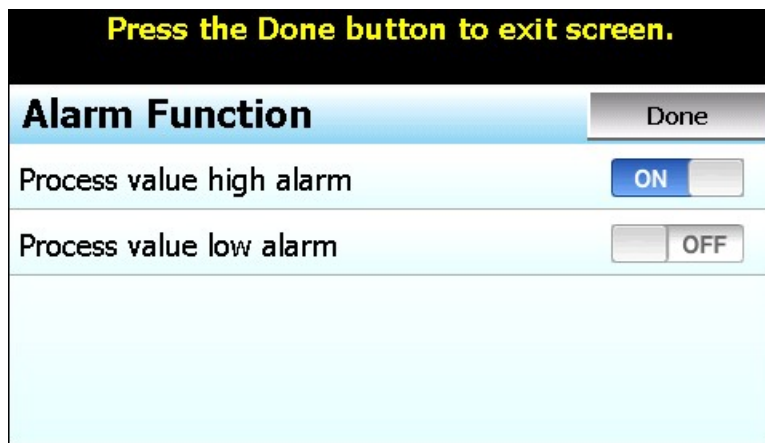
The **DC power supply output** function must be selected when the output type ordered for the limit control is a transmitter power supply.

The **Alarm output** function activates the alarm configuration settings for assigning the type of alarm logic to apply to output 2. When the alarm condition is active, the output will turn on.

The **Limit annunciator** function uses output 2 as a means for activating an external audible alarm. When the limit output deactivates due to the process value exceeding the high or low limit set point, output 2 will also activate. The output will remain activate until the reset button is pressed on the Alarm screen in the runtime application or the remote reset is activated.

4.3.13 Alarm Function

The Alarm Function is used to select the alarm type for output 2 if the output function is configured as an alarm output. The alarm selections are mutually exclusive, i.e., selecting one will turn off the other. Once the desired alarm type has been selected, press the “Done” button to set the alarm function for the limit control output and return to the main Limit Configuration screen.



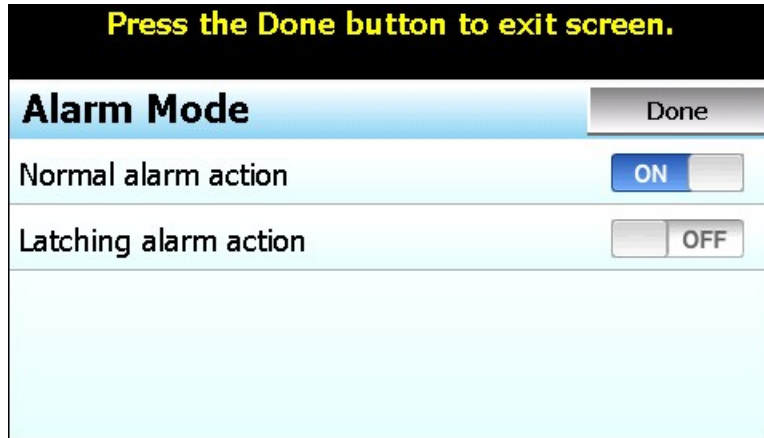
NOTE: For the following alarm descriptions, PV = process value, ASP is the alarm set point and AHY is the alarm hysteresis.

When **Process value high alarm** is selected and the process value is higher than the alarm set point ($PV > ASP$), a process high alarm occurs. When the process value is lower than the alarm set point minus the alarm hysteresis ($PV < ASP - AHY$), the alarm is off.

When **Process value low alarm** is selected and the process value is lower than the alarm set point ($PV < ASP$), a process low alarm occurs. When the process value is above the alarm set point plus the alarm hysteresis ($PV > ASP + AHY$), the alarm is off.

4.3.14 Alarm Mode

The Alarm Mode is used to select the mode of operation for output 2 if the output function is configured as an alarm output. The mode selections are mutually exclusive, i.e., selecting one will turn off the other. Once the desired alarm mode has been selected, press the “Done” button to set the alarm operation for the limit control output and return to the main Limit Configuration screen.



Normal alarm action has the alarm output off in the non-alarm condition and on in the alarm condition.

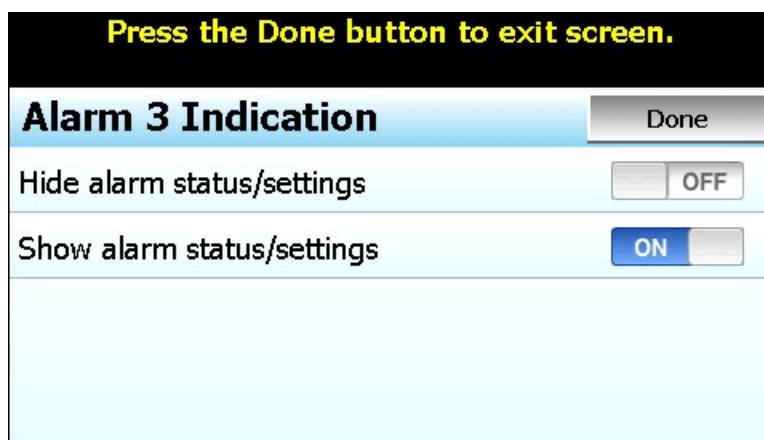
Latching alarm action will keep the alarm output on even if the alarm condition has cleared until the alarm is reset by the user.

4.3.15 Alarm Indication

The Alarm Indication entry is used to select whether the alarm will be shown in the EZt-570L runtime application or be hidden from the user. This allows the alarm to perform a specific control function while preventing the user from adjusting the set point or seeing the activation state of the alarm.

The indication selections are mutually exclusive, i.e., selecting one will turn off the other. Once the desired alarm indication has been selected, press the “Done” button to set the alarm operation and return to the main Limit Configuration screen.

NOTE: *If the alarm is hidden but its mode is set for latching, the user will not have any indication that the alarm requires manual reset. When an alarm is hidden, the normal or hold mode be used so that the alarm output automatically resets when the alarm condition is no longer present.*



When the alarm indication is set for **Hide alarm status/settings**, the alarm will be removed from the EZT-570L runtime application. The user will not be able to edit the alarm message or adjust the alarm set point. When the alarm activates, there will be no indication or message on the alarm screen and the audible alarm will not sound. The alarm operates as a “silent” alarm with no indication to the user.

When the alarm indication is set for **Show alarm status/settings**, the user will be able to access and change the alarm set point and alarm message under the device settings. When the alarm occurs, the alarm message will be displayed on the Alarm screen and the audible alarm will sound.

4.3.16 Alarm Setpoint

The alarm set point can be set when output 2 is configured as an alarm output. If the alarm indication is set to “show” the alarm status and settings, the set point will also be available in the EZT-570L runtime application. If the alarm indication is set for “hide” alarm status and settings, the alarm set point will not be available in the EZT-570L runtime application and can only be changed in the Configurator.

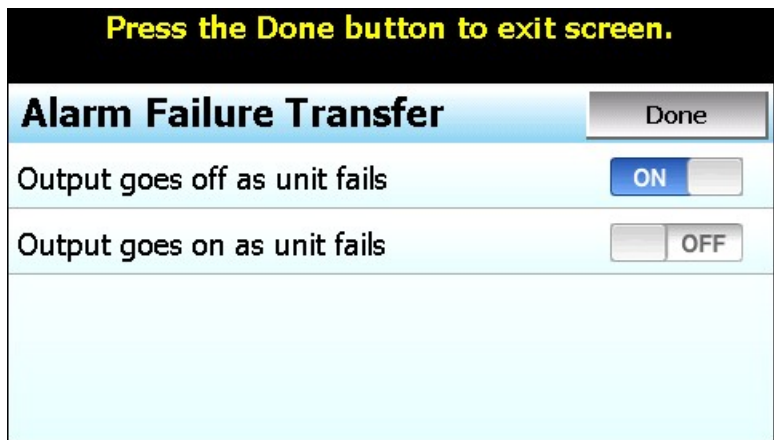
4.3.17 Alarm Hysteresis

The alarm hysteresis can be set when output 2 is configured as an alarm output. It is used to eliminate rapid on/off cycling of the alarm output by applying a safe-sided dead band to the alarm. When the alarm set point is exceeded, the alarm will activate. The alarm will not deactivate until the process rises above (for low alarm) or falls below (for high alarm) the alarm set point by the hysteresis value.

The hysteresis can be set from a minimum of 0.1 to a maximum of 10.0 for units of degrees Centigrade and to a maximum of 18.0 for units of degrees Fahrenheit and linear input types.

4.3.18 Alarm Failure Transfer

The Alarm Failure Transfer is used to set the state of output 2 if there is an input failure, i.e., sensor break. The selections are mutually exclusive, i.e., selecting one will turn off the other. Once the desired alarm failure transfer selection has been made, press the “Done” button to return to the main Limit Configuration screen.

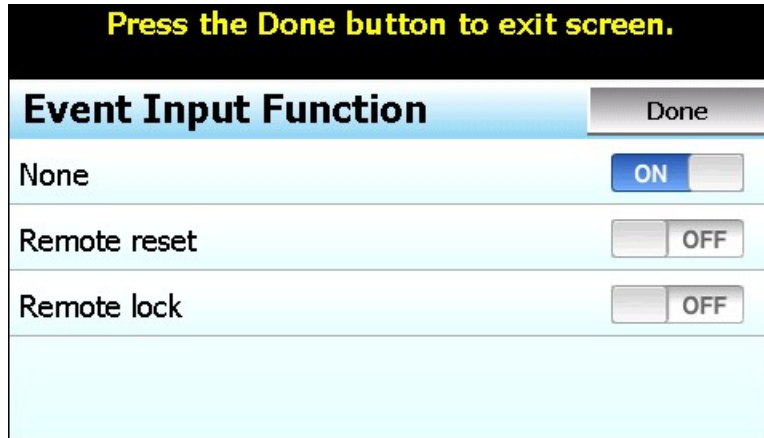


The **Output goes off as unit fails** selection will force the output off during failure regardless of the alarm activation status.

The **Output goes on as unit fails** selection will force the output on during failure regardless of the alarm activation status.

4.3.19 Event Input Function

The Event Input Function is used to select the desired mode of operation for the digital input of the limit control board. The event input selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the event input function for the limit control and return to the main Limit Configuration screen.



When **Remote reset** is selected for the event input function, the event input will perform an alarm reset each time the input terminals go from open to closed.

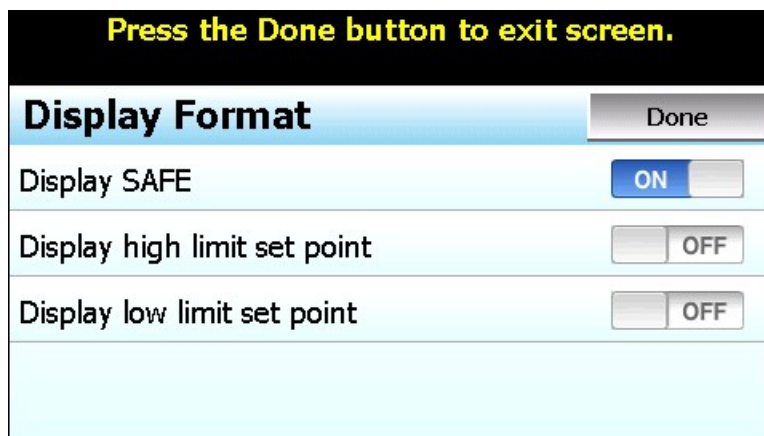
The **Remote lock** function is available for the L41 limit control only. When selected for the event input function, the event input will lock and unlock the front panel of the L41 limit control. When the input terminals are opened, the keys will be unlocked allowing a user to adjust the limit and alarm set points from the front of the L41. When the terminals are closed, the keys will be locked preventing adjustment of the limit and alarm set points from the front of the L41.

NOTE: Any setting changes made from the EZT-570L display via the Configurator or runtime application will unlock the front panel of the L41. The L41 will automatically lock the front panel after several minutes of inactivity regardless of the event input state.

The remote lock event input function can be used to prevent the user from unlocking the L41 via the reset key on the front panel if the input is hardwired on at all times. However; there will still be brief periods where the L41 will remain in an unlocked state after a change is made via the EZT-570L Configurator or runtime application.

4.3.20 Display Format

The Display Format entry is used to select the normal display mode for the limit control in a non-limit condition. The display format selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired display format has been chosen, press the “Done” button to return to the main Limit Configuration screen.



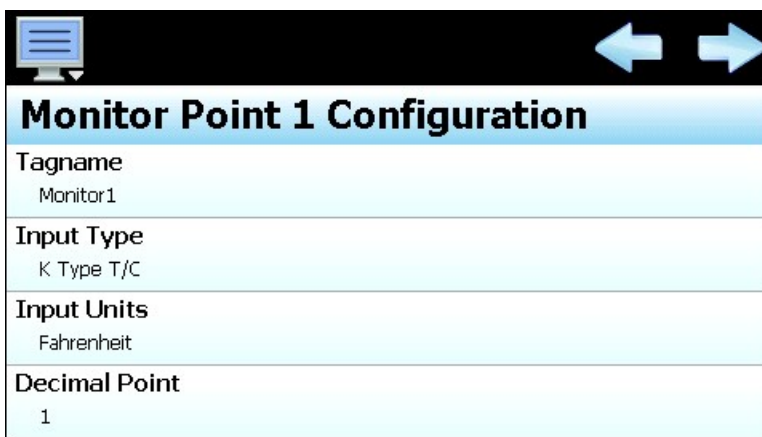
When **Display SAFE** is selected, the front panel of the L41 and the Loop view and Overview screens in the runtime application will display the word “SAFE” when the limit alarm is not active. When a limit alarm is activated, the word “SAFE” will be replaced with either the high limit set point (if the high limit alarm is tripped) or the low limit set point (if the low limit alarm is tripped).

When **Display high limit set point** is selected, the front panel of the L41 and the Loop view and Overview screens in the runtime application will display the high limit set point regardless of the limit alarm condition.

When **Display low limit set point** is selected, the front panel of the L41 and the Loop view and Overview screens in the runtime application will display the low limit set point regardless of the limit alarm condition.

4.4 Optional Monitor Point Configuration

The Monitor Configuration screen is accessed from the Setup menu. The screen provides access to all monitor points as entered on the Control Setup screen. When more than one monitor point is configured, the left/right scroll buttons will be provided at the top right of the screen. These buttons can be used to scroll through all available monitor points in order to view/edit settings for each.



To view all of the available settings for a monitor point, simply swipe up or down on the screen to scroll through the list items. To edit a value, tap the row for the desired item. If the entry is a simple numeric value, the number entry pad will be shown. If the item has multiple selections to choose from, a list of individual selections for the item will be shown.

4.4.1 Tagname

The Tagname entry allows is used to assign a specific name for each monitor point, up to 11 characters in length. This name will be used throughout the EZT-570L runtime application. The default tag names are Monitor1 to Monitor8.

4.4.2 Input Type

The Input Type entry is used to select the type of sensor that will be connected to the monitor point input. The input type can be a temperature input (thermocouple) or a linear input type (VDC or mA). The input type selections are mutually exclusive, i.e., selecting one input will turn all other selections off. Once the desired input type has been selected, press the “Done” button to set the input type for the monitor point and return to the main Monitor Configuration screen.

Press the Done button to exit screen.

Input Type	Done
0-10V Linear	<input type="checkbox"/> OFF
0-5V Linear	<input type="checkbox"/> OFF
0-1V Linear	<input type="checkbox"/> OFF
0-500mV Linear	<input type="checkbox"/> OFF
0-100mV Linear	<input type="checkbox"/> OFF

NOTE: Each input is equipped with a slide switch for selecting voltage or current input type. The switch must be set properly according to the input type selection made. See section 3.4.1 Sensor Wiring for details on sensor wiring and switch settings according to selected sensor type.

4.4.3 Input Units

The Input Units entry is used to select the temperature units for thermocouple input types. If the selected input type for the monitor point is a linear input (VDC or mA), the Input Units entry will display the text entry keypad allowing entry of specific engineering units up to 4 characters.

Press the Done button to exit screen.

Input Units	Done
Centigrade	<input checked="" type="checkbox"/> ON
Fahrenheit	<input type="checkbox"/> OFF

The input unit selections for temperature are mutually exclusive, i.e., selecting one will turn off the other. Once the desired temperature units have been selected, press the “Done” button to set the input units for the monitor point and return to the main Monitor Configuration screen.

4.4.4 Decimal Point

The Decimal Point entry allows the input precision to be adjusted between 0 and 1 decimal digits for temperature input types (thermocouple) and between 0 and 3 for linear input types (VDC and mA).

IMPORTANT: Once the monitor point has been configured with a specific decimal point, changing the decimal point will require the low/high scale to be reconfigured for linear input types in order to maintain the previous input span. An entry of 100.0 becomes 1000 when changing the decimal point to zero (not 100) and must be re-entered to set the proper value.



4.4.5 Input Low/High Scale

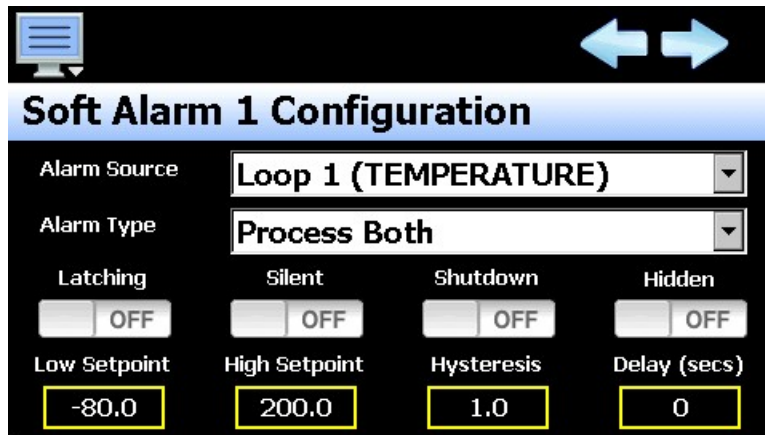
The Input Low Scale and Input High Scale entries are used to set the input range for linear input types (VDC or mA). The entries are not available for thermocouple inputs since they utilize a fixed range based on the sensor type. The input low scale value can be set from -32768 up to the high scale value. The high scale value can be set from the low scale value up to 32767.

NOTE: *The minimum and maximum scale values are limited by the decimal point selection. For a decimal of 0, the values are -32768 and 32767 respectively. For one decimal point, the values are -3276.8 and 3276.7. For two decimal digits, the values are -327.68 and 327.67 and for three decimal digits the values are -32.768 and 32.767.*

4.5 Soft Alarm Configuration

The Soft Alarm Configuration screen is accessed from the Setup menu. The screen is used to configure each soft alarm up to the total number entered on the Control Setup screen. When more than one soft alarm is programmed, the left/right scroll buttons will be provided at the top right of the screen in order to view/edit settings for each alarm.

NOTE: *The soft alarms are utilized as the loop and monitor point alarms that are accessed over the EZT-570L communications interface. The soft alarms must be configured in sequential order beginning with loop 1 and continuing on through each monitor point in order for the user to be able to properly access the correct alarm via the chosen user communications interface.*



The **Alarm Source** drop down menu selection lists all loops, limits, monitor points and math equations (if configured) to be chosen for the process value to be monitored by the alarm. Any configured logic equations are also included as alarm source selections in which the true/false state of the equation is utilized to activate the alarm.

The **Alarm Type** drop down menu selection is used to choose the type of alarm. Alarm choices include process (active) high, process (active) low, deviation high, deviation low, deviation band and end of program. The deviation alarms can only be chosen for control loops. For the limit, monitor points, math/logic equations and loops programmed for monitor only, there is no set point to associate with the alarm.

For the following alarm descriptions, PV = process value, SV = the control set point value, AHSP is the alarm high set point, ALSP is the alarm low set point and AHY is the alarm hysteresis.

Process (Active) High The alarm is independent of set point. When the process value is higher than the alarm set point (PV > ASP), a process high alarm occurs. When the process value is lower than the alarm set point minus the alarm hysteresis (PV < AHSP-AHY), the alarm is off.

When the alarm source is a logic equation, the alarm will activate when the result of the logic equation is true. The alarm will deactivate when the result of the logic equation is false.

Process (Active) Low The alarm is independent of set point. When the process value is lower than the alarm set point ($PV < ASP$), a process low alarm occurs. When the process value is above the alarm set point plus the alarm hysteresis ($PV > ALSP+AHY$), the alarm is off.

When the alarm source is a logic equation, the alarm will activate when the result of the logic equation is false. The alarm will deactivate when the result of the logic equation is true.

Process Both The alarm is independent of set point and utilizes two trigger levels. When the process value is above the alarm high set point ($PV > AHSP$), or below the alarm low set point ($PV < ALSP$), a process alarm occurs. When the process value is lower than the alarm high set point minus the alarm hysteresis ($PV < AHSP-AHY$), and above the alarm low set point plus the alarm hysteresis ($PV > ALSP+AHY$), the alarm is off.

Deviation High The alarm is dependent upon the control set point and alerts the operator when the process value deviates too high over the set point value. For deviation high alarms, the alarm set point is entered as a positive value. When the process is higher than the control set point plus the alarm set point ($PV > SV+ASP$), a deviation high alarm occurs. When the process value falls below the control set point plus alarm set point minus the alarm hysteresis ($PV < SV+ASP-AHY$), the alarm is off.

Deviation Low The alarm is dependent upon the control set point and alerts the operator when the process deviates too far below the set point value. For deviation low alarms, the alarm set point is entered as a negative value. When the process is lower than the control set point plus the alarm set point ($PV < SV+ASP$), a deviation low alarm occurs. When the process value rises above the control set point plus alarm set point plus the alarm hysteresis ($PV < SV+ASP+AHY$), the alarm is off.

Deviation Band The alarm sets two trigger levels relative to the control set point value. For deviation band alarms, the alarm set point is entered as a positive value. The two alarm trigger levels are then defined as $SV+ASP$ and $SV-ASP$ for the high and low alarm values. When the process value is greater than the high alarm value ($PV > SV+ASP$) or less than the low alarm value ($PV < SV-ASP$), a deviation band alarm occurs. When the process value is within the high and low trigger levels by the value of the alarm hysteresis ($PV < SV+ASP-AHY$ and $PV > SV-ASP+AHY$), the deviation band alarm is off.

End of Program The alarm is not associated with the process value or set point. The alarm is turned on upon completion of an automatic ramp/soak program. Once the alarm has occurred it must be manually cleared from the Alarm screen of the runtime application.

The **Latch** selection is used to keep the alarm active even after the alarm condition has passed. It can only be deactivated by the user by pressing the Reset button on the Alarm screen. An alarm that has latching turned off will be self-clearing and will deactivate automatically when the alarm condition has passed.

The **Silent** selection is used to disable annunciation of the alarm in the runtime application. When on, this prevents the alarm icon from being shown and the audible alarm from sounding when the alarm occurs; however, the alarm will be reported on the Alarm screen. If the alarm options for latch or shutdown are on,

the alarm icon will be shown in order to provide a visual alert to the operator that user intervention is required.

The **Shutdown** selection is used to turn off the chamber and pause the operating ramp/soak program when the alarm activates. Note that this option is only available if the expansion IO module is configured for EZT Logic operation. See section 4.8 Expansion IO Module Option.

The **Hidden** selection is used to remove from alarm from the alarm settings screen in EZT-570L runtime application. This prevents the user from editing the alarm message or altering alarm settings.

The **Alarm Setpoints** can be entered when the alarm function is set for a process or deviation type of alarm. The alarm set point will also be available in the EZT-570L runtime application.

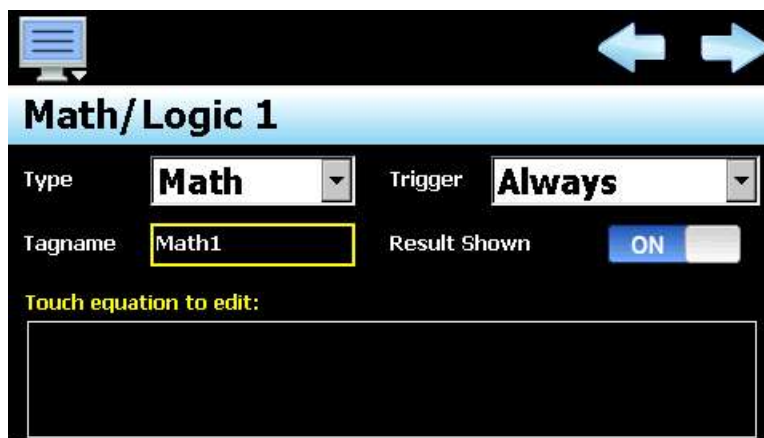
The alarm **Hysteresis** can be entered when the alarm function is set for a process or deviation type of alarm. It is used to eliminate rapid on/off cycling of the alarm output by applying a safe-sided dead band to the alarm. When the alarm set point is exceeded, the alarm will activate. The alarm will not deactivate until the process rises above (for low alarm) or falls below (for high alarm) the alarm set point by the hysteresis value.

The alarm **Delay** can be entered when the alarm function is set for a process or deviation type of alarm. The alarm delay will also be available in the EZT-570L runtime application. The alarm delay is used to delay the activation of the alarm for a specified period of time. The delay is entered in seconds and can be set with a minimum of zero to a maximum 5999 seconds (99 minutes and 59 seconds).

The programmed time delay is activated (timing begins) when the alarm setpoint is exceeded. The alarm delay will stop timing (and reset) once the process value returns to non-alarm level. If the time delay times out and the alarm setpoint is still exceeded, the alarm will activate.

4.6 Math/Logic Configuration

The Math/Logic Configuration screen is accessed from the Setup menu. The screen provides access to all math/logic equations as entered on the Control Setup screen. When more than one equation is configured, the left/right scroll buttons will be provided at the top right of the screen. These buttons can be used to scroll through all available equations in order to view/edit settings for each.



Math Type

The **Type** drop down menu is used to select what the equation will be used for. Selections include Math, Logic and timer. When Math is selected, the result of the equation can be shown on the Overview screen in the runtime application if the Result Shown selection is turned on. The result of the calculation would then also be selectable for plotting on each of the four user configurable trends as well as a selectable point for data logging.

Math/Logic 1

Type: **Logic** Trigger: **Always**

Tagname: **Math1** Output: **Not Selected**

Touch equation to edit:

Logic Type

When Logic is selected, the equation will be utilized to obtain a true/false result which will then be set to the selected output. The output will be activated when the result of the equation is true and turned off when the result of the equation is false.

Math/Logic 1

Type: **Logic** Trigger: **Always**

Tagname: **Math1** Delay (seconds): **0**

Touch equation to edit:

Timer Type

When Timer is selected, the equation will be utilized to obtain a true/false result to activate a time delay. The equation can then be selected as a timer input on another Logic equation as T1-T20 corresponding to the number of the math/logic equation 1-20.

The **Tagname** entry allows the user or OEM to assign a specific name for each equation, up to 11 characters in length. This name will be used throughout the EZT-570L runtime application to identify the calculated value on the Overview screen and in the trend and data logging point selection lists. The default tag names are Math1 to Math20. The tagname will also be shown in the Inputs drop-down menus on the equation entry screen for reference when selecting math or timer equations as inputs to other equations.

The **Trigger** selection is used to determine what condition must be met in order for the equation to be solved. If the condition is not met, the runtime application will skip the equation and not evaluate it. The default selection of “Always” means that the equation is constantly evaluated and a new result determined every scan. Depending upon the configuration of the EZT-570L, the following additional trigger selections are available:

S1_EventIn Loop 1 (slot 1) event input. If selected, the equation will be evaluated when the event input is activated. This selection is available when the event input function of the B42 in slot 1 is configured for any of the functions except for failure transfer.

- S2_EventIn** Loop 2 (slot 2) event input. If selected, the equation will be evaluated when the event input is activated. This selection is available when the event input function of the B42 in slot 2 is configured for any of the functions except for failure transfer.
- S3_EventIn** Loop 3 (slot 3) event input. If selected, the equation will be evaluated when the event input is activated. This selection is available when the event input function of the B42 in slot 3 is configured for any of the functions except for failure transfer.
- S1_EvOut2** Loop 1 (slot 1) event output 2. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 2 function the B42 in slot 1 is configured for event, manual event only or math/logic event output only.
- S1_EvOut3** Loop 1 (slot 1) event output 3. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 3 function the B42 in slot 1 is configured for event, manual event only or math/logic event output only.
- S1_EvOut4** Loop 1 (slot 1) event output 4. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 4 function the B42 in slot 1 is configured for event, manual event only or math/logic event output only.
- S2_EvOut2** Loop 2 (slot 2) event output 2. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 2 function the B42 in slot 2 is configured for event, manual event only or math/logic event output only.
- S2_EvOut3** Loop 2 (slot 2) event output 3. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 3 function the B42 in slot 2 is configured for event, manual event only or math/logic event output only.
- S2_EvOut4** Loop 2 (slot 2) event output 4. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 4 function the B42 in slot 2 is configured for event, manual event only or math/logic event output only.
- S3_EvOut2** Loop 3 (slot 3) event output 2. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 2 function the B42 in slot 3 is configured for event, manual event only or math/logic event output only.
- S3_EvOut3** Loop 3 (slot 3) event output 3. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 3 function the B42 in slot 3 is configured for event, manual event only or math/logic event output only.
- S3_EvOut4** Loop 3 (slot 3) event output 4. If selected, the equation will be evaluated when the event output is activated. This selection is available when the output 4 function the B42 in slot 3 is configured for event, manual event only or math/logic event output only.
- ExpIn8-23** Expansion IO module inputs 8 to 23. If selected, the equation will be evaluated when the input is activated. The selections are available when the expansion IO module is enabled and the input function is set to any of the available functions except for “None”.
- ExpOut32-45** Expansion IO module outputs 32 to 45. If selected, the equation will be evaluated when the output is activated. The selections are available when the expansion IO module is enabled and the output function is set to any of the available functions except for “None”.

NOTE: *When a trigger selection other than “Always” is made and the condition is no longer met, the previous result of the equation will be maintained until the trigger condition is again met and a new result is calculated. For math equations, the calculated value will be maintained. For logic and timer equations, the previous output and timer state will be maintained.*

The **Output** selection is provided for Logic equations and is used to select the output for the equation. The available output selections depend upon the number of loops available and the number of outputs configured as events as well as expansion IO module configuration. The available selections can include S1_EvOut2, S1_EvOut3, S1_EvOut4, S2_EvOut2, S2_EvOut3, S2_EvOut4, S3_EvOut2, S3_EvOut3, S3_EvOut4 and ExpOut32 to 45 which correspond to the trigger selections above.

IMPORTANT: *The output selections are common to all logic equations; therefore, multiple equations can be assigned to the same output. If multiple equations are required for various conditions to control a single output, make sure to configure the proper trigger for each equation so that only one equation is active at a time. If more than one equation is active at a time, the output may toggle on and off according to different results coming from multiple equations.*



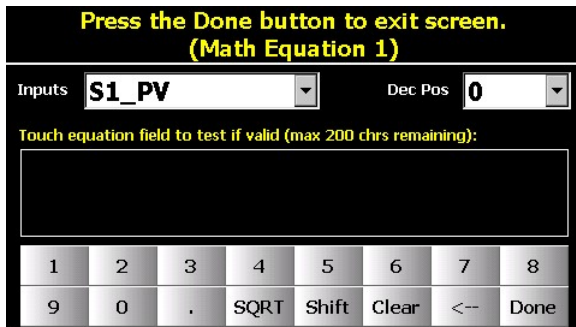
If a logic equation is set to an event output and an automatic ramp/soak program is in operation, the event state is continuously set by the running program. If the program state and equation result are different, the output will continuously toggle on and off. Therefore, it is recommended that logic equations not be tied to event outputs that can also be under program control.

The **Result Shown** selection is provided for Math equations. When on, the result of the equation is displayed on the Overview screen in the runtime and the value is also selectable for data logging and trending. When off, the value is not displayed in the runtime. The off selection is typically chosen if a derived value is required for a soft alarm, but is not something that needs to be displayed to the user.

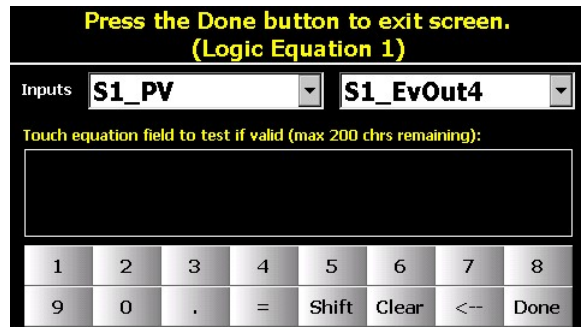
The **Delay** entry is provided for Timer equations. The delay is entered in seconds and can be set with a minimum of zero to a maximum 86400 seconds (24 hours). When the equation result is true for the time period entered, the internal timer output will activate. When the equation result is false, the time will be reset to zero and the internal timer output will deactivate.

4.6.1 Entering a Math/Logic Equation

To enter an equation, first select the equation type desired. Once the type has been selected, touch the equation field on the Math/Logic Configuration screen. This will display the equation entry screen.

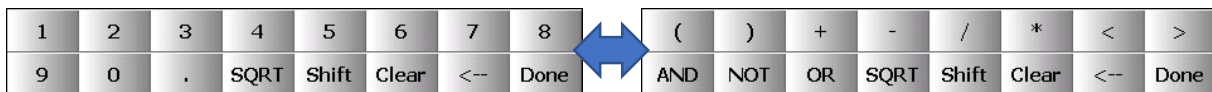


Math Equation Entry



Logic Equation Entry

The entry screen provides a keypad with access to all available operators for equation entry. Math type equations provide a SQRT (square root) key while logic/timer equations replace the square root function with the equals (=) comparator. Pressing the “Shift” key toggles between the numeric and comparison operators as shown below.



Equations follow the standard order of operations for mathematics. Multiplication and division operators are evaluated first, followed by addition and subtraction. It is recommended that you determine what your equation should be prior to entry, so that parenthesis can be added in the proper locations in order to ensure that operations are carried out in the proper order. New entries are always appended to the current equation. You cannot go back and insert values or operators into an existing equation that may have been missed. You must either backspace to the location (<-->) or clear the equation and start over. By planning and/or writing down the equation first, it will prevent you from having to start over.

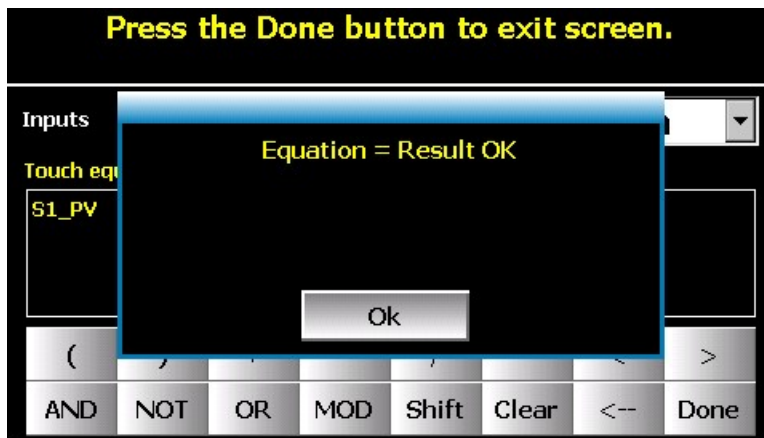
The **Inputs** drop-down menu(s) provide the means for adding system process values to the equation. Simply select the desired value from the menu, and the value will be appended to the equation. For math equations, only process values are available. These include the loop/limit PV, loop SP, loop %Out and the results of other math equations. The available process input selections can include:

- S1_PV* Loop 1 (slot 1) process value.
- S1_SP* Loop 1 (slot 1) set point value.
- S1_%Out* Loop 1 (slot 1) percentage of output.
- S2_PV* Loop 2/Limit (slot 2) process value.
- S2_SP* Loop 2 (slot 2) set point value. Only available a B42 is installed in slot 2.
- S2_%Out* Loop 2 (slot 2) percentage of output. Only available a B42 is installed in slot 2.
- S3_PV* Loop 3/Limit (slot 3) process value.
- S3_SP* Loop 3 (slot 3) set point value. Only available a B42 is installed in slot 3.
- S3_%Out* Loop 3 (slot 3) percentage of output. Only available a B42 is installed in slot 3.
- M1-M20* Math equation 1-20 result. The tagname entered for the math block will also be shown in parenthesis to assist in identification of each math result, i.e., M1 (*Tagname*).

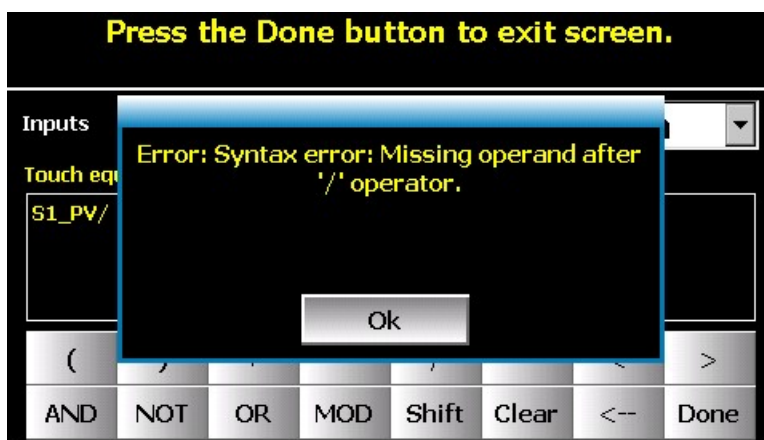
For logic equations, an additional menu is provided that allows you to select from the available loop event inputs and event outputs which correspond to the items listed under the Trigger selections above. If any equations are configured as the Timer type, they will also be provided as T1 to T20. The tagname of the equation will appear after the "T" designator for reference. If equation 5 was configured with the tagname "Cool Dly" the menu item would be displayed as "T5 (Cool Dly)". When selected as an input, the value would be displayed in the equation as simply "T5". Additionally, if any soft alarms have been configured, they will also be available for selection in a logic equation. They will be provided in the drop-down menu as SA1 to SA10 corresponding to soft alarms 1 through 10.

The **Dec Pos** entry field is available for math equations only. It allows precision of the math equation result to be adjusted between 0 and 3 decimal digits for display on the Overview screen in the runtime application and is also reflected in the value written to the data log file if the point is chosen for logging.

Any time during equation entry, you can test the validity of the equation by touching the entry field. The equation is also automatically tested when the "Done" button is pressed.



Only a valid equation can be saved. If the equation cannot be properly solved, you will not be able to exit the screen until the equation is corrected or cleared.



The error message will provide help in determining what is wrong with the equation; however, due to the number of possible combinations it is up to the user to ultimately evaluate the equation and verify its validity. Once the equation can be properly solved, pressing the “Done” button will return to the Math/Logic Configuration screen.

4.6.2 Math/Logic Equation Examples

The EZT-570L equation module is not designed for high speed calculation or logic purposes. The equation module is not deterministic, i.e., does not operate on a fixed interrupt. The equations are scanned approximately once every two seconds; however, file IO operations or remote communications, VNC activity, etc., could extend the evaluation interval.

If your desired output control logic requires timing resolution better than the above scan rate, use separate external device(s) to perform the required logic that are capable of the timing resolution needed.

4.6.2.1 Order of Operations

The EZT-570L supports standard math operators including addition (+), subtraction (-), multiplication (*), and division (/). The power of the EZT-570L math/logic block, is that it allows free-form entry of any equation including any combination of variables the system provides. Due to this however, when entering equations, it is important to understand the standard order of operations or the result may not be what is expected. The standard order of operations is a collection of rules that reflect conventions about which procedures to perform first in order to evaluate a given mathematical expression.

For example, in mathematics and most computer languages (including the EZT-570L), multiplication is granted a higher precedence than addition, and it has been this way since the introduction of modern algebraic notation. Thus, the expression $2 + 3 \times 4$ is interpreted to have the value $2 + (3 \times 4) = 14$, not $(2 + 3) \times 4 = 20$. Where it is desired to override the precedence conventions, or even simply to emphasize them, parentheses () can be added to indicate an alternative order or reinforce the default order to avoid confusion. For example, by adding parenthesis to the original expression, $(2 + 3) \times 4$ forces addition to precede multiplication providing the result of 20.

The same holds true for division and subtraction in which division is given a higher precedence than subtraction. Therefore, when an equation is evaluated by the EZT-570L, multiplication and division are executed first from left to right, and then addition and subtraction are performed from left to right. If parenthesis are included in the equation, the expression(s) within the parenthesis are evaluated first.

Parentheses First

$4 \times (5 + 3) - (4 / 2)$	$(5 + 3) = 8$ and $(4 / 2) = 2$ are evaluated first
$4 \times 8 - 2$	$4 \times 8 = 32$ is evaluated first since multiplication before addition
$32 - 2$	subtraction performed last to get result of 30

Else Multiply or Divide before Add or Subtract

$4 \times 5 + 3 - 4 / 2$	$4 \times 5 = 20$ and $4 / 2 = 2$ are evaluated first
$20 + 3 - 2$	addition and subtraction performed last to get result of 21

With the introduction of exponents in the 16th and 17th centuries, they were given precedence over both addition and multiplication and could be placed only as a superscript to the right of their base. For example, $3 + 5^2 = 28$ and $3 \times 5^2 = 75$. The EZT-570L does not provide the exponent operator; however, it can be accomplished by multiplying the number by itself the same number of times as the value of the exponent, i.e., $5^2 = 5 \times 5 = 25$.

If you require a value raised to a power, you must multiply the value by itself in the equation remembering to ensure proper order of operation using parenthesis. If you do not use parenthesis to prioritize the operation, you will not get the desired result.

Exponent

Example: $75 / 5^2$

Correct: $75 / (5 * 5)$	$(5 * 5) = 25$ evaluated first since it is in parenthesis
$75 / 25$	division performed last to get proper result of 3
Incorrect: $75 / 5 * 5$	$75 / 5 = 15$ evaluated first since multiply/divide performed from left to right
$15 * 5$	multiplication performed last results in incorrect value of 75

In order to calculate the average of several values, you simply add each of the variables together, and then divide by the number of variables. Again, the parenthesis are required in order for the calculation to be proper evaluated.

Averaging Example:

Average monitor points 1 to 4 where Mon1=72, Mon2=74, Mon3=78 and Mon4=77.

Correct entry: $(\text{Mon1} + \text{Mon2} + \text{Mon3} + \text{Mon4}) / 4$
 $(72 + 74 + 78 + 77) / 4 = 75.25$

Incorrect entry: $\text{Mon1} + \text{Mon2} + \text{Mon3} + \text{Mon4} / 4$
 $72 + 74 + 78 + (77 / 4) = 243.25$

Without the parenthesis, the equation would incorrectly divide the process value of monitor point 4 by 4 and then add that to the sum total of monitor points 1, 2 and 3. By utilizing the parenthesis, the sum total of all monitor points will be determined first, and that value will then be divided by 4 to get the proper average of all four points.

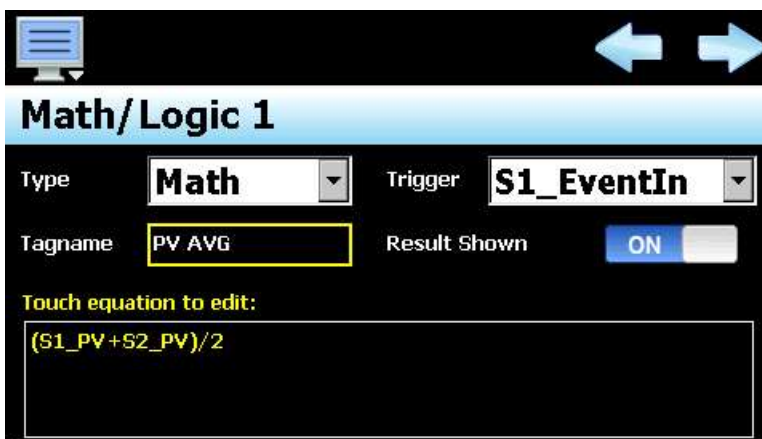
4.6.2.2 Square Root (SQRT) Implementation

To obtain the square root of a value or expression, you first activate the square root function by pressing the SQRT key. This appends the square root function “SQRT[” to the current equation. The SQRT key will “lock” on as indicated by changing color. All variable selections following the activation of the SQRT function will be part of the square root expression. Pressing the SQRT key again will end the square root entry by appending the closing bracket “]” to the equation and the key will unlock. Equation entry can then continue as normal.

4.6.2.3 Sample and Hold

To implement sample and hold, simply assign a trigger to the math equation instead of using the default “Always” selection. When the trigger is on, sampling will occur, i.e., the equation will be continuously evaluated. When the trigger is off, the EZT-570L will stop evaluating the equation, but the previous value will be maintained. This provides a simple means for performing sample and hold.

For example, at the end of a cycle we want to capture the average temperature of loops 1 and 2 and hold that value until the next cycle is started. The event input of loop 1 is already used as a status input to indicate that the cycle is active, so we can use it as our trigger. Our math/logic block would then be as follows:



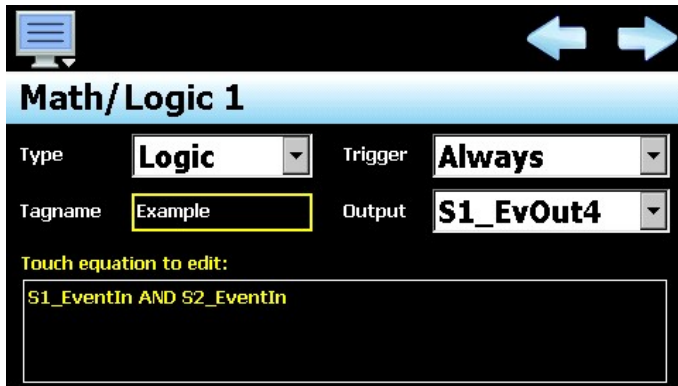
Since the trigger is active during the cycle, the average of loop 1 and loop 2 will be calculated and displayed on the Overview screen. When the cycle completes and the input turns off, the trigger for the equation will also turn off. The average of loop 1 and loop 2 will no longer be calculated; however, the previous value calculated will be held and displayed on the Overview screen until the next cycle is started, at which the trigger is again activated when the input turns on and a new average is calculated.

4.6.2.4 Basic Logic Operators

The EZT-570L provides standard logic operators (AND, OR, NOT) as well comparison operators of less than (<), greater than (>) and equals (=). Couples with the free-form entry of the EZT-570L math/logic blocks, it permits the operators to be used in any combination with any available system variable to create the custom logic required for any application.

Examples:

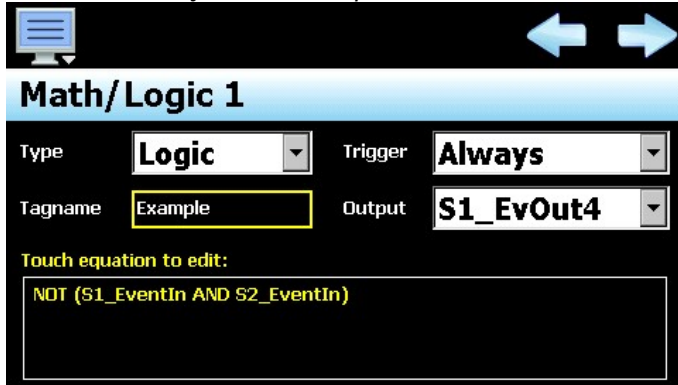
AND If either input is false, the output is false. If both inputs are true, the output is true.



Inputs		Output
F	F	F
F	T	F
T	F	F
T	T	T
F = False (off) T = True (on)		

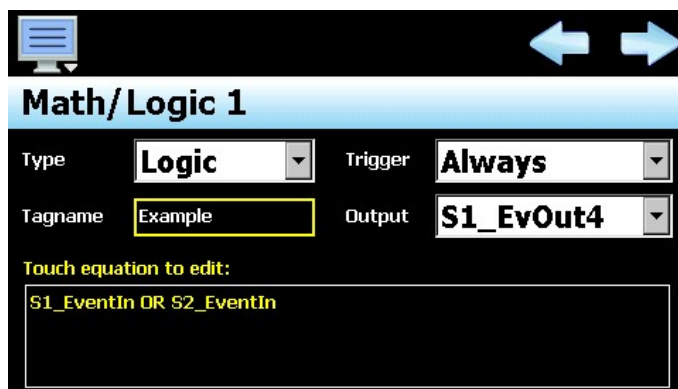
Nand If either input is false, the output is true. If both inputs are true, the output is false.

Note: NAND is just what it implies, i.e., NOT AND.



Inputs		Output
F	F	T
F	T	T
T	F	T
T	T	F
F = False (off) T = True (on)		

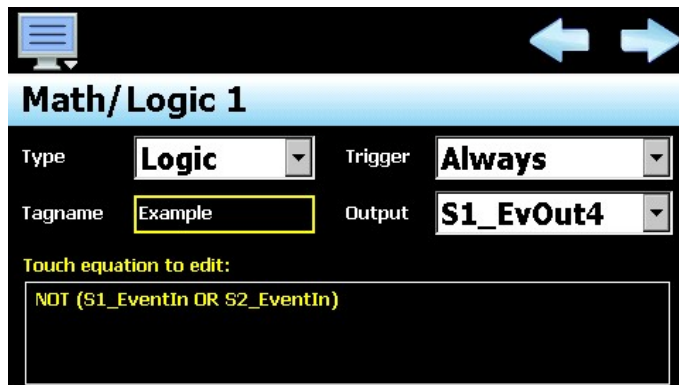
OR If either input is true, the output is true. If both inputs are false, the output is false.



Inputs		Output
F	F	F
F	T	T
T	F	T
T	T	T
F = False (off) T = True (on)		

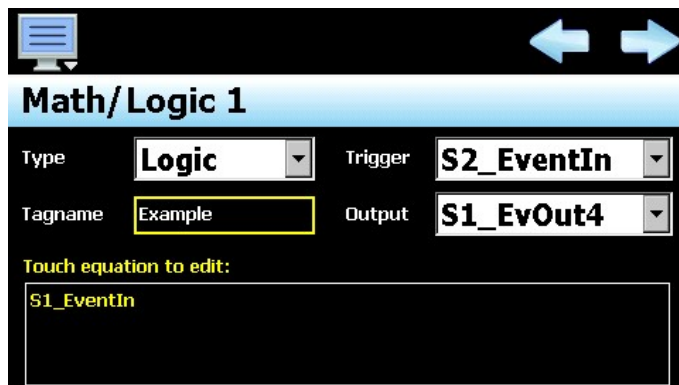
Nor If either input is true, the output is false. If both inputs are false, the output is true.

Note: NOR is just what it implies, i.e., NOT OR.



Inputs		Output
F	F	T
F	T	F
T	F	F
T	T	F
F = False (off) T = True (on)		

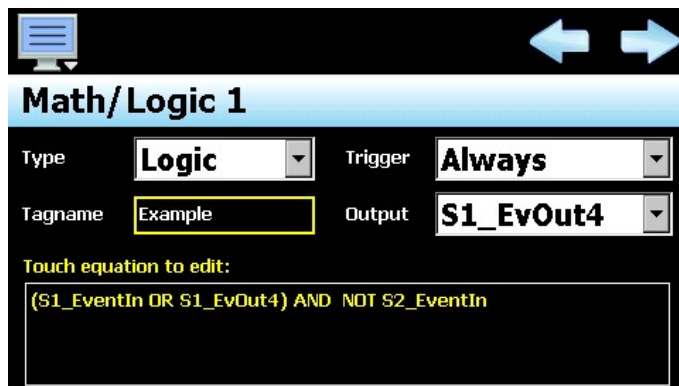
Latch When the trigger is active, the output follows the input. When the trigger is off, the output is held (latched) at the value it had when the trigger was lost.



As long as loop 2 event input is true (on), the equation will be evaluated. Thus, the loop 1 event output 4 will be on when the loop 1 event input is on and off when it is off.

When the loop 2 event input is false (off), the equation will no longer be evaluated and the previous output state will be held.

RS Flip Flop One input sets the output true; another sets it false.



If the loop 1 event input is on and the loop 2 event input is off, the output will be true. Since the output is logically OR'd with the loop 1 event input, even if the input is turned off, the expression within the parenthesis is still true so the output holds itself on.

If the loop 2 event input is then turned on, it will result in a false outcome, and the output will be turned off.

Comparison (Equals) If two values are the same, the output is true.

The screenshot shows the 'Math/Logic 1' configuration interface. At the top, there are navigation arrows. Below the title, the 'Type' is set to 'Logic' and the 'Trigger' is set to 'Always'. The 'Tagname' is 'Example' and the 'Output' is 'S1_EvOut4'. A text area labeled 'Touch equation to edit:' contains the equation $S1_SP=S2_SP$.

Comparing values...

As long as the set point of both loop 1 and 2 are equal, the output will be on.

The screenshot shows the 'Math/Logic 1' configuration interface. At the top, there are navigation arrows. Below the title, the 'Type' is set to 'Logic' and the 'Trigger' is set to 'Always'. The 'Tagname' is 'Example' and the 'Output' is 'S1_EvOut4'. A text area labeled 'Touch equation to edit:' contains the equation $S1_EventIn=S2_EventIn$.

Comparing logic states...

As long as the loop 1 and 2 event input states are equal, the output will be on, i.e., if both inputs are on or both inputs are off, the output is on.

4.6.2.5 Advanced Boost Heat/Cool

Boost heat and boost cool applications typically involve two-stage heating and cooling where the low capacity stage is normally used to maintain set point condition. When a large set point change then occurs, the low capacity stage would require too long of a period in time to achieve set point, so a second stage is then necessary to increase the rate of change until set point is again reached. The boost stage is then disabled and the low stage can again maintain set point.

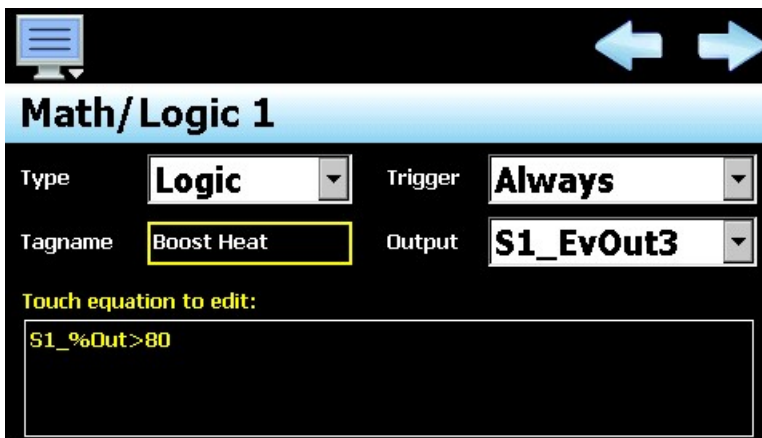
This type of operation can be programmed into the EZT-570L using a logic type equation to activate a digital output which would enable the boost heating or cooling stage. Take the following example:

Loop 1 (temperature control)

- Output 1 configured for heating
- Output 2 configured for cooling
- Output 3 configured as math/logic event output only (for boost heat)
- Output 4 configured as math/logic event output only (for boost cool)

The application requires that the boost heat output is activated when the heating output is greater than 80% and the boost cool output is activated when the cooling output is greater than 50%. This can be done utilizing two logic equations. We can begin by navigating to the Control Setup screen and entering a value of 2 for the number of Math/Logic equations. Next, we will navigate to the Math/Logic Configuration screen to enter the equations.

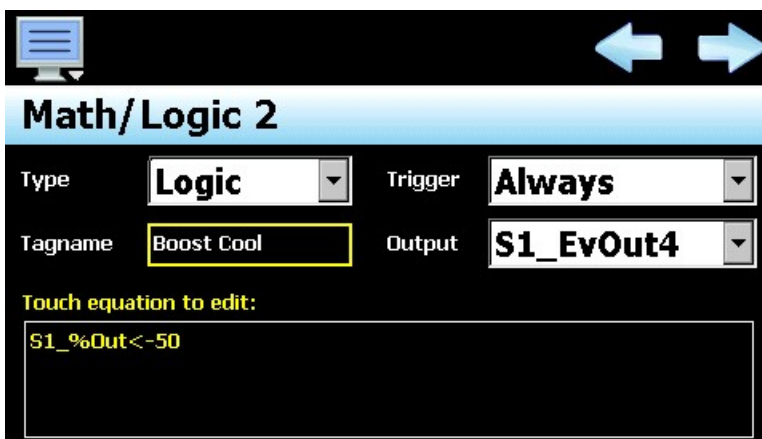
Math/Logic 1 will be used for boost heat, so first we select “Logic” for the equation Type. For reference, the Tagname will be set to “Boost Heat”. The Trigger will be left at the default of “Always” since the output should activate any time the heating percentage of output is above 80%. The Output selection must then be set to output 3 of loop 1. This corresponds to the “S1_EvOut3” selection. To enter the equation, press the equation display field. Select the output value of loop 1 (S1_%Out) and using the keypad buttons, enter the greater than symbol (>) and the value of 80. Finally, press the “Done” button and your screen should be as shown below.



When the temperature percentage of output is greater than 80, event output 3 of loop 1 will activate. When the percentage of output is below 80, the output will turn off. The equation for boost cool will be entered in the same manner. First, press the “next” navigation arrow at the top right of the screen to access equation 2.

Like the boost cool equation, set the equation Type to logic. The Trigger will be left at the default of “Always”. For the Tagname, enter “Boost Cool” in order to provide a reference for what the equation is used for. For the Output selection, choose “S1_EvOut4” which corresponds to output 4 of loop 1. For the equation, elect the loop 1 percentage of output (S1_%Out), but unlike boost heat, we will select the less than symbol for the comparison.

This is necessary because the loop percentage of output is represented as a negative number in heat/cool applications. Thus, in order to have the output activate when the cooling percentage is greater than 50%, we need to specify less than -50 which corresponds to a cooling output of 50% to 100% (full cooling). When complete, the equation will appear as in the image below.



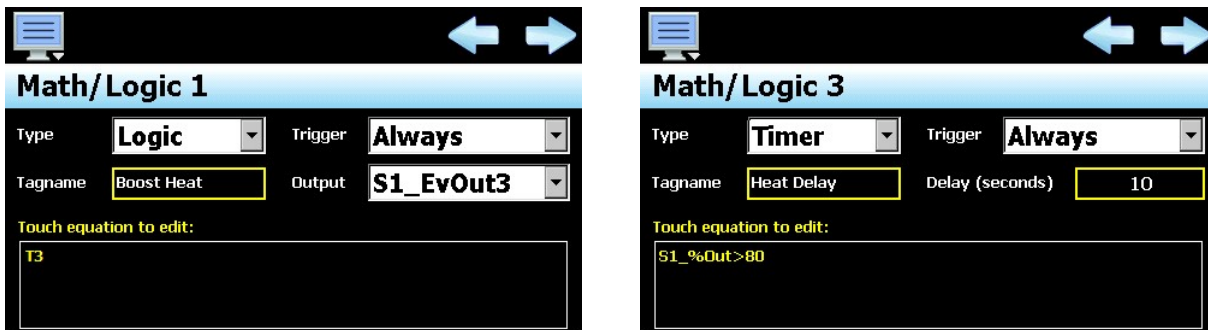
When the temperature percentage of output is less than -50, event output 4 of loop 1 will activate. When the percentage of output is above -50, the output will turn off. The two equations now provide the boost heat and cool functions required. However, what happens if the percentage of output is varying around the desired set point. If the heating output is varying between 79% and 81% for example, this can cause the boost heat output to constantly turn on and off. This could cause a control issue since the second stage of heat would be cycling on and off which may cause oscillation in temperature when the set point is first reached.

In order to prevent that, we could add delays that require the percentage of output for to exceed the required activation point for a period of time. This would prevent the output from cycling on and off when the heating output varies from 79% to 81% by requiring it to be above 80 for a period of 10 seconds for example. In order to do this, we need to implement a Timer equation. To do this, we first need to increase the number of Math/Logic equation on the Control Setup screen. Do this by setting the number of equations to 3. Next, navigate to the Math/Logic Configuration screen and select equation 3.

Set the Type of equation to “Timer”. The Trigger can be left at the default of “Always” so that the timer is activated/deactivated based on the percentage of output. For the Tagname, enter “Heat Delay” to describe the function of the timer. Next, enter the required delay period in seconds (10 for this example). The timer is activated based on the result of the equation entered. Like the previous logic equation for boost heat, we want the timer to activate when the percentage of output is greater than 80%. Thus, for the equation, enter “S1_%Out>80”.

This will result in the time delay being started when the percentage of output is greater than 80%. If at any time the percentage of output falls below 80%, the time will be reset and the delay will start again when the output exceeds 80%. If the output remains above 80% for the 10 second delay period, the internal timer output will be activated. To implement the delay on the output, we must now change the equation for the boost heat output. Do this by pressing the “Next” navigation arrow at the top right of the screen to access Math/Logic 1 equation.

To use the timer in the equation, touch the equation to edit it. Press the “Clear” button to delete the current equation, and then select the timer from the logic item drop-down menu. It will be displayed as “T3 (Heat Delay)”. Press the “Done” button to complete the modification. You should now have Math/Logic 1 and Math/Logic 3 equations as depicted below.



With the above two equations, the timer will begin counting down when the heat percentage of output is greater than 80. Once the 10 second delay period expires, the internal timer output will be on. When the timer output is on, equation one will be evaluated as true since the timer (T3) is expired. This results in event output 3 of loop 1 activating and enabling boost heat. The same thing can be accomplished with boost cool by using a fourth math equation to create another timer to delay the boost cool output.

4.6.2.6 Advanced Compressor Control Logic Example

Compressor control applications typically involve single or dual stage refrigeration systems. Dual stage systems are utilized in ultra-low temperature situations such as environmental test chambers or even heat treat applications where temperatures below -100°F (-73°C) are required. Typically, control schemes for environmental chambers tend to be more complex. Take the following example in which an environmental chamber controls both temperature and humidity. For heat/cool operation only, a dual stage refrigeration system is used to get to ultra-low temperatures. However, when in the temperature/humidity mode of operation in which the chamber is controlling both temperature and humidity, only the first cooling stage is utilized.

Since humidity can only be controlled between temperatures of 32°F (0°C) and 212°F (100°C), the second stage refrigeration system is not used for cooling since it operates at too low of a temperature. Also, stage 1 is required for dehumidification by using what is referred to as a “wet coil” which is used to strip moisture out of the air within the chamber, much like a home dehumidifier unit strips moisture from the air in damp locations such as a basement. All of this requires the controls system to know when to use stage 1 compressor vs. stage 1 and 2 compressors as well as when to turn them on and off based on cooling and dehumidification demand. This can all be accomplished using several logic/timer equations in the EZT-570L. Let’s begin with a typical temperature/humidity system configuration as follows:

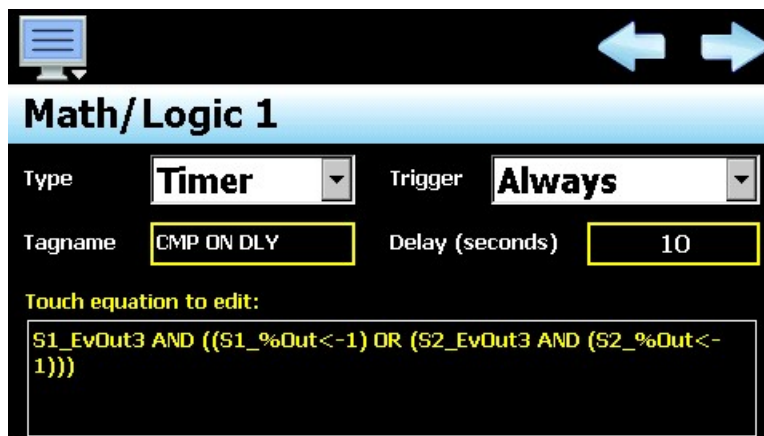
Loop 1 (temperature control)

- Output 1 = heating
- Output 2 = cooling
- Output 3 = event output for chamber on/off (enables/disables fans for circulating air)
- Output 4 = stage 1 compressor (for cooling and dehumidification when humidity control active)

Loop 1 (Humidity control)

- Output 1 = heating (humidification)
- Output 2 = cooling (dehumidification)
- Output 3 = event output for humidity system on/off
- Output 4 = stage 2 cooling (for cooling when humidity control is not active)

We only require the refrigeration compressors to operate when cooling or dehumidification is required. We also do not want the compressors turning on and off rapidly, so start and stop delays should be used to prevent them from turning on and off quickly when the temperature or humidity is hovering around set point. We will begin by creating an on-delay timer that can be used as the requirement for the compressor(s) to run. We will define equation 1 and a Timer type. The Trigger will be “Always” as we want it to evaluate the systems operation at all times. By providing it with a Tagname of “CMP ON DLY” we will know it is for delaying the start of the compressors.



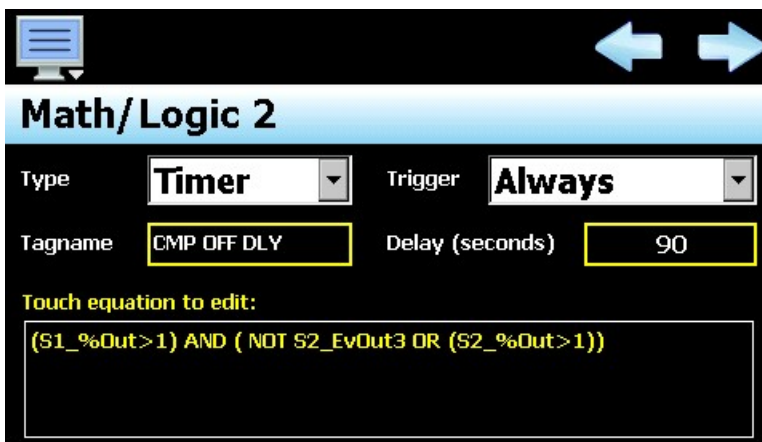
We do not want to delay the start of the compressor too long, so as shown above a short delay of 10 second is used. The equation shown above defines the condition at which the time delay begins. Since we do not want the compressors activating unless the chamber is on, we begin with the chamber event (S1_EvOut3) having to be on which is loop 1 event output 3. As long as that event is on, we require the compressor to run if cooling is required. Thus, we add the condition of loop 1 output being less than -1% which is a cooling demand of 1% (S1_%Out < -1). We also need the compressor to activate if the humidity system is on and dehumidification is called for. This is loop 2 event output 3 active and loop 2 output being less than -1% which is a dehumidification demand of 1% (S2_EvOut3 AND (S2_%Out < -1)).

Note that the two conditions for cooling and dehumidification have to be combined with a logical OR in parenthesis so that if the chamber event is on AND cooling OR dehumidification are required the timer will be activated. The position of parenthesis is important so that the evaluation is carried out properly. As can be seen, the equation can become complicated when multiple evaluations are required so it is best to write out the equation first and then enter it into the EZT-570L. Now that we have the start delay, we need the stop delay. We will advance to math/logic equation 2 and define it as a Timer type also.

Like the start delay, we need the EZT-570L to continuously monitor system operation so the Trigger is "Always". The Tagname can be "CMP OFF DLY" so we know it determines when the compressors are to turn off. We also want to extend the off delay so that once set point is reached, they will be available for a small bump of cooling or dehumidification should it be needed frequently to maintain set point, so in this example we will use 90 seconds. The off delay is essentially the opposite of the on-delay equation. We want the compressors to turn off when both cooling AND dehumidification are not required.

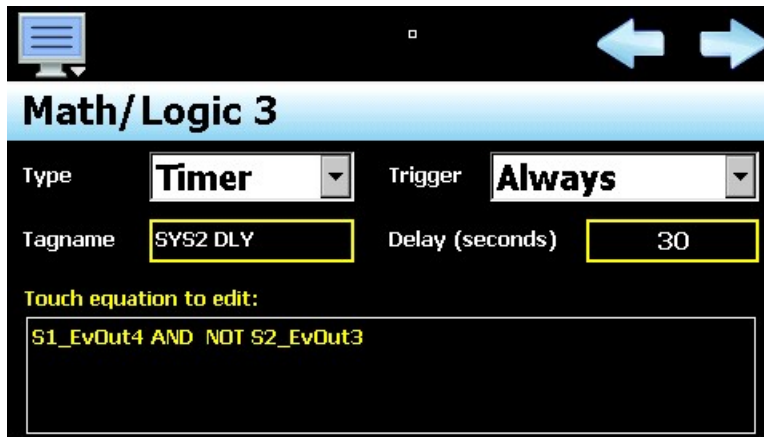
As shown in the image below, we begin by evaluating the loop 1 percentage of output and when greater than 1%, we want to signal that the compressors are not required (S1_%Out > 1). However, we must also perform a logical AND with the dehumidification requirement because we do not want the compressors turning off unless both cooling and dehumidification are not required. The dehumidification requirement is also only a valid condition if the humidity system is on. If it is turned off, the dehumidification requirement does not matter as the humidity system is not enabled. Thus, our off delay can time down if the humidity event is not active OR the loop 2 is actually calling for humidity (NOT S_2EvOut3 OR (S2_%Out > 1)).

Again, note the importance of the parenthesis in evaluating the cooling requirement, the dehumidification requirement, and then evaluating the two together to determine if the off-delay timer can count down.



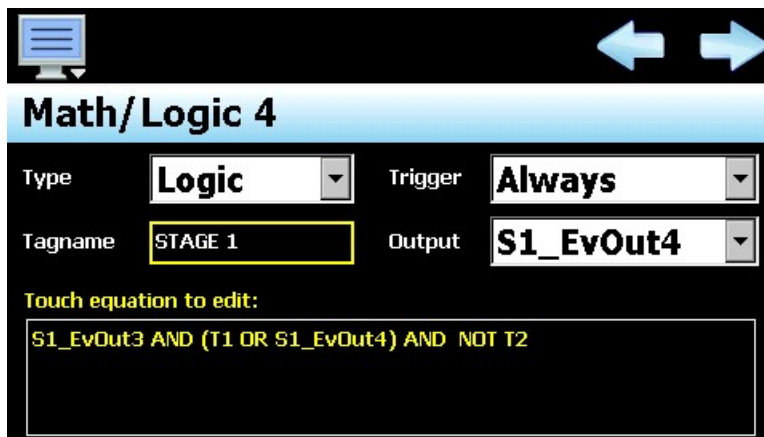
Before utilizing the on and off delay timers in logic equations to active the compressor outputs, one more timer is required. In the case of dual stage refrigeration systems, a delay is required between the start of stage 1 and the start of stage 2. This is necessary in order for the first stage to be ready for the load placed on it when the second stage starts, so that it can remove the heat from the second stage. Thus, we require one more timer which will create in math/logic equation 3.

This equation is relatively simple (as shown below). First, we need to verify that the stage 1 output is activated (S1_EvOut4) which is loop 1 event output 4. Next, we only want stage 2 to activate if the humidity system is not on which is loop 2 event output 3 (NOT S2_EvOut3). We will give it a 30 second delay and the Tagname of "SYS2 DLY" for reference. Now that all of the required time delays have been created, we can create the two logic equations to active the outputs for the stage 1 and stage 2 compressors.



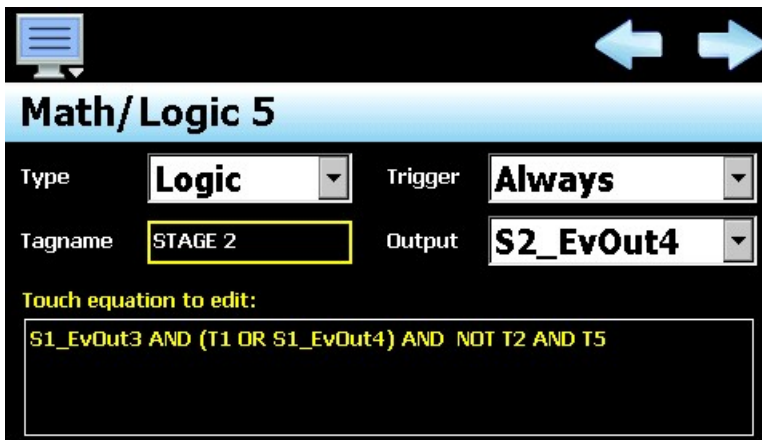
Advancing to math/logic equation 4, we will enter the logic equation for activating the stage 1 compressor. With the equation set for the "Logic" type, we will enter a Tagname of "Stage 1" for identification purposes. The Trigger will be left at the default of "Always" so that it evaluates the compressor output control at all times. Since this equation is to control the stage 1 compressor output which is loop 1 event output 4, we set the Output to "S1_EvOut4".

For the compressor output to activate, we require the chamber event to be active (S1_EvOut3) and the on-delay timer to be expired, which was the math/logic equation 1 (represented as T1). However, we require the compressor to remain on until the off-delay timer expires which was math/logic equation 2 (represented as T2). In order to do this, we can utilize the same output the equation is to control, as the "latch" to hold itself on. This is done by the logic comparison of T1 OR S1_EvOut4. When combined with the chamber event, we then have a result of when the chamber event is on AND the on delay is expired or the compressor is on, turn on the compressor. Since the compressor output is off at system start, the event must be on and the time delay expired for the compressor output to activate.



However, once the compressor activates, it would remain on unless the chamber event turns off. In order to get it to turn off based on the off-delay timer expiring, we add the final portion of the equation which is the off-delay timer NOT being expired. Thus, even once the compressor is activated and it latches itself in, the result of the equation only remains true when the off-delay timer (T2) is not expired. Once the off-delay timer expires, the result of the equation is false and the stage 1 compressor output turns off.

The final equation, Math/Logic 5, is for the stage 2 compressor output. It will essentially be a duplicate of the stage 1 equation, but with one additional condition, i.e., the delay timer (math/logic equation 3) must also be expired.



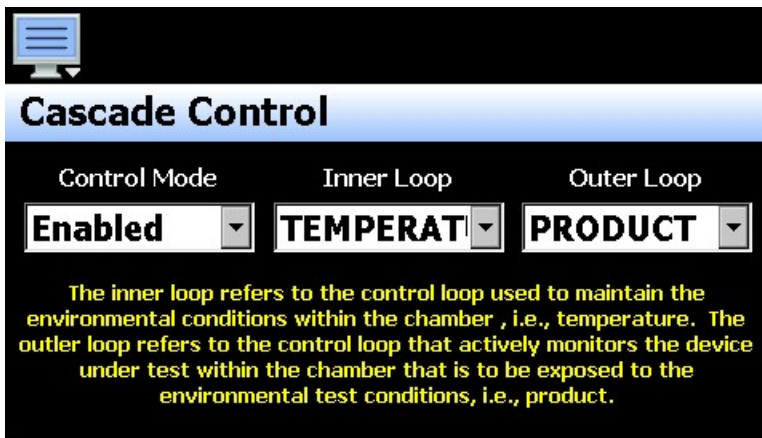
By duplicating the stage 1 equation and appending the requirement that the system 2 delay time has expired (represented as T5), the stage 2 compressor output will activate and deactivate under the same conditions as the stage 1 compressor, but also require the system 2 delay to be expired. Since the system 2 delay timer is only enabled if stage 1 is active and the humidity system is not active, this permits stage 2 operation only when in heat/cool operation and not humidity operation as required.

Note that this is only an example on how the EZT-570L and the math/logic module can be utilized to perform more complex control scenarios such as compressor control. The free-form logic entry provides you with numerous options and possibilities to implement various logic tasks that your application may require.

4.7 Cascade (Product) Control Option

Cascade control (a.k.a. Product Control) can be utilized when the control type is set for Dual Loop (+ Limit) or Three Loop. For the Single Loop (+ Limit) control type selections, the cascade control function selections are not accessible since cascade control requires two loops in order to operate.

The Cascade Control screen is accessed from the Options menu. The function selections are provided via three, drop-down menus. These menus allow the mode of operation to be set as well as select which loops are to be the inner and outer.



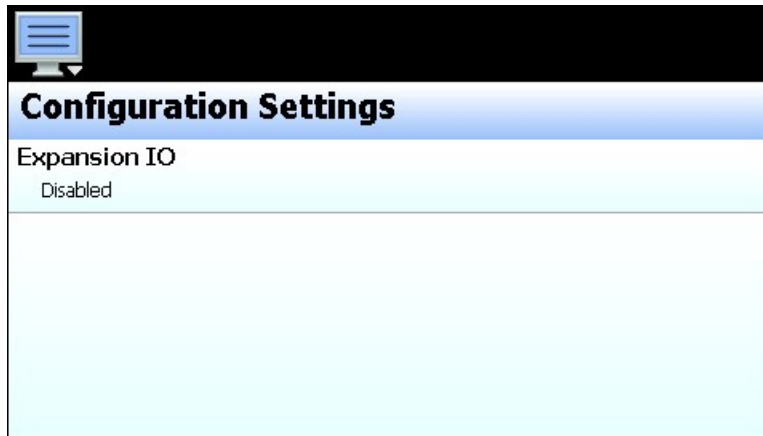
The **Control Mode** drop down menu provides two selections; Disabled and Enabled. When disabled, Product Control will not be available in the EZT-570L runtime application. When Enabled is selected, the product control logic will be activated. However, in order for the settings to be available in the EZT-570L runtime application, the “Loop cascade Settings” function must also be enabled. See section 4.10 Functions.

The **Inner Loop** and **Outer Loop** drop down menus provide a current list of all configured loops (by tag name). This allows the inner and outer loops to be selected according to the desired loop order. Note that both inner and outer loop cannot be set to the same loop. If the same loop is selected, cascade control will not operate. One loop must be selected as the outer loop to drive the set point of the inner loop.

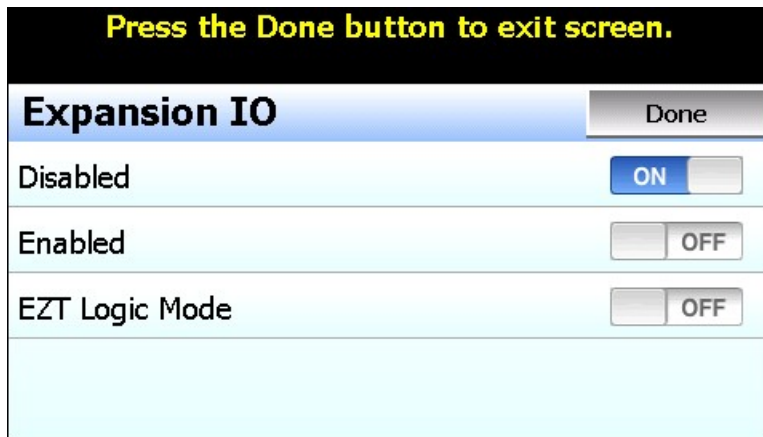
4.8 Expansion IO Module Option

The expansion IO module adds 16 digital inputs and 14 digital outputs to the EZT-570L hardware platform. It provides two modes of operation. The “EZT Logic Mode” provides integrated, preconfigured chamber control logic specifically designed for CSZ environmental chambers while the basic mode simply enables the use of the various digital inputs and outputs with selectable functions that can be tailored to a custom application.

The Expansion IO Configuration screen is accessed from the Options menu. The screen allows the option to be enabled/disabled and also provides access to all input and output function settings for the expansion IO module.

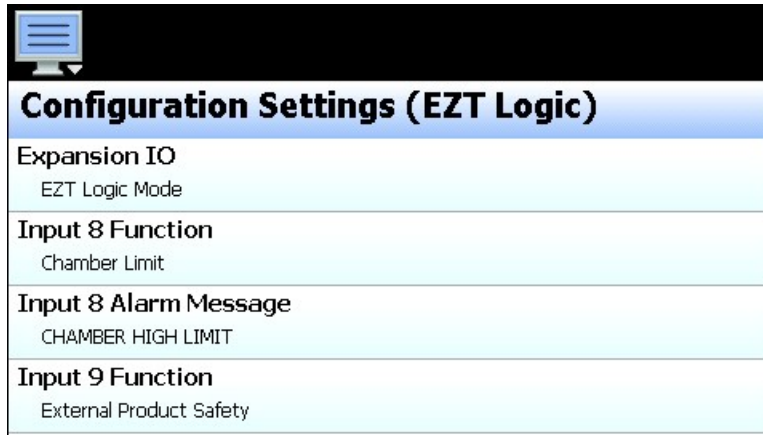


To view all of the available settings, the Expansion IO must be set to “Enabled” or “EZT Logic Mode”. When enabled, the configuration items for each input and output will then be provided in the list. Simply swipe up or down on the screen to scroll through the list items. To edit a value, tap the row for the desired item.



4.8.1 EZT Logic Mode Settings

When the EZT Logic mode is enabled, all of the digital inputs and outputs are predefined for specific functions. Some of the IO points cannot be altered, while others provide certain configuration options such as refrigeration system type.



Configuration Settings (EZT Logic)	
Expansion IO	EZT Logic Mode
Input 8 Function	Chamber Limit
Input 8 Alarm Message	CHAMBER HIGH LIMIT
Input 9 Function	External Product Safety

4.8.1.1 EZT Logic Mode Input (8-23) Functions

All of the digital inputs are predefined as alarm inputs and cannot be altered. Only the door switch input (input 21) offers selectable alarm options. The inputs and the functions they performed are described below.

The **Chamber Limit (8)** input is used to indicate that the chamber temperature safety has tripped. This input is active high, i.e., the input must be on in order for the alarm to be indicated. When active, the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is no longer active (requires manual reset of chamber limit device).

The **External Product Safety (9)** input is used to indicate that the redundant product safety has tripped (if equipped). This input is active high, i.e., the input must be on in order for the alarm to be indicated. When active, the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is no longer active (requires manual reset of product safety).

The **Motor Overload (10)** input is used to indicate that a motor overload relay has tripped due to a motor overload condition (if equipped). This input is active high, i.e., the input must be on in order for the alarm to be indicated. When active, the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is no longer active (requires manual reset of motor overload).

The **System 1 Pressure Safety (11)** input is used to indicate that the system 1 compressor has exceeded its high or low pressure operating range. This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is on (requires manual reset of high pressure safety).

The **System 1 Discharge Safety (12)** input is used to indicate that the system 1 compressor discharge temperature has exceeded the maximum operating range (if equipped). This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is on (automatically resets after allowed to cool down).

The **System 1 Oil Pressure/Protection Module (13)** input is used to indicate that the system 1 compressor oil pressure is below the proper operating range (if equipped) or the compressor protection module (if equipped) detected an improper phase condition/loss or the compressor motor windings have overheated. This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is on (may require manual reset of oil pressure safety/protection module).

The **System 2 Pressure Safety (14)** input is used to indicate that the system 1 compressor has exceeded its high or low pressure operating range. This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is on (requires manual reset of high pressure safety).

The **System 2 Discharge Safety (15)** input is used to indicate that the system 1 compressor discharge temperature has exceeded the maximum operating range (if equipped). This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is on (automatically resets after allowed to cool down).

The **System 2 Oil Pressure/Protection Module (16)** input is used to indicate that the system 1 compressor oil pressure is below the proper operating range (if equipped) or the compressor protection module (if equipped) detected an improper phase condition/loss or the compressor motor windings have overheated. This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is on (may require manual reset of oil pressure safety/protection module).

The **Boiler Temperature Safety (17)** input is used to indicate that the boiler has overheated. This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is on (requires manual reset of thermostat).

The **Boiler Low Water Level Safety (18)** input is used to indicate that the boiler is low on water. This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen).

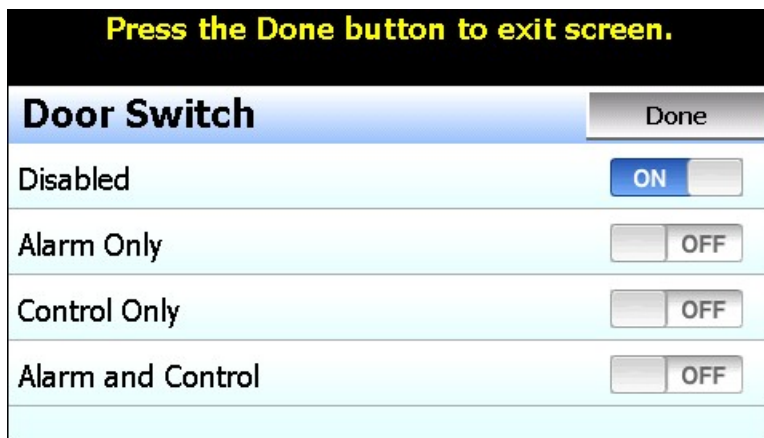
The low water safety has a startup delay to prevent the activation of the alarm until the boiler has been given sufficient time to fill (30 minute delay upon turning on the humidity event). If the boiler has not filled up in the allotted time, the alarm will sound. Once the boiler has reached the proper operating level, the alarm will sound immediately upon loss of level.

The **Water Reservoir Low (19)** input is used to indicate that the humidity system water reservoir is low on water (if equipped). This input is active low, i.e., the input must be off in order for the alarm to be indicated. When active (input off), the EZT will sound the alarm to bring operator attention to the chamber. The alarm will sound until acknowledged (reset button pressed on system status screen). This is a notification alarm only and does not shut down the chamber.

If the chamber has the humidity option, but not the low water reservoir, this input must be wired to +24Vdc. If not, the low water alarm will always be present. Jumping this input out prevents the alarm.

The **Defrost Temperature Switch (20)** input is a control input for defrost (if equipped). There is no user indication for this input or alarm message. When equipped with defrost, this input is wired to a thermostat on the suction line of the cooling coil. When the refrigeration system is in defrost, this input is used to begin the termination sequence for defrost by signaling that the coil defrost temperature has been met.

The **Door Switch (21)** input is used to indicate if the chamber door is open or closed (if equipped). The "DOOR OPEN" status will be displayed on the system status monitor screen. There are three options for the door alarm input operation.



- If the *Alarm Only* option is enabled, the input is active high, i.e., the input must be on in order for the alarm to be indicated. When activated a “door open” indicator will illuminate on the alarm monitor screen and the audible alarm will sound if the door is open when the chamber is running.
- If the *Control Only* option is enabled, the input is active low, i.e., the input must be off in order for the alarm to be indicated. When activated a “door open” indicator will illuminate on the alarm monitor screen and the EZT will shut down the chamber. There will be no audible alarm when this occurs.
- If the *Alarm and Control* option is enabled, the input is active low, i.e., the input must be off in order for the alarm to be indicated. When activated a “door open” indicator will illuminate on the alarm monitor screen and the EZT will shut down the chamber. There will also be an audible alarm and the “door open” alarm will be shown on the Alarm screen.

The **Emergency Stop (22)** input is used to indicate that the emergency stop has been activated (if equipped). This input is active high, i.e., the input must be on in order for the alarm to be indicated. When active (input on), the EZT shuts down the chamber until the alarm is acknowledged (reset button pressed on alarm monitor screen) and the input is off (requires manual reset of E-Stop button).

The **Power Failure (23)** input is used to indicate that there is a primary power failure to the chamber. When the chamber is equipped with a battery backup option for the control circuit, it allows the EZT to send out an alarm message over its network interface to alert operators of the power outage. When main power is restored, the EZT will automatically restart the chamber.

4.8.1.2 EZT Logic Mode Input (8-23) Alarm Message

In EZT logic mode, all inputs are defined as alarm inputs. The default alarm messages correspond to the intended alarm function for each input. These messages will be shown on the alarm screen in the runtime application upon alarm activation. If necessary, the default alarm messages can be modified up to 25 characters long.

4.8.1.3 EZT Logic Mode Output (32-45) Functions

All of the digital outputs are predefined for specific chamber functions; however, many of them have multiple settings in order to set the m to the specific options provided on the chamber. The outputs and their selectable functions are described below.

The **Audible Alarm (32)** output is used to activate an external audible alarm under fault conditions.

The **DUT Safety (33)** output acts as a “chamber run” verification for the customer to use as a product under test enable. As long as the chamber is running, i.e., controlling temperature, this output will be on. When the chamber is turned off or in a critical alarm condition, this output is off.

The **Chamber Light (34)** output toggles on and off to turn the chamber light(s) on and off when the light icon on the EZT-570L display is pressed. This output provides an Enable/Disable selection, so that it can be turned off. When disabled, the light icon will not be shown on the EZT-570L so it can be utilized on chambers that do not provide interior lighting.

The **Window Heater (35)** output is used to turn the window heater(s) on and off based on the configurable “Window Heater Setpoint”. When the air temperature drops below the set point, the output will turn on after a 1 minute delay. Once the air temperature rises above the set point, the output will then turn off after a 1 minute delay. The output will also turn on whenever the humidity system is enabled. This keeps the window clear during high dewpoint conditions in the chamber.

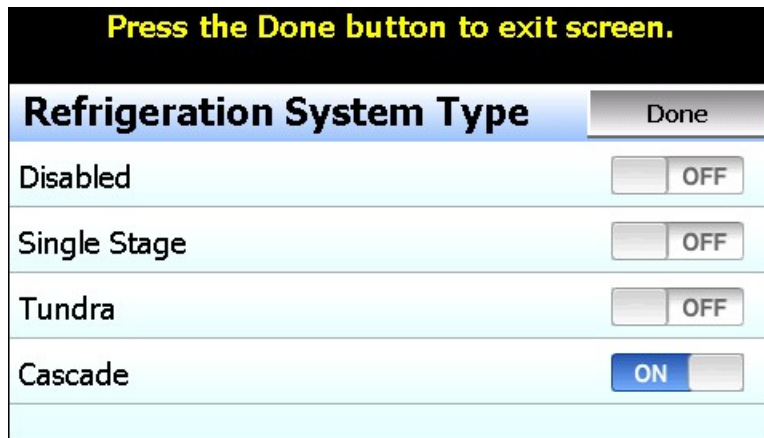
- The **Window Heater Setpoint** entry defines that temperature at which the window heater output is activated. When selected, the numeric keypad will be shown allowing entry between the lower and upper set point limits entered for loop 1 (temperature) on the Loop Configuration screen.

The **Air Circulators (36)** output is used to turn the chamber air circulator(s) on and off when chamber event 1 is turned on and off. If defrost is enabled, this output will turn off the air circulator(s) during defrost and will turn back on once defrost is complete.

The **Pumpdown (37)** output is used to enable pumpdown operation on the system 1 compressor if it is so equipped. This output provides an enable/disable selection. When enabled, and power to the chamber is off for more than the configurable Pumpdown Reset Timeout period, the Pumpdown Disabled alarm will be activated and the chamber will not operate until it is reset. Once pumpdown is reset, this output will remain on allowing the external pumpdown switch to activate the system 1 compressor to perform pumpdown operation.

- The **Pumpdown Reset Timeout** entry defines the number of seconds power can be off before pumpdown is disabled. When selected, the numeric keypad will be shown allowing entry between 0 and 28800 seconds.

The **Refrigeration (38, 39)** outputs are used to enable the refrigeration system compressors. Selecting either output 38 or 39 from the list will provide the refrigeration option selections. The options are mutually exclusive, so selecting one will deselect the others.



- When **Disabled** is selected neither output 38 or 39 will be utilized. The description for each output on the main expansion IO screen will indicate “Refrigeration System: Disabled”.

- When **Single Stage** is selected, output 38 will be designated as the “System 1 Compressor (single stage)” output. This is the standard single stage system selection. Output 39 will be designated as the “Max Cool” output. If the refrigeration system utilizes min/max cooling, output 39 is used to enable the maximum cooling solenoid.
- When **Tundra** is selected, output 38 will be designated as the “System 1 Compressor (Tundra)” output. This is for single stage systems utilizing R410a refrigerant. Output 39 will be designated as the “Max Cool” output.
- When **Cascade** is selected, output 38 will be designated as the “System 1 Compressor (cascade)” output and output 39 will be designated as the “System 2 Compressor (cascade)” output.

To adjust the operation of the refrigeration system, the following numerical entry fields are provided:

Compressor On Percentage: Sets the loop percentage of output required to enable the refrigeration system by demand for cooling. Selecting this field will allow entry from -100% to 100% of the loop 1 (temperature) output.

Compressor On Delay: Sets the delay in seconds for which the loop 1 (temperature) output must exceed the on percentage before the refrigeration system is activated. Selecting this field will allow entry from 0 to 28800 seconds.

Compressor Off Percentage: Sets the loop percentage of output required to disable the refrigeration system because cooling is no longer required. Selecting this field will allow entry from -100% to 100% of the loop 1 (temperature) output.

Compressor Off Delay: Sets the delay in seconds for which the loop 1 (temperature) output must exceed the off percentage before the refrigeration system is deactivated. Selecting this field will allow entry from 0 to 28800 seconds.

Oil/Module Alarm Delay: Sets the delay in seconds for which the system 1 and system 2 oil/protection module safety inputs must active after the compressor is started before the alarm is activated. Selecting this field will allow entry from 0 to 28800 seconds.

Note that a delay of 0 is permitted and when set, the oil/protection module input must be activated at all times. If the input is deactivated, the alarm will be immediately generated shutting down the chamber.

Stager Start Delay: Sets the delay time in seconds for the activation of system 2 after system 1 has started on cascade systems. Selecting this field will allow entry from 0 to 28800 seconds.

Max Cool Disable SP: For Tundra systems, used to define the chamber air temperature below which the maximum cool output is disabled. When selected, the numeric keypad will be shown allowing entry between the lower and upper set point limits entered for loop 1 (temperature) on the Loop Configuration screen.

Max Cool On Percentage: Sets the loop percentage of output required to enable the maximum cooling output. Selecting this field will allow entry from -100% to 100% of the loop 1 (temperature) output.

Max Cool On Delay: Sets the delay in seconds for which the loop 1 (temperature) output must exceed the on percentage before the maximum cool output is activated. Selecting this field will allow entry from 0 to 28800 seconds.

The **Humidity System (40)** output is used to turn the humidity system on and off when chamber event 2 (humidity) is turned on and off. There are two options for humidity system operation.

Press the Done button to exit screen.

Humidity System Type	Done
Disabled	<input type="checkbox"/> OFF
Enabled	<input type="checkbox"/> OFF
RH Cool	<input checked="" type="checkbox"/> ON

- When **Disabled** is selected, there will be no humidity system operation and chamber event 2 will not be provided. The description for the output on the main expansion IO screen will indicate “Humidity System: Disabled”.
- The **Enabled** selection is for single stage/tundra systems or cascade systems without a separate RH cooling circuit on system 1.
- The **RH Cool** selection is used to enable humidity system operation on cascade systems where only system 1 is used for cooling in humidity mode (utilizes separate RH cooling circuit).

To adjust the operation of the humidity system, the following numerical entry fields are provided:

Compressor On Percentage: Sets the loop percentage of output required to enable the refrigeration system by demand for dehumidification. Selecting this field will allow entry from -100% to 100% of the loop 2 (humidity) output.

Compressor On Delay: Sets the delay in seconds for which the loop 2 (humidity) output must exceed the on percentage before the refrigeration system is activated. Selecting this field will allow entry from 0 to 28800 seconds.

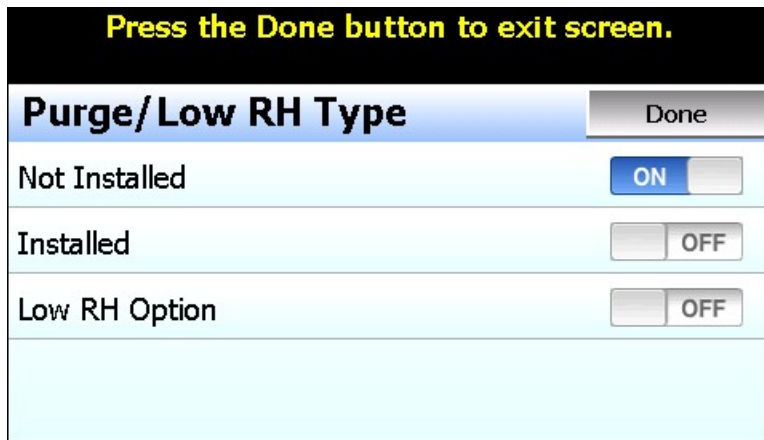
Compressor Off Percentage: Sets the loop percentage of output required to disable the refrigeration system because dehumidification is no longer required. Selecting this field will allow entry from -100% to 100% of the loop 2 (humidity) output.

Compressor Off Delay: Sets the delay in seconds for which the loop 2 (humidity) output must exceed the off percentage before the refrigeration system is deactivated. Selecting this field will allow entry from 0 to 28800 seconds

Humidity Min/Max Operating Temperature: These two fields set the minimum and maximum air temperature set points at which the humidity system will operate. When the air temperature set point and/or air temperature is below the minimum value or above the maximum value, the humidity system will be automatically turned off and the system status indicator “HUMIDITY TEMPERATURE DISABLE” will be lit.

When selected, the numeric keypad will be shown allowing entry between the lower and upper set point limits entered for loop 1 (temperature) on the Loop Configuration screen.

The **Dry Air Purge/Frozen Coil (41, 42)** outputs are used to enable the dry air purge and frozen coil options. Selecting either output 41 or 42 from the list will provide the purge/low RH option selections. The options are mutually exclusive, so selecting one will deselect the others.



- When **Not Installed** is selected, there will be no purge/low RH system operation and chamber event 4 will not be provided. The description for output 38 on the main expansion IO screen will indicate “Dry Air Purge: Not Installed” and output 39 will show “Frozen Coil: Not Installed”.
- The **Installed** selection is used when the chamber is only equipped with an air dryer. Output 41 is then used to turn the dry air purge system on and off with chamber event 4.
- The **Low RH Option** selection is used to enable and disable the operation of the low RH/frozen coil components (when equipped). In normal humidity mode, outputs 38 and 39 will be of so that the wet coil solenoid can be cycled on and off. When operating in frozen coil mode, outputs 38 and 39 will turn on in order to allow the dehumidification output of the humidity control loop to control the frozen coil solenoid instead of the wet coil solenoid.

To adjust the operation of the purge/low RH system, the following numerical entry fields are provided:

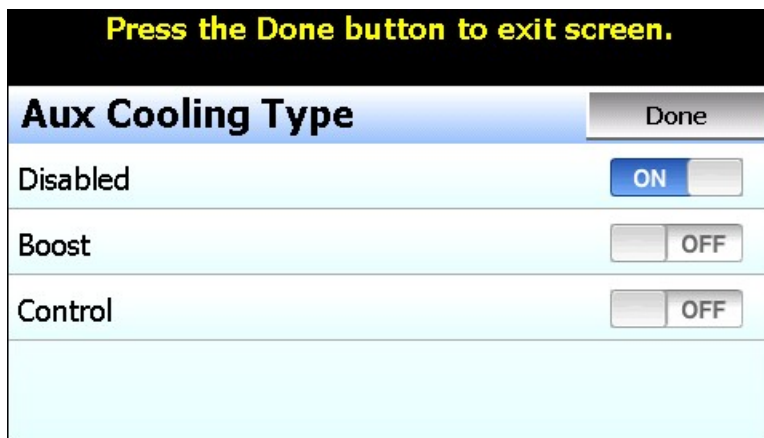
Minimum Dewpoint Limit: Sets the minimum dewpoint that the chamber will control to. In essence, this limits the minimum humidity level that the chamber can achieve at a given temperature. This value is used to protect the refrigeration system from liquid refrigerant flood back that can happen when trying to achieve too low of a humidity level at lower air temperatures. When selected, the numeric keypad will be shown allowing entry between the lower and upper set point limits entered for loop 1 (temperature) on the Loop Configuration screen.

Standard humidity is limited to a 2C (35F) dewpoint.
The low RH option is limited to a -30.0C (-22F) dewpoint.

Maximum Dewpoint Limit: Sets the maximum dewpoint that the chamber will control to. In essence, this limits the maximum humidity that the chamber can achieve at a given temperature. This value is primarily used to protect modular walk-ins. The modular walk-in panels cannot withstand high temperature and humidity levels. When selected, the numeric keypad will be shown allowing entry between the lower and upper set point limits entered for loop 1 (temperature) on the Loop Configuration screen.

Standard chambers typically have a setting of 100C (212F).
Modular walk-ins are typically limited to 70C (158F).

The **Aux Cool (43)** output is used to turn the auxiliary cooling system (supply solenoid) on and off when chamber event 3 is turned on and off. There are two options for auxiliary cooling system operation.



- When **Disabled** is selected, there will be no auxiliary cooling system operation and chamber event 3 will not be provided. The description for output 43 on the main expansion IO screen will indicate “Aux Cool: Disabled”.
- The **Boost** selection is used when the chamber operates within the standard refrigeration temperature range, and the auxiliary cooling source is used as a boost to drop temperature as quickly as possible. When chamber event 3 is activated, the output will turn on to enable the auxiliary cooling supply solenoid.
- The **Control** selection is used when the auxiliary cooling medium is utilized to drop chamber temperature below the capabilities of the refrigeration system. When selected, the EZT-570L will then disable the refrigeration system to prevent damage when the air temperature drops below the operating temperature of the refrigerant utilized.

To adjust the operation of the auxiliary cooling system, the following numerical entry fields are provided:

Boost Cool Disable SP: Sets the air temperature below which the auxiliary cooling system will be disabled in Boost mode to prevent damage to the refrigeration system. When in Control mode, defines the air temperature below which the auxiliary cooling system is activated and refrigeration system disabled in order to reach temperatures below which the refrigeration system is capable of. When selected, the numeric keypad will be shown allowing entry between the lower and upper set point limits entered for loop 1 (temperature) on the Loop Configuration screen.

Aux Cool On Percentage: Sets the loop percentage of output required to enable the refrigeration system by demand for cooling. Selecting this field will allow entry from -100% to 100% of the loop 1 (temperature) output.

Aux Cool On Delay: Sets the delay in seconds for which the loop 1 (temperature) output must exceed the on percentage before the aux cooling control output is activated. Selecting this field will allow entry from 0 to 28800 seconds.

The **Boost Cool/Coolin Enable (44)** output operates under predefined modes based on the combination of the aux cool (43) and defrost (45) output selections. When both the aux cool and defrost output modes are disabled, the output does not perform any function and is shown with a “NA (Aux Cool/Defrost disabled)” status description.

When only Boost cooling is enabled, the output is utilized as the “Boost Cool” output and controls the auxiliary cooling control solenoid. It is automatically enabled and disabled according to the Aux Cool On Percentage and On Delay entries to provide boost cooling when chamber event 3 (Aux Cool) is enabled.

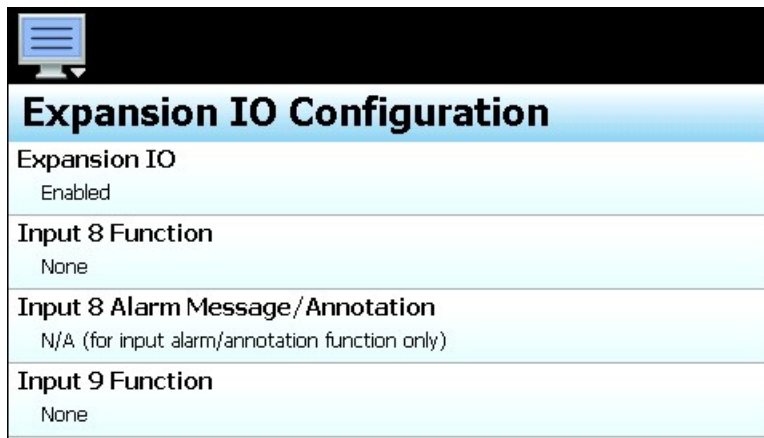
When only the Control mode for auxiliary cooling is enabled, the output is used as a Cooling Enable for the refrigeration system. During operation within the temperature range of the refrigeration system (above the Boost Cool Disable SP), the output is on so that the cooling output of loop 1 (temperature) can control the cooling solenoids. When the air temperature set point is below the Boost Cool Disable SP and the actual air temperature drops below the Boost Cool Disable SP, the output will turn off to disable cooling via the refrigeration system and allow the loop 1 cooling output to control the auxiliary cooling control solenoid directly for extreme low temperature operation.

When Defrost is enabled under output 45, the output is utilized as a Cooling Enable for the refrigeration system regardless of the auxiliary cooling selection. If Boost cooling is enabled, the activation of the auxiliary cooling control solenoid is done by an external timer. When defrost is activates, the output will turn off to disable cooling to the evaporator so that it can be defrosted.

The **Defrost (45)** output is used to activate the defrost solenoid when the chamber is equipped with defrost. When selected, the output mode can be set to Enabled or Disabled. When disabled, the output performs no function. When enabled, chamber event 9 (initiate defrost) is provided and the Defrost settings screen is shown in the EZT-570L runtime application to allow the user to configure defrost operation.

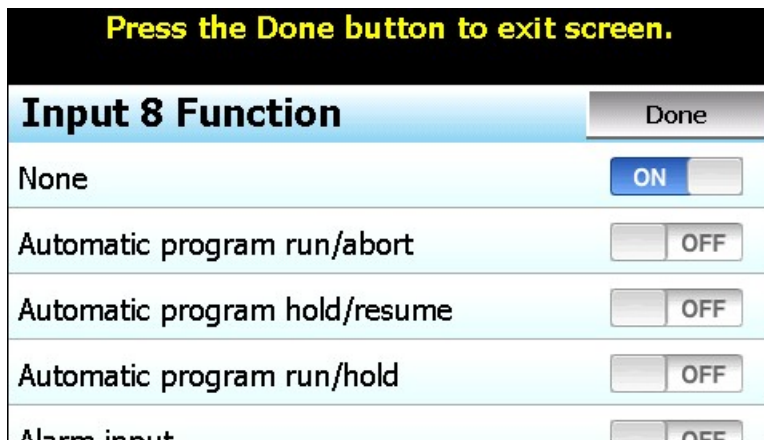
4.8.2 Basic Mode Settings

When the basic mode is “Enabled” to simply provide additional inputs and outputs, the input and output functions can be set randomly to the various IO functions provided.



4.8.2.1 Basic Input (8-23) Functions

The input function is used to select the desired mode of operation for each digital input. Each input is provided with its own function selection. The input numbers correspond to the markings on the expansion IO module. The input selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the input function for the selected expansion module input and return to the main Expansion IO Configuration screen.



The **Automatic program run/abort** function will start the currently loaded program from step 1 if not already running, upon activation of the input (an off to on transition). Deactivating the input (an on to off transition) will stop the program if it is currently running.

The **Automatic program hold/resume** function will place a currently running program into hold when the input is activated (an off to on transition). The program will resume operation and return to the run mode when the input is deactivated (an on to off transition).

The **Automatic program run/hold** function will start the currently loaded program from step 1 if not already running, upon first activation of the input (an off to on transition). Deactivating the input (an on to off transition) will then cause the program to go into hold. The input must then be reactivated in order for the program to resume operation.

The **Alarm input** function allows the input to be used for alarm indication. When the input is activated, the Input Alarm Message/Annotation (see following section 4.8.2) is displayed on the alarm screen in the runtime application and the audible alarm sounds.

The **Data logging annotation** functions allows the input to be used to write an annotation (operator event) to the running data log file. When the input is activated, the Input Alarm Message/Annotation (see following section 4.8.2) is written to the data file.

The **Math/logic input only** function allows the input to be used as an input for math/logic equations only. See section 4.6 Math/Logic Configuration.

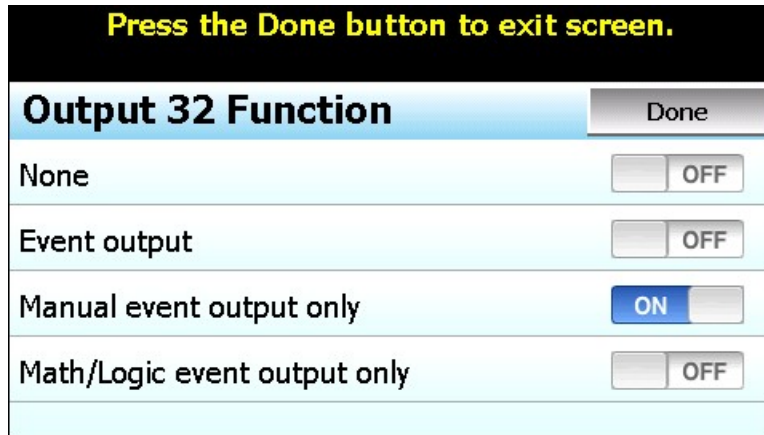
NOTE: *In order for the alarm and annotation input functions to operate properly, the input must be activated for at least five seconds. If the input is not activated for the minimum time period, the input status may not be captured and the alarm or annotation will not be posted. In order for the input to reset and capture the next input status, the input must also remain off for at least five seconds.*

4.8.2.2 Basic Input (8-23) Alarm Message/Annotation

When the input function is set to alarm input or data logging annotation, the Input Alarm Message/Annotation entry (for the corresponding numbered input) allows a fixed message to be assigned that will be shown on the alarm screen in the runtime application for alarm operation, or the operator event that will be written to the data log file for annotation operation. The message can be up to 25 characters long.

4.8.2.3 Basic Output (32-45) Functions

The output function selection is used to select the desired mode of operation for each digital output. Each output is provided with its own function selection. The output numbers correspond to the markings on the expansion IO module. The output selections are mutually exclusive, i.e., selecting one will turn off the others. Once the desired function has been selected, press the “Done” button to set the output function for the selected output and return to the main Expansion IO Configuration screen.



The **Event output** function allows the output to be turned on and off via an automatic program or manually through the EZT-570L runtime application to act as a “soft” switch to turn system components on and off.

The **Manual event output only** function is similar to the Event output function above as it allows the output to be turned on manually through the EZT-570L runtime application to act as a “soft” switch to turn system components on and off. However, the output cannot be controlled via an automatic program which allows the output to be controlled separately regardless of program operation.

The **Math/Logic event output only** function allows the output to be controlled only by a logic equation (See section 4.6 Math/Logic Configuration). The output will not be accessible through the runtime application as a “soft” switch like the event/manual event only selections.

IMPORTANT: *The expansion IO module is equipped with a communications safety interrupt. If communications are lost between the EZT-570L and the expansion module for more than 60 seconds, all outputs of the expansion module will be turned off. When communications to the expansion module is restored, the outputs will immediately return to their previous state.*

Therefore, it is recommended that the system is set to an “off” state and power is cycled to the EZT-570L prior to troubleshooting any communication failures in order to reboot the system from the off state. This ensures that any logic associated with output operation can resume from a known state when communications are restored in order to maintain any programmed sequence of events that must occur in order according to existing logic blocks.

4.9 Functions

The EZT-570L functions are accessed from the Startup menu and provide the means to select which screens/menu items will be enabled (shown) in the runtime application. These functions can be used to customize the system to meet specific requirements. When functions are disabled at the Configurator level from the functions list, it will be disabled in the runtime by removing the menu item or disabling the field so the operator cannot select the function or edit any corresponding settings related to the function.



IMPORTANT: *Disabling EZT-570L functions that are not required for the application results in a system that is clean and easy to use for the operator; however, be careful when disabling certain items. Without access to them, there may be no way to determine if the system is operating as required.*

Function	Runtime Menu Location	Description
Loop View	View\Loop	View loop PV, %Out, set loop set point and set fixed percentage of output NOTE: Without access to the loop view screen, the user will be unable to set a fixed percentage of output for the loop. If access to the Overview is also removed, user will be unable to turn manual event outputs on and off.
Overview	View\Overview	view loop PV, %Out, set loop set point NOTE: If access to the Loop View is also removed, the user will be unable to monitor or adjust loop operation.
Chart View	View\Chart	view and set up real time trends for loops and monitors
Alarm View	View\Alarm Notifications	view and reset current alarms current alarm status NOTE: With the function disabled, the user will only be able to access the alarm screen to reset an alarm when an alarm occurs by pressing the flashing alarm icon.
Alarm File	View\Alarm File	view and email alarm history files

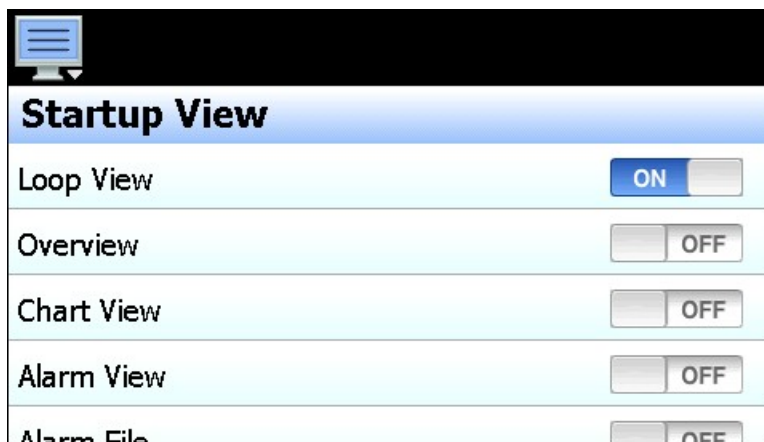
Function	Runtime Menu Location	Description
Security Settings	Security Notifications	view/set security rights, view audit trails, user log on view security and audit status NOTE: If security is enabled, but system security is then disabled through this item, the user will be unable to log on. Default security (device level) access will be used. This allows audit trails to be active while hiding all user security features. With security menu disabled, audit trail files are accessible via Log/USB File Utilities or temporarily re-enable security menu to gain access to the audit files.
Automatic Program Control/Recovery	Program Device\Settings\Offline\Set\Recovery Notifications	view, create, edit and run automatic ramp/soak programs set power recovery mode view program status NOTE: When disabled, all program items and menus will be removed from the runtime application. The user will be unable to access or start programs via the interface.
Data Logging	Data\Data Notifications	enable/disable data logging, select points for logging, access to historical viewer, FTP and USB File utilities view data log status, length and interval NOTE: If data logging is set to log on program operation or when the EZT-570L starts and this menu is then disabled, data logging will be disabled. This menu item must remain visible in order for data logging to function. The USB File utilities will not be accessible to copy or delete data, alarm, audit or program files.
Data Log Viewer	Data\Chart	access to view historical data log files
Annotations	Data\View\Annotation	access to add and view operator annotations to data files

Function	Runtime Menu Location	Description
Digital Signatures	Data\View\Signature	access to view and add digital signature to data log file
File Utilities	Data\Utilities\USB	access to copy/delete alarm, audit, program and data log files Note: Alarm, audit and data files may be transferred via FTP if unit is so configured.
FTP/WAN Settings	Data\Utilities\FTP\WAN	access to view/configure FTP file transfer settings NOTE: Once the FTP is configured for Auto Backup in the runtime application, this menu item can be disabled and hidden from the operator so that the settings cannot be accessed or altered. The Auto Backup to the FTP Server would occur as configured.
Loop Manual Mode	View\Loop	access to placing the loop in manual and setting a fixed percentage of output
Loop PID Tuning	Device\Settings\View\Tuning	access loop tuning screen NOTE: With loop PID tuning disabled, the user will also lose the ability to place the loop in auto tune.
Loop Cascade Settings	Device\Settings\Set\Cascade	access Product Control screen
Alarm Settings	Device\Settings\Set\Alarm	access alarm settings NOTE: Alarms can be fully programmed in the Configurator and hidden in the runtime by disabling this function. The alarms will operate as programmed in the background removing all access by the operator.
Email/SMTP Settings	Device\Settings>Email>Email	access to view/configure email settings
Communication Settings	Device\Settings\Set\Comms Notifications	access to web server, Modbus and VNC settings view web server and VNC status

Function	Runtime Menu Location	Description
Edit Event Names	Device\Settings\Set \Event	access to view/edit system event names NOTE: Event names can be assigned in the runtime and then this item disabled to prevent changes to event names.
Temperature Units	Device\Settings\Offline\Set\Units	access to set temperature units
Input Calibration	Device\Settings\Offline\Calibrate\Inputs	access to input calibration for all loops, limit control and monitor points if installed
Import/Export Setup	Device\Settings\Offline\System\ Configuration	access import/export utility to back up current Orion-M configuration or restore configuration from back-up file
Setpoint Limits	Device\Settings\Set\Limit	access loop set point high and low entry limits as well as ramp rate up/down and deviation hold settings if ramp rate operation configured for loop
Language	Device\Settings\Offline\Set\Language	access to set the display language selection for menus and online help
Exit Application	Device\Settings\Offline\System\Exit	access to the exit application screen
Loop view Manual Operation	View\Loop – Manual Operation button	access for turning manual events on and off
Loop View Program Operation	View\Loop – Program Operation button	access to program selection and run/hold control

4.10 Startup View

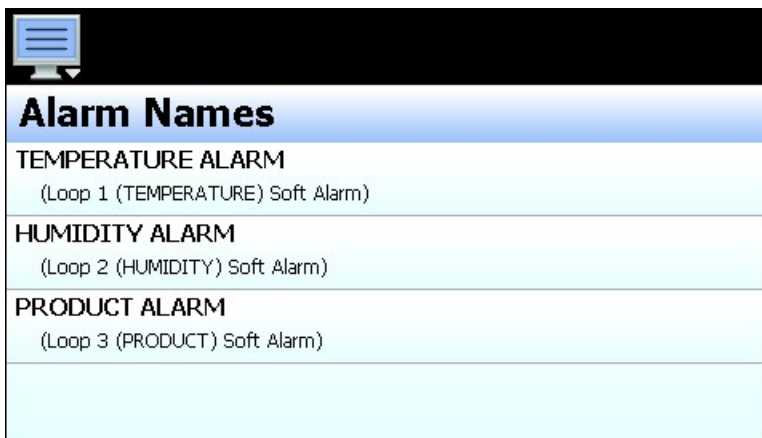
The Startup View screen is accessed from the Startup menu and provides selections for which of the main view screens the runtime application will display when it first starts and when the “Home” icon is pressed.



The available selections are Loop View, Overview, Chart View, Alarm View and Alarm File screens.

4.11 Alarm Names

The Alarm Names screen is accessed from the Tagnames menu and provides the ability to edit the name (alarm message) of all configured alarms. In order to access the screen, there must be at least one loop control output configured as an alarm, one soft alarm programmed or the limit control installed.



The alarms will be listed in sequential order starting with any outputs programmed as an alarm on loop 1 through loop 3 and/or the limit, and then soft alarms. To assist in identifying which device/output the alarm is assigned to, the list includes the alarm source. The alarm names will be displayed in the runtime application as the alarm description on the Alarm screen. To change the name of an alarm, select the alarm from the list and enter the desired text up to 25 characters.

NOTE: *Since the alarm names are assigned in sequential order based on the configured alarms, if the number of alarms are changed due to changes in loop output or limit configuration, previous alarm names may no longer be correct for the alarm output they are assigned to. Therefore, when making configuration changes, be sure to check the alarm names and verify the descriptions are correct for the alarm they are assigned to.*

4.12 Event Names

The Event Names screen is accessed from the Tagnames menu and provides the ability to edit the names of all configured events. In order to access the screen, there must be at least one loop control output or expansion IO output configured as an event.

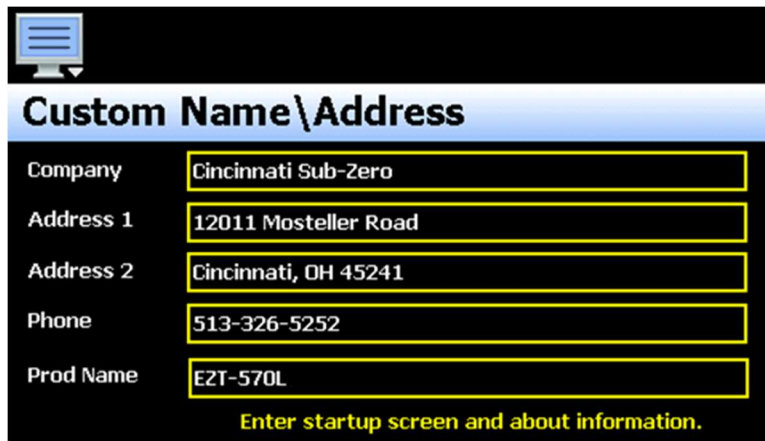


The events will be listed in sequential order starting with any dedicated chamber events, then outputs programmed as an event on loop 1 through loop 3 and finally any expansion outputs programmed as events. To assist in identifying which device/output the event is assigned to, the list includes the event source. The event names will be displayed in the runtime application on the Manual Operation slide out, Overview and program Entry screens. To change the name of an event, select the event from the list and enter the desired text up to 15 characters.

NOTE: *Since the event names are assigned in sequential order based on the system configuration, if the number of events is changed due to a change in the system configuration, previous event names may no longer be correct for the event function they perform. Therefore, when making configuration changes, be sure to check the event names and verify the descriptions are correct for the event function they perform.*

4.13 Custom Name\Address

The Custom Name\Address screen is accessed from the Tagnames menu and is used by CSZ to configure the main splash screen when the EZT-570L runtime application starts. It allows the company name and contact information to be entered and shown each time the system is powered up.



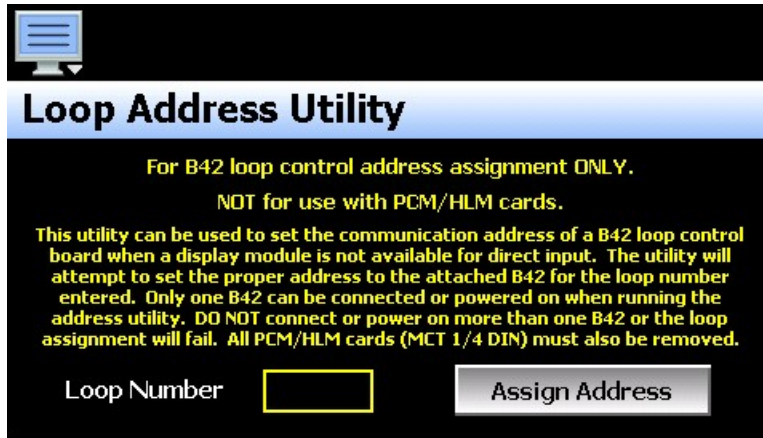
Custom Name\Address	
Company	Cincinnati Sub-Zero
Address 1	12011 Mosteller Road
Address 2	Cincinnati, OH 45241
Phone	513-326-5252
Prod Name	EZT-570L

Enter startup screen and about information.

To edit the company, address, phone number or controller (product) name, press the field and enter the desired text. Each field can be entered with a maximum of 34 characters (except the product name which is limited to 24) that will be displayed on the splash screen when the EZT-570L starts.

4.14 Loop Address Utility

The Loop Address Utility is utilized on the HMI hardware platform to assign loop addresses to the B42 control boards. It is accessed from the File menu. It is not for use with the ¼ DIN hardware platform unless external loop control boards are used (custom application). The PCM and HLM cards of the ¼ DIN hardware platform do not require address assignment. However, external loop control boards (B42) must have their individual communication address set to properly communicate with the EZT-570L user interface.

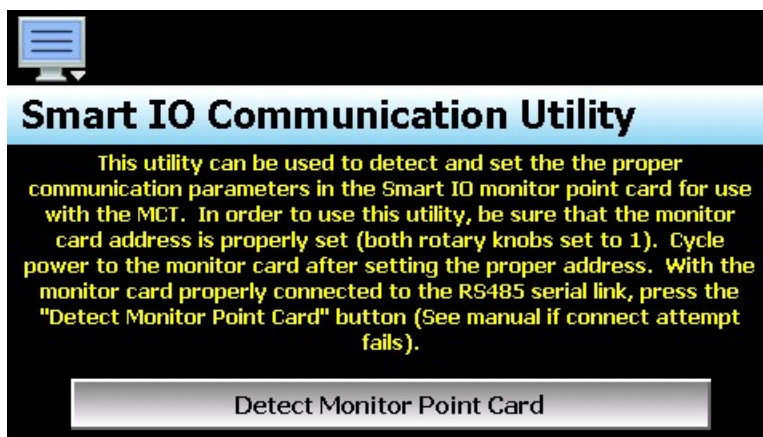


In order to use the utility, only one loop control board can be connected to the master RS485 serial interface at a time. All PCM and HLM cards must also be removed (if installed). With only one loop control board powered on or connected, press the Loop Number field and enter the address to assign to the attached B42 loop control. Once entered, press the “Assign Address” button and the utility will begin scanning for the loop control board and set its address to the one entered once found. If the utility fails to set the address, check the wiring to insure it is properly connected.

IMPORTANT: *The loop input number corresponds to the communications address that must be set in the loop control board for the EZT-570L to access it properly. If the communications address is not set properly in the loop control, the EZT-570L will not be able to communicate with it or may communicate with the wrong loop control and assign the incorrect set points and control parameters to it.*

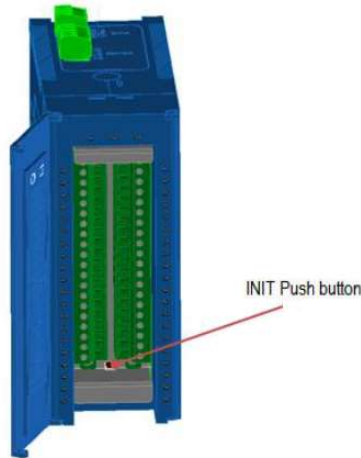
4.15 Smart IO Communication Utility

The default communication parameters of the monitor module (new module or one that has factory reset applied) do not match the proper settings required to communicate with the EZT-570L. The Smart IO Communication Utility (accessed from the File menu) provides quick, easy method to configure the monitor module parameters via the touch of a button.



In order to use the utility, the monitor module must be connected to the RS485 master interface of the EZT-570L and have its communication address properly set via the two rotary dials (see section 3.4 Connecting to the Smart IO Monitor Module). Press the “Detect Monitor Point Card” button and the utility will attempt to set the communication parameters. On success, a prompt will be shown to cycle power to the monitor module. Once power is cycled, the EZT-570L will then be able to communicate with the monitor module and the inputs can be configured.

If the utility is unable to set the monitor module communication parameters, verify that the communication wiring is properly connected and the address is properly set (both rotary dials to one). If the monitor module has been previously used in another application, it may be possible that the default communication parameters are not in use. To reset the monitor module to default values, press and hold the initialization button for approximately 3 seconds. The three LED indicators at the top of the module will blink once the reset has been performed.



Cycle power to the monitor module after the reset is performed and again press the “Detect Monitor Point Card” button on the EZT-570L. The EZT-570L should then be able to set the proper communication settings. Upon success, be sure to cycle power to the monitor module so that it will begin using the new communication settings.

NOTE: *When the initialization is performed, all input type selections will be returned to the factory default of $\pm 10\text{VDC}$. Input types will have to be reconfigured any time a factory reset is performed.*

5. Troubleshooting Chamber Operation

This section provides direction on troubleshooting chamber operation when no alarm condition is present. It is broken into sub-sections for temperature, humidity, altitude control, etc. Locate the section that most closely relates to the problem at hand in order to help diagnose and solve it.

NOTE: *Remember to keep it simple. Don't try and solve everything at once. Take each issue one-at-a-time. It may take several "trips" through this guide to correct each problem or locate the root cause of a single fault, but by breaking it down into pieces you can simplify the process and solve it in less time.*

In many instances, one component failure or incorrect control setting can cause various chamber malfunctions that would point you in several different directions, none of which may be correct. Always try and work backwards from what is not working correctly and determine why. Why is this not working, what makes it work and/or how should it work?

Section 4.1 Conditioning System

This section covers typical problems that may arise with the chamber's heating and refrigeration systems. It includes information regarding the operation of temperature limited sheath heaters for special use as well as information on rate-master and defrost operating conditions in order to help diagnose any problems that may occur with their operation.

Section 4.2 Humidity System

This section covers typical problems that may arise with the chamber's humidity system. It also includes information regarding the operation of the low RH mode (frozen coil) in order to help diagnose any problems that may occur during operation.

Section 4.3 Auxiliary Cooling System

This section covers typical problems that may arise with the chamber's auxiliary cooling system. It includes information regarding the operation of both the boost cooling and cooling control modes in order to help diagnose any problems that may occur during operation.

Section 4.4 Dry Air Purge System

This section covers typical problems that may arise with the chamber's dry air purge system. It includes information regarding the operation of the low RH mode (frozen coil) in order to help diagnose any problems that may occur during operation.

5.1 Conditioning System

When the main chamber event is turned on, temperature control is the primary function. The air circulator output will turn on and enable heating/cooling. The cool enable output, if equipped, turns on with the chamber event to enable the control circuits for heating and cooling. This output is typically only used and wired into the control circuit when the chamber is equipped with defrost. In defrost, the output would turn off in order to disable the heating and cooling control circuits while defrost is running.

Heating operation is relatively basic; however, the refrigeration system operation is more complicated with staging of compressors, etc. Depending upon options present on the chamber, it may include separate RH cooling operation and/or defrost.

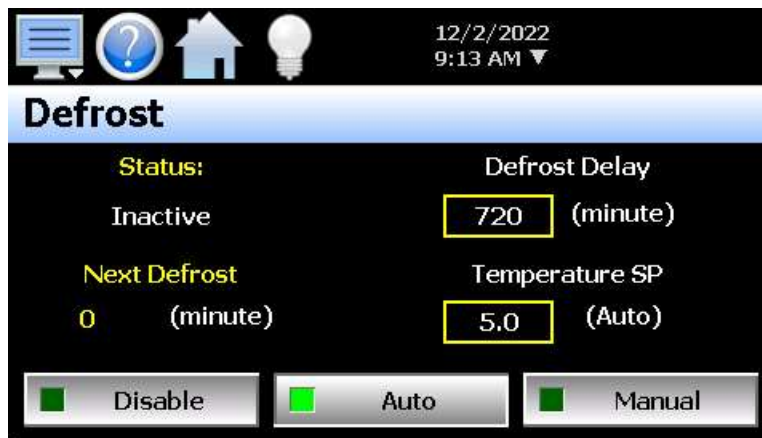
5.1.1 Temperature Limited Sheath heaters

Temperature limited sheath heaters are used in applications where there is, or may be, the presence of a flammable substance within the chamber. These heaters operate at lower surface temperatures than standard open element, nichrome wire heaters and their surface is not electrically “live”. This allows a temperature sensor, typically a thermocouple, to be placed on their surface. The sensor is then connected to a limit device.

This limit device monitors the surface temperature of the heater and removes power from the heater when the surface temperature exceeds the maximum operating limit. The limit device overrides any call for heating by the chamber controller. Once the temperature drops below the operating limit, power is restored to the heaters if heating is still required. The operating temperature limit is dictated by the flammable material. The maximum operating temperature of the heater surface can be no higher than 80% of the auto-ignition temperature of the flammable material in degrees centigrade.

5.1.2 Defrost Operation

Defrost can be manually initiated by turning on the defrost event, or it can be automatically started by the EZT based on the defrost settings. When in automatic mode, the defrost timer will begin counting down whenever the air temperature set point is below the defrost set point. Once the timer counts down to zero, defrost is initiated for one cycle. Upon completion of the cycle, the timer will begin the next timed countdown.



When defrost is started, the air circulator output is turned off. The cooling enable output is also turned off. This prevents any heating or cooling from taking place. The defrost solenoid output will turn on and the refrigeration system will continue operating. This supplies hot gas to the cooling coil. This process will continue until the defrost temperature switch input is made indicating that the suction temperature of the coil has warmed up to the defrost temperature setting or a built-in maximum 30 minute defrost timer expires.

This will terminate defrost and active the Prechill cycle. In pre-chill, the defrost solenoid will be turned off and the cooling enable output will be turned on. This will allow the refrigeration system to pre cool the coil prior to starting the air circulators. After a period of 1 minute, pre-chill will terminate, the air circulators will turn back on, and the system will resume normal operation.

5.1.3 Conditioning System Failures and Corrective Actions

SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
Chamber air circulator(s) not turning on.	Chamber event not turned on. Blown fuse. Chamber in defrost (if equipped). Chamber door open (if door switch enabled in configurator).	Turn on chamber event. Replace Fuse. Check defrost status. Allow defrost to complete or terminate defrost. Close chamber door.
Chamber not heating.	Chamber event not on. Blown heater fuse. Sheath heater limit tripped. Loop control output off. Chamber in defrost (if equipped).	Turn on chamber event. Replace fuse. Check heater limit. Maximum temperature reached. Verify proper loop control configuration. Check set point. Replace loop control. Check defrost status. Allow defrost to complete or terminate defrost.
System 1 compressor not turning on.	Chamber event not on. Blown fuse. Compressor internal thermal overload tripped. Chamber in defrost (if equipped). Refrigeration system not enabled or compressor percent on set point not exceeded for delay time.	Turn on chamber event. Replace fuse. Allow compressor to cool. Check refrigeration system/injection valve operation. Check defrost status. Allow defrost to complete. Compressor will cycle as needed. Check configurator settings. Refrigeration system type should match installed system type.
System 2 compressor not turning on.	Blown fuse. Compressor internal thermal overload tripped. Chamber in humidity mode. Refrigeration system not enabled or stager start delay time not met.	Replace fuse. Allow compressor to cool. Check refrigeration system/injection valve operation. Check humidity system type. System 2 disabled for single stage humidity operation. Check configurator settings. Refrigeration system type should match installed system type. Wait for stager start delay period.

SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
Chamber not cooling. (further diagnosis and/or repair requires certified refrigeration service personnel)	Chamber event not on. Cooling coil fouled with ice build-up. Loop control output off. Chamber in defrost (if equipped). Refrigeration system capacity exceeded.	Turn on chamber event. Initiate defrost or warm up chamber to melt ice from coil. Seal ports or leaks in chamber to minimize moisture migration into chamber and accumulating on coil. Verify proper loop control configuration. Check set point. Replace loop control. Check defrost status. Allow defrost to complete or terminate defrost. Reduce live load in chamber.
Defrost not starting.	Suction line not below defrost thermostat setting. Defrost thermostat not working.	Check thermostat setting. Defrost not required. Check thermostat set point and operation. Adjust/replace.
Defrost not terminating.	Defrost cycle period (30 minutes maximum) not completed.	Allow enough time for defrost sequence to complete.

5.2 Humidity System

When the humidity system is enabled, the humidity system output will turn on. This turns on water supply solenoids and atomizer air compressor if applicable. If the refrigeration system is set to run in single stage mode when humidity is on, the system 2 compressor output will then be turned off as long as humidity is on.

An alarm delay is added to the boiler low water input in order to allow enough time for it to fill with water when the humidity system is first turned on. The delay will prevent the alarm from going off for a period of 30 minutes. Should the level not be made in that time, the alarm will sound and shut down the chamber. Once the proper water level is reached, the alarm will sound and shut down the chamber immediately upon losing the input. Should the alarm occur, silence the alarm from the alarm screen and the chamber will begin operating again and restart the 30 minute alarm delay timer.

Temperature Limits

The EZT limits the humidity system's operational range to a minimum and maximum temperature as set in the configurator. These limits are typically set around freezing and boiling temperatures. Once the air temperature exceeds either limit, the EZT shuts down the humidity system automatically. If the humidity system is shut down due to temperature limitations, the system status monitor will indicate that this has occurred by illuminating the "HUMIDIT TEMPERATURE DISABLE" indicator. The humidity system will restart automatically once the air temperature returns to within the set temperature range.

Dewpoint Limits

In order to protect the refrigeration system and chamber from damage, there are minimum and maximum dewpoint levels that are set in the configurator. These limits in turn define the minimum and maximum relative humidity levels that the chamber will operate to at any given temperature. The EZT uses these limits and internally calculates the minimum and maximum humidity level that the chamber will control to at the current chamber temperature.

Should the user enter a set point outside of those limits, the EZT will coerce the loop control set point to the minimum or maximum value allowed. The system status monitor will then indicate that limiting is taking place and in which direction by illuminating the appropriate LED on the status monitor screen.

Low RH (Frozen Coil)

For chambers equipped with the low RH (frozen coil) option, the EZT monitors the temperature and relative humidity set points and calculates the resulting dewpoint. When this value is below the standard wet coil range of ~2°C (35°F), the EZT automatically switches to frozen coil mode. This allows the chamber to reach lower humidity levels than what is capable with standard humidity.

The EZT does not initiate frozen coil mode until the measured dewpoint in the chamber is below 10°C (50°F). This prevents the coil from loading up with moisture prematurely and reducing the duration of time at which the coil can effectively control low humidity levels in the chamber.

When frozen coil mode is initiated, the frozen coil control output turns on. This activates the EPR bypass solenoid and transfers control from the wet coil solenoid to the frozen coil solenoid to the dehumidification output of the loop control.

5.2.1 Humidity System Failures and Corrective Actions

SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
Humidity system not turning on.	Humidity event not turned on. Air temperature outside of humidity control range.	Turn on humidity event. Change temperature set point to within allowable humidity control range.
Chamber not humidifying.	Maximum dewpoint limit reached. Boiler filling with water/heating up. Blown boiler heater fuse. Loop control output off. Atomizer nozzle clogged. Atomizer water supply low. Atomizer air supply low.	Check system status monitor. Chamber operating at maximum humidity level. Check water supply. Allow time for boiler to heat up. Replace fuse. Verify proper loop control configuration. Check set point. Replace control. Check/clean atomizer nozzle. Check water supply. Increase flow rate. Verify air compressor operation. Check for leaks/cracks in tubing.
Chamber not dehumidifying. (further diagnosis and/or repair requires certified refrigeration service personnel)	Minimum dewpoint limit reached. Dehumidification coil logged with moisture. Loop control output off.	Check system status monitor. Chamber operating at minimum humidity level. Check coil. Warm up chamber to remove moisture build-up. Verify proper loop control configuration. Check set point. Replace control.

5.3 Auxiliary Cooling System

The auxiliary cooling system can be installed as a boost system or a low range control system. When set as a boost, it will assist the refrigeration system in lowering chamber temperatures quickly. As a control, it will take over once the low temperature limit of the refrigeration system is reached and continue cooling the chamber down to an ultimate low of the auxiliary cooling medium (LN2 or CO2).

Auxiliary Cool Boost Operation

When the auxiliary cooling option is set for boost in the configurator, the auxiliary cooling supply valve output will turn on when the chamber and auxiliary cooling events are enabled. The EZT will then monitor the cooling percentage of output. When it exceeds the auxiliary cooling on percentage set point for the on delay time period, the boost cool output will turn on. When the percentage of output drops below the on percentage set point, the output will turn off. The supply valve output will remain on as long as the event is on. Only the boost output will cycle on and off for control.

Once the air temperature reaches the low limit set point in the configurator (boost cool disable), the boost cooling output will be disabled to prevent the chamber from going colder than what the refrigeration system is capable of in order to protect the compressors.

Auxiliary Cool Control Operation

When auxiliary cooling is set for control in the configurator, the auxiliary cooling supply valve system output will turn on when the chamber and auxiliary cooling events are enabled. The operation of the boost cooling control solenoid is then handled by an external time delay relay off the cooling output of the loop control. In addition, the cooling enable output will be on allowing the refrigeration system to cool the chamber.

Once the low limit set point temperature is reached, the refrigeration system is shut down and the cooling enable output is disabled. This transfers the cooling output from the loop control directly to the auxiliary cooling control solenoid. This allows the chamber to be controlled to temperatures below what the refrigeration system can produce.

5.3.1 Auxiliary Cooling System Failures and Corrective Actions

SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
Boost cooling not turning on.	Auxiliary cooling event not turned on. Loop percentage of output not exceeding on percentage for delay period. Air temperature at minimum allowable range.	Turn on auxiliary cooling event. Check loop output percentage, adjust configurator settings if necessary for performance. Chamber at low limit. Cannot go any colder.
Poor cooling performance with auxiliary cooling on.	Cooling medium (LN2/CO2) not reaching chamber as liquid. Supply/control valve clogged/failed.	Allow boost cooling to run longer in order for liquid to reach chamber. Insulate supply lines. Install automatic purge system to bleed off gas in order to maintain liquid in supply line. Inspect valve. Clean/Replace if necessary.

5.4 Dry Air Purge System

The dry air purge system can work independently or as part of the humidity system. If the chamber is a standard dry unit (non-humidity) or the humidity system is off, the dry air purge output will turn on when the chamber and purge events are turned on. The purge system will run continuously supplying dry air to the chamber until the event is turned off.

If the chamber is equipped with humidity, the dry air purge system output will be automatically turned off when the humidity system is turned on. This is done in order to allow the humidity system to control the humidity level. If the purge system was allowed to continue operation, it would be constantly trying to dry the chamber regardless of the humidity set point. However, if the minimum dewpoint limit is reached, the humidity system will allow the dry air purge system to operate when the purge event is on, in order to obtain the lowest possible humidity level. The purge system will act as the primary method of dehumidification since the wet coil is limited by the low dewpoint limit.

For chambers equipped with the low RH (frozen coil) option; the purge system will automatically run during low RH humidity operation. The EZT monitors the temperature and relative humidity set points and calculates the resulting dewpoint. When this value is below the standard wet coil range, the EZT will automatically switch to frozen coil mode. The EZT does not initiate frozen coil mode until the measured dewpoint in the chamber is below 10°C (50°F). This prevents the coil from loading up with moisture prematurely and reducing the duration of time at which the coil can effectively control low humidity levels in the chamber.

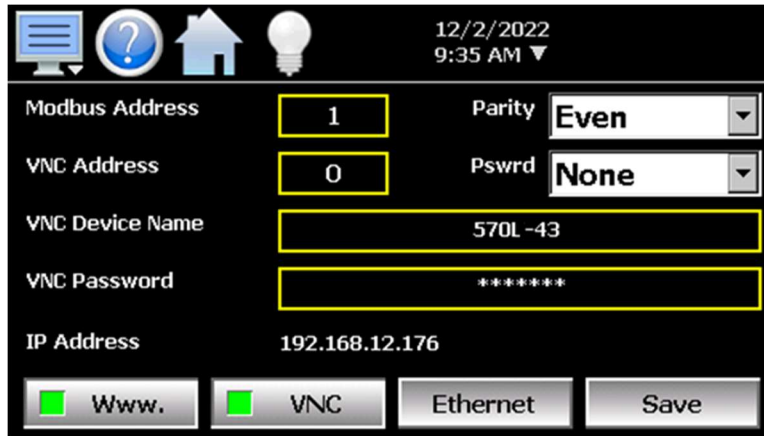
When frozen coil mode is initiated, the dry air purge system output and air control solenoid output turn on. The air control solenoid output transfers control of the purge air supply over to the dehumidification output of the loop control. This allows the dry air purge to be controlled along with the dehumidification solenoid for proper humidity control.

5.4.1 Dry Air Purge System Failures and Corrective Actions

SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
Purge system not supplying dry air to chamber.	Purge system off. No compressed air supply. Purge flow meter adjusted too low. Supply/control valve clogged/failed.	Turn on purge event. Supply compressed air to purge system. Verify/adjust flow meter for proper flow rate. Inspect valve. Clean/Replace if necessary.
Dry air purge not turning on.	Purge event not turned on. Chamber operating in humidity mode.	Turn on purge event. Purge automatically controlled. Dry air purge will turn on automatically when required. Turn off humidity.

6. Remote PC Communication Problems

This section covers troubleshooting basics for user communications to the EZT. This is for PC to EZT communications, not internal communication between EZT components. The user communication capabilities are enabled from the “Comms” screen under the device settings menu.



NOTE: For more detailed information on communication format, commands and functionality of the standard Modbus TCP Ethernet and optional serial interfaces, see the EZT-570L User Communication Reference Manual.

6.1 Serial Communications Troubleshooting

The EZT-570L allows a user to remote monitor and control chamber operations over an optional RS232 or RS485 serial communications connection. Only one connection, RS232 or RS485 may be used at a time.

The Modbus settings in the EZT allow the controller address and parity of the communications port to be changed. When communicating with a PC, the PC and the EZT settings must match in order for the communications connection to operate. The EZT is set with a default address of 1 and even parity. Even parity is required when using CSZ EZ-View software to communicate with the EZT. The baud rate, data bits and stop bits of the serial interface are fixed at 9600 baud, 8 data bits and 1 stop bit. These settings are fixed and cannot be changed.

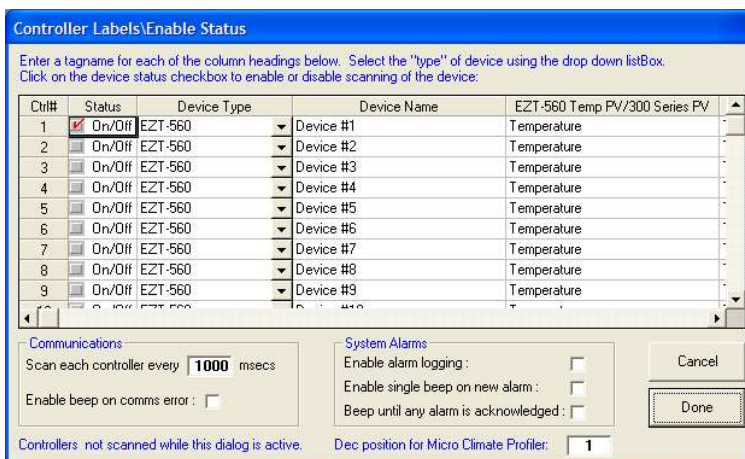
SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
EZT not responding to commands from PC.	<p>Wrong slave address.</p> <p>Wrong parity setting.</p> <p>Wrong communication port settings in PC or wrong command format.</p> <p>Improper or loose connection.</p>	<p>Use slave address set in EZT or change EZT slave address to match.</p> <p>Use parity setting in EZT or change EZT parity to match.</p> <p>Verify proper protocol used (Modbus RTU) Verify proper serial port settings used in PC.</p> <p>Check cables and wiring for loose or damaged connections. Verify proper connection polarity (null-modem cable connection for RS232).</p>

6.1.1 CSZ EZ-View Software

EZ-View is a SCADA and configuration package for CSZ EZT controllers. Connection to controllers is accomplished via an RS232 (single) or RS485 (one to many) connection. This allows for up to 31 EZT controlled chambers to be connected to a single PC using RS485.

EZ-View requires the use of a serial port on the computer it is installed on. If the computer does not have a serial port, a suitable USB to RS232/485 adapter can be used. If using an adapter, once configured to work with EZ-View, do not plug the adapter into any other USB port on the computer. If the adapter is plugged into a different USB port, the port # may change and EZ-View will not be able to communicate with any attached devices.

EZ-View must be configured for the chambers attached to the system prior to use. The "Controller Labels/Activation" menu under the "Setup" menu allows the user to add EZT controllers attached to the PC. EZT-570 series controllers are enabled (turned on) sequentially starting with address 1 through 31 which must match the address entered in each EZT-570. Each EZT must also have its parity set to "Even" in order for EZ-View to communicate with EZ-View.



SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
EZ-View communication error: "Control Address #, Device did not respond in 1 sec."	<p>Wrong slave address at EZT.</p> <p>Wrong parity setting at EZT.</p> <p>EZ-View not assigned to proper serial port # of the PC.</p> <p>Improper or loose connection.</p> <p>Excessive "noise" on communication lines.</p>	<p>Set EZT address to match controller number in EZ-View.</p> <p>Set EZT parity to "Even".</p> <p>Verify serial port # used and assigned port to EZ-View in the configurator.</p> <p>Check cables and wiring for loose or damaged connections. Verify proper connection polarity (null-modem cable connection for RS232).</p> <p>Reduce length of communication wires/number of devices. Increase polling interval of EZ-View to slow down rate that each controller is scanned (Scan each controller every ### msecs).</p>

6.2 GPIB Communications Troubleshooting

The GPIB communication option is provided through the use of ICS's Model 4899 GPIB-to-Modbus Controller. The 4899 is an IEEE 488.2 compatible GPIB device that can control Modbus slave devices. It accepts simple GPIB bus commands that are used to create Modbus RTU packets that are transmitted serially to the Modbus slave devices, in this case, the EZT. When this option is provided, it is connected to the EZT's serial connection.



SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
GPIB interface not responding to read/write commands.	4899 power turned off. Wrong bus address. Missing termination character. Serial buffer overflow.	Turn 4899 power switch on. Verify 4899 GPIB bus address. Use proper termination character on commands (default is LF). Use "E?" command to read and clear error register.
Not reading data from EZT.	Read command sent too quickly after write command. 4899 serial time out set too short. Improper or loose connection. Serial address of 4899 and EZT do not match.	Slow down communication rate between write/read commands to allow EZT time to respond. Set 4899 serial timeout to higher value. Use "D ####" command where #### = timeout in milliseconds. Check cables and wiring for loose or damaged connections. Verify proper polarity. Use "C #" command to set the 4899 serial address to match the EZT Modbus address.

6.3 Ethernet Communications Troubleshooting

The EZT-570L provides several options for remote control and monitoring over the Ethernet communications interface. The web server interface provides a monitor only connection, while the VNC server and Modbus TCP interfaces allow a user to manipulate and control the chamber remotely.

NOTE: *The EZT-570L Ethernet interface is a 10/100 Base-T connection. If the local network that the EZT is to be connected to is gigabit only (GbE), then an adapter (hub or switch) that can bridge the connection between the gigabit network and the 10/100 connection of the EZT will be required.*

In order to use any of the three, you must use the assigned IP of EZT-570L in order to access it. To obtain the correct IP address, go to the communications screen under the device settings menu or open the notifications list by touching the date/time field in the menu bar. Scroll to the bottom of the notifications list to view the IP address.

Enter the IP address in your Modbus TCP or VNC client or as the web page address in your web browser. When using a Modbus TCP client, be sure to also use the proper unit ID (Modbus address) of the EZT. When using the web browser connection, use the complete address as shown in order to display the web page: <http://IPaddress/ezt.html>.

SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
Web page not updating.	Connection to EZT lost. Page update period not elapsed.	Verify EZT is connected to the network and has a valid IP address. Wait 30 seconds or press refresh button on web browser.
Cannot open web page in web browser.	Web server disabled. IP address entered incorrectly in browser. Invalid IP address.	Enable web server on communications screen. Verify web address format. Verify EZT is connected to the network and has a valid IP address.
VNC client not connecting to EZT.	VNC server disabled on EZT. IP address entered incorrectly. Invalid IP address.	Enable VNC server on communications screen and cycle power to the EZT. Power must be cycled after VNC server is enabled in order for the server to activate. Verify IP address format. Check VNC address of EZT. If set to value other than 0, port number must be entered with IP address in client viewer Verify EZT is connected to the network and has a valid IP address.
Unable to communicate with EZT over Modbus TCP port 502.	Invalid IP address. Incorrect unit ID.	Verify EZT is connected to the network and has a valid IP address. Verify unit ID in read/write command to EZT matches the Modbus address on the communication screen.

7. User Interface (HMI) Troubleshooting

The EZT-570L user interface is an embedded device. Once powered up, it will follow a typical boot up sequence (similar to any PC running a Microsoft Windows product) and automatically start the EZT-570L application. The EZT-570L application is what provides the operating screens, loop views, trends, logging, etc., that the user can navigate through to change set points, create and run programs, and so on.

SYMPTOM	PROBABLE CAUSES	CORRECTIVE ACTIONS
1) <u>Black Screen</u>		
"PWR" indicator is off.	Power is off. Wrong polarity of power source.	Turn on power. Check/correct polarity of power source.
"PWR" indicator is on.	Screen saver is on. Bad backlight.	Touch screen to disable screen saver. Replace HMI/base unit.
2) <u>EZT Application not Starting</u>		
"System Startup Please Wait" desktop image shown.	Power not cycled after configuration change or application exit. HMI not properly set up (new unit) or files missing/corrupted.	Cycle power. Perform factory setup to reconfigure unit.
3) <u>Screen Locked Up</u>		
Screen does not respond to touch.	Touch screen out of calibration. HMI operating temperature exceeded. Operating system error. Touch screen failure.	Calibrate touch screen. Turn off EZT. Bring ambient temperature to within allowable range of 0°C (32°F) to 50°C (122°F). Cycle power. Replace HMI/base unit.

7.1.1 Factory Setup

The SD card contains a "Factory Setup" program that installs the EZT-570L application and all supporting files. This program can be run to clear all current settings and installation files and replace them with the default files and folders contained on the SD card.

NOTE: *The factory setup program will erase all current configuration files and settings. The EZT-570L Configurator will have to be run in order to properly set up the chamber after the factory setup program is run, or if a known good configuration is available on a USB memory stick, the import configuration can be used to reconfigure the chamber.*

See Section 4.0, Adjusting EZT Configuration Options for information on the Configurator and how to adjust chamber settings. The "Restore to Factory Defaults" will not work after the factory setup program is run. The factory setup also clears any factory default configuration files so the chamber must be reconfigured manually or from a valid configuration import.

To access the factory setup program, you must activate the Windows taskbar from the desktop.

Hidden taskbar application icon



From the desktop, double-tap the hidden icon at the top left of the screen to access the taskbar application.



Press the "Show Taskbar" button in order to show the taskbar and then press the "Quit" button to exit the taskbar application. Press the Start button on the taskbar and select Programs\Windows Explorer in order to show the "My Device" folder.



From the “My Device” folder, locate and open the “Storage Card” (SD card) folder.



The SD card holds a copy of all EZT-570L application and data files. DO NOT alter or delete any files on the SD card. Locate the “570L Factory Setup” application and run the application.



To perform the factory setup, press the proper button for the selected hardware platform (4.3” screens only) or press the “Start” button on 7” HMI models. To abort the factory setup program, cycle power to the HMI. There is no way to exit the factory setup program once started except for cycling power.

Press the button for the current hardware platform to setup the EZT-570L 4.3” user interface.

MCT 1/4 DIN

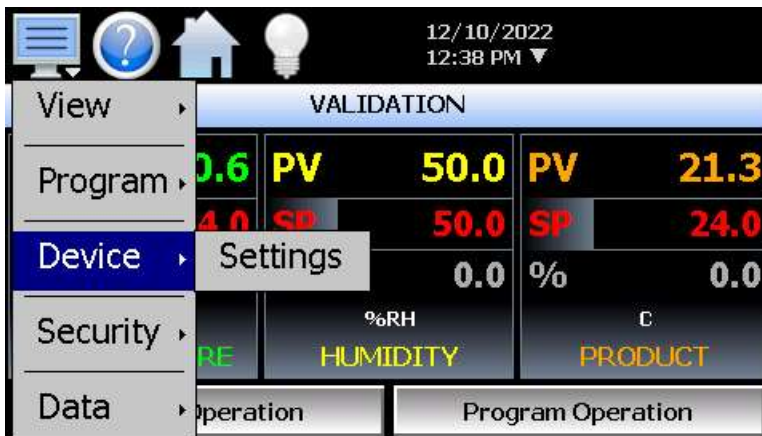
FDC-0450 HMI

Once in the installation is complete, cycle power to reboot the system and begin the reconfiguration process.

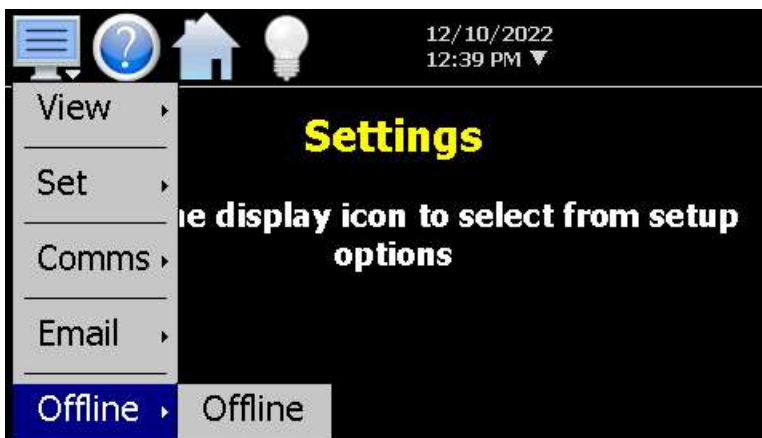
7.1.2 Touch Screen Calibration

If the touch screen is severely out of calibration it can appear as if the unit is “locked-up”. It may not respond to touch or will make it impossible to accurately select items in order to navigate to the normal display calibration menu. If this occurs, calibration can still be performed with the assistance of a standard USB mouse.

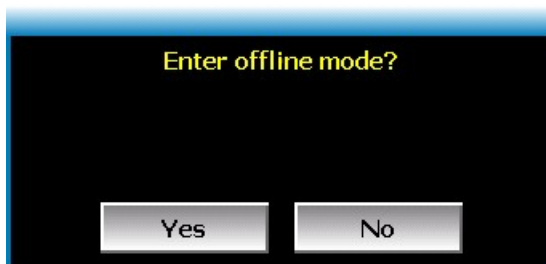
Begin by connecting the mouse to the EZT’s USB port. Using the mouse, you can navigate the screen just like using a desktop PC. Begin by selecting “Device\Settings” from the home menu.



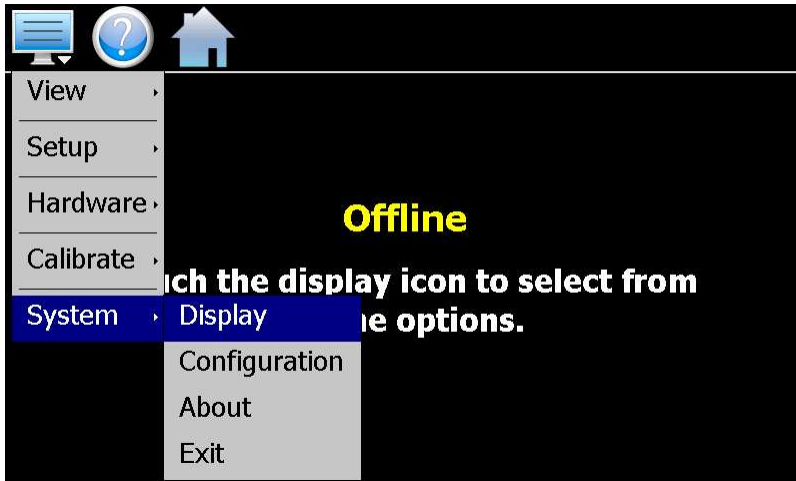
Select “Offline” from the Offline menu.



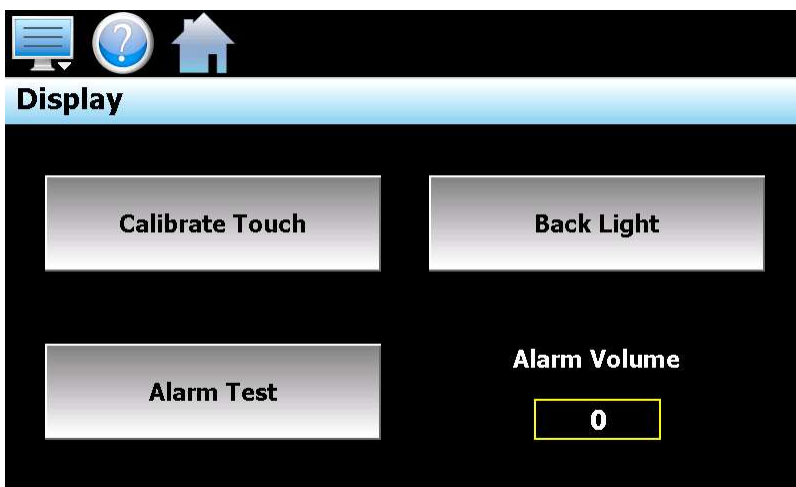
You will be prompted with a message stating “Enter offline mode?”. Click on “Yes” to go offline.



Select "Display" from the System menu.



Click on the "Calibrate Touch" button. You will be prompted with a message stating "The application will be disabled. Yes or No?". Click on "Yes" to start screen calibration.



Once the calibration screen is shown, use a stylus or the tip of a plastic pen cap, touch and hold on the center of each point marked by the crosshairs on the screen. Once all points have been measured, touch anywhere on the screen to accept the settings and complete the calibration routine.

You will be prompted with a message stating "Application is now active." Press the "OK" button to return to normal operation.

CAUTION: Do not use any metal or sharp edged instruments on the screen or permanent damage to the screen may result.