



EZT-570L

Environmental Chamber Controller
User Manual



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1. Overview

This manual has been tailored to cover all of the specific features and options available on the EZT-570L environmental chamber controller. Not all options and/or features may be available on your particular chamber. It is highly recommended that you read this manual thoroughly and understand all aspects of the EZT-570L controller prior to operating your chamber.

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.

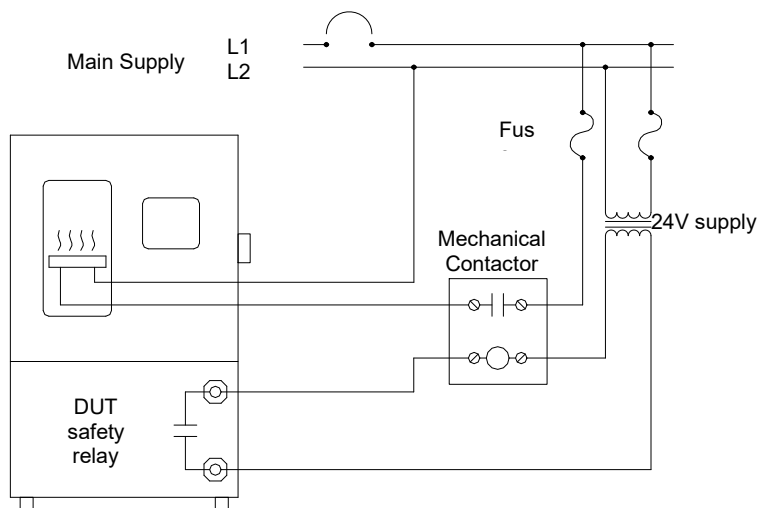
A **“CAUTION”** appears with information that is important for protecting your equipment and ensuring performance.

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.

1.1.1 Device Under Test (DUT) Safety Information

The environmental chamber is equipped with high heat limits and/or safety devices. These devices are installed to protect the chamber from exceeding design limits. These devices remove power from the chamber’s heaters only and DO NOT remove power from the device under test.

Provisions must be made by the end user to de-energize the tested device with the chamber in order to prevent an over-temperature condition and subsequent damage to the chamber and/or device under test. For this reason, the chamber is equipped with a DUT safety relay (24V AC/DC, 2A maximum resistive load) that should be connected to the device’s power supply control circuit at a minimum. This relay will open and de-energize the device under test whenever the chamber is not operating.



WARNING: Leaving devices powered within a chamber that is not operating can cause catastrophic damage to the test item and/or chamber in very short periods of time depending upon the heat output of the device.

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

1.3 About the EZT-570L

The EZT-570L environmental chamber controller combines all of the features of typical loop controllers, video/chart recorders and data logging systems into a single/intuitive device. Email (supporting SSL/TLS), SMS (text messaging), FTP, FileWeb, DataWeb (file transfer protocols for automated data backup and web database interface) and remote viewing/control (via Web server/VNC server) are standard with the EZT-570L and can be accessed via LAN/WAN using a PC, tablet or smart phone device.

The EZT-570L allows the chamber to be operated in single set point or automatic ramp/soak program control modes. Program entry is made easy through the use of copy, paste, and delete menu selections. Programs can be copied to the external USB memory stick and then imported to another EZT-570L controller which eliminates the need to enter duplicate ramp/soak programs into multiple chambers.

Data file analysis tools make looking at historical data a simple task. Any control variable saved to the data file can be plotted on the historical data chart for any time frame within the data file's total time range. The EZT-570L can store over a year's worth of data on its SD memory card. Data logging can be enabled manually or automatically during program operation. Data backup is provided via a USB memory stick for plug and play transfer of files to any PC and through the included FTP back-up utility.

The built in Ethernet functionality includes a Web Server to provides access to all EZT-570L data (view only), a VNC interface for remote control and monitoring and an NTS clock, all available via a local Intranet connection (wired or wireless), or the World Wide Web using standard software like Microsoft's Internet Explorer.

The EZT-570L provides a rich set of tools for control interaction and process monitoring. The interface provides various loop, chart, alarm, automated program status as well as historical data, alarm log and audit trail views. The menu driven interface eliminates screen "clutter" by providing an easy to use "Smart Device" interface for interaction between the user and EZT-570L.

The EZT-570L protects system access with a four-level security system (user rights based), including audit trail capability that documents all user activity and ensures data integrity by digitally signing all data files and audit trails to meet regulatory requirements.

NOTE: *The graphic displays shown in this manual are representative of those on a standard temperature and humidity chamber. The screens and examples shown within may vary slightly from your chamber based on installed options and type of chamber.*

1.4 Touch Screen Interface

The EZT-570L display is split into two sections; the icon bar and main display area.



The menu icon will open the main menu for navigating to the different control and monitoring screens. Menu items will dynamically appear providing available options based on the system area the user is in, i.e., security, data logging, setup, etc.



The information (help) icon will display text-based help associated with the current screen. Help is available in 10 languages based on the user selection in the offline setup of section of the EZT-570L.



The home icon will return the user to the main view from anywhere in the EZT-570L application. The main view can be set by the user in the EZT-570L configuration and can be the Loop, Overview, Chart, Alarm or Alarm File screen.



The alarm icon will appear and flash on each new alarm occurrence. Pressing the alarm icon will take the user directly to the alarm screen in order to view and/or reset the active alarm condition(s).



Once new alarms have been acknowledged the main alarm icon will be hidden. If any of the alarm conditions are still active, the alarm notification icon will appear in the upper right of the screen to remind the user that alarm condition(s) still exist even after they have been acknowledged. Once all alarm conditions have cleared, the icon will no longer be shown.



The light icon allows the user to turn the chamber light(s) on and off.



The left and right navigation arrows will appear on screens that provide additional information that the user can scroll to such as the real time trends or program entry screen in order to cycle through each step of a ramp/soak program.

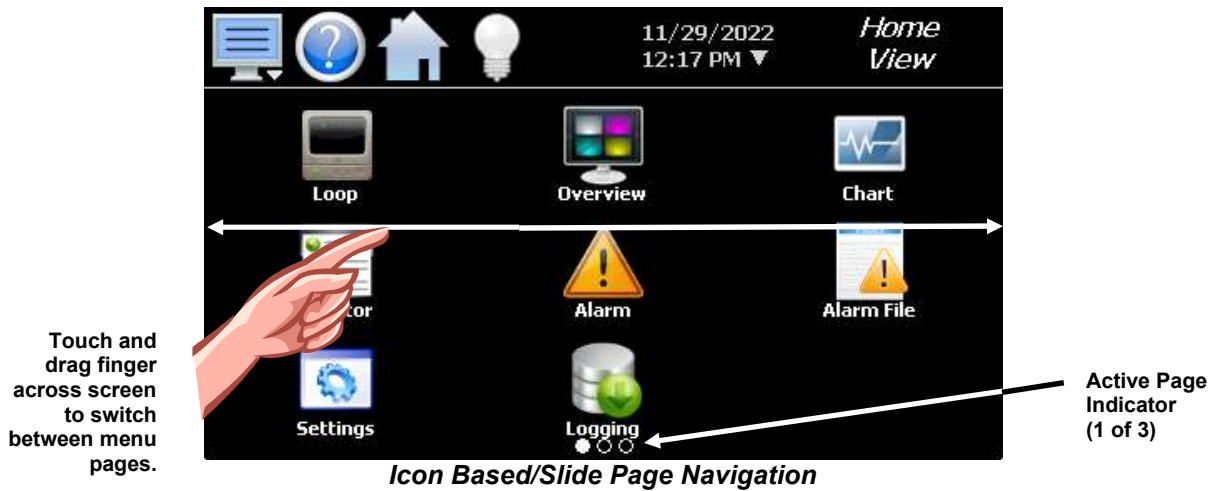
NOTE: A single press of the left or right arrows will scroll program steps to the next step or screens to the next available screen option (i.e., chart number). Pressing and holding the arrow keys will continue the item scrolling until the last step of the program is reached or the button is released.

1.5 Menu Navigation

The EZT-570L provides the user with the ability to select text-based menu navigation, much like the typical file menu system of a PC, as well as an icon-based navigation system like that of a “smart” device. The user can switch back and forth between the two from the Device\Settings menu.



Text Based Navigation



Touch and drag finger across screen to switch between menu pages.

Active Page Indicator (1 of 3)

Icon Based/Slide Page Navigation

The available menu items are dependent upon the options installed on the chamber. Not all of the menu items shown may be available on chamber. The following information is provided as an overview of the full navigational menus for the EZT-570L.

IMPORTANT: Do not use any sharp or metal objects on the touch screen as they may damage the surface. Also, be sure that hands and fingers are free from oils and/or chemicals which may mar the surface of the touch screen. DO NOT use chemicals to clean the surface of the touch screen. A soft, damp cloth is all that is necessary.

1.5.1 Home Menu

The home menu is the top level, default menu provided when the chamber and the EZT-570L first powers on. Pressing the menu icon will display the main menu offering the selections shown below.

1.5.1.1 Text Based Home Menu

View	Loop
Program	Chart
Device	Alarm
Security	Alarm File
	Monitor
Data	Overview

The **View** menu provides navigation to all standard view screens. These include the main Loop view, real time Chart, Alarm monitor, Alarm File, status Monitor and Overview control screen.

View	
Program	Entry
Device	Status
Security	Plot
Data	

The **Program** menu provides access to the program Entry and Status views. It also provides access to the program Plot screen which allows the user to view the entire program under edit in either a graph or list format.

View	
Program	
Device	Settings
Security	
Data	

The **Device** menu provides access to the EZT-570L controller settings. These include, loop set point entry limits, alarm settings, communication settings, email setup as well as access to offline settings for date/time, etc.

	Configure
View	Login
Program	Log Off
Device	Audit
Security	User
Data	Password

The **Security** menu provides access for user login, security settings and audit trail viewing if the security system is enabled.

View	
Program	
Device	
Security	
Data	Logging

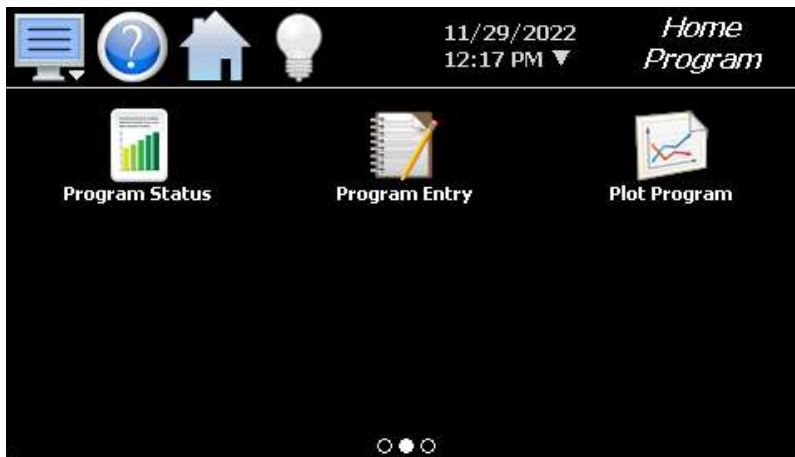
The **Data** menu provides access to data log functions, file utilities, FTP\WAN back-up settings as well as the historical data viewer.

1.5.1.2 Icon/Slide Page Based Home Menu



Slide page 1 provides navigation to all standard view screens. These include the main Loop view, Overview, Chart, status Monitor, Alarm, and Alarm File screens.

It also provides access to the EZT-570L Settings and data Logging sections.



Slide page 2 provides access to the program Entry and Status views.

It also provides access to the Plot Program screen which allows all steps of the current program under edit to be viewed in graph or list format.

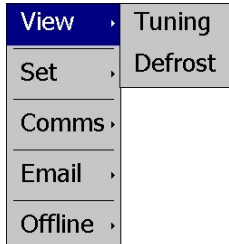


Slide page 3 provides access to Security settings, Audit trail, User information, Password editing and user Login and Log Off functions.

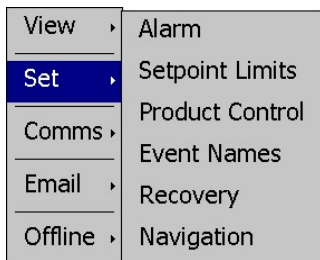
1.5.2 Device Settings Menu

The device settings menu is provided when “Settings” is selected from the home “Device” menu. See section 5 on System Settings for detailed information on these settings and their use.

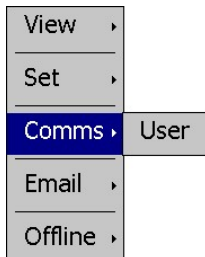
1.5.2.1 Text Based Device Settings Menu



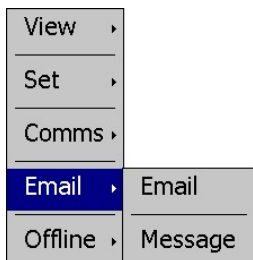
The **View** menu provides navigation to the Tuning and Defrost screens.



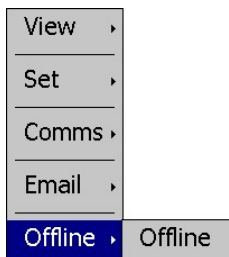
The **Setup** menu provides access to the setup screens for Alarms, Setpoint Limits, Product Control, customer Event Names, power Recovery, and Navigation.



The **Comms** menu provides access to the User communications settings for the web page, VNC server and Modbus user communications.

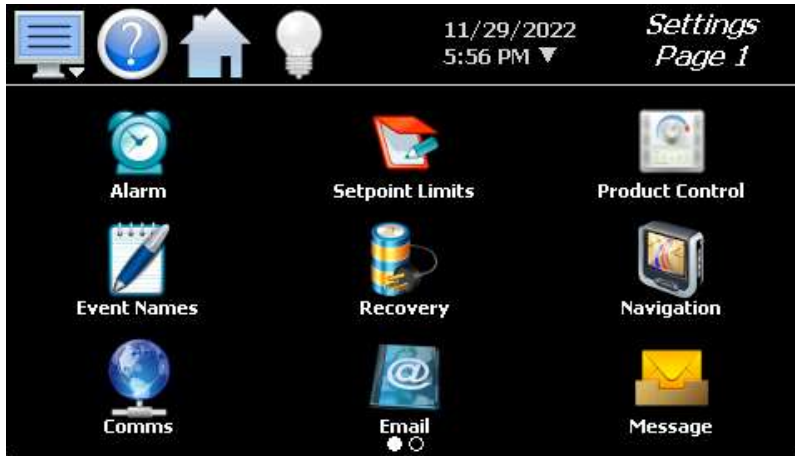


The **Email** menu provides access to the Email settings screen to configure the mail server to send SMS text messages and/or emails on alarm. It also allows the user to compose and send messages to any user configured in the system from the Message screen.



The **Offline** menu provides access to the EZT-570L Offline settings screens which provide the user with the ability to adjust the date/time, calibrate the touch screen, etc.

1.5.2.2 Icon/Slide Page Based Device Settings Menu



Slide page 1 provides access to the settings screens including options for Navigation type, setpoint Limits, Alarm setup, Event Names entry, power Recovery, Product Control, Email server settings and Messaging.

It also includes access to the communications settings for the web page, VNC server and user Modbus communications.



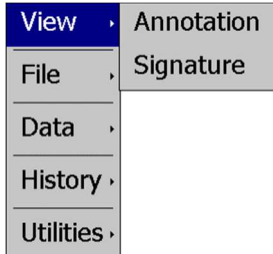
Slide page 2 provides access to the EZT-570L Offline setup screens which provide the user with the ability to adjust the date/time, calibrate the touch screen, etc.

It also includes access to the Defrost setup screen if the chamber is equipped with defrost.

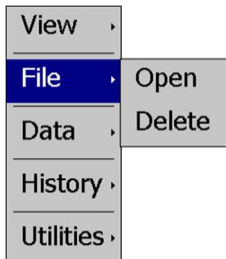
1.5.3 Data Menu

The data log menu is provided when “Logging” is selected from the home “Data” menu. See section 7 on Data Logging for information on these settings and their use.

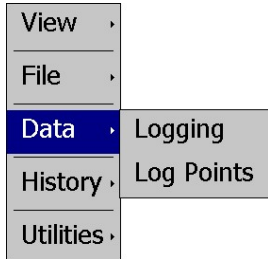
1.5.3.1 Text Based Data Menu



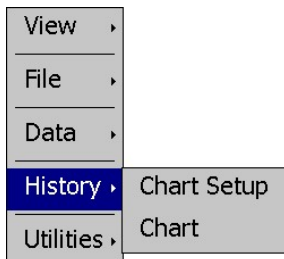
The **View** menu provides access to the data file Annotation and digital Signature screens.



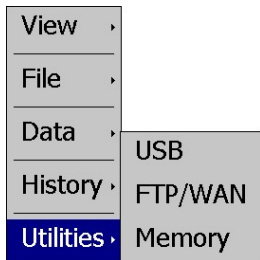
The **File** menu provides functions for opening and deleting historical data files.



The **Data** menu provides access to the main Data screen for starting and stopping data logging and to the Log Points assignment screen where the user can select which items are to be logged to the history file.



The **History** menu provides functions for viewing historical data files in graphical format.



The **Utilities** menu provides access to the EZT-570L file management utilities including USB file transfer and FTP/WAN back-up.

1.5.3.2 Icon/Slide Page Based Data Menu



Slide page 1 provides access to the main Logging and Log Points assignment screens.

Historical data file functions are provided for Opening and Deleting historical files as well as viewing and setting data file Annotations and Signatures.

The Chart Setup and Chart icons provide access to the data viewer options.



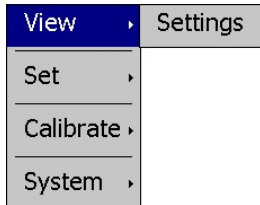
Slide page 2 provides access to the FTP/WAN back-up settings and the memory check utility for viewing the available system and storage memory space.

1.5.4 Offline Menu

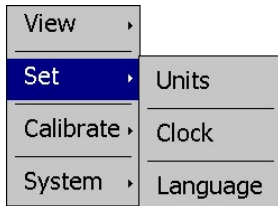
The offline menu is provided when “Offline” is selected from the device settings “Offline” menu. See section 8 on Offline Settings for information on these settings and their use.

NOTE: *Offline settings can only be accessed when a ramp/soak program is not running and data logging is turned off. When entering offline setup, the EZT-570L will go offline. This means that all outputs and control functions will stop and be disabled. If the chamber’s operation cannot be interrupted due to an active test, do not enter offline mode.*

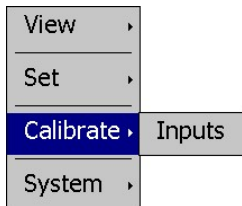
1.5.4.1 Text Based Offline Menu



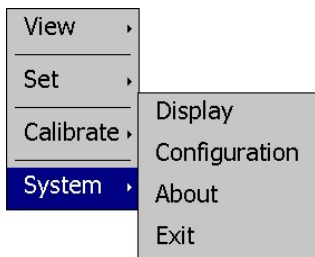
The **View** menu provides navigation back to the online device settings menu.



The **Setup** menu provides access to the temperature Units selection, Clock and Language selection.

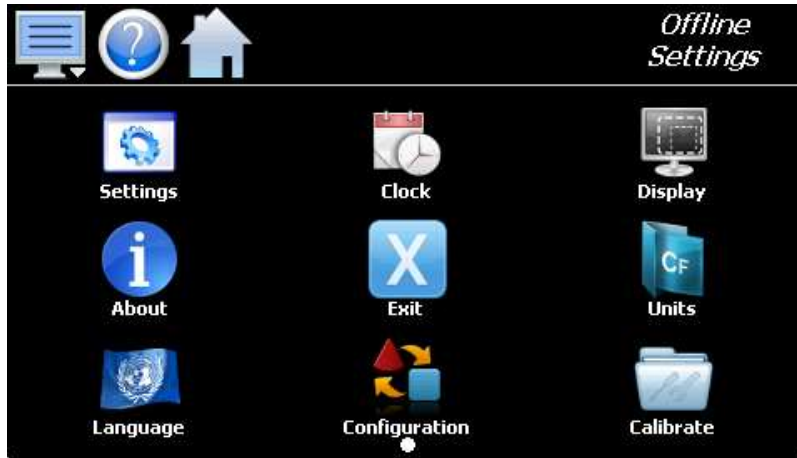


The **Calibrate** menu provides access to the user input calibration for the control loop, limit and monitor point inputs.



The **System** menu provides access to the EZT-570L display settings, import/export Configuration utility, About screen and Exit application screen.

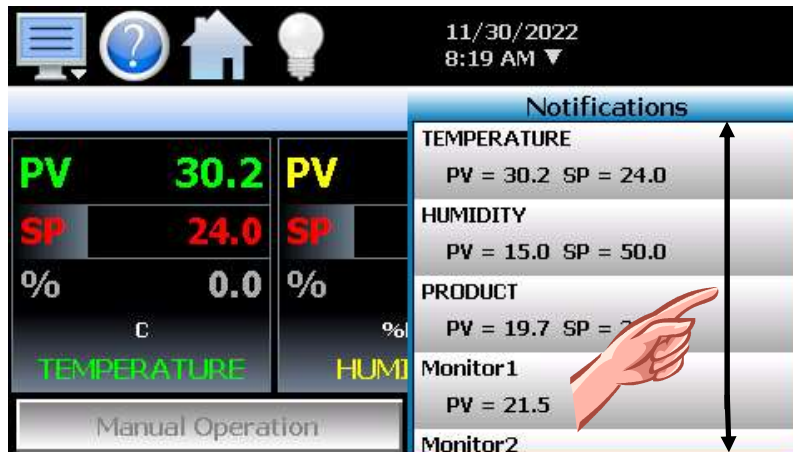
1.5.4.2 Icon/Slide Page Based Offline Menu



Provides navigation back to the device Settings menu, Clock, Display settings, About EZT-570L and Exit application screens, temperature Units selection, Language, import/export Configuration utility and input calibration.

1.6 Notifications

The notification window is a feature that can be accessed by pressing the date/time field in the icon bar. This window provides a snapshot of current activity. The notification window can be closed by pressing the date/time field again, or is automatically closed if the Menu, Home, Alarm or left or right arrow icon is pressed.



All available notifications can be viewed by touching the screen and dragging a finger up or down on the list to scroll through all items like all other lists in the EZT-570L. The notifications include the following:

- PV and SP for each loop.
- Monitor PV for each monitor point.
- Automatic program status including name of running program.
- Defrost operational status.
- Active alarm status including the most recent alarm.
- Data logging status including active file name and the length and logging rate set.
- Security status including the current user.
- Audit trail active/inactive status.
- Web server active/inactive status.
- VNC server active/inactive status.
- EZT-570L IP address.
- Available SD storage memory remaining.

The appearance of the items is based on the configuration of the chamber. If monitor points are not available or the chamber is not equipped with defrost for example, those status items will not be shown. If navigation from the notifications list is enabled (see section 5.9 Navigation), pressing a single row in the list will display the screen associated with the item. This provides an easy way to quickly access the desired item if user action is required.

NOTE: *The notification items do not update while the list is shown. The information shown in the list is a snapshot of the data at the time the window was shown. Therefore, the PV or SP shown for a loop may not be the actual values for the loop if the notification window is left open for extended periods of time. The notification window is not available under offline settings.*


2. Monitoring

The home menu view screens provide various means of verifying chamber operation and performance. The Loop view and Overview screens provide different viewing options for the control and monitoring of chamber processes such as the current temperature and humidity.

In order to view the temperature and/or humidity over time, the EZT-570L provides real-time trends. Eight user configurable trends are provided with up to eight user selectable plot points each. In addition, the EZT-570L provides system status and alarm views to inform the user of any issues that arise with chamber operation.

2.1 Loop View

The Loop screen is accessed from the home “View” menu. It automatically configures itself to display from one to three loops or up to two loops and limit control based on the configuration of the EZT-570L.



Press PV value for historical min/max.

Press PV tag to reset historical min/max.

Press % tag to enable/disable manual output.

Percent Output Entry Field

Set Point Entry Field

Loop Units

Loop Name

Loop Name	PV	SP	Unit	%
TEMPERATURE	30.6	24.0	C	-100.0
HUMIDITY	15.0	50.0	%RH	100.0
PRODUCT	20.3	24.0	C	0.0

The **set point entry field** is the area where the screen can be touched in order to bring up the keypad entry window. Using the numeric entry keypad, a new set point can be entered. Once entered, the new set point will be shown in the set point entry field. Adjustment of the set point is locked out if an automated ramp/soak program is running.

IMPORTANT: *When operating in single set point mode, the set point and event selections are saved 15 seconds after the last entry is made. If the set point or event selections are changed and power is removed prior to the 15 second time period, when power is re-applied, the set point and event selections will return to the previous value. Ensure that power remains on for 15 second interval after an entry is made in order to have it power-up with the desired set point and event selections the next time power is applied.*

The **percent output entry field** is the area where the screen can be touched in order to bring up the keypad entry window. Using the numeric keypad, a new fixed percentage of output can be set. In order to be able to enter a fixed output percentage, the loop must first be placed in manual output mode. This is done by pressing the “%” tag on the screen. This feature may be removed by turning off the “Loop Manual Mode” function in the configuration.

The **Manual Operation** button displays the manual event control window. This provides access to all of the chamber and customer events allowing the operator to turn the chamber and other systems on and off directly from the main screen. See section 3.2 Setting Events (Turning the Chamber On/Off) for more information.

The **Program Operation** button displays the automatic ramp/soak program control window. This provides access to program select, start, stop and hold functions allowing the operator to control the program directly from the Main screen. See section 4.3 Starting an Automatic Ramp/Soak Program for more information.

2.1.1 Historical Minimum and Maximum

The EZT-570L monitors and stores the minimum and maximum process value reached during operation for each loop in the system as well as the limit if equipped. The current historical values can be viewed by pressing the process value display field for the desired loop or limit.



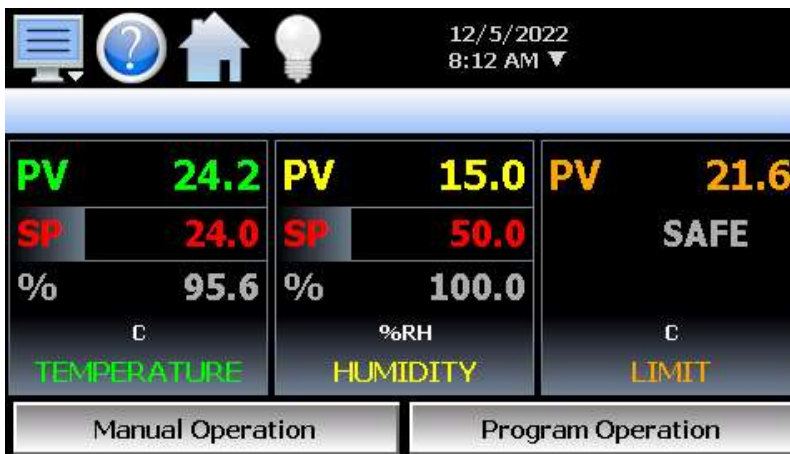
Pressing the "OK" button will close the dialog window and return to the Loop view screen. The historical values are reset each time the runtime application is started and can also be manually cleared by pressing the "PV" tag on the Loop view screen.



Pressing the "Yes" button in the dialog window will reset historical minimum and maximum values and default them both to the current process value. Pressing "No" will simply close the dialog.

2.1.2 Integrated Limit Option

If your EZT-570L is equipped with the integrated limit option, the faceplate for the limit will simply indicate the current process value and provide the current limit status. The status will be displayed with the word "SAFE" if the process value is within the high/low set point limits.



If a limit set point were to be exceeded, the “SAFE” status word would be replaced by the set point of the exceeded alarm, i.e., the high limit or low limit alarm set point entered on the alarm settings screen under device settings. In order to clear the alarm condition, the process value must first be within the safe operating range (within the high/low set points) and then the Reset button must be pressed on the Alarm screen.

2.2 Overview

The Overview screen provides access to the chamber and customer events as well as a convenient way to view all control loops and monitor inputs.



The Overview screen contains two scrolling lists. The list on the left contains all loop and monitor information. To change the set point of a loop, touch the row of the desired loop. The numeric keypad will then be shown allowing a new set point to be entered.

The list on the right contains the system events. To turn the system events on and off, press the on/off button for the event that you want to turn on or off to toggle the on/off state of the event.

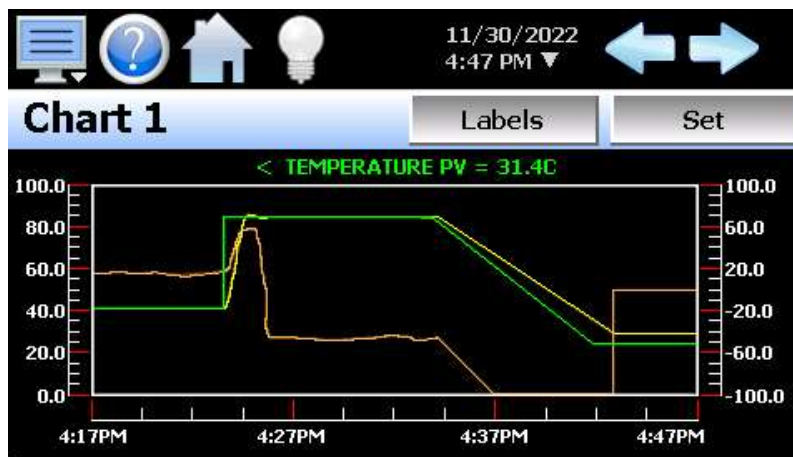
The currently loaded program, or status of a running ramp/soak program will be displayed at the bottom left of the screen. The Overview will also display all current alarms that have not been cleared from the Alarm screen. The alarm field will automatically scroll through each alarm, displaying one at a time every few seconds until all alarms have been cleared.

The **Program Operation** button displays the automatic ramp/soak program control window. This provides access to program select, start, stop and hold functions allowing the operator to control the program directly from the Overview screen. See section 4.3 Starting an Automatic Ramp/Soak Program for more information.

IMPORTANT: *When operating in single set point mode, the set point and event selections are saved 15 seconds after the last entry is made. If the set point or event selections are changed and power is removed prior to the 15 second time period, when power is re-applied, the set point and event selections will return to the previous value. Ensure that power remains on for 15 second interval after an entry is made in order to have it power-up with the desired set point and event selections the next time power is applied.*

2.3 Charts

The Chart screen is accessed from the home “View” menu. The real-time charts can be configured to display the set point (SP), process variable (PV) and percentage of output (%) of control loops and the process variable of monitor points over a selectable period of time. The vertical axis determines the range of displayed data while the horizontal axis determines the history period. The maximum time period that can be shown in a trend is 24 hours. The EZT-570L provides four configurable charts with each chart user configurable for up to eight plots.



The rate at which the trend plots a new point is based on the time period to be shown. Each buffer can hold a total of 720 readings for each of the selected channels to plot. The update rate can be calculated by the formula: $\text{time period (in minutes)} * 60 / 720$. Note that for time periods less than 72 minutes, the update rate will be held to a minimum of 6 seconds. Thus, the update rate will vary from a minimum of 6 seconds (for time periods of 72 minutes or less) up to a maximum of 120 seconds for 1440 minutes (24 hours).

The **Labels** button cycles through each of the configured plot channels to determine what each colored plot represents as well as view the current value without having to return to the loop view screens. The left and right scroll buttons at the upper right of the screen are used to cycle through each of the four available charts.

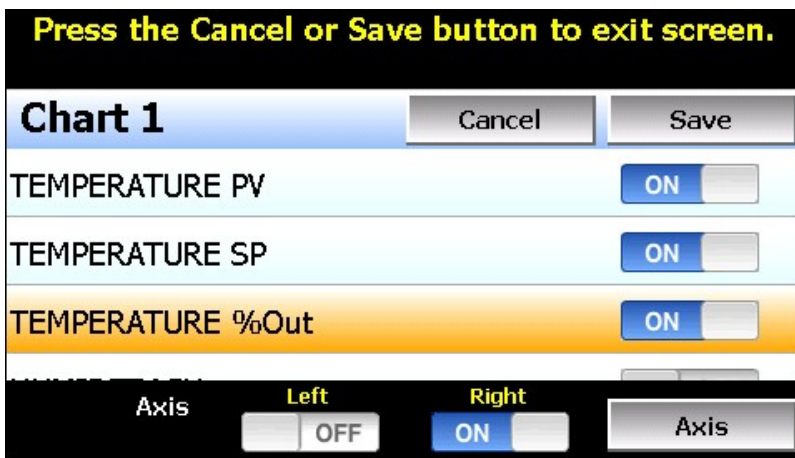
If plot points have been assigned to both left and right axis of the chart, the displayed plot point (selected via the Labels button) will be preceded by a “<” if the point is assigned to the left axis of the chart. The displayed plot point will be followed by a “>” if the point is assigned to the right axis. This allows the operator to know which scale the plot point is associated with. If only one vertical axis is provided on the chart, the axis designator indicator will not be shown as all plot points are associated with the same vertical axis.

The charts also allow a user to “zoom in” on a particular area to have a more detailed look at current data. By using a finger to select an area on the screen, the trend will zoom in on that area. To select a portion of the plot, touch and hold the screen with a finger or stylus. Drag the stylus across the trend and a box will be drawn around the selected area. Removing the stylus from the screen will cause the trend to redraw with only the selected plot area. To return to the normal view, touch the 'X' or 'Y' axis and select zoom out to return to the previous zoom setting or zoom normal to return to the full display.

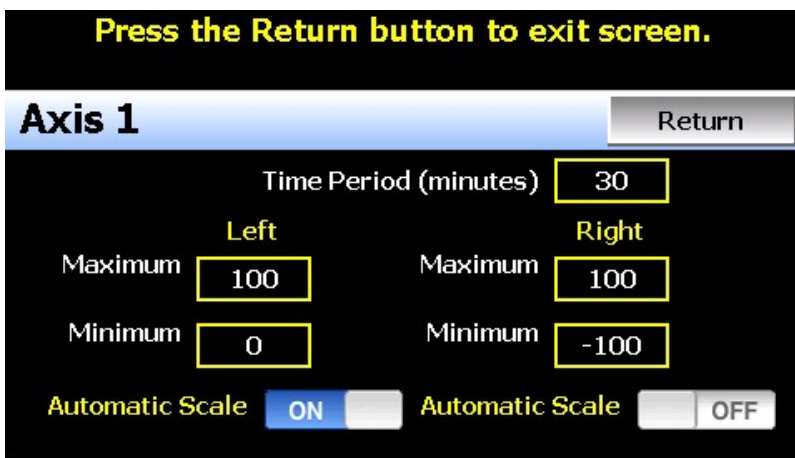
NOTE: When a chart is “zoomed in” it will not update with new information. The chart must be in normal view mode in order to update at each time interval. The chart will return to normal view automatically when selecting a different chart or screen to view.

2.3.1 Chart Setup

To configure a chart, press the “Set” button to display the chart setup screen. To assign plot channels to the chart, simply touch the on/off button for the desired items in the list to select them. Select the left or right vertical axis for each item by selecting the item in the list and press the button for the desired “Left” or “Right” axis. The left axis is the default axis selection. If none of the plot channels are assigned to the right axis, the axis will not be shown on the chart.



Once the channel selections have been made, press the “Axis” button to adjust the time period and vertical axis range of the trend.



Time Period - Adjusts the displayed time period for the graph. The allowable range is from 4 to 1440 minutes (24 hours).

- Maximum -** The maximum value sets the maximum range of the vertical access with a minimum value of -32,760 and a maximum of 32,760.
- Minimum -** The minimum value sets the minimum range of the vertical access with a minimum value of -32,760 and a maximum of 32,760.
- Automatic Scale -** When on, the vertical axis will automatically adjust its zero and span as needed to display the selected plot channels.

Once all settings have been made, press the “Return” button to return to the channel selection screen. Press the “Save” button to store the current channel and axis entries or the “Cancel” button to exit chart setup without altering the current chart settings. If channel selections or the time period for the chart has changed, all current chart data will be cleared when the new entries are saved. The chart will then begin plotting new data according to the new settings.

2.4 Alarms

The Alarm screen is accessed from the home “View” menu. It can also be displayed by pressing the alarm icon whenever a new alarm occurs. It displays all current and/or previously acknowledged alarms according to time and date of occurrence. Once the alarm is reset, the alarm icon will be hidden; however, the alarm condition may still be present.

If the chamber does not restart upon reset of the alarm, verify that all manual reset safeties have been reset and the alarm condition has been cleared by pressing the “Clear” button. This will remove all alarms that have been reset from the list. If the alarm is still present, the alarm condition still exists and must be corrected in order for the chamber to resume operation.



IMPORTANT: *If a loop is in manual mode or in automatic tune and the reset button is preset, the alarm reset will terminate automatic tune or manual mode and place the loop back into normal operation.*

2.4.1 Pumpdown

Chambers with large horsepower refrigeration systems have an automatic mode of operation called “pumpdown”. The refrigeration system is in this mode whenever it is not running to cool or dehumidify the chamber. In pumpdown mode, the system 1 compressor will automatically turn on and off at preset pressures in order to force refrigerant into the high side of the system. This serves as a means to protect the compressor on start-up.

If pumpdown was not used, refrigerant could migrate throughout the system and accumulate, typically in the coldest location like the compressor crankcase. On start-up, this refrigerant could then enter the compressor as a liquid and cause permanent damage to the compressor. In addition, a crankcase heater is installed on the compressor in order to heat the oil in the crankcase of the compressor. This helps boil out any refrigerant, so that it can be pumped into the high side of the system.

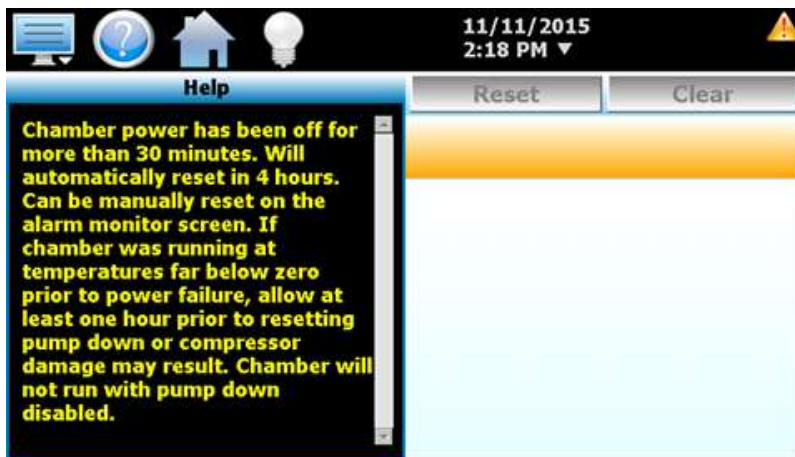
If the chamber is equipped with the pumpdown mode of operation, the “Pumpdown” button will be provided on the Alarm screen if pumpdown is disabled. This provides a manual way to reset pumpdown mode. Pumpdown will be automatically disabled if main power is off for more than 30 minutes. This is due to the fact that without main power, the crankcase heater will be off and cannot warm the compressor. Depending on the temperature of the compressor, this could allow refrigerant to accumulate in the compressor causing a potentially damaging start-up.

The “Pumpdown Disabled” alarm will notify the operator of this condition. The chamber will not operate when pumpdown is disabled. Pumpdown will automatically reset after the main power has been on for a period of 4 hours or it can be reset at any time by pressing the “Pumpdown” button.

NOTE: *If your chamber is equipped with pumpdown, main power should remain on at all times. If power is removed for extended periods of non-use, DO NOT reset pumpdown immediately after power is applied to the unit. Only silence (reset) the alarm. Allow a minimum of two hours out of the four hour warm-up period prior to use or damage to the compressor may result.*

2.4.2 Help for Alarms

The EZT-570L provides alarm specific help to assist the operator in determining what caused an alarm and how it may be corrected. To view the help for an alarm, select the alarm from the alarm list by touching the alarm’s description. The selected alarm will then be highlighted orange as shown in Figure 2-7.




Once the alarm is selected, press the help icon in the menu bar. The help screen will then be shown with information relating specifically to the alarm. If alarm specific help is not available for the selected alarm, the standard system alarm help information will be provided. See Section 10, Diagnostics, for alarm codes and corrective actions.

2.5 Alarm File

The Alarm File screen is accessed from the home “View” menu. It displays all alarms for a given day. The EZT-570L can store daily alarm files for a period of a year or longer (time based on storage usage for data logging). Each time an alarm occurs, the alarm is written to a file. Alarm file names are listed as MMDDYYYY (where MM = month, DD = day, YYYY = year. The “Open” file button will display a dialog box where the user can select any alarm file to view.



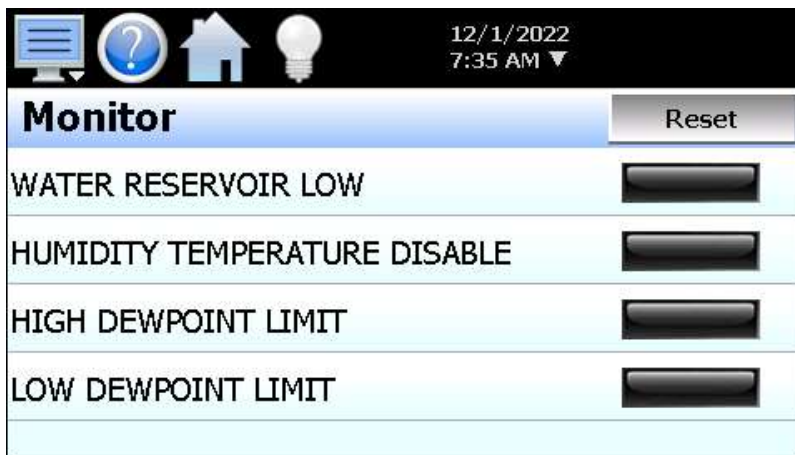
The send email icon  provides the ability to send a copy of the currently opened alarm file to any of the email addresses entered into the EZT-570L. When the email icon is pressed, an “Add Recipients” window will be displayed where the user can select recipients for the file from any of the email addresses configured under the EZT-570L email settings. For information on how to add email recipients to EZT-570L, see Section 5.8 Email.

The **Disk** icon next to the email icon allows the user to save the currently opened data file to a USB memory device connected to the EZT-570L.

NOTE: *If no alarms occurred on a given day, an alarm file will not be created for that day. The alarm list will display up to 650 alarm files. If more than 650 alarm files are present, the alarm files cannot be shown in the list and the files will have to be exported from the EZT-570L in order to view them. This can be done either via USB file transfer (see section 7.4) or FTP (see section 7.5).*

2.6 System Status Monitor

The Monitor screen provides status information and alerts to indicate specific operational conditions or limits that have been reached in the chamber's operation.



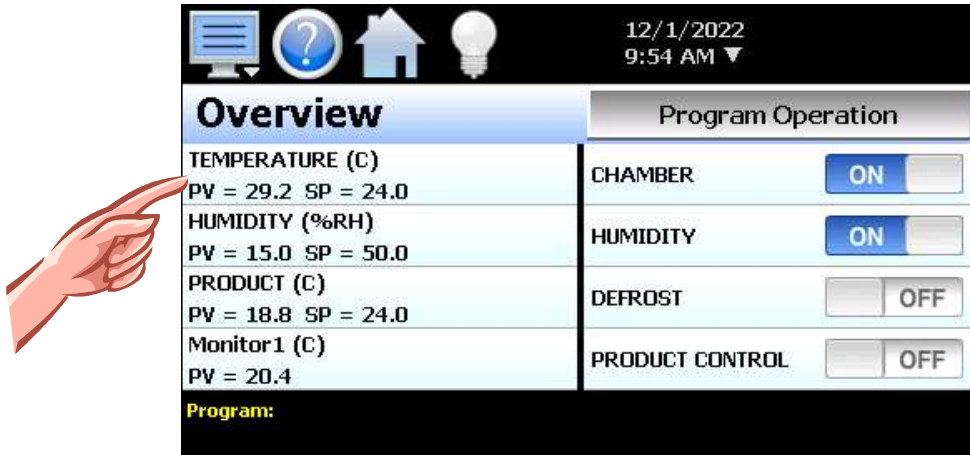
The LED next to the system status description will be green to indicate that the status is active. Alerts that require operator attention, such as the low water reservoir, will be indicated by an intermittent beeping of the chamber's audible alarm. The alarm icon will also flash. Pressing the alarm icon while one of the alerts is active will automatically display the Monitor screen for user convenience. The alert can then be silenced through the use of the "Reset" button. See Section 10, Diagnostics, for alarm codes and corrective actions.

NOTE: *If an alarm is currently active or there is an alarm that had previously occurred and was reset but not cleared from the alarm screen, pressing the alarm icon will always navigate to the alarm screen. System alarms take priority over the status alerts. The EZT-570L will always direct the user to the alarm screen if an alarm is present in the list.*

3. Manual (Single Set Point) Operation

The EZT-570L controller can function as either a static (single) set point controller or as an automatic ramp/soak program controller. The EZT-570L is in static mode (single set point operation) when it is not running a ramp/soak program. This section describes how to operate the chamber in this mode.

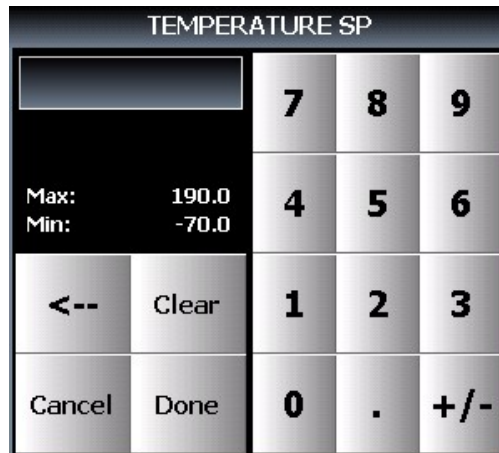
3.1 Set Point Adjustment



Overview

To adjust a set point:

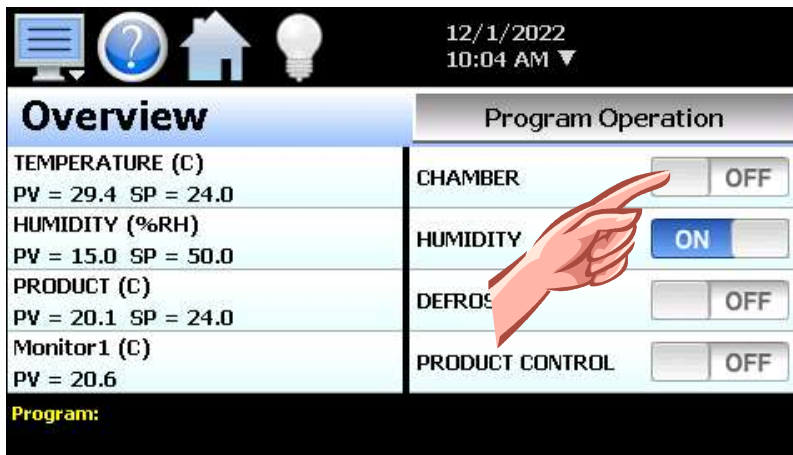
1. Select either the main Loop view or Overview screen from the home View menu.
2. Touch the set point for the desired value on the Loop view screen or select the row from the list on the Overview screen. The numeric keypad will be shown. Enter the desired set point value and press the "Done" button.



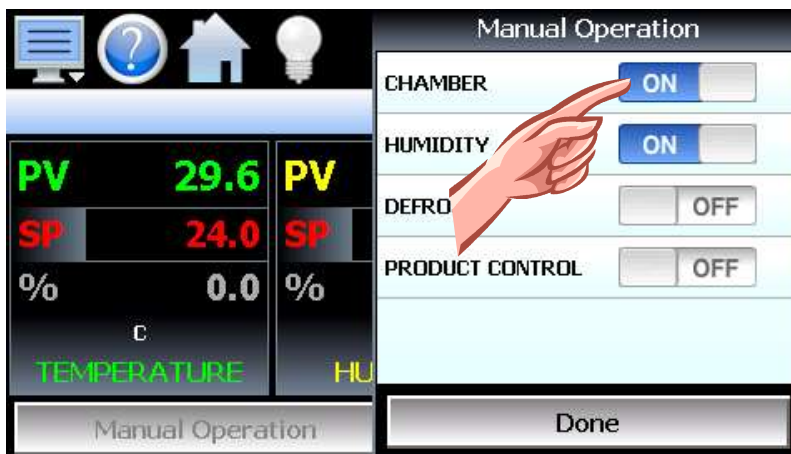
3. Turn on the Chamber event. See the following section 3.2 Manual Operation.

3.2 Setting Events (Turning the Chamber On/Off)

Events are the “switches” used to turn the chamber, its related functions, and optional systems on and off. These events can be manually turned on and off as well as programmed into ramp/soak programs so that they can be turned on and off at set time intervals.



Overview



Manual Operation Loop View

To turn the chamber and optional events on/off:

1. Select “Overview” from the home View menu or press the “Manual Operation” button on the main Loop view screen.
2. Touch the on/off button for each event to toggle it on and off.
3. Press the “Done” button on the “Manual Operation” window once the desired events have been set to close the window and return to the main Loop view.

3.2.1 Chamber Event Options

The first event is the “switch” that turns the chamber on and off. This will enable air circulators, pumps, heating/cooling systems and any other components associated with the operation of the chamber. This event is present on all chambers. Depending on the options provided with your chamber, additional events may also be present.

3.2.1.1 Humidity Operation

The humidity event turns the chamber's humidity system components on and off. Note that when humidity is turned off, the relative humidity is still measured and displayed; however, no control takes place to obtain the set point value. The humidity system will not operate unless the chamber event is also turned on.

The operating limits of the humidity system are dependent upon actual chamber temperature and chamber construction. *Please **note** the following regarding humidity system operation:*

Temperature Extremes

When operating your environmental chamber at extreme air temperature, below freezing (0°C / 32°F) or above boiling (100°C / 212°F), the chamber is not capable of controlling humidity. This is due to the physical properties of air and its ability to hold moisture at standard atmospheric pressures when at these temperatures.

To prevent malfunction or damage to the chamber, the EZT-570L control system automatically disables the humidity system components when outside of the valid operating temperature range. The event will remain on; however, so once the air temperature in the chamber returns to the valid operating range, humidity control will resume at the target humidity set point.

When humidity is disabled due to the chamber air temperature, the corresponding system status Monitor indicator (HUMIDITY TEMPERATURE DISABLE) will illuminate to indicate that this condition is present.

Minimum Humidity Limitations

The standard humidity option provides a lower limit of humidity control relating to a 4.4°C (40°F) dewpoint. The dewpoint refers to the temperature at which the air contains the maximum amount of moisture it can hold. When a surface drops to that temperature or below, condensation will occur on that surface. The dewpoint varies logarithmically with temperature and relative humidity. This means that at higher temperatures, a much lower humidity level can be obtained because the air can hold more moisture the warmer it becomes.

For example, an air temperature of 85°C (185°F) and relative humidity of 12% is the equivalent dewpoint of air at a temperature of 5°C (41°F) and 79%. Both of these values are at the minimum achievable dewpoint of the chamber, and thus the minimum achievable humidity at the related temperature. If you were to set the humidity set point at 0% for example, the humidity level would never reach 0 since the chamber is not capable of removing any more moisture from the air.

The EZT-570L is programmed to determine what the minimum achievable humidity point is at any given temperature and will control to that limit. Therefore, the system will not overwork itself trying to reach an unattainable point. This prolongs system life, reduces wear and tear and prevents damage to humidity system components. Thus, if you set a set point of 0%, you can be confident that the environment within the chamber will remain as dry as possible at any given temperature within the operating range.

When humidity is limited due to the fact that the minimum dewpoint has been achieved, the corresponding system status Monitor indicator (LOW DEWPOINT LIMIT) will illuminate to indicate that this condition is present. If your chamber is not obtaining the desired humidity level, check the status monitor to verify that you are not trying to operate the chamber at a point outside of the chamber's minimum dewpoint capability.

Maximum Humidity Limitations

Certain chambers have limitations on the maximum humidity level that they can operate at a given temperature in order to protect the chamber structure. This limit typically applies to modular chambers. These chambers are constructed of individual panels that lock together to form the chamber. The panels have an inner chamber liner and outer skin with a foam insulation sandwiched between them. They are primarily used for large walk-in/drive-in chambers. Due to the materials used in the construction of the modular panels, the humidity is typically limited to a maximum 70°C dewpoint which corresponds to a maximum of 95% at 70°C (158°F).

When humidity is limited due to the fact that the maximum dewpoint has been achieved, the corresponding system status Monitor indicator (HIGH DEWPOINT LIMIT) will illuminate to indicate that this condition is present. If your chamber is not obtaining the desired humidity level, check the status monitor to verify that you are not trying to operate the chamber at a point outside of the chamber's maximum dewpoint capability.

3.2.1.2 Auxiliary Cooling Operation

The auxiliary cooling system utilizes LN2 or CO2 as a boost cooling medium to assist the refrigeration system in lowering the chamber air temperature. It is an inexpensive method for fast cooling transitions without having to make the investment in a high horsepower refrigeration system that may rarely be used. It can also be used as the primary cooling source for ultra-low temperature operation on chambers designed to operate at temperatures below -84°C (-120°F)

When this option is installed on the chamber, turn the "Aux Cooling" event on. When the boost is required during a pull down, the EZT-570L will automatically turn on the boost cooling solenoids and inject LN2 or CO2, into the chamber to rapidly drop the temperature as required. Once the desired set point is achieved, the boost solenoids will close in order to conserve LN2 or CO2 since it is no longer required, and allow the refrigeration system to maintain the chamber air temperature.

If the chamber is designed for ultra-low temperature operation, and the set point is below the minimum achievable temperature for the refrigeration system, the EZT-570L will disable the refrigeration system and use the boost cooling system for the primary cooling source. This automatically protects the refrigeration system from damage and optimizes system operation.

If the auxiliary cooling event is turned off, the only means of cooling will be from the refrigeration system. If the set point is below the capabilities of the refrigeration system on an ultra-low temperature chamber, the chamber will not be able to reach set point until the event is turned on.

3.2.1.3 Dry Air Purge/Low RH Operation

The dry air purge event can provide two levels of operation.

Level 1 - The first level of operation is dry air purge only. The purge only option consists of an air dryer which dries a small volume of air and discharges the dry air within the chamber work space. This helps reduce condensation on surfaces within the chamber by drying the air. When this event is turned on with the purge only option, the air dryer will run continuously until the event is turned off. Note that the chamber event must also be on in order for purge to operate.

If the chamber is also equipped with the humidity option and the humidity system is enabled, the purge system will be disabled automatically by the EZT-570L. The humidity system cannot control the humidity level within the chamber if the purge system is continuously trying to dry out the chamber. However, if the humidity set point is below the minimum achievable humidity (low dewpoint limit), the EZT-570L will turn the dry air purge back on in order to achieve the lowest possible humidity level.

Level 2 - The second level of this option includes the frozen coil (low RH) option. This option allows the chamber to reach a -29°C (-20°F) dewpoint. This relates to lower relative humidity capabilities at a given air temperature. When the low RH option is installed and the humidity system is enabled, the dry air purge system is automatically operated in conjunction with the frozen coil by the EZT-570L controller based on the air temperature and humidity set points. When required to obtain low humidity levels, the frozen coil and dry air purge systems will start in order to achieve the target set point. When no longer required, they will automatically turn off.

This level of operation also provides the benefit of being able to manually use the dry air purge system by turning the purge event on and off. However, in the case where the low RH option is installed, the humidity system must be disabled for the dry air purge to function manually.

3.2.1.4 Defrost Operation

If the chamber is equipped with the hot-gas defrost option, the “DEFROST” event will allow for programmed or manually initiated defrost of the chamber’s cooling coil(s). See section 5.6 Defrost Settings, for more information on using the defrost option.

3.2.1.5 Product Control Option

Most chambers are equipped with a product control loop. The “PRODUCT CONTROL” event can be used to enable/disable product control programmatically through a running ramp/soak program or just manually via the vent on the Manual Operation or Overview screen. See section 5.5 Product Control, for more information on settings and use of this feature.

3.2.2 Customer Event Option

The EZT-570L controller has the ability to control up to six event output relays. These outputs can be manually turned on and off or controlled programmatically through a running ramp/soak program. They can be used to start and stop devices under test within the chamber, turn signal beacon lights on and off to indicate different steps within the test cycle, etc. If your chamber is equipped with the customer event output option, the events will be included at the bottom of the event list on the Manual Operation and Overview screens.

4. Automatic Ramp/Soak Program Operation

A ramp/soak program is a set of instructions (set points and events) programmed as a timed sequence of steps. When a program is run, the EZT-570L executes each step of the program automatically, in sequence, based on the time duration and settings for each step. The EZT-570L can store hundreds of automatic ramp/soak programs (depending on storage usage for data logging) with up to 99 steps in each program.

The program entry toolbar provides the following functions for editing programs:



New
Open
Save
Save As
Delete
Export

File menu button

- New: Clears all current program entries.
- Open: Provides file open dialog to select a program from memory.
- Save: Saves the current program being edited.
- Save As: Saves the program being edited under a new name.
- Delete: Deletes the current program from internal memory.
- Export: Copies the program being edited to USB memory stick.

Copy
Paste
Step Events
G-Soak Limits
AutoStart

Edit menu button

- Copy: Copies current step data including events.
- Paste: Pastes previously copied step data to the current step.
- Step Events: Copies and pastes current step events to all following steps.
- G-Soak Limits: Displays the guaranteed soak limits screen.
- AutoStart: Displays the auto start settings screen.

Insert step button

Inserts a step after the current step. Upon insert, the EZT-570L will copy the current step set points and events and automatically fill in the data for the newly inserted step. This speeds program entry by minimizing the number of entries a user has to make such as eliminating the need to set the same events on each step of the program. Only the time for the new step and set points (if ramping to a new value) needs to be entered.

Delete step button

Deletes the current step.

Run button

Displays the program operation window to allow the user to start the program under edit or select or control an existing program. See section 4.3 Starting an Automatic Ramp/Soak Program for more information.

4.1 Entering a Ramp/Soak Program

Ramp/Soak programs are created and edited from the Program Entry screen. To create an automatic ramp/soak program:

1. On the Program Entry screen, press the File menu icon, select “New” to create a new program.
2. Enter the data for step 1 of the program.

NOTE: *The first step of a program is an “initialization” step meaning that the loop set points will immediately go to the set points entered for the step and stay there for the duration of the step when the program is started. This ensures that the program will always start from the same conditions each time it is run.*

3. For each additional step required, press the Insert icon to add a step. Make any required changes to the step time, set points, events and wait for conditions.
4. Once entry is complete, press the File menu icon and select “Save” to save the program.

NOTE: *Programs can be saved with names of up to 16 characters long. However, the EZT-570L only uses the first 10 characters of the program name for display updates and record keeping. When naming programs, try to keep the name limited to 10 characters in order to have the full program name shown, or use the first 10 characters as a means of more clearly identifying the program if more than 10 characters are used in the name.*



4.1.1 Entering Step Time

The length of time, loop set points and jump conditions for each step are entered by touching the corresponding row for the desired entry in the list on the left side of the Program Entry screen. To enter the time for the step, press the first row in the step data list view that contains the time entry. Upon doing so, the numeric entry keypad will be shown.

The length of each step is entered as a period of time in hours, minutes and seconds. To make time entry easy, the entry will automatically be formatted into time as the number keys are pressed. For example, if a step is to be thirty seconds long, just enter a value of 30. If the time for the step is one minute and thirty seconds, enter a value of 130 for 1 minute, 30 seconds. If the step time is one hour and thirty minutes, enter a value of 1300 for 1 hour, 30 minutes and 00 seconds.



Since one hour and thirty minutes is also a time of 90 minutes, you can also enter a value of 9000 for 90 minutes, 00 seconds. Upon pressing the Done button, the time will be formatted and displayed in the step data list view as 1:30:00.

NOTE: A step time of zero can be entered for a step to implement an immediate set point change. This will cause the chamber to go to the set point as quickly as possible. When used in conjunction with a “wait” condition on the following step, there is no need to know the time it takes for the chamber to achieve set point.

The wait can be used to trigger the next step, typically a soak, so that the desired soak time is achieved without having to determine what additional time may be needed in order to make sure the chamber reaches set point before starting the soak time.

4.1.2 Entering Step Set Points

The length of time, loop set points and jump conditions for each step are entered by touching the corresponding row for the desired entry in the list on the left side of the Program Entry screen. To enter set points for each control loop, touch the loop in the step data list view and enter the desired set point via the numeric keypad.

The loop set points are used as the target set points for the step, i.e., the set point that each control loop will reach by the end of the step. Each set point will then change independently of the other set points in order to arrive at the target set point when the time left in the step reaches zero. Thus, based on the time entered and the difference in set point from the previous step, the step will either be a “ramp” step or a “soak” step.

Entering a Soak Step

The set point entry for a step defines the target set point, i.e., the set point that will be achieved by the end of the step. Thus, if the set point of the step matches the set point from the previous step, the loop will soak, i.e., remain at that set point for the entire step creating a soak step.

When adding (inserting) steps into the program, the new step assumes the same set points and events as the current step. Thus, as steps are added, the new step is automatically a soak step. By simply adjusting the time of the new step, soak step entry would be complete.

Entering a Ramp Step

A ramp step is merely a step with a set point that is different from the previous step. The loop's set point will then ramp from the previous set point, to the set point of the current step, linearly over the time entered for the step. This creates a ramp step.

When adding (inserting) steps into the program, the new step assumes the same set points and events as the current step. Thus, as steps are added, the new step is automatically a soak step. By simply changing the set point for a loop, the step becomes a ramp step. Adjusting the time length of the step will then vary the ramp rate.

4.1.2.1 Entering Ramp Rate

In order to enter a ramp rate, you can either calculate the time it will take to go from the previous step's set point to the current step's set point at the desired ramp rate and enter the time for the step directly, or you can enter the ramp rate on the numeric keypad when entering the loop set point.

For example, if you desire a ramp rate of 0.5 degrees per minute from the previous step's 24 degree set point to the new 85 degree set point, the step time will be the difference in temperature (61 degrees) divided by the rate of 0.5 degrees per minute. This equates to a time period of 122 minutes (2 hours and 2 minutes). Thus, the step would require a set point entry of 85 degrees and a time entry of 2 hours, 2 minutes.

Or, when entering the loop set point for the ramp step of 85 degrees, you could specify a ramp rate by touching the ramp rate field on the numeric keypad and then enter the desired ramp rate of 0.5 degrees.



Once the Done button is pressed, the time length of the step will be automatically calculated in order to achieve the desired ramp rate and will be shown in the step data list view along with the set point and the specified ramp rate.



The ramp rate entry is fixed in units/minute with a range of 0.0 to 99.9. When the ramp rate entry is zero (or left blank), the EZT-570L simply enters the new set point.

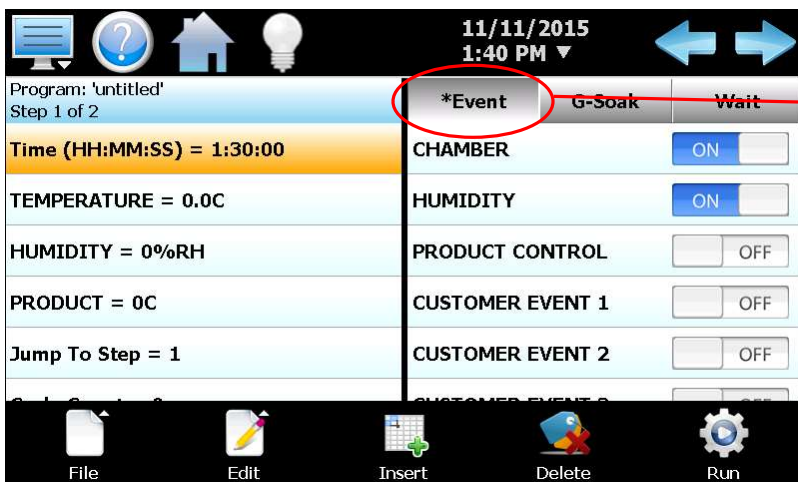
NOTE: Ramp rate can only be entered on one loop per step since the program operates on a single time base. In order to set the ramp rate (and subsequent time length for the step) to a different loop, you must clear an existing ramp rate entry.

Entering step time will clear any existing ramp rate entry on the step. Ramp rate is a function of time and difference in set point, so the length of time for the step can be entered or a ramp rate can be entered, not both.

When entering ramp rate, on temperature for example, it sets a length of time for the step based on the ramp rate and set point entered. If another set point is different from the previous step, humidity for example, the humidity set point will also ramp to the humidity set point for the step. However, the actual ramp rate for humidity will be based on the difference in set point from the previous step and the time length of the step. It will not be equal to the ramp rate for temperature.

4.1.3 Setting Step Events

The **Event** selections are used to select which system events are to be on during the step. To edit step events, press the Event button on the Program Entry screen. This will display the list of all chamber and customer events. You can then select which events are to be on during the step by touching each event on/off button to toggle the events on or off.



When at least one event is turned on in a step, an asterisk '*' will appear before the word 'Event' on the list selection button.

This lets the user know that events have been turned on without having to press the 'Event' button, or if the events that are on are not currently shown in the list due to the scroll position of the list.

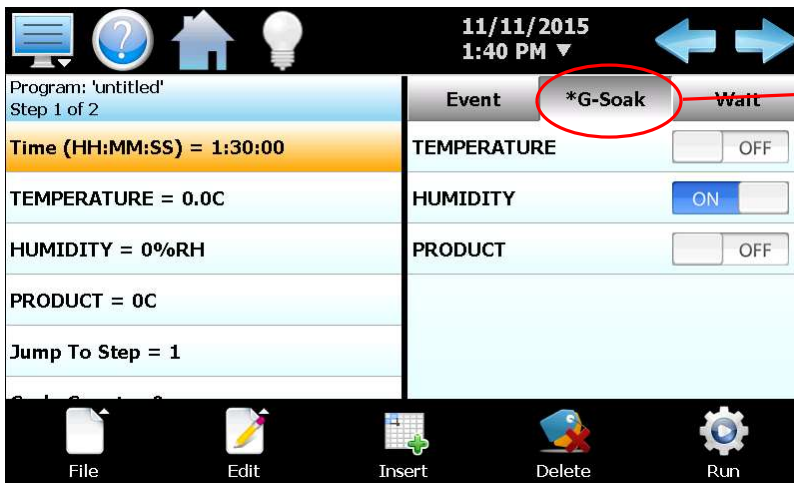
NOTE: The step events must be set individually for each step. Also, for the chamber to operate, the relevant chamber systems must be turned on via event selection. Even though a ramp/soak program may be in operation, if the events are not set, the chamber will not run.

To help reduce the number of actions required to create a program, each time a new step is added, the events of the current step will be automatically copied to the new step eliminating the need to set them. Most programs require the same events to be set one each step, thus eliminating the need to set them manually. If an event is not required on the new step, then only the one event would need to be turned off.

The EZT-570L also provides the “Step Events” function from the “Edit” menu icon. When selected, all event selections of the current step will be copied to all following steps. This can be useful when making copies of programs. For example, if you wish to create a temperature only program from an existing temperature/humidity program, you can save the temperature/humidity program under a different name. On step 1 of the program, turn off the humidity event, and then use the “Step Events” function to copy the events from step 1 to all following steps. This would turn off humidity on all steps without the need to go through each step individually to turn off the humidity event.

4.1.4 Setting Guaranteed Soak Events

The **G-Soak** selections are used to turn on the guaranteed soak option for one or more of the control loops. To enable guaranteed soak for a loop, first press the G-Soak button above the event list view on the Program Entry screen. This will display the list of soak selections for each loop of the chamber.



When a guaranteed soak selection is made on a step, an asterisk '*' will appear before the word 'G-Soak' on the list selection button.

This lets the user know that guaranteed soak selections are made without having to press the 'G-Soak' button.

Press the on/off button for a loop to toggle the guaranteed soak selection on and off as desired. When the guaranteed soak event for a loop is turned on, the program will automatically enter a hold condition during the step if the loop's PV deviates from its set point by more than the soak limit setting for the loop as entered on the G-Soak Limits screen.

NOTE: Guaranteed soak should not be used on ramping steps. The ramp rate will be affected if the process variable deviates from the soak band because the program will be placed in hold. When the program is in hold, the step length will be extended and the set points will no longer ramp at the desired rate. Guaranteed soak should be used on soak steps to make sure that the process stays at the desired set point, within the soak band, for the entire duration of the step.

4.1.5 Using Wait For

The “wait” function is a powerful tool for pausing a program until a particular process variable reaches a predefined set point. This differs from the guaranteed soak function by being a single shot monitor. With guaranteed soak, the process variable is monitored throughout the whole step. If the process exceeds the upper or lower soak band, the program will pause until the process returns to within the band. The wait for function puts the program in hold and “waits for” the process to exceed a particular value that is set for the step. Once the process reaches this set point value, the program will resume.

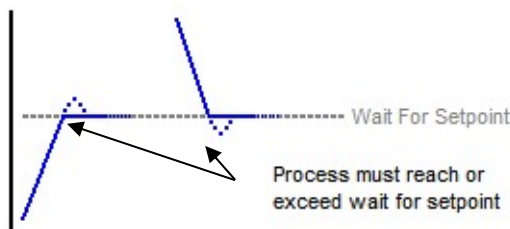


When a wait selection is made on a step, an asterisk '*' will appear before the word 'Wait' on the list selection button.

This lets the user know that a wait for condition is entered for the step without having to press the 'Wait' button.

To enable a wait condition in a step, first press the Wait button above the event list view on the Program Entry screen. This will display the list of available wait selections. Select the input to wait for, and if a process variable is selected (Loop or monitor input) enter the set point for the wait. This is the set point that the process variable must reach in order for the step to continue.

NOTE: The set point entry for a wait step is critical for the “wait for” loop or monitor to operate correctly. During the wait state, the selected process input must arrive at or cross the set point (Wait SP) in order for the program to resume operation.



4.1.6 Using Jumps

The jump allows the program to “jump” between different steps within it. This is useful for repeating the same ramp/soak combination during extended cycle testing of product. When a jump is programmed on a step, the program will first execute the step as a normal step; however, once the step time is complete, the program will jump to the specified “jump to step” rather than continuing on to the next step in the program. After all of the programmed jumps have been completed, the program will then continue to the next sequential step in the program without making any further jumps.

To program a jump, enter the step number that you want the program to jump to when the step is complete, along with the total number of jumps to be made. A cycle count of zero on a step indicates that no jump will be made once the step is complete regardless of what the jump step number is set to.

Jump to Step: Sets the step number that the program will jump to upon the completion of the step. The program will only jump to this step if the cycle count is greater than zero.

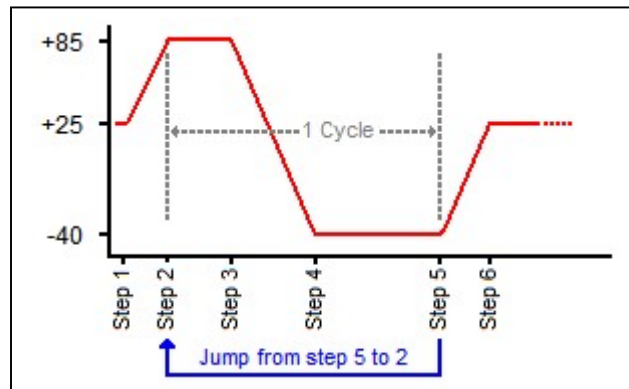
Cycle Count: Sets the number of jumps that will be made from the step. Once all jumps have been made, the program will continue on to the next step in sequential order.

NOTE: The cycle count defines how many jumps will be made. Thus, if you wish to perform 10 cycles within a program, your cycle count will be set to 9, 10 minus the 1 performed prior to reaching the jump step.

Example:

Product is to be loaded into the test chamber at ambient conditions, cycled between +85 and -40 for 10 cycles, and then returned to ambient temperature, so that it can be removed in order to load the next test sample.

- Step 1 Start at +25
- Step 2 Ramp to +85
- Step 3 Soak at +85
- Step 4 Ramp to -40
- Step 5 Soak at -40
Set Jump to Step=2
Set Cycle Count=9
- Step 6 End at +25



With the jump programmed on step 5, the program will jump from step 5 back to step 2 after the soak time has completed. The program will then repeat steps 2 through 5. It will continue to do this until all 9 jumps have occurred. Once all 9 jumps have been completed, the program will continue on to step 6 after the final soak at -40. Since 1 cycle is made prior to the first jump at the end of step 5, a total of 10 cycles are completed.

4.1.7 AutoStart

Auto start is a feature that can be used to start a ramp/soak program on a specified date or day, and time. The settings are saved with the program. To enter settings for program auto start, first select "AutoStart" from the Edit menu icon on the Program Entry screen. Choose the desired auto start method, by date or by day, from the drop-down menu and enter the start time settings.

When auto start by date is selected, the exact date and time must be entered. Enter the month, day, year and time of day in hours and minutes for when the program is to start. The day of week is not required to be set. It is not used for this function. When auto start by day is selected, only the day of week and time is required to be entered. The date settings are ignored. The EZT-570L simply looks for the day of week and time to begin the program.

Press the Return button to exit screen.

Program: 'AutoStart Settings'		Return
Month	<input type="text" value="1"/>	DOW
Day	<input type="text" value="1"/>	Hour
Year	<input type="text" value="0"/>	Minute
DOW = 0 (Sunday) to 6 (Saturday)		Off

Once all entries have been made, press the “Return” button to get back to the Program Entry screen.

NOTE: The time is entered in a 24-hour time format. To convert time from a 12-hour format (AM/PM) into 24-hour format, add 12 to the hours for PM time. For example, 2pm will be a value of 14 (2 + 12) for hours. A time of 5:30pm will be 17 hours, 30 minutes.

4.1.8 Guaranteed Soak Limits

To access the guaranteed soak limits, select “G-Soak Limits” from the Edit menu icon on the Program Entry screen. The Guaranteed Soak Limits screen is used to set the control tolerance for guaranteed soak steps when in program operation. When the process variables deviate from their set points by more than the soak limits, the program time will stop until the process variables re-enter the soak bands. These limits apply to each step in the program and only need to be set once.

Press the Return button to exit screen.

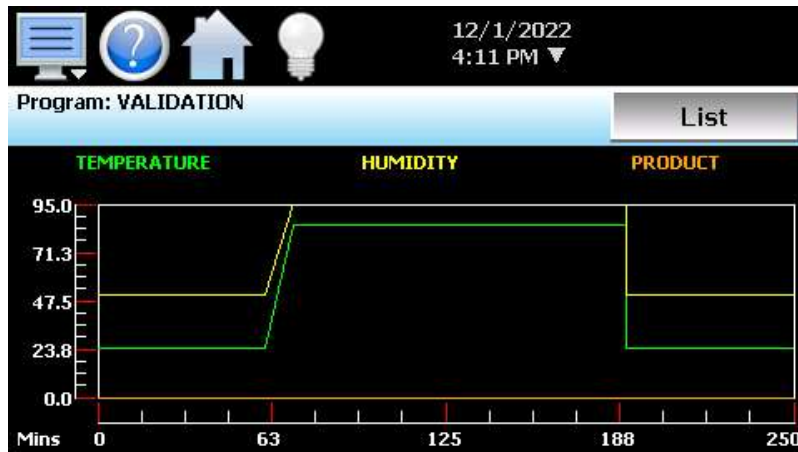
Program: 'Guaranteed Soak Limits'		Return
TEMPERATURE		
Guaranteed Soak Limits SP = 0C		
HUMIDITY		
Guaranteed Soak Limits SP = 0%RH		
PRODUCT		
Guaranteed Soak Limits SP = 0C		

To change a limit, touch the row for the desired limit set point in the list, enter the new limit setting on the numeric keypad and press Done when finished. The new limit value will then be shown in the list view for the selected control loop. Once all entries have been made, press the “Return” button to get back to the Program Entry screen.

NOTE: If soak limit is set too tight, i.e., a very small deviation value from set point, it could prevent the program from operating as desired because the process may not be able to be controlled to such a tight limit setting.

4.2 Program Plot

The program under edit can be viewed graphically by “Plot” from the Program menu. This allows you to see if the program entered matches the expected appearance. The Y-axis auto-scales to fit the range of set points entered for each loop in the program. The X-axis auto-scales to the total time duration of the program. Note that jump steps are not shown on the plot.



4.2.1 Program List

The program Plot screen also provides the user with the option to view all program steps in a scrollable list format by pressing the “List” button. To revert back to the plot view, press the “Plot” button.



The screenshot shows the 'Program List' interface for the 'VALIDATION' program. The top status bar is identical to the plot view. Below the status bar, there are navigation icons and a 'Plot' button. The main list area displays three program steps (S1, S2, S3) with their respective times, set points, and events.

Step	Time	Temperature	Humidity	Product	Event
S1	1:00:00	24.0	50.0	0	CHAMBER,HUMIDITY,
S2	0:10:00	85.0	95.0	0	CHAMBER,HUMIDITY,
S3	2:00:00	85.0	95.0	0	CHAMBER,HUMIDITY,

The list will display each step of the program including time, jump entry, loop set points and programmed events. If a wait condition is programmed for a loop, the set point of the loop will be followed by a “(W)”. If guaranteed soak is programmed for a loop, the set point will be followed by a “(GS)”. Note that a wait condition for a digital input is not shown on the list view.

4.3 Starting an Automatic Ramp/Soak Program

The selection, starting and stopping of ramp/soak programs is done via the Program Operation window. This can be accessed from the main Loop view and Overview screens by pressing the “Program Operation” button and on the Program Entry or Status screens by pressing the “Run” or “Start/Stop” icon.



The Program Operation window provides selections for program run, hold, stop, and off as well as short cuts for accessing the Program Entry screen via “Edit” and selecting which program to run from available programs stored on the EZT-570L via “Select”. The status of the current program is displayed at the top of the window. If a program is not in operation, the current name of the program selected to run will be shown.

In order to start a ramp/soak program, simply press the Run icon if a program is already loaded, and it will start from the beginning on step one. If a program is not loaded, or you wish to start the program on a step other than the first step, first press the Select icon and choose the desired program from the list, and then press the Run icon. This will display the **Start Step** entry.



The **start step** can be adjusted up and down by pressing the left/right arrow buttons or by pressing the step number field and directly entering the desired start step via the numeric keypad. Once the desired start step number is entered, press the “Start” button. The Program Operation screen will then be automatically closed and the program will start on the selected step.

NOTE: *If the program was set up with the auto start feature enabled, the program will enter the auto start mode immediately upon starting. Once the set date or day and time are reached, the program will begin running. The start date shown on the Program Status screen indicates when the program will start based on the auto start settings.*

To stop a program, select “Stop” or “Off” from the Program Operation window. When a program is stopped, the loops will return to single set point (static mode) operation and the events will return to manual control.

The **Stop** selection stops the running program, but leaves the set points and events at their current values when the program stops. This allows you to stop a program and continue running the chamber in manual mode.

The **Off** selection stops the running program and leaves the set points at their current values when the program stops; however, all events will be turned off. This allows you to immediately stop a program and shut down the chamber with a single selection.

4.3.1 Hold/Resume Ramp/Soak Program Operation

At any time during the operation of a program, it can be manually placed into hold. This stops the program timer; however, the chamber continues operation under the current step settings at the time the program was put into hold. To pause the running program, select “Hold” from the Program Operation window. To resume the program from the point in which it paused, select “Run”.

NOTE: *When a program is in hold, the set points and events can be manually changed; however, once program operation is resumed, the set points and event status will return to those defined by the program step.*

4.4 Monitoring Automated Ramp/Soak Program Operation

The Program Status view provides all status information regarding the operation of the current program. It can be accessed directly from the home Program menu.



Status indicates the current program operating mode, i.e., active, inactive, hold, etc.

Start indicates the date and time at which the program was started (or will begin if in Autostart).

End is the calculated stop date and time for the program.

Step indicates the step number currently being executed.

Time Remaining is the time remaining in the current step.

Wait indicates the input(s) being monitored if a wait for condition is present.

Wait SP shows the set point or digital input number for the wait for condition if active.

Jump indicates the step number that program will jump to at the completion of the current step.

Cycles indicates the number of jumps remaining for the step (if any).

The **loop set points** for the current step can be viewed at the top of the screen by pressing the left and right scroll buttons to cycle through each loop. Note that the set points shown here are the target set points, not the actual set points the loops are controlling to. To view the actual control set point, see the main Loop view or Overview screen.

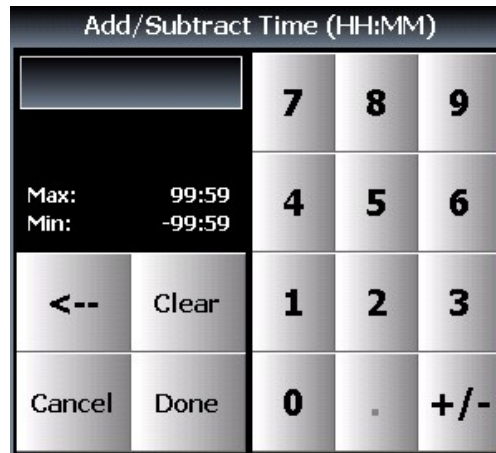
4.4.1 Advance Previous/Next Step

The advance step functions allow you to skip certain program steps or repeat them by advancing to the desired step. To advance to a previous or next step in the program, it must first be put into hold. Once the program is in hold, the advance step buttons on the Program Status screen will be enabled.

By selecting “Previous Step” or “Next Step”, the program will jump back or jump forward by one step each time the menu item is selected. When the program is on the desired step, place it back into run and the program will resume operation from the beginning of the step.

4.4.2 Adjusting Step Time

During program operation, the length of time remaining in a step can be adjusted to increase or decrease the time left. The adjust step time function allows you to add or subtract time from the current step; however, the program must first be put into hold. Once in hold, the “Adjust Time” button on the program Status screen is enabled.



When selected, the numeric keypad will be shown. Enter the time adjustment in hours and minutes and press Done when finished. The time remaining in the step will be adjusted by the total time entered. Once complete, resume the program.

NOTE: *When adjusting the time of a ramping step, the ramp rate will be altered for the remainder of the step. The ramp rate will decrease if time is added and increase if time is removed. To subtract time from a step, enter a negative value for hours and minutes.*

4.5 Program Worksheet

This table can be used as a template for creating programs prior to entering them on the EZT-570L. It can also be used as a tool for quick checks to make sure all of the entries were made correctly.

Profile Name: _____
 Date Programmed: _____
 Programmed By: _____

Step #																				
Set point	1																			
	2																			
	3																			
Step Time (H:M:S)																				
	1																			
	2																			
	Chamber Events	3																		
		4																		
	5																			
6																				
Customer Events	1																			
	2																			
	3																			
	4																			
	5																			
	6																			
GS Events	1																			
	2																			
	3																			
Wait for																				
Wait for Set point																				
Jump Step																				
Jump Count																				

4.6 Common Questions About Ramp/Soak Program Operation

1. How do I start or run a ramp/soak program?

From the Loop view or Overview screen press the “Program Operation” button or on the Program Status or Program Entry screen press the “Start/Stop” or “Run” icon. From the Program Operation window, press the “Run” icon to start the program currently loaded or press “Select” to choose from a list of programs stored in the EZT-570L memory. Select the desired program from the list, and then run the program.

2. How do I know which program is running?

When a program is running, the name is displayed on Program Status view screen as well as the Loop view and Overview screens. The EZT-570L will indicate that the program is running when it is in operation. If a program is not running, the EZT-570L will display the name of the currently loaded program, i.e., present in memory and ready to be run.

The current program status can also be viewed in the notifications list from any screen by pressing the date/time display in the icon bar.

3. Why does the program not ramp to the set points in the first step?

The program operation of the EZT-570L was designed to operate the chamber based on the set points and events defined in the program. Since the chamber can be at random set points when a program is started, this could cause the chamber to not follow the selected program properly or the same each time it is run. To ensure that the program is executed in the same manner each time, the chamber set points are immediately set to the first step's set points for the length of the step. This acts as an "initialization" step to get the chamber running and conditioning product as desired prior to performing ramping sequences of the program. This eliminates the need for the operator to set the chamber to the proper set points prior to starting a program.

NOTE: *For instances where only a single ramp is required, or a remote software package is being used to send ramping sequences to the EZT-570L, the program operation was designed to except a one step program. If a one step program is run, the chamber will ramp from its current set points to the set points of the one step program. It will not immediately take the set points of the step. Thus, by executing one step programs, ramping sequences can be executed when required and not on predefined time intervals. This is especially useful and simplifies programming when custom software applications are being used to control the chamber.*

4. Why is the program not running to the set point entered for the step?

Automatic ramp/soak program operation is limited by the lower and upper set point limits (see section 5.2 Set Point Limits). If a program step has a set point that exceeds the lower or upper limit, the set point will be automatically coerced to the limit it exceeds. This prevents damage to equipment or product by ensuring that the system only operates to the range entered by the user. If a program step has a set point of 100 for example, but the upper limit is 90, when the program is run the set point will be coerced to the maximum allowed upper limit of 90 during operation of the step.

The original program remains unaltered, so if the user then changes the lower and upper limits to match the range of set points within the program, the program will then operate to the programmed set points. This ensures that the operating range of the system cannot be exceeded even if a user accidentally copies a program from another system with a greater operating range.

5. How do I enter a jump step?

A "jump step" is a normal step; however, instead of continuing to the next step of the program when the step is complete, the program jumps to a specified step. To enter a jump, set the step number you want to the program to jump to and the number of times that the jump is to take place. When the step is complete, the jump settings will tell the program to jump to the specified step until all jumps have taken place. The next time the jump step is executed (after all jumps have taken place), the program will continue on to the next sequential step.

6. Why is the program not coming out of Hold?

If an alarm condition is present which shuts the chamber down, the program is automatically placed into hold. The alarm condition must be cleared in order for the program to resume operation.

7. Why is the program not coming out of a Wait?

When a "wait for" condition is applied to a step, the step will not begin until the wait for condition is met. The selected input(s) must reach and/or exceed the wait for set point. If an input does not reach the set point, the step will not continue.

When using a wait for to initiate a soak time, be sure to place the wait for condition on the soak step. If the wait condition is applied to the ramp step, the program will not continue because the set point will not change until the wait for condition is met, i.e., the ramp cannot take place until the step is executed. Since the set point does not change, the input will not change to meet the wait for set point and the program will wait indefinitely.

8. Why has the program not completed its run by the stop date given when I started it?

The estimated stop date provided by the EZT-570L for the program is a calculated value based on the sum total of all step times. This time can be affected by any guaranteed soaks or wait for conditions entered into steps of the program. The effects of these times are an unknown and can cause the program to run longer than calculated because they pause the program until their conditions are met.

The EZT-570L updates the estimated stop date based on these conditions as they occur; however, it does make the stop date a moving target.

9. I have guaranteed soak turned on, why is the chamber not following the ramp step?

Guaranteed soak should not be turned on for ramping steps. Guaranteed soak is used to pause a step until the selected input is within the soak band around set point. On a ramping step, if the step time is paused due to an input leaving the soak band, the ramp rate is then affected because the set point is no longer changing. It will hold at that set point until the input returns to the soak band.

Since the purpose of a ramping step is to change the set point over time, the input could be constantly falling in and out of the soak band throughout the step, thus causing the program to start and stop. This will elongate the overall step time and alter the rate of change of the set point. Guaranteed soak should only be enabled on soak steps.

5. System Settings

This section covers the use of extended controller features that enhance the functionality of your chamber. To gain access to the setup options, select “Settings” from the Device menu.

5.1 Recovery

The power recovery settings direct the EZT-570L’s response to the interruption of electrical power. The EZT-570L’s battery-powered real-time clock tracks the amount of time the power is out. When power is restored, the controller compares this amount of time to the Recovery Time setting and takes whatever action is selected in the Recovery State.

First, determine how long the power can be interrupted without adversely affecting results. Set the Recovery Time to this time. If power is returned prior to this time period being exceeded, the chamber will automatically continue operation where it left off. If it takes longer than the recovery time for power to be restored, it will take action based on the Recovery State selection.



- Off** Select “Off” to have the chamber default to the off state on power-up. If a ramp/soak program was active prior to the power outage, the program will also be stopped.
- Hold** Select “Hold” to have the chamber return to operation at the same point it was prior to the power outage. If a ramp/soak program was running, the program will still be active; however, it will remain in hold until manually set to continue.
- Continue** Select “Continue” to have the chamber pick-up where it left off on loss of power. If a ramp/soak program was running prior to the power outage, it will resume where it left off and continue through the rest of the program when power is restored.
- Start Over** Select “Start Over” to automatically restart the ramp/soak program that was running at power failure. Use this option if it is critical for a program to run from start to finish without interruption.
- Resume** Select “Resume” to have the chamber pick-up where it would be at the current time, if power had not been lost. If a ramp/soak program was running prior to the power outage, the EZT-570L will advance forward through the program to the point where it would be, at the current time, and resume operation from that point.

5.2 Set Point Limits

The Setpoint Limits screen allows for the adjustment of the minimum and maximum operating set points permitted to be entered for the control loops. These limits can be used to prevent operators from entering a value that exceeds the survivability limits of a product being tested, reducing the risk of product damage.



IMPORTANT: *The operation of automatic ramp/soak programs is limited by the lower and upper limits. If a program was created or imported from another EZT-570L with set points that exceed the current lower and/or upper limits, when the program is run, the program step set points will be coerced to the lower or upper limit that it exceeds. This protects the equipment or product under test from being subjected to values that exceed current set point limits.*

The minimum and maximum values for the lower and upper limits are defined by CSZ limits set in the configuration. The EZT-570L prevents the user from entering set point limits outside of these configuration values to protect the chamber from operation outside of design limits. Contact CSZ regarding the maximum set point limits permitted for your chamber.

5.3 Event Names

The names of the optional customer events can be changed to describe what function they are used to perform. To alter event names, select “Event Names” from the Set menu.

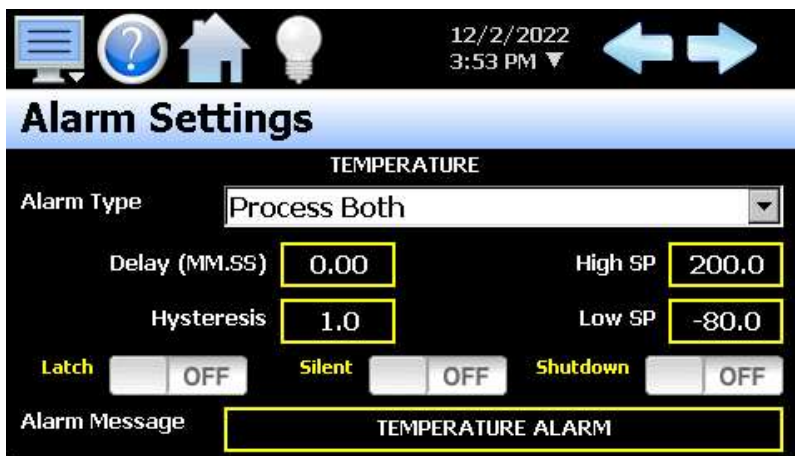


To change the name of the event, select the event by touching it in the list view. A text entry keypad will be shown allowing you to enter a new description (up to 15 characters long). Once complete, press Done and the new name will be shown in the list and used throughout all EZT-570L screens.

NOTE: Chamber events will also be included in the event list. Depending upon chamber configuration and options, the names for these events may also be editable. Use care when altering event names so that events utilized for chamber systems are not altered.

5.4 Alarms

The EZT-570L can provide user configurable alarms for each input. The alarms are activated when the process value leaves the selected range. A user can configure how and when an alarm is triggered, what action it takes and whether it clears automatically when the alarm condition is over or requires manual reset.



NOTE: Depending upon the configuration and options provided on your chamber, some of the EZT-570L alarm functions may not be available. The use of each alarm, and the function it performs, is determined by CSZ. If there are questions or concerns about the configuration and operation of your chamber, contact CSZ for further information.

Alarm Types

Process: A process alarm uses one or two set points to define an alarm condition. Process alarms can be set for high only, low only or both (high and low).

Deviation: A deviation alarm uses one or two set points that are defined relative to the control set point. High and low alarm set points are calculated by adding and/or subtracting offset values from the control set point. If the set point changes, the window defined by the alarm set points automatically changes with it. A deviation alarm can be set for high only, low only or both (high and low).

NOTE: The deviation alarm type is not available for the optional monitor inputs. The monitor inputs are not associated with a control set point.

Alarm Modes

Latch: An alarm with the latch turned on will remain active 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.

Silent: This is used to control the method by which an alarm is reported. When silent mode is turned off, an alarm condition will trigger the audible alarm on the chamber and the alarm icon will flash to indicate the alarm condition. The audible alert must then be manually silenced by pressing the reset button on the alarm monitor screen.

If silent mode is turned on, there will be no audible alert when an alarm condition is present. In addition, if the alarm is not set to latch, the alarm icon will not be shown. The alarm will be reported on the alarm screen, but no visual alert will be given. If the alarm is set to latching and/or to shut down the chamber, the alarm icon will be shown in order to provide a visual alert to the operator that user intervention is required.

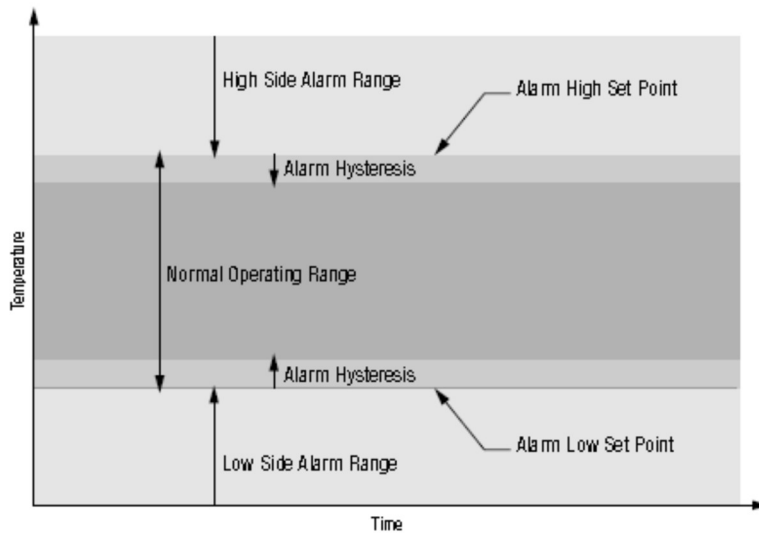
Shut Down: If shut down is turned off, the alarm will not affect the operation of the chamber. If shut down is turned on, the chamber will turn off all systems in an alarm condition. If an automatic ramp/soak program is operating, the program will also go into hold.

Alarm Set Points

High: The alarm high set point defines the process value that will trigger a high side alarm. It must be higher than the alarm low set point.

Low: The alarm low set point defines the process value that will trigger a low side alarm. It must be lower than the alarm high set point.

Hysteresis: The hysteresis (often referred to as alarm dead band) defines how far the process must return into the normal operating range before the alarm can be cleared.



The alarm **Delay (MM.SS)** allow the user to enter a delay period (in minutes and seconds) for which the alarm set point must be exceeded before the alarm can activate.

The **Alarm Message** is the text notification that appears on the Alarm screen when the alarm activates. This message can be edited (up to 25 characters maximum) so that the alarm message more accurately describes what the alarm means.

5.4.1 Special Alarm Types

Depending upon the configuration and options provided on your chamber, some alarms may provide limited or no configurable options other than the alarm message. The optional “End of Program” alarm for example, only allows the alarm message to be altered as it simply provides an alarm notification when a ramp/soak program completes operation.

5.4.1.1 Optional Limit

If the limit option is installed, the high and low limit alarm set points and alarm (output 2) set points will be provided depending upon the configuration of the limit control. All limit alarm set points are locked in addition to system security settings if configured. In order to change a limit alarm set point the field must first be unlocked.



When the alarm is locked, the “Alarm Message” description will be replaced with “(Locked)”. Pressing the alarm set point entry field will display a dialog indicating that the field is locked. In order to unlock a limit alarm set point, press and hold the alarm set point field. After approximately 4 seconds, the “(Locked)” descriptor will be replaced with the standard “Alarm Message” text. When this occurs, stop pressing on the screen and the numeric keypad will be shown. A new alarm set point can then be entered.

After a period of 1 minute (if no further edits are made to limit alarm set points) or upon leaving the Alarm screen, the limit set points will automatically be relocked. The process will then have to be repeated to make another change.

5.5 Product Control

If the chamber is equipped with a product control loop, this screen will be accessible from the device settings Set menu. Product control is a control strategy in which one control loop provides the set point for another loop. It allows the process or part temperature to be reached as quickly as possible while minimizing overshoot. Product control can be used to optimize the performance of chambers containing product with long thermal lag times.

If only single-loop control is used, air temperature for example, the air will reach its designated set point and the chamber will hold at this temperature. However, the part in the chamber may take hours or even days to reach this temperature due to its thermal mass. The reason for this is the fact that as the part temperature approaches the air temperature, the difference between the part temperature and the air temperature decreases. This difference in temperature is what forces the heat to move between the part and the air. The lower this difference, the slower the heat moves. The composition of the product material, whether it is a natural insulator or conductor, also affects the rate of heat transfer.



The product control feature can be used to speed up this process and ensure that your part reaches the desired temperature as quickly as possible. It does this by monitoring the part temperature through the product control loop, and based on the set point for product temperature, generates a set point for the air temperature control loop. This set point is then automatically fed into the air temperature control loop. This allows the air to exceed the desired product temperature and increase the temperature difference between the part and the air. This accelerates the transfer of heat between the air and product under test.

There are two modes of operation for the product control feature, deviation and process. These modes define how the air temperature set point is calculated:

- The **Deviation** mode uses the lower and upper set points to generate a set point that is defined relative to the product set point. The upper and lower range of the air temperature set point is calculated by adding and/or subtracting these values as offsets from the product set point. As the product set point changes, the window defined by the upper and lower points automatically changes with it.

The deviation mode has the benefit of limiting the maximum and minimum temperature that the air can achieve relative to the desired product set point. This allows the system to be fine-tuned to the minimum amount of overshoot required to obtain the desired product temperature.

- The **Process** mode uses the lower and upper set points as the upper and lower range of the air temperature set point. The output of the product control loop is then used to calculate a linear set point between these two values in order to provide the set point for the air temperature loop.

The process mode has the benefit of maximum change rates by allowing the air temperature to go to absolute limits. This allows the product to achieve set point temperature as quickly as possible, but does so at the cost of stability. If the part has a large thermal lag, the air temperature control may oscillate uncontrollably once the product reaches set point because of the large overshoot. In most cases, deviation control is the recommended selection.

The product control feature can be turned on and off in one of two ways. It can be either enabled or disabled by pressing the desired mode control button, disable, deviation or process, or an event can be used to enable and disable the selected mode when the “uses event” button is chosen in addition to the product control mode.

When the **Use Event for Enable/Disable** selection is made, the selected product control mode (deviation or process) is turned on and off with the product control event (chamber event 10). When the selection is not made, the selected product control mode is in operation at all times until disabled by the user. This allows product control to be turned on and off during different steps of a ramp/soak program or manually from the Overview screen or Manual Operation window on the Loop view screen when required without having to disable it altogether.

NOTE: Depending upon chamber configuration and options, the “use event selection for enable/disable” may not be available on your chamber. Product control will then have to be manually enabled/disabled when required from the Product Control screen.

5.5.1 Using Product Control

The key to using product control, or even if it is necessary for your testing purposes, is understanding your product and what temperature conditions you want to test it under. There are several other factors that also come in to play such as the product shape, location in the chamber and most importantly, air flow over the product.

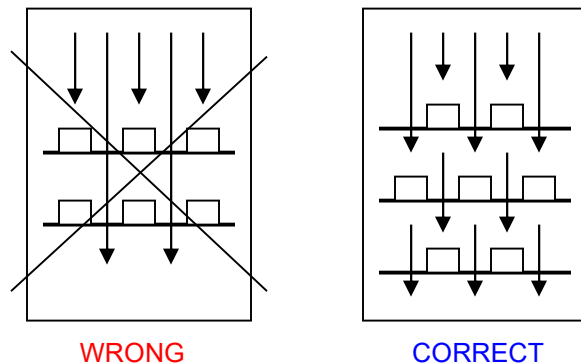
5.5.1.1 Should I Use Product Control for My Test

It is important to remember that it is the chamber air that is adding or removing heat from your product, and there must be a difference in temperature between them in order to do this. The larger this difference, the more heat that flows. Additionally, the more air moves across your product, the more heat can be added or removed at any given temperature difference.

Product placement in a chamber can affect the rate at which product changes temperature. It is important to not overload a chamber since blocking or restricting airflow will reduce performance and can prevent some of the product from seeing the proper test conditions. Product should be located in such a way that it gets good air distribution around it. While this may not be always possible due to certain circumstances, such as product shape, it is a factor to consider whenever possible.

Product Placement

Typically, the most detrimental affects are caused when shelves are used in a chamber and not enough free space around the product is provided for proper air flow. It is more beneficial to use multiple shelves with staggered product placement than to overload a shelf. Regardless of the number of shelves, staggering product is a must.



Once product is correctly positioned in the chamber, the need for product control depends on how the product responds to the test program and if the test requirements demand that the product be at a specific temperature. Small product placed inside a chamber with adequate airflow over them should follow the air temperature relatively close. However, large and/or dense product may lag behind air temperature.

This may require the test cycle to be extended in order to allow longer soak periods to provide enough time for the product to reach air temperature. Again, due to the need for a temperature difference to force the heat to move between the product and air, the product may never reach air temperature. If the test requirements specify that the product must be at the designated temperature, using product control is the only effective way to do this in the shortest cycle time possible.

Since speed for product to market is always desired, the need for faster test cycles is a necessity. Thus, if your testing needs are leaning towards the use of product control, it is important to implement it correctly for your product. Since the response that every product will have to a test program is an unknown, the exact settings for every situation cannot be predetermined. However, the following sections provide guidance on where to start. They provide assistance for the two “known” types of product loads that can be placed within a chamber; a dead load or a live load.

5.5.1.2 Implementing Product Control on “Dead Loads”

A “dead load” is a term describing a product that does not generate heat. Any product can be a dead load, even if it is an electrical product, as long as it is not powered during the test. Dead loads lag behind the air temperature when increasing or decreasing temperature. Since they lag in both directions, the product control settings need to be adjusted in order to allow the air temperature to go above and below the desired product temperature in order to drive it to set point.

In determining the upper and lower set point limits for product control, it is important to consider the maximum and minimum air temperatures that your product can be exposed to. Since the air temperature will exceed the product temperature in order to get it to set point, the air temperature could exceed the maximum or minimum air temperature that the product should be exposed to at any given time. Therefore, it should be considered when selecting the product control mode and set points.

Deviation Control

Deviation control uses the lower and upper set points as minimum and maximum offsets from the product set point. In other words, these values are subtracted and added to the product set point to create an air temperature set point range. For example, if you enter a product loop set point of 50 degrees, with a lower product control set point of -20.0 and an upper product control set point of 20.0, the air temperature control loop will be given a set point from the product loop in the range of 30.0 to 70.0 degrees as required to get the product to set point.

Therefore, as the product set point is changed, the deviation band changes with it so you always maintain an air temperature control range around the product set point. This provides a stable and accurate control method throughout the product’s test range. Knowing what values to set for the lower and upper set points may require some trial and error.

A good starting point is to run a simple air temperature control test where you set the air temperature set point (no product control) to the upper test set point and then the lower test set point in order to see how the product responds to the changing air temperature. During the transitions, monitor the difference between the air temperature and the product temperature. Using the maximum difference observed, double the value and use that as the lower set point. The upper set point should then be set to four times that difference.

The reason for the larger offset on the heating side (upper set point) is due to the fact that when air temperature increases, its density decreases. Cooler air is denser and thus has greater heat content than warmer air. This increase in density transfers more heat between the product and air than at warmer temperatures. Therefore, a larger deviation is required at warmer air temperatures in order to maintain the same rate of heat transfer with the product.

Process Control

If there is a minimum and maximum air temperature that the product can be exposed too, which is, or very close to, the minimum and maximum product temperature you need to achieve, process control may be the better choice. This allows you to set the upper and lower set point limits that the air temperature is allowed to reach regardless of the product temperature set point.

For example, if a product test requires it to run between 70 and -20, but the air temperature is not to exceed 75 or -25, you can set the upper and lower product control set points to 75 and -25. The air temperature loop will then be sent a set point between 75 and -25 regardless of what the product set point is. This will maximize the rate of change of the product temperature by allowing the air temperature set points to reach maximum limits. However, once the product reaches set point, the larger air temperature control range may cause undesired oscillation once set point is achieved.

5.5.1.3 Implementing Product Control on “Live Loads”

A “live load” is a term describing a product that generates heat. This is typically some type of electrical product that is being tested while under power. Live loads tend to lead the air temperature when increasing in temperature, and can severely lag behind the air temperature when decreasing in temperature since they are self-heating. Since they usually lag in only one direction, the product control settings usually need to be adjusted to go considerably below the desired product temperature in order to drive it to set point. The upper set point is typically a smaller value.

When using product control on a live load, the location of the product temperature sensor is critical. Since the product is generating heat, placing the sensor on a heated component as compared to a non-heated surface, like a portion of the product case, will dramatically affect performance and test results. It is up to the user as to what component or location on the product is required to get the proper test results. Just consider that if the sensor is placed on a heated surface, the chamber may not be able to control it to the desired temperature due to airflow constraints or the amount of heat being produced.

Deviation Control

Deviation control, when used for live loads, operates in the same manner as for dead loads described above; however, determining the lower and upper set point limits are where they differ. The maximum deviation between air temperature and product temperature should be found in the same manner as for dead loads, but the value is then applied differently.

A good starting point is to use the maximum deviation found for the upper set point and use three times the deviation for the lower set point. This allows the air temperature to drop further in order to increase the rate at which heat is pulled from the product in order to compensate for its internal heat generation.

Process Control

Process control also operates in the same manner for live loads as dead loads. However, due to the fact that the product is generating heat, process control is typically unstable and produces undesirable results with fluctuations and oscillation in temperature control. It is recommended to use deviation control mode for these applications.

5.5.1.4 Considerations When Applying Product Control

Product control is a powerful tool, and when used properly, can decrease test cycle times and provide more accurate and thorough product testing to ensure the quality of your product. However, it is important to consider all of the factors that may affect the test results.

Whether the product is a live load or a dead load, sensor location will play an important part in the test results. If the test method is correct, but you are not getting the desired results, try changing the location of the sensor on the product or change the orientation of the product within the chamber. This may provide the results you were expecting.

Relative humidity is a measurement of the amount of moisture in air at a given temperature as a percentage of the total water it could hold at that temperature. If your test requires both humidity and temperature control, product control may have a detrimental effect on the chamber’s ability to control humidity. Since the air temperature varies in order to maintain product temperature, humidity control will be affected by the difference in air temperature required to get the product to temperature. The magnitude of this affect will be dependent upon your test conditions. Under some conditions, product control may have to be turned off in order to achieve the test results you require, or more extensive or tighter product control set point adjustments may be required.

5.5.1.5 How do I Know when Product Control is Active?

When product control is not active, the product set point will follow the temperature set point. As the temperature set point is changed, the product set point will automatically change with it. If you attempt to change the product set point, the set point entered will revert back to the temperature set point.

When product control is active, the temperature set point will be controlled by the product loop. The temperature set point typically varies readily as the product loop drives temperature. The product set point will also take user entry and control the value entered via the numeric keypad. The “temperature” set point is then entered on the product loop as the EZT-570L is now controlling product temperature.

The “units” display on the Main and Overview screens will also display the text “DUT Active” instead of the temperature units, i.e., C or F. This provides the user with direct status indication that product control is active and the temperature loop is under product loop control.

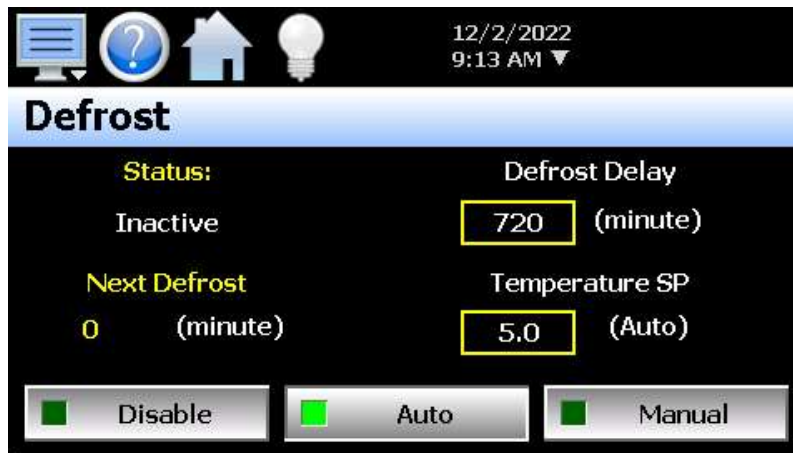
5.6 Defrost Settings

These settings will be available on chambers equipped with defrost. This option is typically provided on systems that must operate at low temperatures for extended periods of time or where frequent entry into the chamber is required. It is used to periodically warm the refrigeration coils and remove the normal accumulation of ice that occurs when running at low temperatures.

Moisture in the air is naturally attracted to the cold surface of the refrigeration coils in the chamber. This moisture freezes to the surface of the coil over time and can eventually cover the entire surface. This will render the coil useless and block all airflow in the chamber. In chambers that run through high and low temperature cycles, the moisture does not typically accumulate to a detrimental level, but in chambers that run at low temperatures for days or weeks at a time, this can be a problem.

Defrost is a means of warming the refrigeration coils to melt the ice, while minimizing the rise in temperature of product within the chamber. When defrost is enabled, the air circulators shut down and the hot-gas solenoid opens. The hot gas flows through the refrigeration coil and melts the ice. Once the coil reaches a preset temperature limit, typically 10°C (50°F), defrost terminates. The refrigeration system then pre-cools the coil prior to turning on the air circulators. This further prevents the warming of the chamber’s contents.

Defrost can be set to run automatically or under manual control through the use of an event. When auto mode is selected, the EZT-570L will monitor the conditions of operation and automatically start defrost based on the parameters the user has entered.



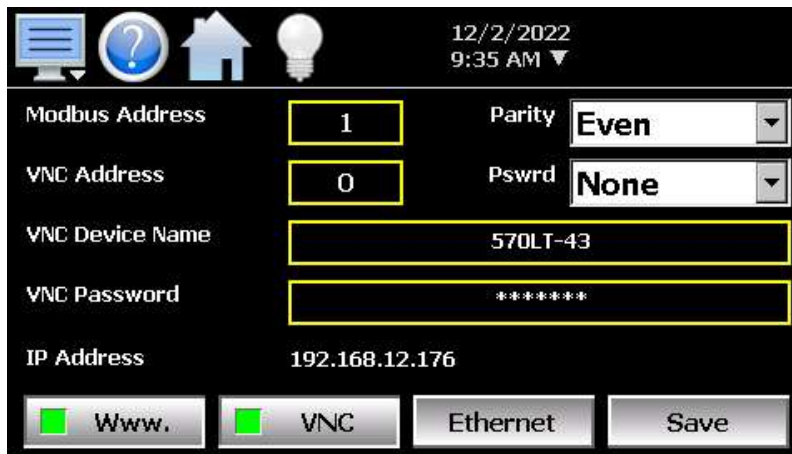
Defrost Delay: Time in minutes between defrosts when auto mode is enabled. This is based on individual operating conditions. It may take some analysis to determine how long your chamber can run before defrost is required.

Temperature SP: Temperature below which defrost is enabled when in auto mode and after the defrost delay, defrost will be activated. If at any time the chamber temperature rises above the set point temperature, the delay timer will be reset and the countdown will begin anew the next time the chamber temperature drops below the set point. This prevents defrost from starting at temperatures above which ice does not form on the cooling coils.

Once defrost has activated, it will run until the cooling coil has warmed enough to melt all of the ice accumulation (up to a maximum time period of 30 minutes). The Prechill period will begin in which the coil is allowed to cool down before the fans are reactivated (typically 60 seconds) and the chamber then resumes normal operation.

5.7 Communication Settings

The User communications screen is used to set up and configure the EZT-570L communication interfaces. For more information regarding the use of the EZT-570L data communications interfaces, see Section 9, Communications.



The **Modbus Address** and **Parity** settings are used to configure the optional serial interface for user communications. Valid addresses are 1 to 247. The parity setting allows the serial port to be set for Even, Odd or no parity (None).

The Modbus Address is also used to specify the unit ID for Modbus TCP communications. Modbus TCP communications is provided over the Ethernet interface on port 502.

The **VNC Address and Password** set access rights to the EZT-570L VNC server. Valid addresses are from 0 to 99. The VNC password selection defines the connection mode for the server. The selections are “None” and “VncAuth” which requires users to enter the password when connecting to the EZT-570L over the VNC interface.

IMPORTANT: *When multiple EZT controllers are connected to a single router (DHCP server), it is imperative that each EZT have a different VNC address. If multiple EZT controllers have the same VNC address, network errors may result causing the VNC server to shut down or cause the EZT to “lock-up” and become non-responsive requiring the unit to be power cycled in order to return to normal operation.*

The **VNC Device Name** field is used to enter a name (up to 35 characters) that can better identify the chamber to users logged into the VNC interface. The name entered here will be used on the VNC header window on a PC, so that if multiple VNC clients are open to different chambers, each one can be identified.

The **VNC Password** field is used to enter the password (up to 20 characters) that a user must enter for the VNC interface to connect to the EZT-570L if the VNC password is enabled.

The **Www.** (web server) pushbutton is used to enable or disable the web server interface.

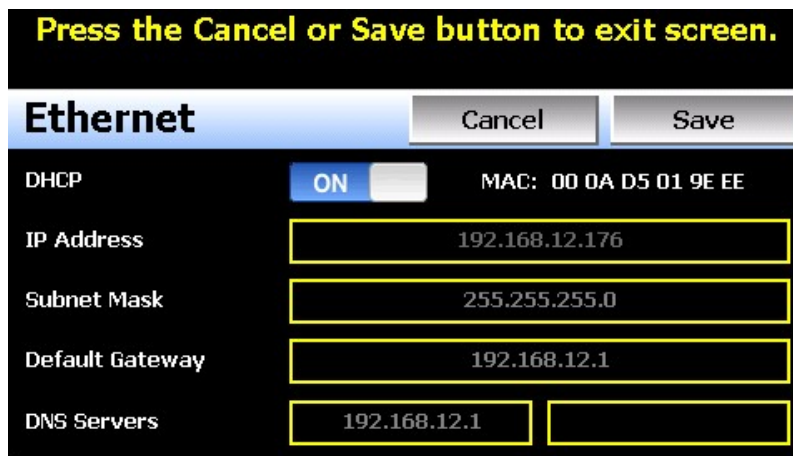
The **VNC** server pushbutton is used to enable or disable the VNC server interface.

The **IP Address** field is a static field that provides the IP address of the EZT-570L which is required for connecting over the VNC, web and Modbus TCP server interfaces. See the following section 5.8.1 Ethernet Settings for more information on how to adjust the device IP and other LAN information.

NOTE: Any changes made to the above settings must be saved in order for them to take effect. When changes are completed, press the “Save” button. In order for any changes to the VNC server to take effect, power must also be cycled to the EZT-570L. The new VNC settings will only take effect when EZT-570L first boots up. Serial communication and web server settings take effect immediately upon save.

5.7.1 10/100 Base-T Ethernet Settings

The “Ethernet” screen provides settings for the network interface of the EZT-570L. It is accessed by pressing the Ethernet button on the Communications screen.



The **MAC** address field displays the media access control address (physical address) of the EZT-570L. This is a unique identifier for the network hardware of the EZT-570L and cannot be changed. It is for informational purposes and may be required by your network administrator when connecting the EZT-570L to your network.

The **DHCP** button is used to turn automatic addressing on and off. By default, the EZT-570L is shipped with the DHCP setting on. This means the EZT-570L will be assigned an IP address by the network router. When on, the entry fields will be disabled, but will display current connection information used by the EZT-570L. In order to enter a static address, press the button to turn it off.

To set the static network address, enter a valid **IP Address**, **Subnet Mask** and **Default Gateway**. The **DNS Servers** are not required, but typically the IP address of the network router is entered to provide one. Consult your network administrator for the proper values. The IP address must not be a duplicate of any other address on the network or the interface will not operate correctly. The entry fields except IPV4 addressing format only. The EZT-570L does not except IPV6 addressing.

NOTE: When DHCP is on and the EZT-570L is disconnected from the network, the entry fields on the Ethernet screen will continue to display connection information based on its last valid connection for diagnostic purposes. The IP address on the main Communications screen (or shown in the notifications list) always displays the current address used by the EZT-570L. If the IP address on the Communications screen displays the loop-back address of “127.0.0.1” then no connection is present.

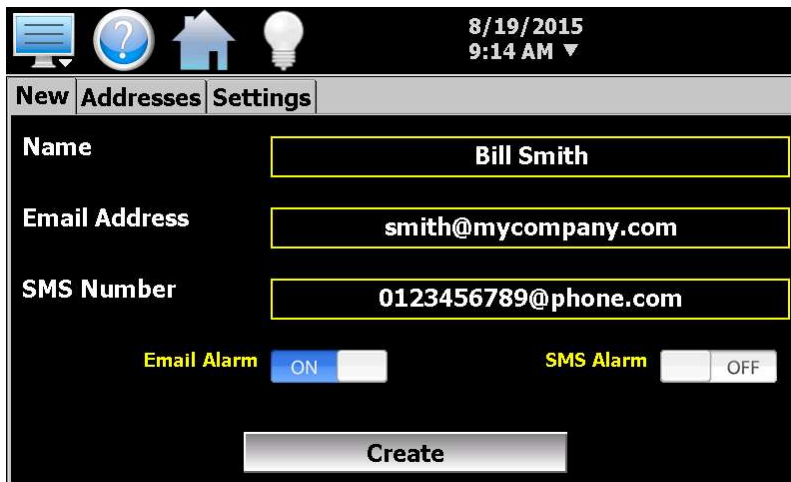
When DHCP is off, the IP address on the Communications screen will always display the user entered static IP address regardless of connection status. It does not indicate whether a valid network connection is present or not.

5.8 Email

The EZT-570L email server has the ability to send alarm messages to email and SMS addresses. Up to 30 addresses can be programmed into the system. Each one can be configured to receive emails, SMS text messages or both. When an alarm occurs, the EZT-570L will send an alert to the specified address for each user in the list. The email settings are accessed by selecting “Email” from the setup “Email” menu.

5.8.1 Address Entry

Select the “New” tab to add new email addresses to the system. For each entry, enter the recipient’s Name, Email Address and/or SMS Number (up to 50 characters each). Turn on the Email Alarm and/or SMS Alarm options to specify which addresses the alarm messages are to be sent to. Press the “Create” button to add the user to the list.



The screenshot shows a configuration screen with a dark background and white text. At the top, there are icons for a list, help, home, and a lightbulb, along with the date and time: 8/19/2015 9:14 AM. Below the icons are three tabs: 'New', 'Addresses', and 'Settings'. The 'New' tab is selected. The form contains three input fields: 'Name' with the value 'Bill Smith', 'Email Address' with 'smith@mycompany.com', and 'SMS Number' with '0123456789@phone.com'. Below these fields are two toggle switches: 'Email Alarm' which is turned 'ON' (blue), and 'SMS Alarm' which is turned 'OFF' (grey). At the bottom center is a 'Create' button.

NOTE: The SMS address is specific to the service provider. Each service provider has their own unique address; however, the phone number is always the “name” for the address entry. There are internet sites with this information that cover most of the providers, or when in doubt, contact your service provider for the proper address format.

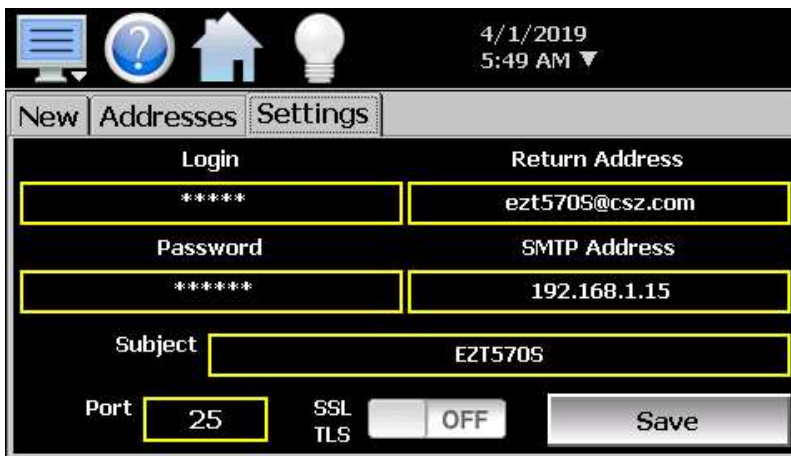
5.8.2 Email Addresses

Selecting the “Addresses” tab allows the user to view the list of email addresses entered into the EZT-570L. Each entry will be shown with the notification method and address associated with it (email/SMS). To delete a user, touch the name of the user in the list box and press the “Delete” button. This will permanently remove the user from the list.



5.8.3 Email Settings

The “Settings” tab provides access to the email server configuration, which is how the EZT-570L is able to connect and send email messages over its Ethernet connection. Each field may have up to 50 characters.



The **Login** field is used to enter the login name required by the EZT-570L to log in to your company’s mail server. You can use your login if one is not set up specifically for the EZT-570L on your network. Contact your network administrator for assistance.

The **Return Address** is the address given for the EZT-570L on your company’s mail server. The EZT-570L does not accept email messages; however, this field is required for proper email delivery for security/anti-spam purposes. If using your personal login name, you can also use your personal email address if one is not set up specifically for the EZT-570L on your network. Contact your network administrator for assistance.

The **Password** field is used for entering a password, if required by your network server, to send email. Contact your system administrator for assistance.

This **SMTP Address** field is for entering the address of the email server used for sending emails. This must be a valid mail server for which the above settings allow EZT-570L access. Contact your system administrator for assistance.

This **Subject** field is used to enter a subject line for emails and/or SMS text messages. It can be used to provide an identifier to the recipients of the alarm message to know which chamber it is coming from.

NOTE: *It is recommended to put some form of entry in this field. It can be left blank; however, many firewalls and spam filters will filter out messages without subject lines. That may prevent recipients from receiving the email. It can also be useful for identifying a particular unit on the factory floor.*

The **Port** field is used to set the port number that will be used on the device for email operations. For non-secure connections (no SSL/TLS) port 25 is the default. If SSL/TLS is used, port 587 is usually the standard port selected.

The **SSL/TLS** button is used to enable or disable Secure Socket Layer (SSL) and Transport Security Layer (TLS) functionality. These protocols are used to provide an authenticated connection between servers and clients as well as encrypt information between the two. This provides a more secure environment for email information with many public email services only allowing SSL/TLS connectivity.

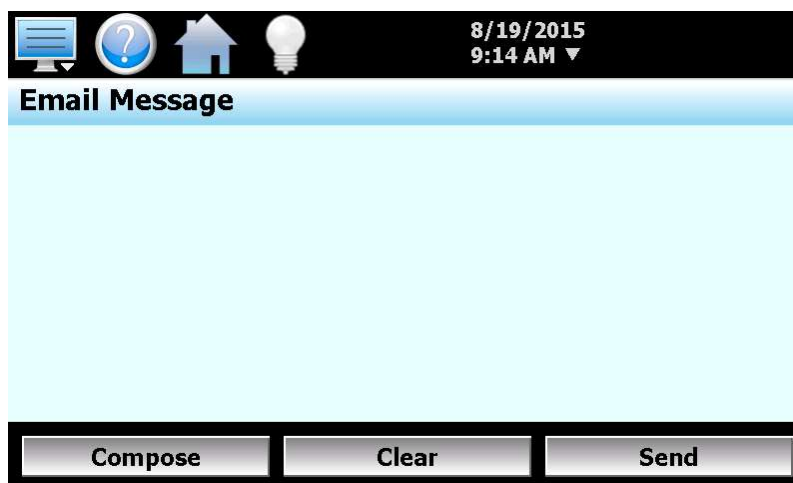
NOTE: *The EZT-570L (client) uses the explicit mode of securing the connection to the mail server. This typically uses the same port as clear text (unsecured) which is usually port 25 or port 587. In this mode, the EZT-570L will connect to the mail server, then request a secure connection. Once the secure connection has been established, the EZT-570L will transmit the email over the secured connection.*

The EZT-570L does not support the implicit mode of securing the connection which is typically done over port 465. Common services (Gmail for example), by default use the implicit mode of securing the connection. This model assumes that the link is secure from the start, and all communication is done using secure protocols.

Once all settings have been made, be sure to press the “Save” button to begin using the new values and store them, so that on the next power up, the settings will be retained. The body of the email/SMS text message will contain the description of the alarm condition as it would appear on the alarm screen. If the mail server is down, or the EZT-570L is not connected to the network, the message will not be sent and a local alarm message on the Alarm screen will indicate a transmission failure.

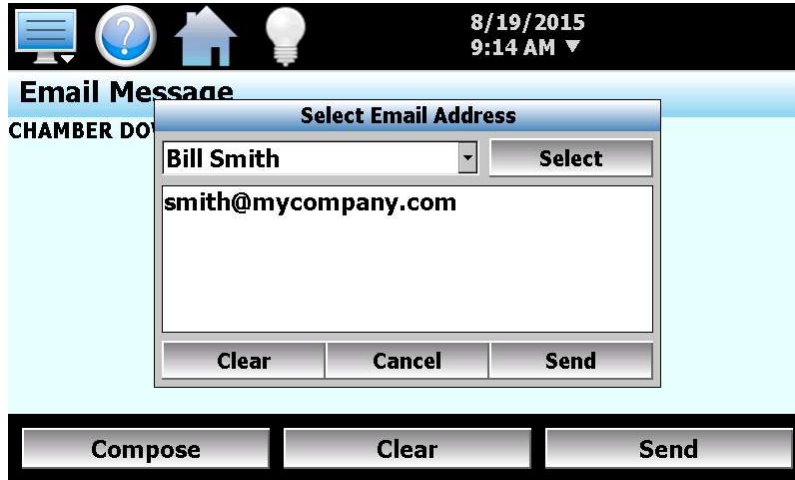
5.8.4 Sending Email Messages

The EZT-570L provides the ability to send short email messages to addresses programmed into its email server. To send a message, select “Message” from the device settings, Email menu.



Press the “Compose” button to create a brief message using the keypad (up to 100 characters). When you are finished entering the message, press the “Enter” button. The completed message will then be shown

in the message window. Press the “Send” button to select the email recipients you wish to receive the message and send the message.



Use the drop-down menu to select from the available list of email addresses and press the “Select” button to add that recipient to the list. Multiple email recipients can be added by individually selecting them. Once all of the desired recipients have been added, press the “Send” button to send the message.

5.9 Navigation

The EZT-570L provides both text-based PC style menus and icon based/slide page navigation menus similar to today’s “smart” devices. The user can select either type at any time from the Navigation screen. Press the button for the desired navigation type to make the selection. The choices are mutually exclusive, so when one selection is made, the other will be de-selected. The button indicator for the active selection will illuminate to show the current selection.



The **Notifications Navigation** selection allows the user to enable/disable navigation from the notifications window. When enabled and the user presses a row in the notifications window, the screen associated with the item in the selected row will be shown.

Depending upon the system configuration, selections can include:

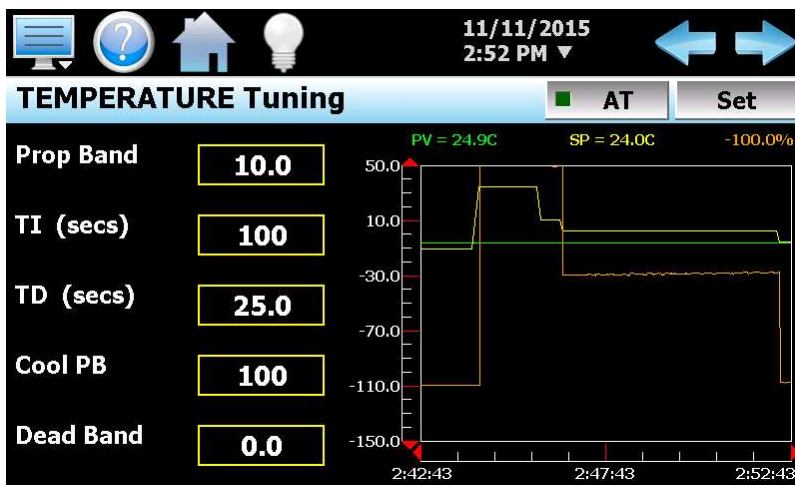
- Loop, limit, monitor point and math results display the Startup screen selected in the configuration.
- Defrost status displays the Defrost control screen.

- Ramp/Soak program status including name of running program displays the program Entry screen.
- Active alarm status including the most recent alarm displays the main Alarm screen.
- Data logging status including active file name, length and logging rate display the Data Log screen.
- Security status will display the Security settings screen if the current user has access.
- The current User displays the Log In screen or Log Off prompt if security is active.
- Audit trail active/inactive status displays the Audit Trail screen.
- Web server active/inactive status displays the Communication settings screen.
- VNC server active/inactive status displays the Communication settings screen.
- IP address displays the Communication settings screen if enabled in the configuration.
- Available SD storage memory remaining displays the current memory status.

5.10 Tuning

The Tuning screen allows for both manual and automatic tuning of the EZT-570L control loops. All CSZ chambers are factory tuned; however, the chambers are typically empty and under no load. Unless specific performance tests were performed at the factory for your particular needs, the base-line performance may not be accurate once your product is placed inside the chamber.

Tuning parameters should only be adjusted by skilled users familiar with proportional control. Improper settings can result in control loop instability and equipment damage. All of the EZT-570L control loops feature an automatic tune function which is the recommended method of loop tuning. If the control response achieved after performing an auto tune does not provide the desired control response, then minor adjustment of the tuning parameters may be done to obtain the desired response.



The tune screen also provides a live real time chart for monitoring the control response of the control loop while adjusting tuning parameters. The chart is fixed at a 10-minute time period and updates once per second.

Pressing the **SP** button allows the user to adjust the loop set point without having to leave the tuning screen in order to observe the control response.

Pressing the **AT** button allows the user to activate/deactivate the loop auto tuning feature. When auto tune is active, the indicator on the button will be illuminated. In addition, the process value of the loop on the Loop view screen will flash while auto tune is active. This allows the user to activate auto tune and then return to the main Loop view screen to observe system operation while being informed of the loop auto tune status.

NOTE: The auto tune function does not affect any of the configured PID sets. The auto tune only updates the current PID values currently used in the loop control. If auto tune is being used to determine

PID set values for a specific operating range, the values determined by the auto tune function must be manually entered into the proper PID set. They will not be transferred automatically when the auto tune is complete.

Pressing the **PID Set** button provides access to the loop PID Set Configuration screen that allows multiple PID values to be utilized by the loop at varying process ranges. See the following section 5.10.1 Configuring PID sets for more information.

The **left** and **right arrow buttons** at the top right corner of the screen will cycle through each loop available. By pressing either button, the previous or next loop will appear in sequential order. When the first or last loop is reached, the EZT-570L will automatically wrap around to the beginning or end of the list to show the next loop. If the system has only one loop, the arrow buttons will not be shown.

It is recommended that only one loop be tuned at a time. Temperature for example, affects humidity. If the EZT-570L is currently tuning temperature and auto tune were activated on the humidity loop as well, any fluctuation in air temperature during its tuning process can affect the tuning process of the humidity loop. By tuning chamber temperature first and allowing it to stabilize prior to activating the humidity loop tune, it will ensure that the humidity control loop gets an accurate base-line performance reading on the chamber.

The **Proportional Band** is in the units of measurement for the control loop. On temperature for example, a proportional band of 10 would be 10 degrees. Thus, as the PV drops below set point by 0 to 10 degrees, the output would go from 0 to 100% for full heat.

The **Cooling PB** is measured in % of the proportional band with a range 50-300. If cooling action should be enhanced then decrease the band. If cooling action is too strong then increase the cooling band. The value of the cooling proportional band is related to the heating proportional band and its value remains unchanged throughout any auto tuning procedures. Only the proportional band, TI and TD factors are determined by auto tune.

The cooling proportional band is typically set at a default value of 100% from the factory as chamber design balances heating and cooling capacities. Under certain conditions however, it may be necessary to increase the cooling side response when testing live loads that produce a lot of heat.

The **TI** and **TD** values for reset and rate are both entered in seconds and affect both heating and cooling response. Large values for TI will slow down the control response while smaller values will speed up the reset action. Having too large of a value can make the chamber sluggish in response to process changes while too small of a value can cause oscillation.

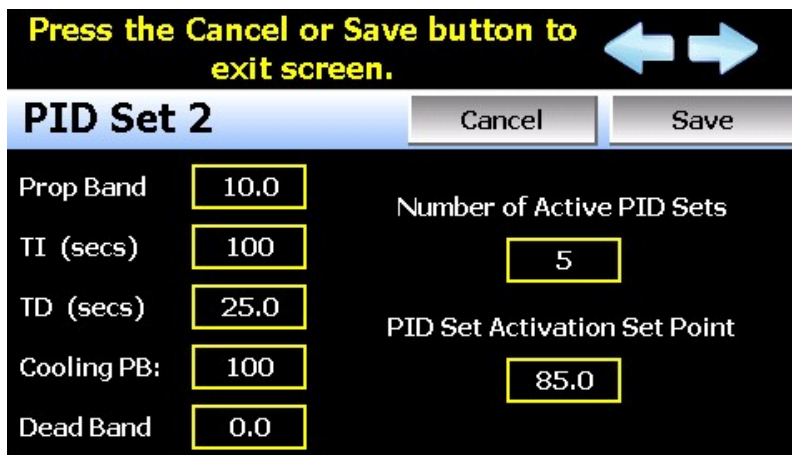
A larger TD factor can help reduce overshoot; however, it can also make the output respond too rapidly to small changes in the process and prevent the chamber from every reaching set point. Too small of a value will usually result in the chamber getting to set point quickly under small process changes, but may result in greater than desired overshoot.

The adjustment of **Dead Band** is more dependent upon system requirements. If more positive values of dead band (greater dead band) are used, an unwanted cooling action can be avoided but an excessive overshoot may occur. If more negative values of dead band (greater overlap) are used, an excessive overshoot can be minimized but an unwanted cooling action may occur.

Dead band is adjustable in the range of -36.0% to 36.0 % of the heating proportional band. A negative dead band value provides an overlap between heating and cooling in which both outputs are active. A positive dead band value provides a dead band area in which neither output is active around set point. This value is rarely used and it is recommended to leave it at the default value of 0.0.

5.10.1 Configuring PID Sets

The PID Set screen allows the user to assign multiple PID sets to the control loop. Each loop can have up to five PID sets assigned. The default is one PID set. When only one PID set is assigned, the PID entries and activation set point fields are hidden. At least two PID sets must be enabled in order to enter specific PID values and the process value at which they will be used.



The **Number of Active PID Sets** allows the user to specify how many PID sets to use. When set to a value of one, only the PID values currently set to the loop are used (the values displayed on the Tuning screen). When set between two and five, the PID set entries are then written to the loop control according to the activation set point and current process value.

The **PID Set Activation Set Point** is the process value above which the PID set is utilized. PID sets two through five have an activation set point. PID set one is the default PID set, so an activation set point is not utilized. Each PID set activation set point must be greater than the previous set point. Thus, as the process value increases, the PID set utilized will increase.

For example, a temperature control loop having the Number of Active PID Sets at a value of three, will result in the loop control using one of three PID sets based on the current temperature. The PID sets will switch according to the activation set points entered for PID set two and PID set three. For this example, PID set two will have an activation set point of 100 degrees and PID set three will have an activation set point of 200 degrees.

Starting with a loop control set point (SP) and process value (PV) of 70 degrees, the loop will use PID set one as both SP and PV are below the activation set points for PID set one and PID set two. In order for the PID set to change to PID set two, both the SP and PV have to rise above the 100 degree activation set point. If the user were to then change the loop SP to 150, the loop continues operation using PID set 1. As the temperature starts to rise, PID set two values will then be written to the loop control once the PV rises above 100 degrees.

The loop will then continue to use PID set two until the SP is changed to a value within another PID set range and the PV also enters that same range. If the user then changes the SP to 200 which matches the activation set point of PID set three, the loop will use PID set two until the PV rises above 200. If the PV does not reach the 200 activation set point, the PID set will not be activated. This prevents PID sets from actively toggling back and forth at the activation point and causing control instability. Once the PV reaches the 200 degree activation point, the PID set would switch to set three. PID set three would then remain in use even if the PV were to drop below 200. Only when both SP and PV are below 200 would the PID set switch back to set two.

During operation, should the set point change span multiple PID sets, the PID sets will be activated as the PV enters each activation range. Continuing from the example above, if the set point is changed back to 70 degrees, it is then in the PID set one range. However, with the PV at 200 degrees, PID set 3 is active.

As the temperature starts to decrease and the PV falls below 200 degrees, this will then activate PID set two. The loop will then operate under PID set two. As the temperature continues to fall and drops below the PID set two activation set point of 100 degrees, the loop will then begin operating under PID set one.

NOTE: *As different PID sets are activating, the tuning constants shown on the Tuning screen will change to the active PID set. The tuning constants on the Tuning screen are the actual PID values used by the loop control. Thus, at any time during operation, the user is able to view the values currently in use. Changing any of the values on the tuning screen will result in the loop control using the new value, but will not affect the PID set. The manually entered value will remain in use until another PID set is activated when the corresponding activation set point is met.*

6. Security

The EZT-570L security model provides an administrator with the tools to add up to 30 users to the system. Each user must have a unique ID, full name and password. Four user levels are provided which include system, user, supervisor and administrator levels. Specific access rights can be assigned to each user level and password aging can be implemented. Verification is provided (if enabled) for any parameters that will change a control parameter, which could upset the process (i.e. loop set point, start/stop automated ramp/soak programs, etc.).

Verification requires that the logged in user must log in again before the process value will actually be changed. This feature is provided for extra security. The following example will make verification clearer:

A supervisor logs on the system. The supervisor then steps away from the system to take a phone call but does not log out before leaving. If another user tries to change the temperature control set point, the system will require another login (by an authorized user for that level) before the control set point is actually changed. This provides an extra level of protection to make the system more “tamper proof”.

The Security menu is accessed from the home menu and provides access to the security features of the EZT-570L.



The Security menu provides the following functions:

Configure	Provides access to security setup to add users, set rights and options.
Login	Log on a user if security is enabled.
Log Off	Log off a user if security is enabled.
Audit	Allows the user to view any of the saved audit trail files.
User	Shows the current user logged into the system. Default User ID is “FACTORY”.
Password	Allows the current user to change their password. Default Password is “CONTROL”

6.1 Adding Users

The “New” user tab provides the ability to add up to 30 users to the system. To add a user, first select the type of user from the drop-down list (System, User, Supervisor or Administrator). Press each field to add the user ID, full name and password (no spaces allowed, 5 character minimum and 16 characters maximum). Once all entries are made, press the “Create” button to add the user to the system. If the passwords do not match or the user ID is already used, the EZT-570L will alert the user and not accept the entry.

NOTE: You must have at least one user with administrator access in order to turn on security. There is no “back door” to the system. If the password is lost or forgotten, you must contact the CSZ Service Department for support.

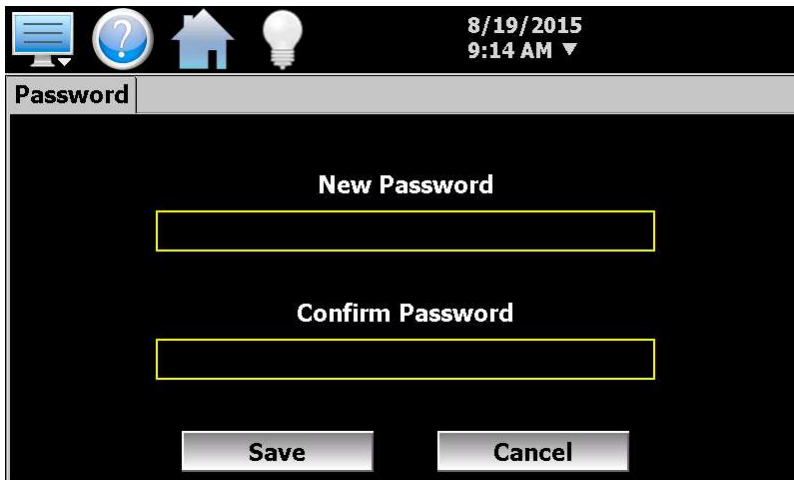
6.2 Viewing Users

The “Users” tab provides the administrator with the ability to view information on each user entered into the system. Password information is not available. The user can be deleted from this tab and a new password for each user can also be entered from this area.

To delete a user, select the user from the list and press the “Delete” button. Likewise, to change the password for a user, select the user from the list and press the “Password” button.

6.2.1 New Password Entry

To change a password, select the desired user by touching the User ID in the list box and press the 'New Password' button. Enter the new password and confirm the password. Press the 'Save' button to change the password (no spaces allowed, 5 character minimum and 16 characters maximum).



6.3 Setting User Access

The "Access" tab provides the administrator the ability to assign rights to each user level (System, User, Supervisor and Administrator). To enable or disable specific program functions (user rights) for each user level, select the user right from the list and press the corresponding on/off button for the user level you want to change access rights for. If the button is set to on, user access will be enabled for the user group.



User access for "Security" cannot be disabled for the administrator group. This is a safety feature to make sure that any administrator with the proper user ID and password can access security. If the administrator loses his/her ID or password, there is no "back door" to the system and it will have to be reset and reprogrammed in order to return to normal operation.

6.3.1 User Access Rights

The following table is a list of the available user rights, where to find the menu item(s) applicable to the user right and a description of what it applies to. Note that the configuration of your chamber may disable certain menu items; in which case the menu for a specific user right may not be provided.

User Right	Menu Location	Description
Setpoint Edit	View/Loop, Overview	applies to loop controls when not running an automatic ramp/soak program (does not apply to loop alarms)
	Device/Settings/Set/Limit	applies to loop controls with ramp rate operation enabled allowing rate up/down and deviation hold entry
Events	View/Overview,Loop; Manual Operation	applies to enable or disable system events
Manual Mode	View/Single	enable or disable loop control manual output mode
Automatic Tune	Device/Settings/View/Tuning	enable or disable loop control Automatic Tune (AT) button
Program Operate	see description	applies to all program control menu selections; does not affect digital Inputs configured for same action
Recovery	Device/Settings/Set/Recovery	logic when running an automated ramp/soak program when power lost & recovery:
Reset Alarms	View/Alarm; Reset/Pumpdown buttons	Prevents alarms/pumpdown from being reset
Clear Alarms	View/Alarm; Clear button	prevents alarm list view from being cleared
Chart Settings	View/Chart	configure plot channels, scale & time for charts
Data	Data/Logging	applies to all data logging actions & settings
Annotation	Data/View/Annotation	access to add operator messages to active log file
Signature	Data/View/Signature	access to add digital signature to active historical data file
Open	see description	alarm, automatic program, audit & data files
Save	see description	program "save" and "save as"; note files may be copied from system with USB file transfer utilities
Delete	see description	data files & automatic programs; note files may be deleted with File Utilities
Program Edit	Program/Entry	no data entry or access to Events or Step SP/Time fields or G-Soak limits, AutoStart; can't insert/delete/copy/paste step.
USB	Data/Utilities/USB	allows USB memory stick to copy/delete data, alarm, program & audit trail files & to import programs
FTP/WAN	Data/Utilities/FTP/WAN	configure FTP client settings
Communications	Device/Settings/Set/Comms	configure web page, Modbus address & VNC settings
Tuning	Device/Settings/View/Tuning	manual adjustment of loop tuning parameters
Setpoint Limits	Device/Settings/Set/Limit	applies to loop controls (does not apply to loop/monitor alarms)
Adjust Alarms	Device/Settings/Set/Alarm	applies to all loop and monitor point alarms
Event Names	Device/Settings/Set/Event	configure event tag names (seen in manual Events & program step Events)
Email Settings	Device/Settings/Email/Email Settings	configure email settings and addresses
Email Message	Device/Settings/Email/Message	access to compose & send email message
Offline	Device/Settings/Offline	access to Off-Line menu system: Units, set Clock, Calibrate Touch, Language, Exit To Application, input Offset, Configuration
Calibrate Touch	Device/Settings/Offline/System/Display	access to the touch screen calibration utility
Backlight	Device/Settings/Offline/System/Display	access to edit backlight settings for brightness and off delay time
Alarm Volume	Device/Settings/Offline/System/Display	allows edit of EZT-570L alarm beeper volume
Units	Device/Settings//Offline/Set/Units	loop/monitor point temperature units configuration - C/F
Clock	Device/Settings/Offline/Set/Clock	Set Date/Time, Time Zone, DST and NTS connection
NTP	Device/Settings/Offline/Set/Clock	enable & choose National Time Server location
Daylight Savings	Device/Settings/Offline/Set/Clock	enable Daylight Savings Time (DST)
Language	Device/Settings/Offline/Set/Language	Select help language
Security	View/Security/Configure	applies to Security Setup
Configuration	Device/Settings/Offline/System/Configuration	access to import/export setup files
Default Configuration	Device/Settings/Offline/System/Configuration; Reset Default Configuration button	function to clear system configuration and reset all to blank (default) state for reconfiguring

User Right	Menu Location	Description
Exit (run mode)	Device/Settings /Offline/System/Exit; "Exit application. (automatic mode startup)." button	prevents the EZT-570L application from being stopped
Exit to Configurator	Device/Settings /Offline/System/Exit; "Exit Application. (configuration mode startup)." button	prevents the EZT-570L application from being stopped and access to the configurator application
Product Control	Device/Settings/Product Control	Set product control settings when configured.
Calibrate Inputs	Device/Settings /Offline/Calibrate	Provides user offset calibration or full calibration of all EZT-570L inputs.
Defrost	Device/Settings/View/Defrost	Applies to defrost mode, interval and set point

6.4 Setting Security Options

The security "Options" tab provides the administrator the ability to set the global security options.



Security is the global setting that turns the security system on or off. The security system must be enabled for the audit trail to be enabled.

Audit is a global setting that turns the audit trail on or off. When the audit trail is turned on, all user actions are written to a daily log.

When enabled, **Verification** requires that the logged in user must log in again before the entry value will actually be changed.

The **Password Aging Days** field is a global for all users. Password aging starts from the day the user is entered into the system. The value can be set from 0 to 365 days. A value of zero disables password aging.

NOTE: When using password aging and the password expires for a user, the user will be required to change their password before access to the system is permitted. A user can change their password at any time (even if aging is not used) by selecting "Password" from the main security menu.

The **Log Off Time Period (minutes)** field is a global for all users. The log off time begins once a user logs into the system. If the user does not perform any actions within the specified time, the system will automatically log the user out. User actions are defined as any action that requires a process change, i.e., changing a SP, changing an alarm description, etc. Any field protected by security settings are user action fields. The log off time can be set from 0 to 1440 minutes (24 hours). A value of zero disables the auto log off feature.

NOTE: *If a user begins an action such as changing a set point, but does not complete the task and leaves the numeric keypad shown, the system will log the user out if the log off time elapses. However, since the keypad is still shown, the set point change can still be completed as the task had already begun. In this case, if a user then enters a new set point, the audit trail will record the change under the user that was previously logged in, but since the user was automatically logged out while the keypad was shown, the user will be required to log in to access the set point again.*

6.5 Audit Trail


The audit trail viewer is accessed by selecting “Audit” from the Security menu. It displays all user actions that affected the system for any given day. The EZt-570L can store daily audit files for a period of a year or longer (time based on storage usage for data history).

Each time a user takes an action that affect the operation of the system (changing a set point, start/stop data logging, changes an alarm set point, etc.), the action is written to a file. Audit trail file names are listed as MMDDYYYY (where MM = month, DD = day, YYYY = year. The “Open” file button will display a dialog box where the user can select any audit file to view.

NOTE: *If no actions occurred on a given day, an audit file will not be created for that day.*



Each action recorded to the file includes the date/time it occurred as well as the user (if logged in) that made the change. If no user is logged in, the user will be listed as “Device Manager”, which is the default user account for the EZT-570L.

The send email icon  allows the user to send a copy of the currently opened audit trail file to any email address entered into the system. When the email icon is pressed, an “Add Recipients” window will be displayed where the user can select recipients for the file from any of the email addresses configured under the EZT-570L email settings. For information on how to add email recipients, see the section 5.10 Email.

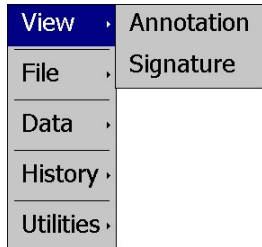
The **Disk** icon next to the **Email** icon allows the user to save the currently opened data file to a USB memory device connected to the EZt-570L.

NOTE: *Functions performed via optional digital inputs, such as starting or stopping a ramp/soak program, are not logged to the audit trail. These are external inputs and are not protected by security.*

7. Data Logging

The EZT-570L data logging features are accessed via the home ‘Data’ menu item. The system data logging provides the ability to select individual points for logging, view data log files and start/stop logging operations. The logging ability of the EZT-570L provides an easy-to-use, convenient method to obtain electronic data without the need for additional data acquisition equipment.

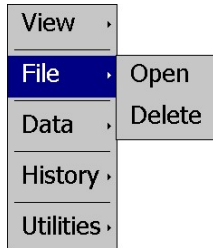
The Data Log menu provides navigation to the following functions:



View menu

Annotation: Allows the user to insert a notification into the currently running log file or view all annotations associated with the currently loaded historical data file.

Signature: Allows the user to digitally sign a file to prevent data tampering and view all digital signatures associated with the currently loaded historical data file.

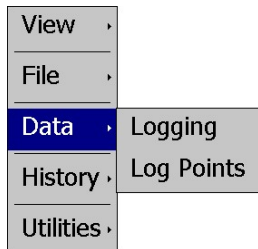


File menu

Open: Opens a history file for review.

Delete: Allows the user to delete the currently loaded history file.

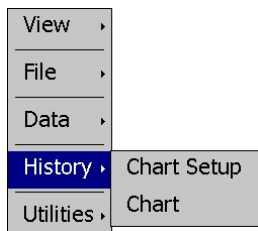
NOTE: The “Delete” log file function does not affect data from a file that is running, only the current data log file loaded for review.



Data menu

Logging: Displays main data log screen with status of logger.

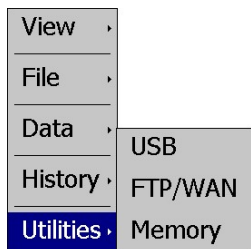
Log Points: Allows the user to select what variables are to be logged.



History menu

Chart Setup: Select data file points and time period for history review.

Chart: Plots historical data after time and points are selected.



Utilities menu

USB: Allows the user to access file utility functions.

FTP/WAN: Provides access to the automatic file back-up settings.

Memory: Displays memory capacity remaining on the EZT-570L.

7.1 Selecting Points for Logging

In order for the data logging function of the EZT-570L to operate, you must first select what variables are to be logged to the data file. To choose which points are to be logged, select “Log Points” from the Data menu.

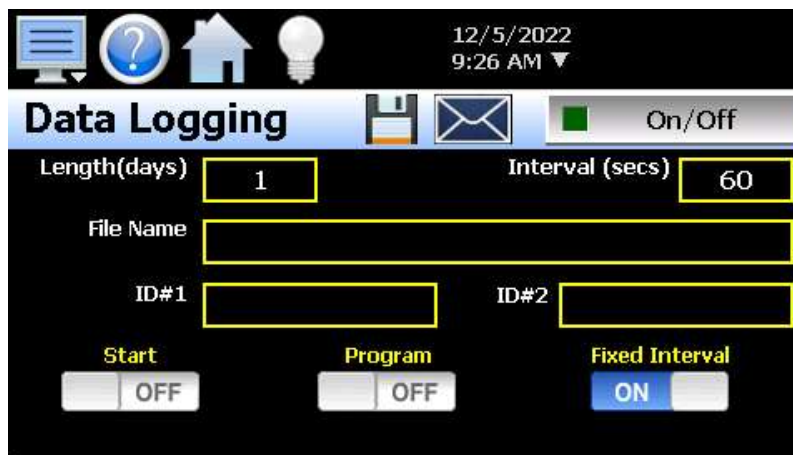


Press the on/off button for each item to toggle it on/off. When on, the variable will be logged to the data file. When selections are completed, press the “Save” button to save the point selection to memory. New selections will not take effect until the Save button is pressed.

7.2 Start/Stop Data Logging

The EZT-570L logs data to its SD card. Current data for each variable is written to the log at a fixed interval based on the settings entered in the “Length” and “Interval” fields. File names are automatically generated using MMDDYYYY-HHMMSS format (where MM = month, DD= day, YYYY = year, HH = hour, MM = minutes, SS = seconds).

To use a specific file name, touch the “File Name” field and enter the desired name (up to 16 characters). When a file name is entered, the file will be saved as FileName_MMDDYYYY-HHMMSS.



The data logger also provides two entry fields, **ID#1** and **ID#2**, which allow the user to enter in information specific to the file such as a batch and/or lot number to identify product that may be associated with the new data file. These entries will be saved with the data log file for later identification.

The ID#1 and ID#2 fields are also used to identify the EZT-570L when DataWeb is active (see section 7.5 FTP/FileWeb/DataWeb Interface). When the DataWeb feature is in use, the ID#1 and/or ID#2 entries are used to identify a specific EZT-570L from many units that may be sending data to the same database. The ID#1 and ID#2 fields also allow the user to search for only the data specific to a single unit in the remote database. The entries in these fields should be unique to each EZT-570L connected to the server.

If more than one EZT-570L utilizes the same entries, the data from all units with the same ID's will be combined under the one ID in the database. This will render the data unusable as there will be no way to split the data between the different units and know which data points are from each unit. If this does occur; however, the EZT-570L will still have a local copy of the data stored to the local data log file(s). This provides a backup copy of the data just in case the ID numbers of more than one unit are identical.

The **Length (days)** field sets the length of a data file in number of days. It can be set for 1 to 31 days. Once the selected number of days has elapsed, a new data file will be created and logging will continue in the new file.

The **Interval (seconds)** field is used to set the rate at which points are written to the log file which equates to the sample rate in seconds. When the "Fixed Interval" option is turned on, the logging interval will be automatically set to record at minute intervals based on the number of days set for the file. If the file is set for 1 day in length, the logging rate will be at 1-minute intervals. If the file is set for 7 days, then the logging rate will be every 7 minutes. This keeps the data file size manageable and able to be viewed by the EZT-570L data viewer.

The log interval can be manually set to any rate between 2 and 1860 seconds in any combination with the number of days before a new file is started. To do this, turn off the "Fixed Interval" option and enter in the desired logging rate in seconds.

NOTE: *Logging at shorter intervals allows the EZT-570L to capture fast changing processes, but the data files can become extremely large. Files that exceed the capability of the data viewer (>520KB in size) will have to be extracted from the EZT-570L using a USB memory stick or FTP file transfer in order to be viewed remotely on a PC.*

Files larger than the 520KB limit will not be automatically, digitally signed by the EZT-570L. If the files are to be digitally signed, this must be done manually by extracting the files and using the CSZ data viewer program running on a remote PC.

To manually start data logging, press the "On/Off" button. Any time logging is enabled, the indicator on the button will be illuminated. To stop data logging, press the "On/Off" button again. Data logging can also be started automatically by turning on the "Start" or "Program" option.

The **Start** option automatically turns data logging on whenever the EZT-570L is first powered on. This action simulates that of a standard chart recorder.

The **Program** option is a convenient method for gathering information that pertains only to the operation of an automated ramp/soak program. When selected, the EZT-570L will turn the data logger on at the beginning of a program and off once the program is completed. This eliminates the need to scan through extensive data records to find the specific information you are looking for from a particular time period.

NOTE: *The EZT-570L will automatically use the program name as the filename for the log file. This provides a simple identifier for log files that pertain only to automatic program operation. Any entry made in the File Name field will be ignored.*

The **Disk** icon next to the **Email** icon allows the user to save the currently opened data file to a USB memory device connected to the EZT-570L.

The **Email** icon next to the data log on/off button allows the user to select the currently open data file and email the file to any user that has been setup to receive emails from the EZT-570L.

NOTE: *The email utility has a file transfer capacity of 500KB. If the file is too large to be sent using the email utility, it will have to be copied to a USB memory stick using File Utilities or transferred using FTP in order to be viewed remotely on a PC.*

7.2.1 Calculating Log File Size

The EZT-570L saves the log file in a text-based format (.csv), so the amount of memory consumed for each reading is dependent upon the number of digits required to accurately display the value (1 byte per character). This optimizes memory usage but also makes calculating an exact file size difficult. To obtain a worst-case approximation of the resultant file size, use the following formula:

File Size (Bytes) = (64 + LD) * number of readings in the file

Where:

LD (loop data) = 7 * number of points selected for logging

Example

EZT-570L with three loops of controller data (PV, SP, %Out selected) for each loop (total of nine points). Logging set at two second interval running for a duration of one day.

LD: $7 * 9 = 63$

number of readings in file = 30 readings/min * 60 mins/hr * 24 hrs/day = 43200

File Size (Bytes) = (64 + 63) * 43200 = 5,486,400

An EZT-570L logging nine points of data at a two second interval will consume a maximum of ~5.5MB of memory per day. With an SD memory card size of 8GB, the EZT-570L can log data for approximately four years before the SD memory card is full.

8GB = 8,000MB (total memory card space) / 5.5MB (per day) = 1454 days (3.9 years)

NOTE: *Available memory space on the SD card is also affected by the number of ramp/soak programs, alarm files and audit trail files that are stored. The quantity and size of these files will reduce the memory space available for logging. Regular file maintenance is recommended in order to ensure adequate space remains available for the logging of data.*

7.3 Reviewing Historical Data

Historical files can be opened and viewed using the historical viewer. In order to view a historical data file, it must first be opened by selecting "Open" from the File menu. Once the file has been opened, the EZT-570L will automatically plot up to the first eight channels of the historical data file or the user can choose to cancel the plot select which channels should be plotted as well as adjust the specific time period to plot.

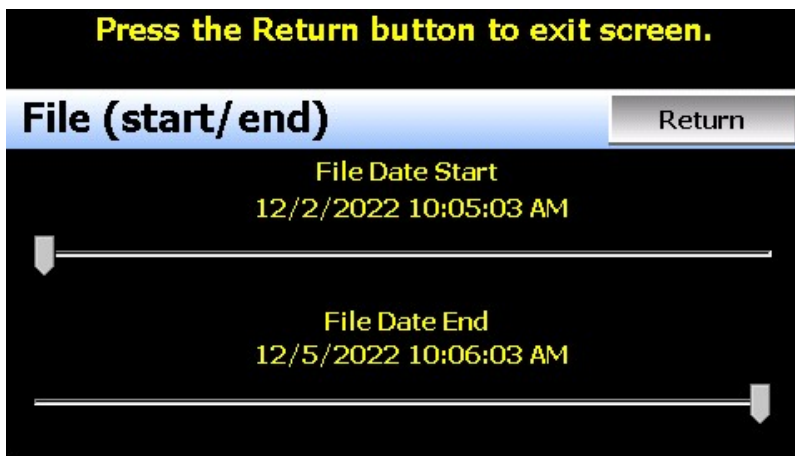
NOTE: *The open historical data file list will display up to 650 files. If more than 650 log files are present, the files cannot be shown in the list and the files will have to be exported from the EZT-570L in order to view them. This can be done either via USB file transfer (see section 7.4) or FTP (see section 7.5).*

7.3.1 History Plot Setup

The history plot setup allows the user to select any time frame (zoom in/out) from the historical data file as well as select up to six channels of data to plot. To edit the settings for the historical plot, select “Chart Setup” from the History menu.



Any point from the data file can be selected along with the vertical axis to be used for each channel to be plotted. Select channels from the list by turning them on or off, and use the “Left” and “Right” axis buttons to assign the selected item to the left or right axis for the plot range. To adjust the period of time to plot from the data file, press the “Time” button.



The start and end dates for the currently loaded file will be shown with time in hours, minutes and seconds. The “File Date Start” and “File Date End” sliders are used to select a time span for historical viewing. Once the desired start and end times have been set, press the “Return” button to return to the Chart Setup screen.

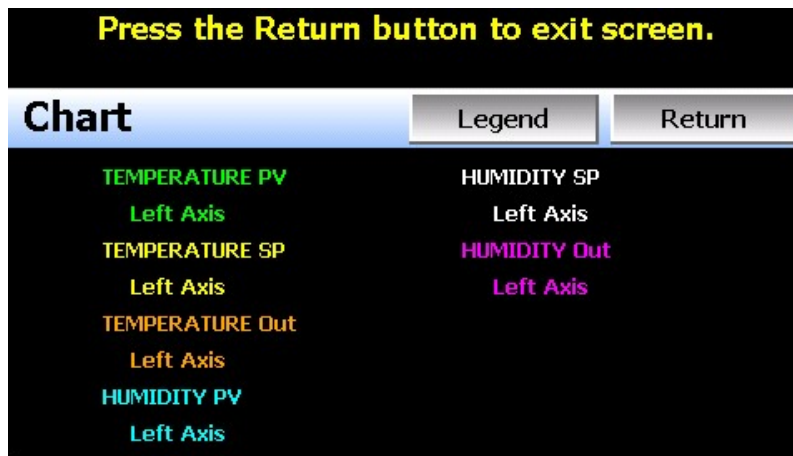
7.3.2 Plotting Historical Data

To display the data from the currently opened history file select Plot from the History menu. If a file has not been opened or data points have not been assigned to plot, the EZT-570L will alert the user to correct the problem. The ‘X’ and ‘Y’ axis scales are set to auto scale based on current values for each plot channel so no user action is required.

The historical graph provides the same zoom feature as the real-time trends so the user can zoom in on a particular area of the historical plot by dragging their finger across the screen to draw a rectangle around the desired plot area.



Pressing the “Legend” button will provide the user with channel information by displaying the names of the selected plot channels, which axis they are associated with and the color used to display the plot channel. Pressing the button again will toggle the display back to the historical plot.



NOTE: When pressing the Legend button to toggle between the historical chart and the legend screen, it may take several seconds for the chart to become visible depending on the size of the data file and number of channels selected to plot.

When finished viewing the historical chart, you must press the “Return” button to exit the historical data viewer and return to the main data log screen.

7.4 USB File Transfer

The “Utilities” section of the EZT-570L provides all the functionality required for retrieving files and maintaining the internal SD memory card. The internal SD card should not be removed from the EZT-570L interface. Any change to SD directory structure (moving or deleting files with a PC) may cause the EZT-570L interface to stop operating and a new SD card will need to be ordered. Never move or delete the directories unless using the provided EZT-570L file utilities functions.

NOTE: The data log files, programs, alarm log and audit trail directories are saved to the internal SD card (not the USB memory stick device) plugged into the EZT-570L interface. Never unplug the SD card when EZT-570L is powered up or loss of data may result.

The USB file transfer screen allows the user to copy or erase files from the internal SD card. Complete file directories for all EZT-570L file types can be copied to the USB memory stick and erased from the internal SD card. The current status for file functions is displayed for the operator during copy/delete operations. The EZT-570L also allows automatic programs to be imported from the USB memory stick. Programs must be exported from another EZT-570L device to the memory stick first, before this function can be used. The EZT-570L will look for “Profiles” directories on the memory stick for import and alert the user if none exist.

NOTE: All file transfer functions can be used while data logging is running. If the operator needs to back up or delete files from the system, a large number of files could take considerable time to backup and delete from memory. The file transfer screen will be locked during file transfer so plan the timing appropriately when access to other screen functions is not required.

When data logging is running, the current data log file will not be copied or deleted while using the file transfer functions. This protects the current file and makes sure that the data file is complete before being copied and cannot be deleted from memory while it is still in operation.



To **Copy** files, insert the USB memory stick into the USB port. Select the file type you wish to copy from the “Export Type” drop down menu. Available file selections are Program, Alarm, Audit and Data files. Once the selection is made, press the “Copy” button. All related files will be copied to the USB memory stick with progress status displayed to user.

To **Copy/Delete** files from internal memory, insert the USB memory stick into the USB port. Select the file type you wish to copy and erase from the EZT-570L internal memory by selecting it from the “Export Type” drop down menu. Available file selections are Program files, Alarm files, Audit trail files and Data files. Once the selection is made, press the “Copy/Delete” button. All related files will be copied to the USB memory stick and then deleted from the EZT-570L with progress status displayed to user.

The **Import** file function allows automatic ramp/soak program files to be copied from the USB memory device to the EZT-570L. A dialog box will appear listing the available program directories on the USB memory stick. Program directory names exported from the EZT-570L are in the format ‘Profiles_mm-dd-yyyy-hh-mm-ss’.

NOTE: The USB memory stick must be inserted into the USB port for any of the file utility operations to function. It is recommended to only use memory sticks certified by Cincinnati Sub Zero for use with the EZT-570L. CSZ has tested and validated these memory devices for proper operation and performance.

Due to manufacturing variations in the USB memory sticks, it may take a few seconds up to 30 seconds for the EZT-570L to recognize the device when it is plugged in. Allow sufficient time for

the device to be recognized before attempting any file utility operations or the EZT-570L will indicate a file transfer/memory stick error.

When files are being copied to the USB storage device, a directory for each file type will be created to store the copied files. The directory structure is as follows:

Program files directory:	Profiles_mm-dd-yyyy-hh-mm-ss
Alarm files directory:	Alarm Files_mm-dd-yyyy-hh-mm-ss
Audit files directory:	Audit Files_mm-dd-yyyy-hh-mm-ss
Data files directory	Data Files_mm-dd-yyyy-hh-mm-ss

The purpose for using the date and time as part of the directory name, is to make sure the user can track the date and time of the file transfer. If a user transfers a file type more than once in a single day, the files will be grouped logically by time.

When accessing the data files saved to the USB memory stick, the data files will be in “.csv” format. These files can be opened directly with Microsoft Excel or any program that opens a comma separated file format. You can copy or empty the “Data Files” directory by simply plugging the USB device into a PC’s USB port. The device then becomes like any removable disk attached to the computer and can be manipulated once plugged into the PC.

The CSZ Data Viewer program is a free Windows accessory program that allows users to view, plot and print data files and is available from Cincinnati Sub Zero. It is required when using the digital signature feature of the EZT-570L.

IMPORTANT: *Once files are deleted from the EZT-570L storage devices, they are gone and cannot be retrieved. DO NOT edit, move or delete any other files from the internal SD memory card unless using the EZT-570L file utilities. The EZT-570L will not operate properly if the file/directory structure is altered.*

7.4.1 Recommended File Maintenance

A quick note about file storage; data and setup files (programs, data files, alarm log and audit trail files) need some maintenance every now and then. After a period of time, storage devices fill up and files require backup or file deletion when no longer needed. The Microsoft WinCE platform allows for a maximum of 999 files per directory when all the files begin with the same 8 characters. Alarm and audit files are recorded by date (one per day) with the format of MMDDYYYY (where MM = month, DD = day, YYYY = year) so there is essentially no limit to the number of files other than available storage area.

Data log files however, could reach the maximum based on the number of files created per day and if the logging on Program is enabled or a file name is specified by the user. If data logging is manually started or activated on system Startup and only 1 file is created per day, there will be no effective file limit since the first 8 characters of the file name are the date, like that of alarm and audit files.

If a file name is specified or logging on Program operation is enabled, each file will begin with the same prefix. Thus, multiple files can begin with the same 8 characters this limiting the maximum number of files that can be stored. At a frequency of 3 per day, 7 days a week for example, the maximum 999 files would be reached within one year. It is recommended that a quarterly maintenance schedule be adopted to copy and delete all data files from the EZT-570L through either the USB file transfer or FTP backup utilities to prevent the maximum file number from being reached.

If the maximum number of files is reached, the EZT-570L will display the alarm message “Data file error. SD card full or missing.” and data logging will be disabled. Note that there is still sufficient memory space on the SD card; however, due to the maximum number of files being reached, no more files can be placed

in the data log folder. Regular backup and removal of files from the EZT-570L will prevent this from occurring.

It is also highly recommended to backup and delete alarm and audit files as well. While it is possible to store years of files, the time it will take to copy the files once the time has come, could take hours due to the large number of files. The EZT-570L file browser is also limited to a total of 650 files. If the number of alarm files or audit files exceeds the 650-file limit, you will be unable to open and view alarm or audit files on the EZT-570L. They will have to be exported via USB or FTP in order to be viewed.

More frequent backups will also require less time to perform. The speed at which files can be transferred is more dependent on the number of files than the size of the files. A fewer number of large files takes less time than a large number of small files.

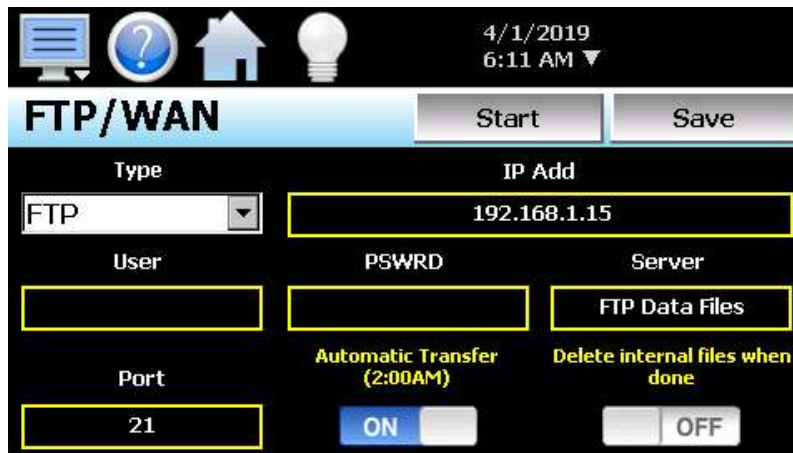
7.5 FTP/FileWeb/DataWeb Interface

The FTP/WAN screen allows the user to configure automatic back-up of all data files contained in the EZT-570L memory to a user designated FTP or secure FileWeb site (https://). When enabled, the EZT-570L will automatically back up all data log files, alarm files and audit trail files at 2:00AM each day. With the optional delete files selection, the EZT-570L will then automatically delete the files from its internal memory after back up. This will maintain EZT-570L memory automatically, so that continuous data logging can be performed without filling up the available memory space.

The EZT-570L also offers a DataWeb LAN/WAN/Cloud interface. This allows the EZT-570L to transfer data directly into a server's data base rather than using file-based data solutions. The DataWeb interface provides the transfer of secure (https://), real time data which can be shared and viewed across networks for real time manufacturing data systems interface.

NOTE: *Cincinnati Sub-Zero offers a PC based data acquisition solution for all EZT series controllers called CSZ-Connect. It is a complete data acquisition, web based visual solution, file transfer (data backup) and device configuration storage solution for EZT series controls connected to your LAN/WAN. Contact CSZ for more details.*

Setting up CSZ-Connect or an FTP site on your network may require authorization and/or assistance from your network administrator. Contact your network administrator for proper settings and authorization from your network server (if required) to allow the EZT-570L to connect to the designated site.



The **Type** drop down is used to select the FTP/WAN interface. Choices are FTP, FileWeb and DataWeb.

The **IP Add** field is used to enter the IP address of the FTP/FileWeb/DataWeb site that EZT-570L is to interface with.

The **User** field allows you to enter a user name for site access. When the EZT-570L connects to the FTP/FileWeb/DataWeb site, the user name will be used to identify the connection. If a security login is required (FileWeb/DataWeb always require security credentials), the proper user name will have to be entered in this field. If security is not used (FTP only), this field can be left blank (blank for anonymous login using FTP only).

The **PSWRD** (password) field is used in conjunction with the user name field and is for entering a password so the EZT-570L can access the site. If security is not used (FTP only), this field can be left blank (blank for anonymous login using FTP only).

The **Server** field is used to enter the directory information where the files are to be backed during FTP/FileWeb operation. This field is not used during DataWeb interface selection. When the connection occurs, the EZT-570L will place the historical data files in the "Sever" field directory structure when using FTP/FileWeb interfaces. The EZT-570L will automatically create an "Alarms" directory and an "Audit" directory within the specified server directory for backup of the alarm files and audit trail files. The "Sever" field for FTP and FileWeb must match the directory structure setup at the server.

For example, if FTP is used and the "root" path at the server is "Files", in order for the EZT-570L files to be transferred to this directory, the "Sever" field must contain the text "Files". If there is a directory inside of the server root "Files" directory named "unit1775" and the files are to be transferred to this directory, the "Server field must contain the text "Files/unit1775". The FTP operation will error and the transfer will not be completed if the "Server" field is not entered properly or does not match the FTP server configuration.

NOTE: *For FileWeb operation, the Server field is optional and can be left blank. It can be used to enter additional directory information (if desired) on where the files are to be stored. By default, the EZT-570L is hard coded to store files on the specified server in the "\Files\user name\" directory. If an entry is made in the Server field, the resulting path would be "\Files\user name\server\".*

When the **Automatic Transfer (2:00AM)** option is turned on, the EZT-570L will perform an automatic backup of all historical data files, alarm files and audit trail files contained in its internal memory to the designated FTP/FileWeb site. Note that if data logging is currently active, the active file will not be copied. When the **DataWeb** interface is used, real time data is transferred to a database rather than transferring actual files so this option is not used and is disabled.

When the **Delete internal files when done** option is turned on, the EZT-570L will delete all data log files, alarm files and audit trail files within its memory after completing the backup to the FTP site. Note that if data logging is currently active, the active file will not be deleted. When the DataWeb interface is used, real time data is transferred to a database rather than transferring actual files so this option is not used and is disabled.

Once all settings have been made, press the "Save" button to save the settings so that on the next power-up, the entries will be maintained. The "Start" button can be used at any time to perform a manual data backup using FTP or FileWeb interfaces. If the files already exist on the FTP/FileWeb site, they will be overwritten on each subsequent backup. If the FTP/FileWeb site is down, or the EZT-570L is not connected to the network, a local alarm message on the Alarm screen will indicate a transmission failure.

NOTE: *Typically, FTP/FileWeb server connections use case sensitive alpha-numeric characters for the User name, Password and Server directory. Contact your network administrator for proper settings.*

7.5.1 More About FTP, FileWeb and DataWeb Interfaces

FTP servers (File Transfer Protocol) have been around for many years and can be installed on local or network machines. The FTP server allows a client (EZT-570L) to transfer files to the FTP server once installed. This allows for manual and automatic backup of data from the EZT-570L.

EZT-570L Field Setup	FTP Server Setup
Type = FTP	FTP server setup for passive operation (see Appendix section FTP, FileWeb, DataWeb Requirements/Installation for additional information).
IP Add = xxx.xxx.xxx.xxx	Actual IP address of FTP server
User = userName	Actual user name for login if authentication used.
Password = userPassword	Actual password for login if authentication used.
Server = myFTP	FTP server setup with a root directory named "myFTP". The FTP server directory path must exist and match the EZT-570L setup for proper operation. If there is an additional directory within the "myFTP" root directory, its name would be appended to the path. (i.e. myFTP/Files if a "Files" directory inside the myFTP server root directory is the target for transfer).
Port = 21	Port used at EZT-570L and open at FTP server.

NOTE: Make sure proper permissions are set at the FTP server for access/creation of directories and read/write access. Also check root directory structure at Server to identify the actual root that was created for the files since there can be additional layers created by the server and displayed in the path.

The FileWeb interface allows the EZT-570L to transfer its files to a web site for download which can then be viewed using a standard web browser. This interface provides the user the ability to setup a web site to store files for local or global access without installing an FTP server. The EZT-570L supports https:// (secure) transfer of files.

EZT-570L Field Setup	FileWeb Server Setup
Type = FileWeb	FileWeb server setup (see Appendix section FTP, FileWeb, DataWeb Requirements/Installation for additional information).
IP Add = https://cszutil.com/FDDDataService.svc	Actual named address of FileWeb server/service.
User = userName	Actual user name for login at FileWeb server (required).
Password = userPassword	Actual password for login at FileWeb server (required).
Server = <i>optional path</i>	The FileWeb server/service must be configured with a root "files\" directory in order to use the EZT-570L FileWeb feature. The EZT-570L is hard coded to transfer files to the "files" directory in the root of the server. If the Server field also contains an entry (i.e. optionalPath), the resulting path would be "files\ <i>optionalPath</i> ". If the directory does not exist, it will be created at the server by the EZT-570L based on the permissions settings at the server.
Port = not used	

NOTE: *Make sure proper permissions are set at the FileWeb server for access/creation of directories and read/write access. Also check root directory structure at Server to identify the actual root that was created for the files since there can be additional layers created by the server and displayed in the path.*

The DataWeb interface allows the EZT-570L to transfer data to a web data base service using MySQL and Microsoft IIS as a web platform. The EZT-570L can interface directly to a local or Web data base (Cloud) thereby allowing access to any system globally without any special “client” applications required to view the data. This allows the EZT-570L to share data with local or global manufacturing systems by storing data directly to a manufacturing database. The EZT-570L supports https:// (secure) transfer of data.

EZT-570L Field Setup	DataWeb Server Setup
Type = DataWeb	FileWeb server setup (see Appendix section FTP, FileWeb, DataWeb Requirements/Installation for additional information).
IP Add = https://csztuil.com/FDDataService.svc	Actual named address of DataWeb server/service.
User = userName	Actual user name for login at FileWeb server (required). This is the directory where the database structure will reside on the server. The EZT-570L will use this directory path for sending data to the database.
Password = userPassword	Actual password for login at DataWeb server (required).
Server = not used	The directory where the database exists uses the userName as the default location for data storage.
Port = not used	
Data logging screen entries: ID#1 = unit specific identifier ID#2 = unit specific identifier (see section 7.2 Starting/Stopping Logging)	Used as the unit identifiers by the remote database in order to store the data sent from the EZT-570L. At least one field must contain an entry and should be unique to any other EZT-570L that connects to the same server database.

NOTE: *An IT professional with experience is required for DataWeb server setup. Cincinnati Sub Zero does not support server-side programming or setup but can offer 3rd party resources to assist with or handle complete server-side projects.*

The DataWeb interface does not transfer complete files for backup like the FTP and FileWeb interfaces. The DataWeb interface transfers records in real time based on the log setup interval at the EZT-570L. When logging is started at the EZT-570L, data will begin transfer to the server-side site. Data will be transferred to the server at the beginning of logging (one record) with additional records transferred based on the rate that the EZT-570L data log interval is set for.

If the data log interval rate is set for 60 seconds, the EZT-570L will populate the database with a single set of records (PV, SP, %Out determined by data log/server setup) once every 60 seconds. If the data log interval rate is set for 120 seconds, the EZT-570L will populate the database with a single set of records (PV, SP, %Out determined by data log/server setup) once every 120 seconds. Data log intervals can be set as fast as 6 seconds since buffering is used at the EZT-570L for faster data log rates, but in this case the database would receive a total of 10 records once per minute (one record per 6 seconds). Buffering for rates faster than 1 minute is used to reduce access/overhead at the server side while still maintaining 6 second date/time stamps for database record keeping.

7.5.2 FileWeb/DataWeb Server Components and Requirements.

While the actual server-side development is more involved than this manual will cover, component overview and installation is covered in section A.1 of the Appendix.

Web Development Support:

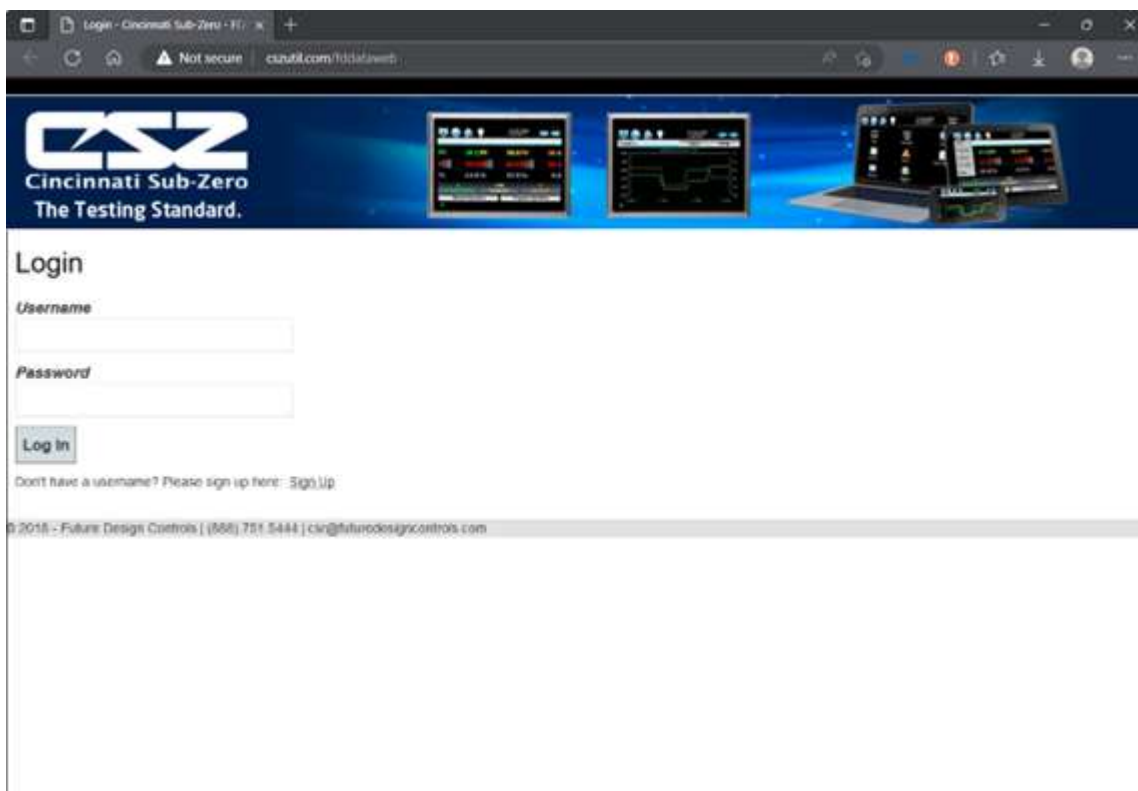
Cincinnati Sub Zero does not support or develop custom server-side web solutions. We can offer 3rd party resources to assist customers in these development requirements.

7.6 CSZUtil.com Web site for FTP, FileWeb and DataWeb Testing

The CSZUtil web site is a CSZ http/https site that allows customers to create a free account and test the FTP, FileWeb and DataWeb interfaces offered on the EZT-570L. The site automatically deletes files every hour since this is a test site only and cannot be used for permanent web storage of files or data. The site allows customers to fully test and verify that data is being transferred properly from the EZT-570L device to the CSZUtil site, thereby providing everything needed to test the EZT-570L and the Internet connection without requiring additional software or development. This allows the customer to test the interface and pick which type of data transfer is the best for operations.

Access the Web Site and Create an Account:

To create a free account, go to the following link: <http://cszutil.com/fddataweb>



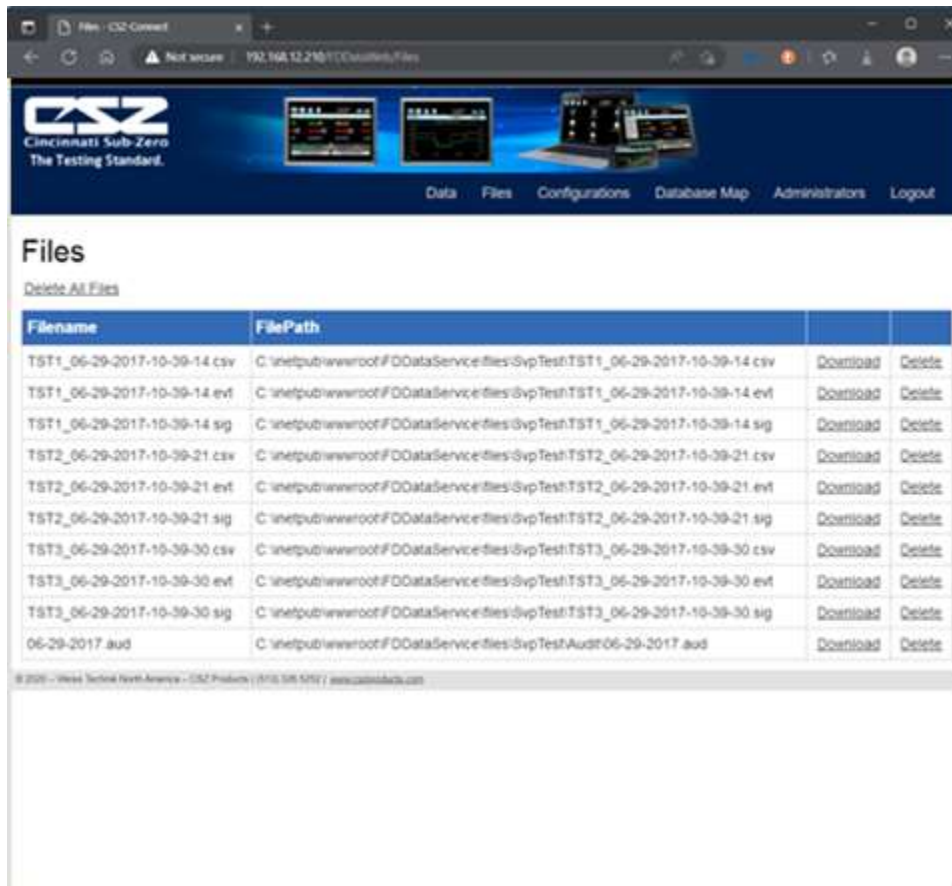
Click on the “Sign Up” link. Enter your name, company name, email address and password. Note that your email address will not be used for solicitation purposes. It is used to send an account verification email. The email sent requires no confirming information; it only verifies that a real user got the email before activating the account. Although CSZUtil.com is a no-charge site, important user data is encrypted for additional protection.



Once you have created and verified your account, you can log in to the website. Once logged in, the main CSZUtil website will be displayed with tabs for Data (DataWeb), Files (FileWeb) and Configurations. These tabs can be clicked on and will display data after transfer from the EZT-570L. Every hour, the data will be deleted from each section (except for Configurations) or the data can be manually deleted using the “Delete” link on each page.

Data Files Page (FileWeb):

The data files page, accessible from the “Files” menu item, lists the files in the customer’s data directory. These are only the files in the customer’s directory, not all uploads. The user can delete the files from this page.


FileWeb sample setup using CSZUtil.com:

To setup the EZT-570L for use with the CSZUtil.com FileWeb server, go to the FTP/WAN screen on the EZT-570L and enter the following data into the screen fields. Make sure to replace the “custName” and “custPassword” text below with the actual user name/password entered during the CSZUtil.com signup process.

Type = FileWeb
 IP Add = https://cszutil.com/FDDataService.svc
 User = custName
 Password = custPassword
 Server = optional
 Port = not used

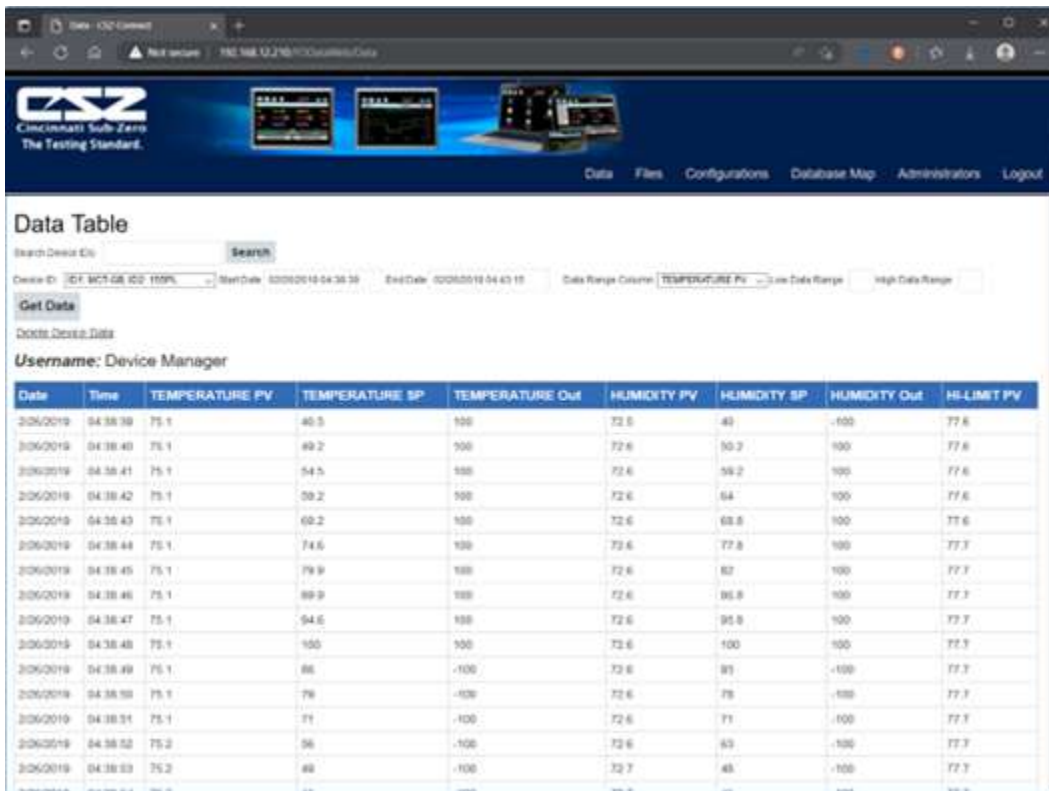
Press the “Save” button to complete the setup on the EZT-570L FTP/WAN screen. Press the “Start” button to begin a manual transfer of files from the EZT-570L to the CSZUtil.com site. Login to the CSZUtil.com site to view the FTP files by pressing on the Files link on the page (or press Files link if already logged into CSZUtil.com).

Database Data Page (DataWeb):

Once logged in, the customer will be shown the Data page. If data has been uploaded to the database, the “Device ID” drop-down menu will contain the list of units (according to the ID#1 and/or ID#2 entries as made on the Data logging screen).



To view the data, select the desired unit from the list and click the “Get Data” button below the Device ID menu. The data available between the Start Date and End Date will be displayed.

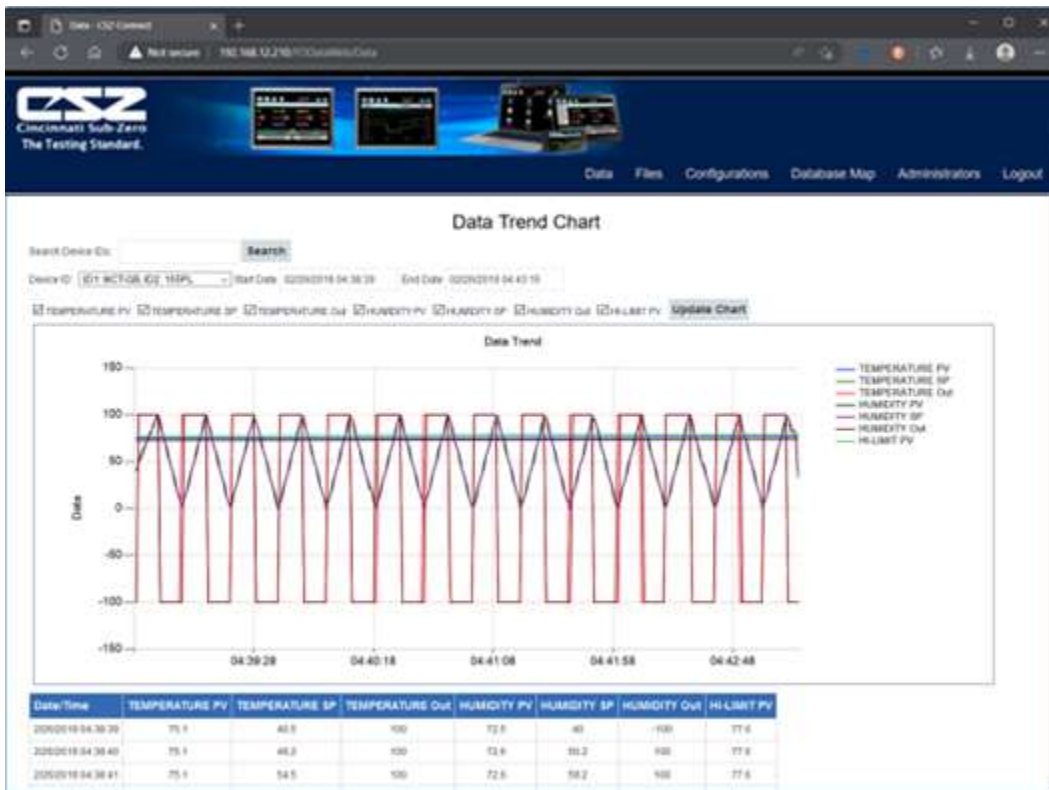


The start and end dates can be altered by simply clicking on the fields to display only data from a specific time frame. When the specified time period is entered, press the Get Data button to refresh the data table.

The Data Range Column selection and Low/High Data Range fields can also be used to search for data points that fit within the specified range. The available data can also be viewed in graph format. Hover the mouse over the Data tab and selections for Trend and Table will be provided.



Once Trend is selected, choose the desired unit from the Device ID menu. Place a check next to each available point you want to plot and click the Update Chart button. A trend plot according to the chosen plot points and time range will be displayed along with the corresponding data table below.



NOTE: Once you access the Data Table or Data Trend Chart page, the default start and end times are based on the available data at the server. If an EZT-570L is actively sending data, you must manually set the end time to a future date so that each time you refresh the page via the Get Data or Update Chart buttons, the page is updated with the latest data sent from the EZT-570L.

DataWeb sample setup using CSZUtil.com:

To setup the EZT-570L for use with the CSZUtil.com DataWeb server, go to the FTP/WAN screen on the EZT-570L and enter the following data into the screen fields. Make sure to replace the “custName” and “custPassword” text below with the actual user name/password entered during the CSZUtil.com sign up process.

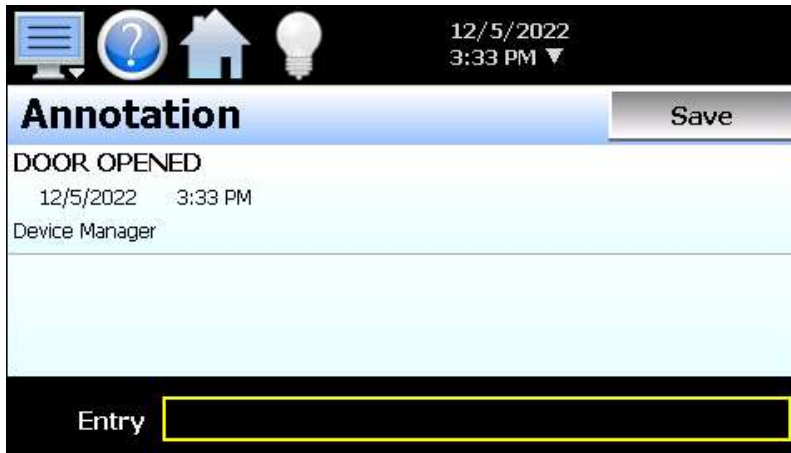
Type = DataWeb
 IP Add = https://cszutil.com/FDDataService.svc
 User = custName
 Password = custPassword
 Server = empty (no characters)
 Port = not used
 ID#1 = unique identifier of your choice
 ID#2 = unique identifier of your choice

Press the “Save” button to complete the setup on the EZT-570L FTP/WAN screen. Next, navigate to the Data logging screen. Make entries in the ID#1 and/or ID#2 fields. These entries should be unique to the EZT-570L and not duplicates of any other EZT-570L you may have connected to the site. Once logging is started at the EZT-570L, data will begin transfer to the “Data” section of the server-side site. Data will be transferred to the server at the beginning of logging (one record) with additional records transferred based on the rate that the EZT-570L data log interval is set for.

If the data log interval rate is set for 60 seconds, the EZT-570L will populate the database with a single set of records (PV, SP, %Out determined by data log/server setup) once every 60 seconds. If the data log interval rate is set for 120 seconds, the EZT-570L will populate the database with a single set of records (PV, SP, %Out determined by data log/server setup) once every 120 seconds. Data log intervals can be set as fast as 6-seconds since buffering is used at the EZT-570L for faster data log rates, but in this case the database would receive a total of 10 records in 1 minute (one record per 6 seconds). Buffering for rates faster than 1 minute is used to reduce access/overhead at the server side while still maintaining 6 second date/time stamps for database record keeping.

7.7 Annotation

The Annotation screen allows the user to add a message to the running data file and view any messages currently associated with a loaded historical data file.



When a historical data file is loaded, the Annotation screen will display any messages that were written to the file. The date, time, user name and description of the data file annotation is shown. Note that the currently running data log file can be opened as a historical data file, and the current annotations for the running file will be shown.

To add an annotation to the running log file, touch the “Entry” field at the bottom of the screen and enter the message (up to 16 characters maximum). Press the “Save” button and the message will be added to the current log file. If the running log file was opened as the historical log file, the annotation will be shown immediately on the screen as it is added. If logging is not currently running, the entry field will be disabled.

7.8 Digital Signatures

The Signature screen allows the user to add digital signatures to historical data log files and view any digital signatures currently associated with the loaded historical log file.



When a historical data file is loaded, the Signature screen will display any signatures currently associated with the file. To verify a digital signature and ensure that the data file has not been altered, touch the signature in the list box and press the “Verify” button. The EZT-570L will compare the signature to the log file to see if any alterations to the data have been made. The EZT-570L will then indicate if the signature is valid or not.

If the signature is valid, the historical data file is intact and has not been altered. If the signature is invalid, the data has been altered at some time after the signature was assigned to the file. For data integrity, the EZT-570L automatically signs a data file when logging is stopped; however, this only occurs if the “Auto Interval” is selected on the Log screen. If a different logging interval is used, and the file size becomes greater than 500KB, the EZT-570L will not automatically sign the file, and it must be signed by a user.

To add a digital signature to the historical log file, touch the “Entry” field at the bottom of the screen and enter in the comment line for the signature (up to 16 characters maximum). Press the “Save” button and the signature will be added to the log file. The signature includes the date and time of the signature, the user name and comment line. If a user is not logged into the system, the default user name “Device Manager” will be used as the user.

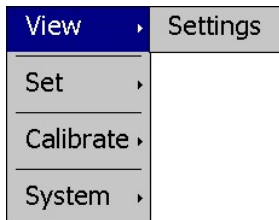
NOTE: *The Signature screen is not available if security is disabled. The EZT-570L security module must be enabled in order to digitally sign data log files. See Section 6 Security.*

8. Offline Settings

The offline settings are available from the Device/Settings/Offline menu. Prior to entering offline setup, ramp/soak program operation and data logging must be manually stopped.

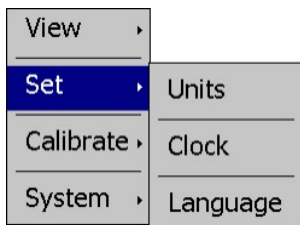
NOTE: Upon entering offline setup, all loop control outputs, event outputs and alarm outputs will be set to their corresponding OFF state. Power supply and retransmission outputs will continue to operate normally. Upon returning to the online mode, the outputs will be returned to normal operation. Limit outputs are not affected.

The offline menu provides navigation to the following functions:



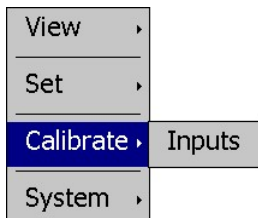
View menu

Settings: Navigation back to the online settings menu.



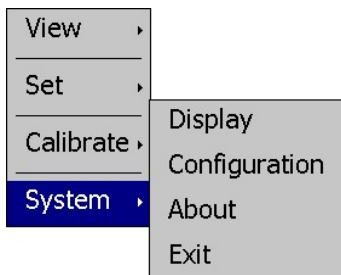
Set menu

Units: Setting for temperature units.
 Clock: Settings for system date and time
 Language: Settings for menu and help language text.



Calibrate menu

Inputs: Settings for loop and optional monitor point calibration.

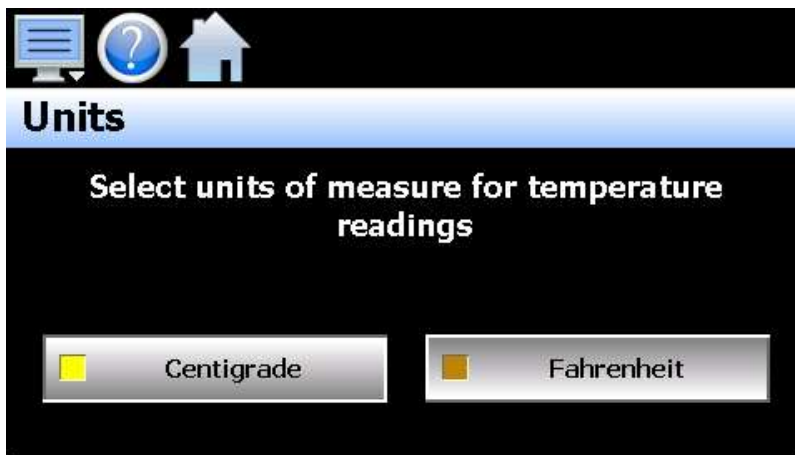


System menu

Display: Access to display calibration and backlight settings.
 Configuration: Access to EZT-570L import/export utility.
 About: View current firmware/software version numbers.
 Exit: Exit EZT-570L application and access to the configurator.

8.1 Degrees C/F Selection

The EZT-570L can display temperatures in either degrees C or F. To change the temperature units, select “Units” from the offline “Setup” menu.



Press the button for the desired temperature units to make the selection. The choices are mutually exclusive so when one selection is made, the other will be de-selected.

CAUTION: *When changing display units, ramp/soak program set points will not be converted between units. Separate programs are required for each temperature range. Operating the chamber with programs that have been written using alternate temperature units could cause property damage or personal injury.*

8.2 Clock Settings

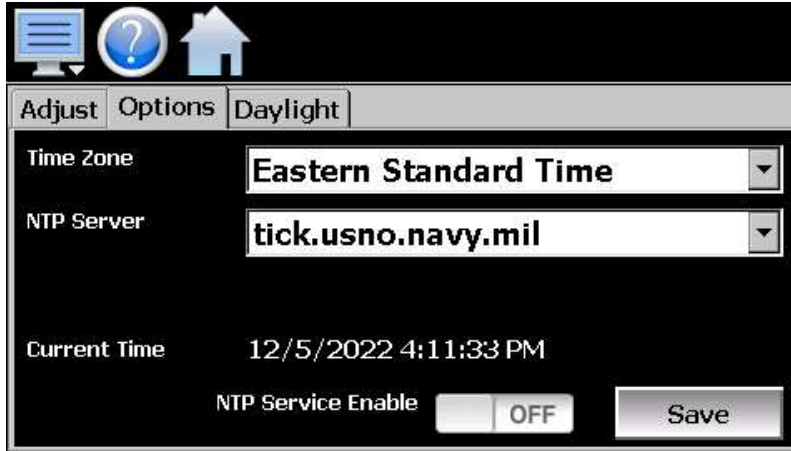
The system date and time is adjusted from the “Adjust” time tab under the Setup/Clock menu. The current date and time will be displayed in the thumb wheels as shown below.



To make adjustments, scroll each time wheel to adjust the month, day, year, hour, minutes, seconds and AM/PM selection. Once all adjustments have been made, press the “Save” button to set the system clock to the date and time entered.

8.2.1 Time Options

Select the time “Options” tab to configure the time zone and national time server clock settings. If the EZT-570L is connected to the internet, these settings can be used to have its clock automatically synchronize the time with one of the nationally provided time servers.



To enable the national time server, select your time zone and which time server you wish to use from the drop-down menu selections. Turn on the “NTP Service Enabled” option and press the “Save” button. The EZT-570L will then synchronize its time with the selected national time server at 2:00AM each day.

If the EZT-570L is not connected to the internet, a local alarm message will be shown on the alarm screen; “NTP Failure. Check cable and server”, to indicate that the time server could not be located.

8.2.1.1 Local Time Server Settings

If an active internet connection is not available, or company policy prohibits internet access, the EZT-570L can be configured to use a local time server instead of one of the national time servers. To configure the use of a local time server, select “local” from the NTP server list. When selected, the “Name/IP” entry field will be shown. The computer name or IP address of the computer running the local timer server on the LAN can then be entered. The EZT-570L will then contact the local computer in order to synchronize time.

NOTE: *The steps required to configure and provide NTP service from a computer on the LAN is outside the scope of this manual. Contact your network administrator for assistance.*

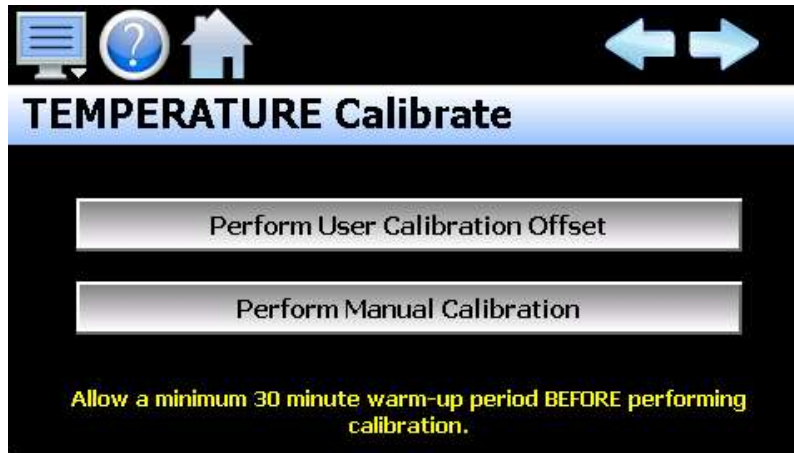
8.2.2 DST Settings

Select the “Daylight” tab to configure daylight saving time options. The daylight savings time options allow the user to set the start date and end date for daylight savings time.

8.4 Calibration

Each EZT-570L loop control and limit control is calibrated at the factory before shipment; however, they can be recalibrated in the field with the use of proper calibration equipment. The user calibration offset provides the means for the end user to simply apply an offset to the factory calibration. Typical reasons for applying this offset may include the need to match a particular reference standard, to match the calibration to a particular transducer or sensor or to remove long term drift in the factory set calibration.

To access calibration, select “Inputs” from the Calibrate menu. When more than one loop and/or limit control or optional monitor point is installed, the left/right navigation arrows will be provided at the top right of the screen. This allows the user to scroll through each available input.



Press the **Perform User Calibration Offset** button to access the settings for applying an offset to the loop, limit or monitor point factory calibration. This is the recommended method of calibrating the inputs for users without special calibration equipment and is suitable for most applications.

Press the **Perform Manual Calibration** button to begin the factory calibration procedure for the selected loop or limit input. This option is NOT recommended for users with limited calibration experience. Special high accuracy equipment is required to properly calibrate the inputs to factory standards. Improper calibration could render the device inoperable and require it to be sent back to the factory for repair.

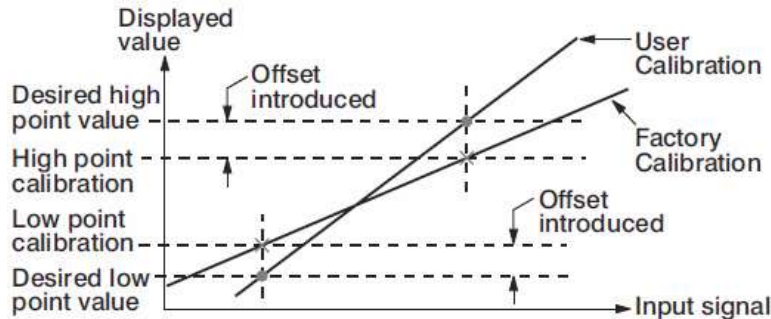
Prior to performing any calibration procedure, read the documentation carefully and understand the steps required to perform calibration. The loop and limit controls must be powered for a minimum of 30 minutes prior to performing calibration in order to ensure that they have warmed up and are at normal operating temperature.

Required calibration sources:

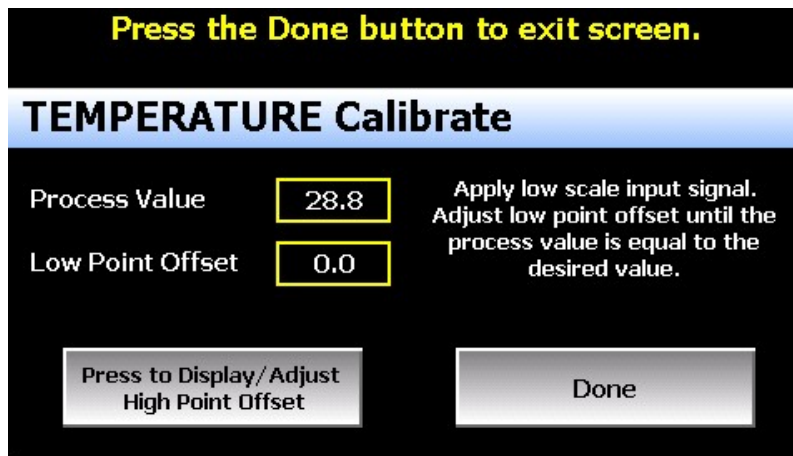
- Thermocouple Input: 0 – 100mV and K-Type source \pm 0.005% accuracy
- RTD Input: 0 – 300ohm source \pm 0.005% accuracy
- Voltage Input: 0 – 10VDC source \pm 0.005% accuracy
- Milliamp Input: 0 – 20mA source \pm 0.005% accuracy

8.4.1 Loop Calibration Offset

The calibration offset provides a two-point offset; a low point offset and a high point offset. The two-point offset constructs a straight line (linear calibration) between the two points. To ensure greatest accuracy, it is best to calibrate with the two points at the minimum and maximum operating ranges for the chamber.



To begin calibration, send the low signal input to the loop control. If the process value does not match the reference signal, adjust the low point offset so that the process value matches the reference input signal. Press the button to switch to the high point offset and then apply the high signal input to the loop control. Adjust the high point offset if necessary in order to make the process value match the reference signal.



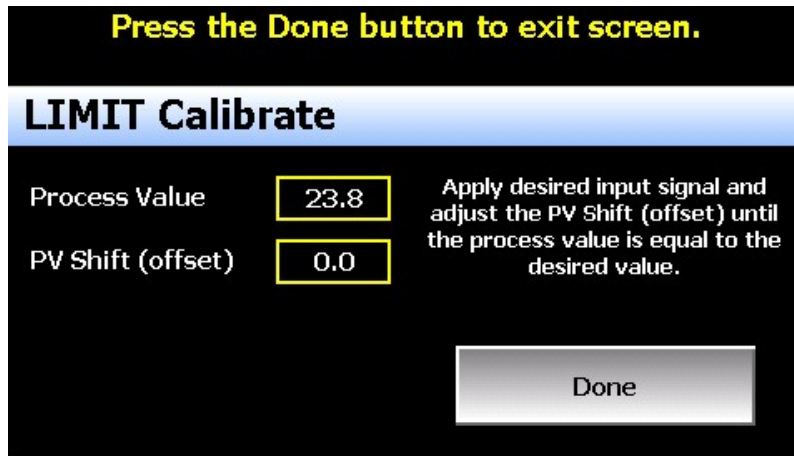
Once the high point offset has been adjusted, press the button to switch to the low point offset and again apply the low signal input to the loop control input. If the process value does not match the reference signal, adjust the low point offset again so that the process value matches the reference input signal. Again, press the button to return to the high point offset and apply the high signal input to the loop control. Adjust the high point offset if necessary in order to get the process value to match the high reference signal. This process may have to be repeated several times depending upon the amount of offset applied. Each time the low or high offset is adjusted, it can affect the opposite end of the calibration curve.

If the known calibration error of the loop input is the same at both the minimum and maximum operating range of the system, i.e., a linear offset, you can simply enter the difference between the reference signal and process value for both the low point offset value and high point offset value. If both the low and high point offsets match, it shifts the calibration curve thus applying the value of the low/high point offset equally across the entire range.

For example, if the range of operation is -65.0 to 180.0 degrees and the error between the reference signal and the process value is 0.7 at both the low and high range resulting in process values of -64.3 and 180.7, simply enter the value of -0.7 for both the low and high point offset. This will shift the curve equally at both ends of the curve so the resulting process values will be -65.0 and 180.0. Once the calibration offset is complete, press the "Done" button to return to the main Calibration screen.

8.4.2 Limit Calibration Offset

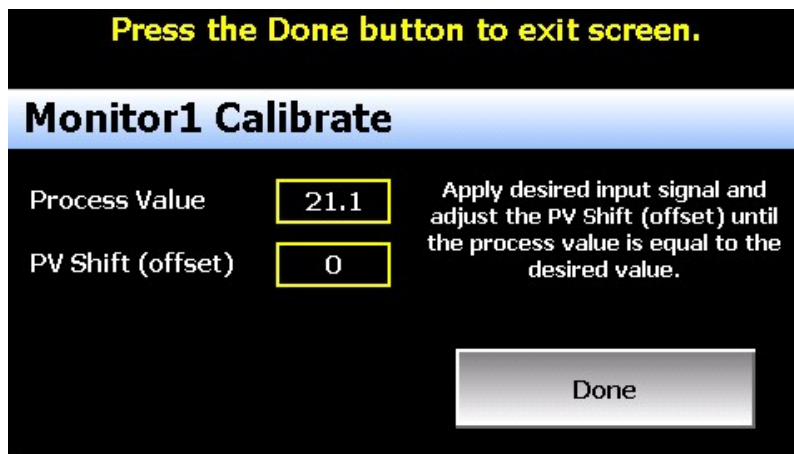
The calibration offset provides a single point shift. If the limit control is used for high/low operation and the error differs from one end of the calibration curve to the other, the shift value can be used to split the difference between the two. This will make the error equal at both ends of the curve or it can be used to shift it to reduce error at one end of the curve; however, it will also increase the error at the opposite end of the curve.



To begin calibration, apply the desired reference signal to the limit control input. Adjust the PV Shift value to achieve the desired process value. Once the calibration offset is complete, press the “Done” button to return to the main Calibration screen.

8.4.3 Monitor Point Calibration Offset

The calibration offset provides a single point shift. If the input error differs from one end of the calibration curve to the other, the shift value can be used to split the difference between the two. This will make the error equal at both ends of the curve or it can be used to shift it to reduce error at one end of the curve; however, it will also increase the error at the opposite end of the curve.



To begin calibration, apply the desired reference signal to the monitor point input. Adjust the PV Shift value to achieve the desired process value. Once the calibration offset is complete, press the “Done” button to return to the main Calibration screen.

8.4.4 Manual (Factory) Calibration

The manual calibration procedure is a two-step process for RTD and linear inputs and a three-step process for thermocouple inputs. Each step of the calibration procedure can be skipped which provides the user with a means to exit manual calibration without actually altering the calibration coefficients of the loop or limit control.

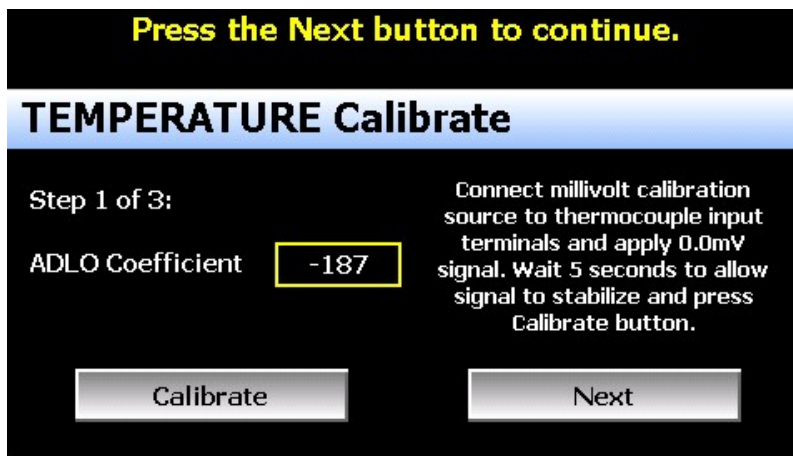
CAUTION: *Performing manual calibration will replace the factory calibration coefficients with new values. If calibration is performed incorrectly, it could introduce a large input error resulting in dangerous operating conditions if not detected or render the device inoperable requiring that it be sent back to the factory for repair. Prior to calibrating each coefficient, it is recommended that the current value be recorded.*

The calibration coefficients can be manually entered so if the calibration process fails, the previous values can be re-entered returning the unit to its previous operational state.

8.4.4.1 Thermocouple Input Calibration

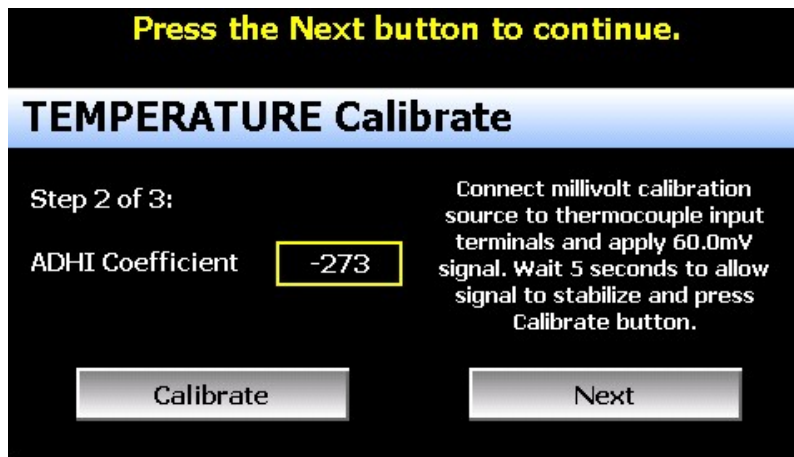
When the loop or limit control input is configured as a thermocouple input, pressing the “Perform Manual Calibration” button on the main Calibration screen will begin the thermocouple calibration procedure. The procedure is a three-step process and begins by calibrating the zero of the A to D converter.

To calibrate the input low coefficient, connect the millivolt source to the input terminals of the loop or limit control. Adjust the source signal to 0mV and allow several seconds for the source signal to stabilize. Record the current calibration coefficient value. Press the “Calibrate” button to calibrate the input low coefficient. A dialog will be shown indicating the new coefficient is being calculated. DO NOT alter the source signal during the process. Once complete, the dialog will close and the new coefficient value will be shown.



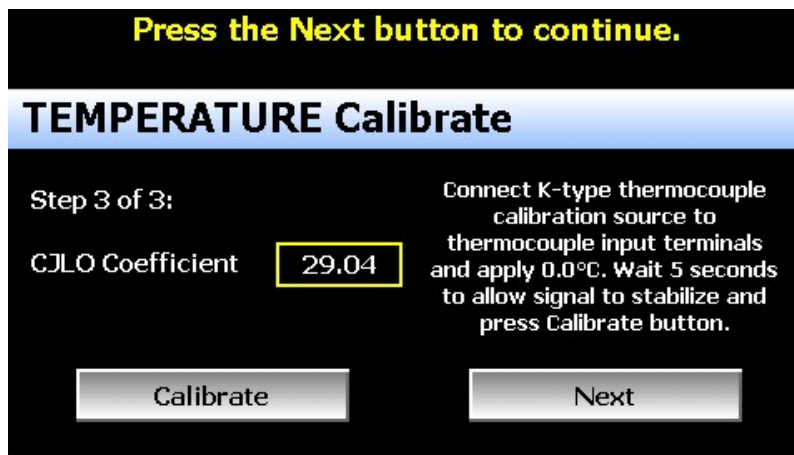
If the new coefficient value is -1999 or 1999, the calibration failed. Check the source connections and ensure the proper signal is applied. Press the Calibrate button to repeat the process or press the coefficient display/entry field and enter the previous coefficient value recorded to return the loop/limit back to its previous state. To skip the input low coefficient calibration or to proceed to the next step after calibration has been performed, press the “Next” button.

Step 2 of the procedure is calibrating the span of the A to D converter. To calibrate the input high coefficient, connect the millivolt source to the input terminals of the loop or limit control. Adjust the source signal to 60mV and allow several seconds for the source signal to stabilize. Record the current calibration coefficient value. Press the “Calibrate” button to calibrate the input high coefficient. A dialog will be shown indicating the new coefficient is being calculated. DO NOT alter the source signal during the process. Once complete, the dialog will close and the new coefficient value will be shown.



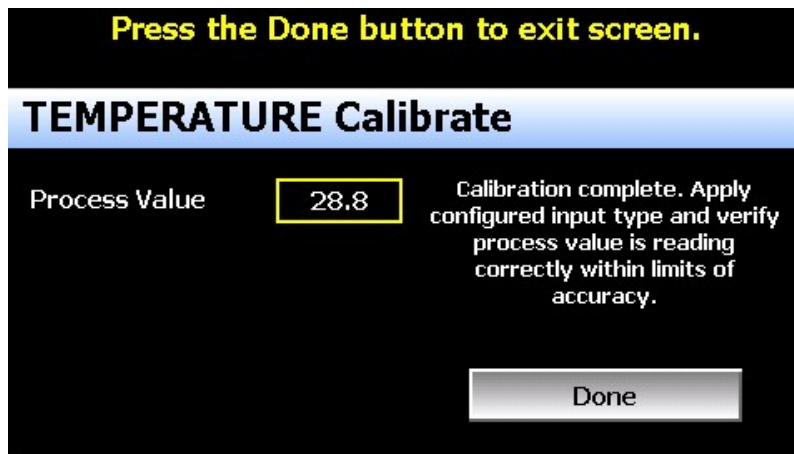
If the new coefficient value is -1999 or 1999, the calibration failed. Check the source connections and ensure the proper signal is applied. Press the Calibrate button to repeat the process or press the coefficient display/entry field and enter the previous coefficient value recorded to return the loop/limit back to its previous state. To skip the input high coefficient calibration or to proceed to the next step after calibration has been performed, press the “Next” button. The final step of the procedure is calibrating the cold junction.

To calibrate the cold junction, a K-Type thermocouple is required. Connect the K-Type thermocouple source to the input terminals of the loop or limit control using K-Type thermocouple wire. Adjust the source signal to 0C and allow several seconds for the source signal to stabilize. Record the current calibration coefficient value. Press the “Calibrate” button to calibrate the cold junction. A dialog will be shown indicating the new coefficient is being calculated. DO NOT alter the source signal during the process. Once complete, the dialog will close and the new coefficient value will be shown.



If the new coefficient value is -5.00 or 40.00, the calibration failed. Check the source connections and ensure the proper signal is applied. Press the Calibrate button to repeat the process or press the coefficient display/entry field and enter the previous coefficient value recorded to return the loop/limit back to its previous state. To skip the cold junction calibration or to complete the calibration procedure, press the “Next” button.

Once the calibration steps have been completed, connect a calibration source matching the type of input configured for the loop/limit control. Adjust the reference signal to the low and high end of the operational range to verify that the process value matches the reference signal within the accuracy limits for the input type.



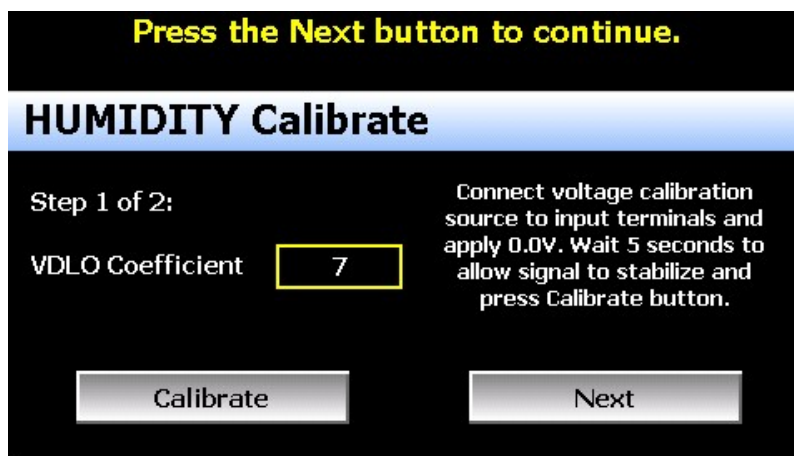
Once the input has been verified to display the proper value according to the input reference signal, reconnect the control sensor to the loop/limit control and press the “Done” button. This will return to the main Calibration screen.

8.4.4.2 RTD and Linear Input Calibration

When the loop or limit control input is configured with an RTD or linear input, pressing the “Perform Manual Calibration” button on the main Calibration screen will begin the calibration procedure for the configured input type. The procedure is a two-step process and begins by calibrating the zero of the A to D converter.

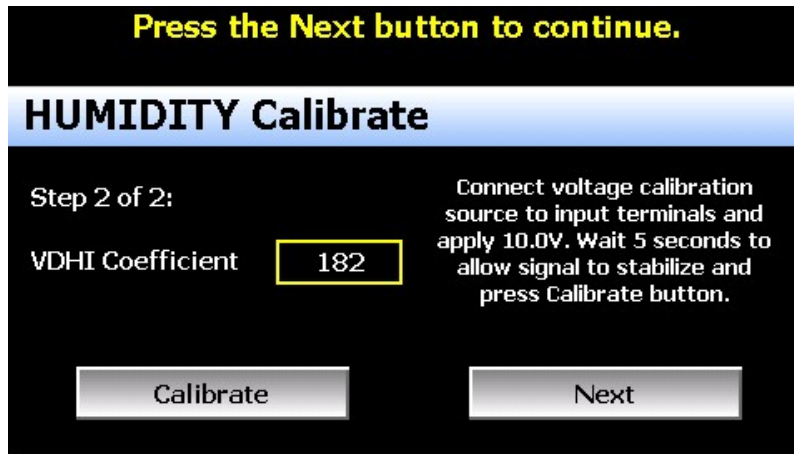
To calibrate the input low coefficient, connect the resistance source (for RTD input), voltage source (for voltage input) or milliamp source (for current input) to the input terminals of the loop or limit control. Adjust the source signal to 100 ohms (for RTD input), 0VDC (for linear voltage input) or 0mA (for current input) and allow several seconds for the source signal to stabilize. Record the current calibration coefficient value.

Press the “Calibrate” button to calibrate the input low coefficient. A dialog will be shown indicating the new coefficient is being calculated. DO NOT alter the source signal during the process. Once complete, the dialog will close and the new coefficient value will be shown.



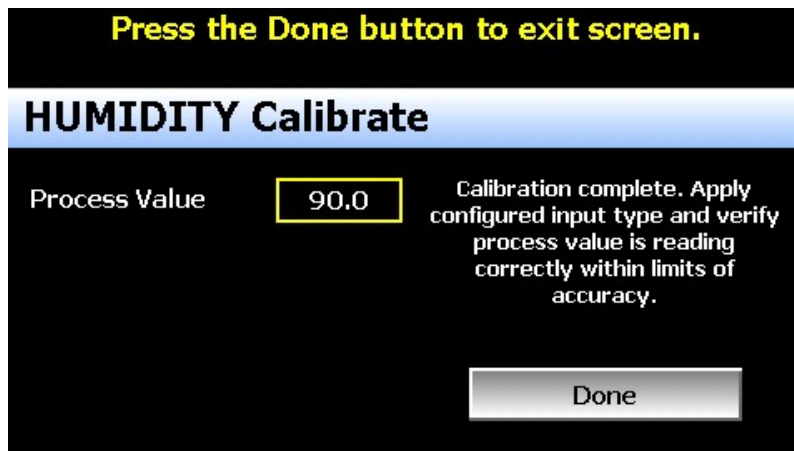
If the new coefficient value is -1999 or 1999, the calibration failed. Check the source connections and ensure the proper signal is applied. Press the Calibrate button to repeat the process or press the coefficient display/entry field and enter the previous coefficient value recorded to return the loop/limit back to its previous state. To skip the input low coefficient calibration or to proceed to the next step after calibration has been performed, press the “Next” button.

Step 2 of the procedure is calibrating the span of the A to D converter. To calibrate the input high coefficient, adjust the resistance source to 300 ohms (for RTD input) or 20mA (for current input). If calibrating a voltage input, adjust the voltage source to 60mV for 0-60mV input, 1VDC for 0-1VDC input, 5VDC for 0-5/1-5VDC input or 10VDC for 0-10VDC input. Allow several seconds for the source signal to stabilize. Record the current calibration coefficient value and press the “Calibrate” button. A dialog will be shown indicating the new coefficient is being calculated. DO NOT alter the source signal during the process. Once complete, the dialog will close and the new coefficient value will be shown.



If the new coefficient value is -1999 or 1999, the calibration failed. Check the source connections and ensure the proper signal is applied. Press the Calibrate button to repeat the process or press the coefficient display/entry field and enter the previous coefficient value recorded to return the loop/limit back to its previous state. To skip the input high coefficient calibration or to complete the calibration procedure, press the “Next” button.

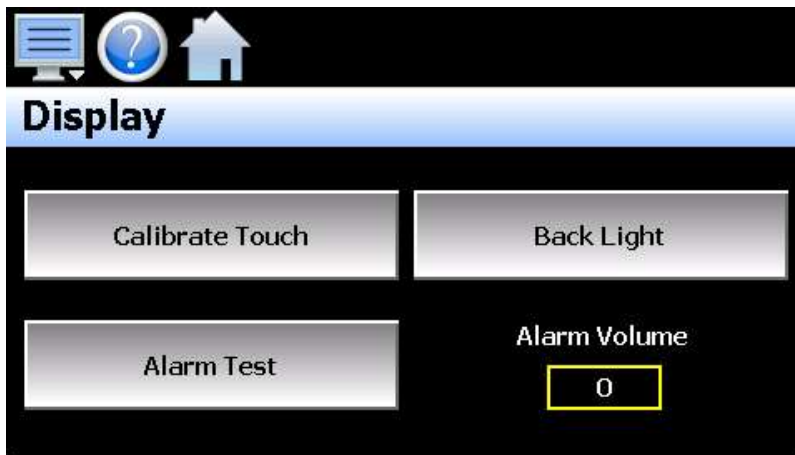
Once the calibration steps have been completed, adjust the reference signal to the low and high end of the operational range to verify that the process value matches the reference signal within the accuracy limits for the input type.



Once the input has been verified to display the proper value according to the input reference signal, reconnect the control sensor to the loop/limit control and press the “Done” button. This will return to the main Calibration screen.

8.5 Display Settings

The Display screen provides access to the touch screen calibration utility, back light settings and alarm volume.

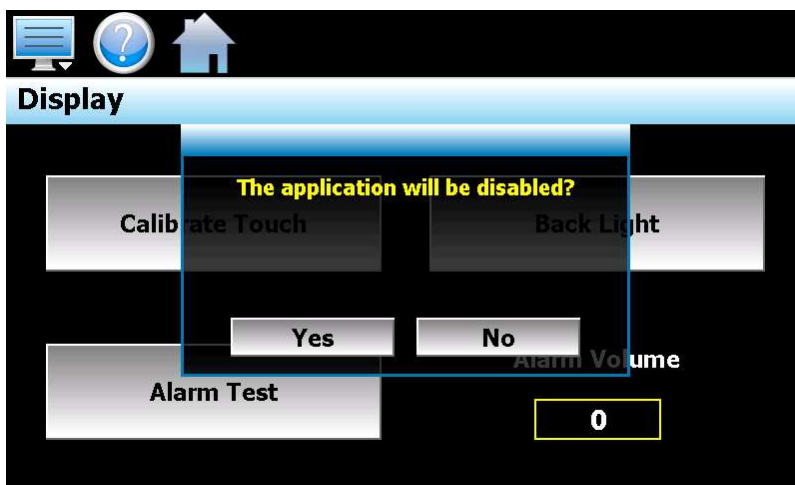


The **Alarm Volume** adjusts how loud the internal alarm buzzer of the EZT-570L will be when activated under an alarm condition. It does not affect the external audible alarm on the chamber (if equipped). The volume can be set from 0 (off) to 100. To edit the alarm volume, touch the entry field and enter the desired volume level. To test the buzzer, press the “Alarm Test” button.

8.5.1 Calibrate Touch

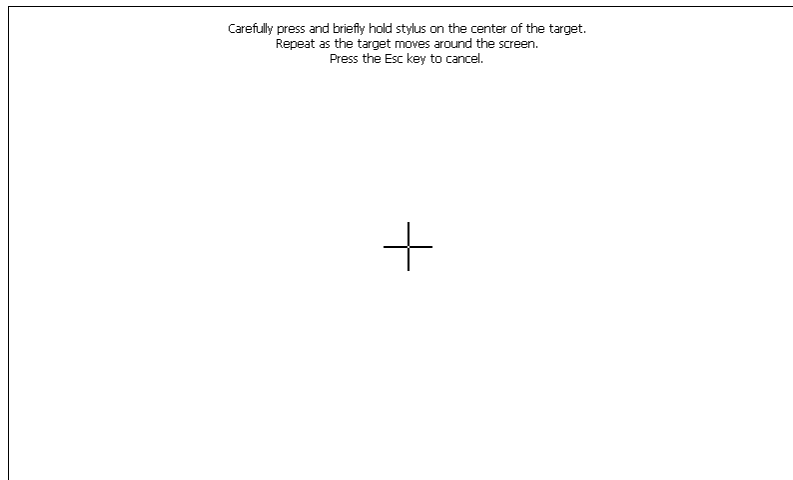
After extended use and many hours of operation, it may be necessary to recalibrate the touch screen of the EZT-570L. A typical sign that the screen may be out of adjustment, is inaccurate responses when attempting to press buttons, check boxes or adjust fields on the display. The calibration utility is provided in order to readjust the screen when this happens.

To begin the calibration process, press the “Calibrate Touch” button. An alert message will appear stating that the application will be disabled to perform the calibration procedure. Press “Yes” to continue.



The calibration utility will start and crosshairs will appear on the screen. At each crosshair position, touch the screen at the center of the crosshairs. Repeat this for each position in order to set the calibration. The calibration requires five points, the center and four corners.

NOTE: *It is recommended that you use your finger rather than a stylus when calibrating the screen. The touch response will be more fluid after calibrating it with your finger.*



Once complete, the calibration utility will provide a notification message that the new calibration settings have been measured and to touch the screen to register the new calibration data; just touch anywhere on the screen to close the window and return to the EZT-570L application to resume normal operation.

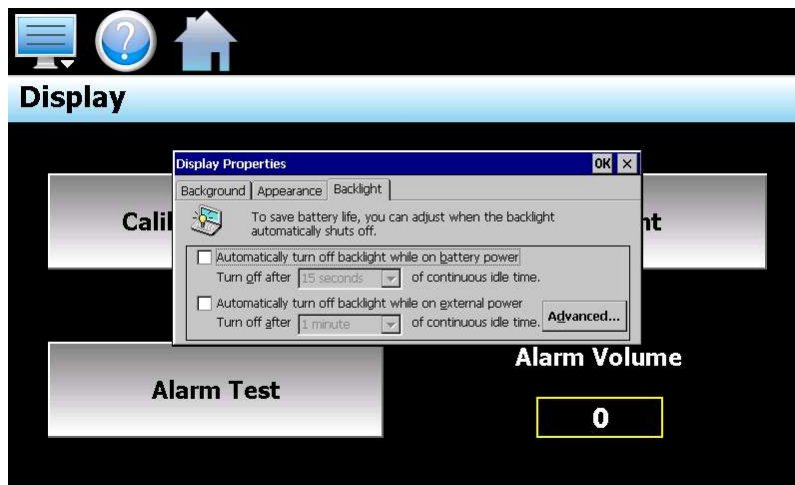


8.5.2 Backlight Settings

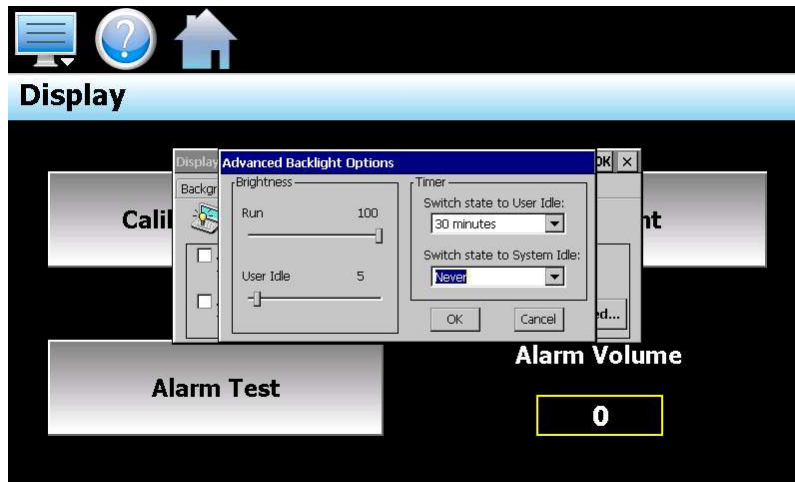
The backlight settings allow the user to adjust the screen brightness as well as set a time period for dimming the backlight after a period of inactivity which can extend the life of the display. To adjust the backlight settings, press the “Back Light” button. An alert message will appear stating that the application will be disabled to enter the backlight settings. Press “Yes” to continue.

Select the “Backlight” tab from on the Display Properties window. Press the “Advanced...” button to access the settings for the backlight.

NOTE: *The checkboxes on the Backlight tab for “Automatically turn off backlight while on battery power” and “Automatically turn off backlight while on external power” have no effect on backlight operation and should be left unchecked.*



The brightness of the display during operation is set by adjusting the “Run” slider. The default setting is 100. The “User Idle” slider is used to adjust the brightness of the display during periods of inactivity. The default setting is 5. Note that as you adjust the slider, the display will temporarily dim to the selected level to indicate how the selected brightness level will appear.



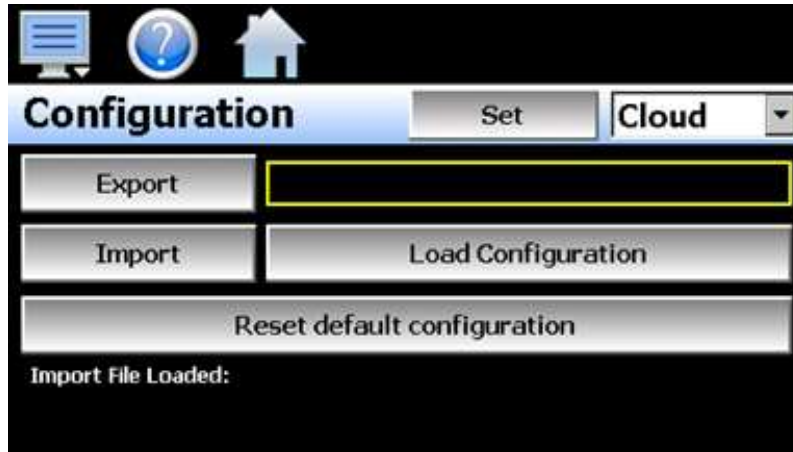
To enable the backlight dimming function, selected the desired delay time from the “Switch state to User Idle” drop down selection box. The delay time can be set at fixed intervals from as little as 1 minute to as long as 30 minutes.

Once all settings are complete, press the “OK” button and then press the “OK” button at the top right of the “Display Properties” window to return to the EZT-570L application and begin normal operation.

8.6 Configuration

The Configuration utility allows the user to back up the settings of the EZT-570L and save it to a file for “safe keeping” in case of system damage due to a lightning strike, etc. The utility also allows the EZT-570L to be configured with a push of a button by selecting from a list of preconfigured setups that could be created and saved on a USB memory device or remote server for import to a new EZT-570L.

CAUTION: Do not import configuration files that are not intended for use with the current chamber type and hardware configuration of the EZT-570L. Consult our service department before using the import function. Importing system configurations not intended for use on your model of chamber may damage to system components and will void the chamber warranty.



By default, the import/export procedure is set to operate via USB. To perform import/export operations from a remote server, use the drop-down menu to select “Cloud”. When “Cloud” is selected, a “Set” button will appear to the left of the drop-down menu. Pressing the button will display the Cloud setup screen where the remote server settings can be entered (See section 8.6.1 Cloud Server Settings). The settings only need to be entered once as they can be saved and used for any future import/export operations.

When the **Export** button is pressed, the EZT-570L configuration data will be written to the USB memory device or remote server. The export file function will use the name entered in the text field to the right of the export button and create a directory on the memory stick with that name, to contain the configuration data. The filename can be entered with up to 10 characters which permits multiple configurations to be identified and saved for later retrieval.

The export file will be saved with a name format of “570L_filename_mm-dd-yyyy-hh-mm-ss” to identify the configuration according to the date and time it was created. This prevents multiple configuration files with the same name from overwriting previous files. It also allows the user to identify a backup of the EZT-570L so that it could be reconfigured to a previous date if multiple back-ups are created.

The **Import** button is used to write the configuration data to the EZT-570L from the currently loaded file. To load a configuration file, the USB memory device must first be inserted into the USB port (or the remote server has to be properly configured and the EZT-570L connected to the internet when Cloud is selected). When the **Load Configuration** button is pressed, a list of available configuration files from the memory stick (or remote server) will be shown.

Select the desired file from the list and press “Open” to load the file. Once the file is loaded, the import process can begin. Pressing the “Import” button will begin the process. When the import is complete, you must cycle power to the EZT-570L in order for the new configuration data to be loaded into runtime memory for proper operation.

The **Reset default configuration** button can be used to clear the current EZT-570L configuration and reset the system back to default values. This function clears all user configuration values and returns the system to an “as new” factory state allowing the system to be configured from scratch. This function is provided as a means to start over in the event that the system configuration has been altered to an unknown state and is not operating properly, and a known good configuration is not available to import.

NOTE: The configuration functions do not affect the VNC server configuration. The enable state, VNC address, device name and password fields must be manually changed as these settings are specific to each device and must be set independently for proper VNC server operation over a network.

The network settings, i.e., DHCP/ Static IP address settings are also not saved to the configuration file. These settings must also be done manually.

8.6.1 Cloud Server Settings

The “Cloud” screen provides settings for the remote configuration FileWeb server. The screen is accessed by pressing the “Set” button on the Configuration screen. Note that the “Set” button is only shown when “Cloud” is selected for the import/export configuration location.

Press the Cancel or Save button to exit screen.

Cloud Cancel Save

IP Address

Server

User Name

Password

The **IP Address** field is used to enter the IP address of the remote server site that EZT-570L is to interface with.

The **User Name** field allows you to enter a user name for site access. When the EZT-570L connects to the site, the user name will be used to identify the connection. The user name is required for FileWeb access.

The **Password** field is used in conjunction with the user name field and is for entering a password, so the EZT-570L can access the site. A password is required for FileWeb access.

The **Server** field is used to enter additional directory information for the server (if desired) where the files are to be stored during import/export operation. The field can be left blank. By default, the EZT-570L is hard coded to store files on the specified server in the “\configs\user name\” directory. If an entry is made in the Server field, the path would be “\configs\user name\server\”.

EZT-570L Field Setup	FileWeb Server Setup
IP Address = https://cszutil.com/FDDataService.svc	Actual named address of FileWeb server/service.
Server = <i>optional path</i>	<p>The FileWeb server/service must be configured with a root “\configs\” directory in order to use the EZT-570L cloud import/export feature. The EZT-570L is hard coded to transfer configuration files to the “configs” directory in the root of the server. This results in a typical file path of “\configs\userName\”. If the Server field also contains an entry, the resulting path would be “\configs\userName\Server”.</p> <p>It is recommended that this field be left blank for the majority of users to ensure all configuration files are stored in the base “configs” directory. When loading a configuration for import, only the files in the specified directory will be available for selection. If a configuration file was stored to a location specified by the Server field and the proper entry is not known, the user will be unable to select the proper configuration file for import.</p>
User Name = <i>userName</i>	Actual user name for login at FileWeb server (required).
Password = <i>userPassword</i>	Actual password for login at FileWeb server (required).

NOTE: Make sure proper permissions are set at the server for access/creation of directories and read/write access. Also check root directory structure at the server to identify the actual root that was created for the files since there can be additional layers created by the server field and displayed in the path (see Appendix section A.1 FTP, FileWeb, DataWeb Requirements/Installation for additional information).

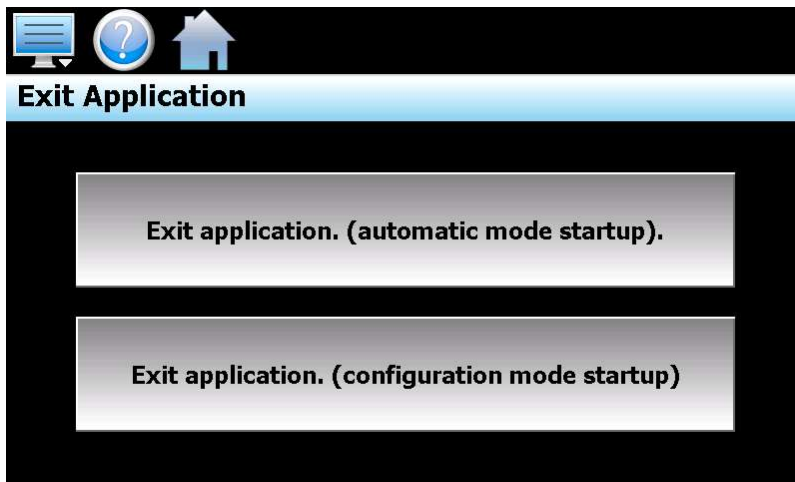
8.7 About the EZT-570L

The “About” screen provides operating system version numbers for the currently installed firmware and program of both the EZT-570L HMI and control module. This information should be recorded prior to any service request so that proper assistance can be provided for your chamber.



8.8 Exit Application

The “Exit” Application screen allows the user to quit the EZT-570L runtime application. This operation is NOT recommended with the exception of users who are in charge of system configuration due to the danger of editing or removing files by accident.



The **automatic mode startup** option will return the EZT-570L to normal operation on the next power up.

The **configuration mode startup** option will start the EZT-570L chamber configurator program on the next power up so that the user can access chamber configuration settings.

CAUTION: *The exit configuration mode startup option is for CSZ factory authorized service personnel only. Do not alter any chamber configuration settings without the expressed permission of our service department. Altering chamber configuration settings can cause chamber malfunction and may damage system components. Unauthorized changes will void the chamber warranty.*

9. Communications

This section provides instructions on how to use the EZT-570L communication interfaces. As a standard, the EZT-570L is equipped with an Ethernet interface for user communications and can provide an optional RS232 serial interface.

9.1 10/100 Base-T Ethernet Communications

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. The VNC interface allows the user to view and observe operation of the EZT-570L display directly on their PC screen while the Modbus TCP interface allows the user to manipulate chamber operation via other devices and/or software capable of Modbus TCP communications.

NOTE: *In order to use Ethernet communications, the EZT-570L must be properly connected to a network. To connect the EZT-570L to a network, connect the chamber's Ethernet port to your network using a standard CAT5 cable connection. After connecting the network cable, it may be necessary to cycle power to the EZT-570L in order for it to obtain a valid IP address from your network.*

9.1.1 Guidelines of Smart Networking Practice

The expansion of Ethernet onto the industrial floor has brought forth a new realm of possibilities from the gathering of information to the inherent control of equipment from anywhere around the world. The flexibility and convenience that this provides makes it a very desirable feature for new equipment. The EZT-570L provides this ability, but there are considerations that must be taken by the end user to protect their equipment and investment.

Just like placing a personal computer on the internet opens it up to outside attack, placing your chamber on a network poses the same risk. The first thing to remember is this: The most likely cause of problems is not a hacker trying to sabotage your equipment, but more often to be related to the ubiquity of PCs with Ethernet cards, the ease with which your own co-workers can 'hang stuff on the network,' and careless or nonexistent internal security measures. Accidental problems are more common than deliberate ones.

Allowing anyone access to the EZT-570L by placing it on the office LAN, also opens the door for accidental shutdown, damage to equipment, loss of data, lost time, etc. This is possible even by the most well-intentioned co-workers. Thus, there are several steps that should be taken to minimize this risk.

The first is to never mix your office LAN with your control LAN. The control LAN should be a separate network that consists of your environmental chamber(s) and possibly any other equipment that you may have that is related to the operation of the system. It should be separated from your office LAN by a firewall, or at minimum, a bridge or router. A control network and a business network have two entirely different purposes and their interaction should be closely controlled.

It is also unwise to assume that any Ethernet capable devices themselves have any security features at all. The EZT-570L VNC server only provides minimal single-password based security access. Separating the control LAN from the office LAN using a firewall would increase security and only allow control access that is based on a combination of IP source address, destination address, and port number. This is by no means completely 'hacker-proof,' but it should keep the well-meaning co-workers out.

Another hazard is connecting consumer 'plug and play' devices to your control LAN. A printer for example, might flood the network with traffic in a 'broadcast storm' as it tries to self-configure or advertise its presence to all nodes on the network. Faulty devices, for example defective NIC cards, can transmit large amounts of bad packets (i.e., runts, which are abnormally short Ethernet frames) into your network. Using switches instead of hubs will limit the effect of such problems.

The most commonly overlooked source of problems is cabling. Not all cables are created equal. Electrical noise generated by factory equipment or other electrical equipment in the area, could easily corrupt transmitted data over the network and cause devices to 'lock up' or shut down the VNC server, both of which then requires the EZT-570L to be shut down and restarted to clear the problem.

Select the right cable for the environment. Shielded twisted pair (STP) cable is naturally more noise immune and is preferable to unshielded twisted pair or UTP in noisy situations. STP should have at least 40dB CMRR and less than 0.1pF capacitance unbalance per foot. Ground STP cable, making sure the ground is connected only at one end. CAT5 STP patch panels normally provide a grounding strip or bar. Hubs and switches don't provide grounding, use cables.

It's wise to be pessimistic about a cable's ability to reject noise from 230 VAC and 460 VAC power lines and electrically 'noisy' equipment in the area. Capacitance imbalance in cables greater than 70pF per 100m can introduce harmonic distortion, resulting in bit errors. The cost of cable is quite small compared to total equipment cost, so if you're looking to save money, this is not a place to do it. Choose a well-designed cable to minimize bit-error rate after installation, and that will give faster throughput with fewer glitches.

9.1.2 The EZT-570L and Network Security

When most people think of security, they think of anti-virus programs and continuous operating system updates to ensure their system is running with the "latest-and-greatest" software. For consumer devices, this is well and good, but when it comes to industrial devices, no. How many times has an update to the OS caused an issue with an existing program that for some reason is not working correctly or crashes inexplicably? How about an anti-virus program updating its threat definitions and now sees an application as a potential threat and blocking it from operating? To have this occur on a control device could be catastrophic to a process. So how does the EZT-570L address these concerns while still providing threat protection?

The EZT-570L software validation uses a specific OS version and revision number as part of the validation process. The OS of the EZT-570L is not the same as Win7, 10, etc. and does not support automatic updates since the OS must be installed in a specific portion of memory. The OS layout is also specific to the hardware on the device. CSZ has never had an update to the OS unless the hardware changed on our units which required a driver for the new hardware. This also provides stability since this is an embedded device that provides specific functionality without most of the "overhead" of the OS that full PC's run.

Most security issues arise from browsing or opening an email attachment that carries harmful code. The EZT-570L does not support the addition of anti-virus software: however, the EZT-570L does not have a browser or an email server to receive emails or attachments. The FTP, FileWeb and DataWeb interfaces are also client based only. They transmit files and data to remote servers, but do not receive.

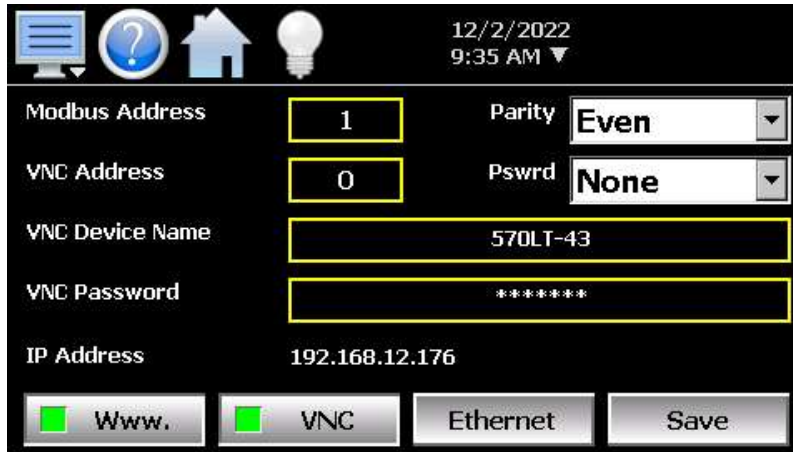
The EZT-570L writes data to a web page in memory that can be accessed by an external browser. This is a read only web page (from the remote browser) that contains process values, set points, event and current program data only. The internal web page data is written over with real time data every 30 seconds. The EZT-570L does not read any data from its internal web page so any corruption of the web page would not affect EZT-570L display/control operations. There are no passwords or sensitive data sent from the remote browser to the "read only" web page.

A virus to attack the EZT-570L OS would be difficult, but not impossible. Every embedded device is different (by manufacturer), so not an easy standard to write the virus against. The virus would need to be built for the OS and the CPU that the EZT-570L runs, and the storage device doesn't have a standard name. There might be industrial devices that run anti-virus on their platforms; however, CSZ is not aware of any. As the saying goes, the best defense is a good offense. It is best to design a "smart network" to prevent intruders from gaining access in the first place, rather than to try and fend them off once they are already in the door.

9.1.3 Using the Web Server

The EZT-570L's web server allows a user to remotely monitor chamber operations anywhere via a PC's standard web browser. When enabled, the web server provides a detailed status page of the EZT-570L's current operating conditions. The web server can be enabled and disabled by simply touching the "Www." button on the communications screen (select "Comms" from the Device\Settings\Set menu).

You must use the assigned IP address to access the EZT-570L. The IP address is shown on the communications screen and is also included in the notifications list. Write down the IP address so you will have it later to enter into your web browser.



NOTE: Contact your network administrator prior to enabling the web server of the EZT-570L. Company policy may prohibit the use of web servers for security reasons. We are not responsible for the use of, nor makes any claims as to the security of the web server interface over your network. The use of the EZT-570L web server is the responsibility of the end user.

To access and view the EZT-570L web page, enter the following link in your PC's browser address window: <http://IPaddress/ezt.html> (from example address, <http://192.168.12.176/ezt.html>). The following example is typical of the EZT-570L web page appearance. The web page updates automatically every 30 seconds and provides information on each individual loop, program status, alarm status and event status.

Cincinnati Sub-Zero - EZT-570L

12011 Mosteller Road - 513-326-5252

CONTROL DATA

TEMPERATURE	PV = 92.5	SP = 24.0
HUMIDITY	PV = 4.3	SP = 50.0
PRODUCT	PV = 32.6	SP = 24.0

AUTOMATED PROGRAM

Program Name	
Program Status	Inactive
Start Date-Time	00/00/00-00:00
Est. Complete Date-Time	00/00/00-00:00
Current Step	0
Remaining Step Time	00:00:00
Wait For	NOT WAITING
Wait For Setpoint	----
Jump Step	----
Jumps Remaining	----
TEMPERATURE Target SP	0.0
HUMIDITY Target SP	0.0
PRODUCT Target SP	0.0

SYSTEM ALARMS

SYSTEM EVENTS

CHAMBER	OFF
HUMIDITY	OFF
DEFROST	OFF
PRODUCT CONTROL	OFF
CUST EVENT 1	OFF
CUST EVENT 2	OFF

9.1.4 Using the VNC Server

The EZT-570L VNC server allows a user to remotely monitor and control the chamber by directly viewing and manipulating the touch screen over the network. You must use the assigned IP address and VNC port number to access the EZT-570L. The IP address is shown on the communications screen and is also included in the notifications list. Write down the IP address and port number so you will have it to enter into your VNC viewer.

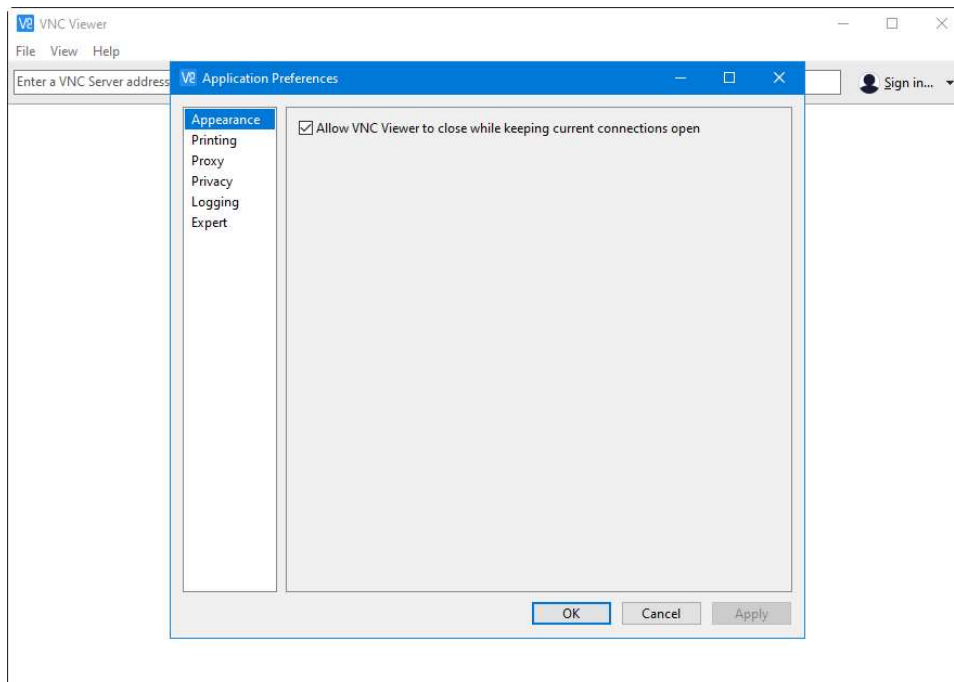
There are many VNC viewers available for both PC and tablet use. Due to the ever-changing market and availability of such applications, it is not possible to test them all for compatibility or provide assistance for their use with the EZT-570L. It is the responsibility of the end user to test the chosen VNC client for compatibility with the EZT-570L prior to putting the unit into service. If the VNC client viewer has compatibility issues with the EZT-570L, it can cause the VNC server to stop responding and/or shut down requiring power to be cycled to the chamber in order to reboot the system and restart the server.

CSZ has tested and recommends the use of RealVNC's viewer. It has been tested for compatibility with the EZT-570L and a free version can be obtained from www.realvnc.com for PC/MAC use. RealVNC does offer a version for the iPad that can be obtained through the App Store for a small fee. The App Store also offers a free VNC client called Remotix for the iPad. It has also been tested for compatibility with the EZT-570L.

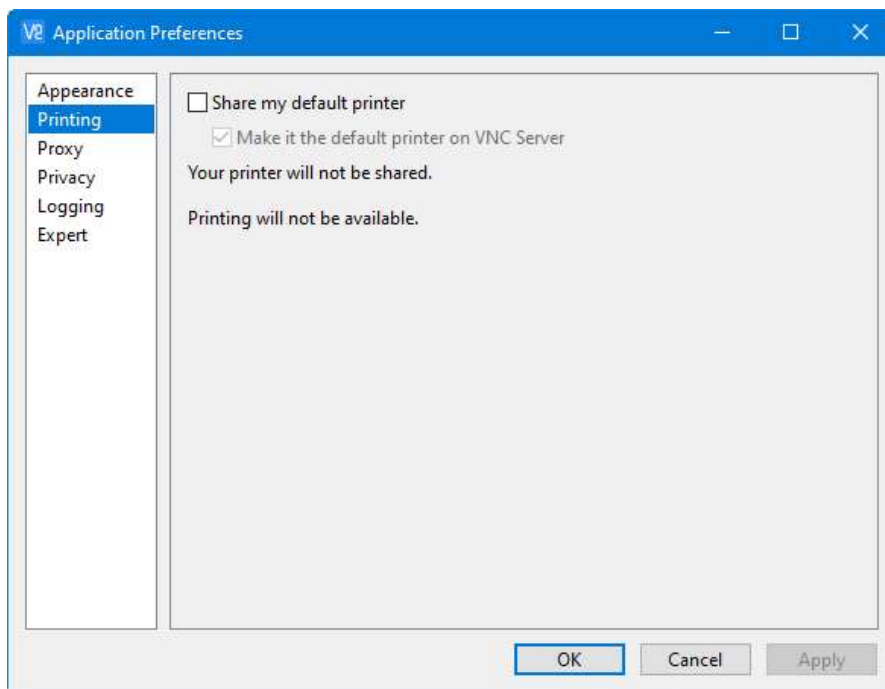
NOTE: *Contact your network administrator prior to enabling the VNC server of the EZT-570L. Company policy may prohibit the use of VNC servers and/or viewers for security reasons. CSZ is not responsible for the use of, nor makes any claims as to the security of the VNC server interface over your network. The use of the EZT-570L VNC server is the responsibility of the end user.*

9.1.4.1 Recommended VNC Viewer Settings (PC/MAC)

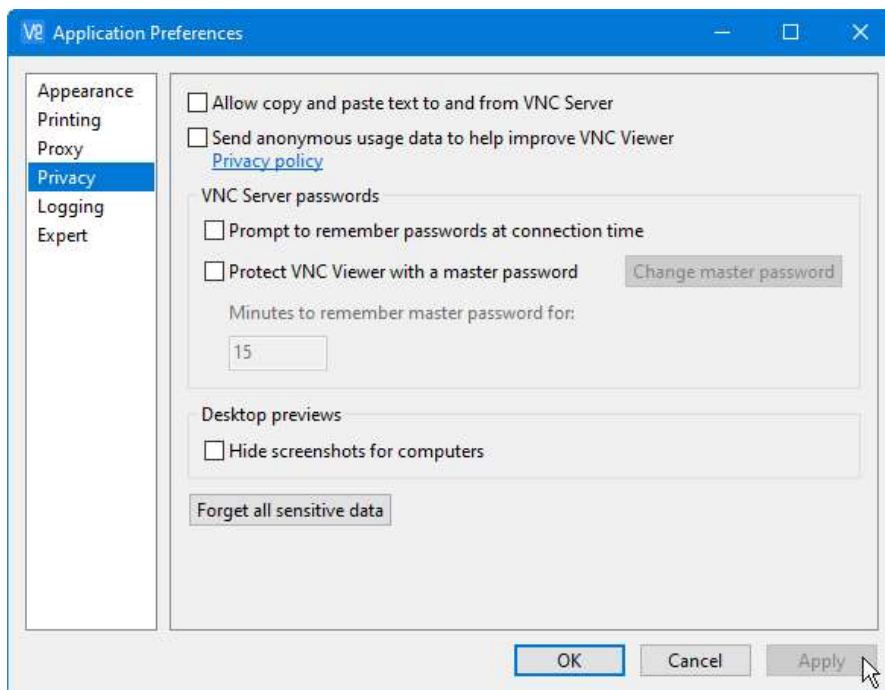
The following settings have been tested and evaluated in order to provide the best performance and quickest response to user input when using the recommended VNC viewer with the EZT-570L. After installing the VNC viewer software, it is recommended that the following changes be made to the default viewer settings. To begin, start the VNC viewer and then select Preferences from the File menu.



Under Appearance, check the “Allow VNC Viewer to close while keeping current connections open” and click the Apply button. This allows the main VNC viewer application to be closed while keeping any connections made to various devices open. This helps reduce screen clutter. Next, select Printing.

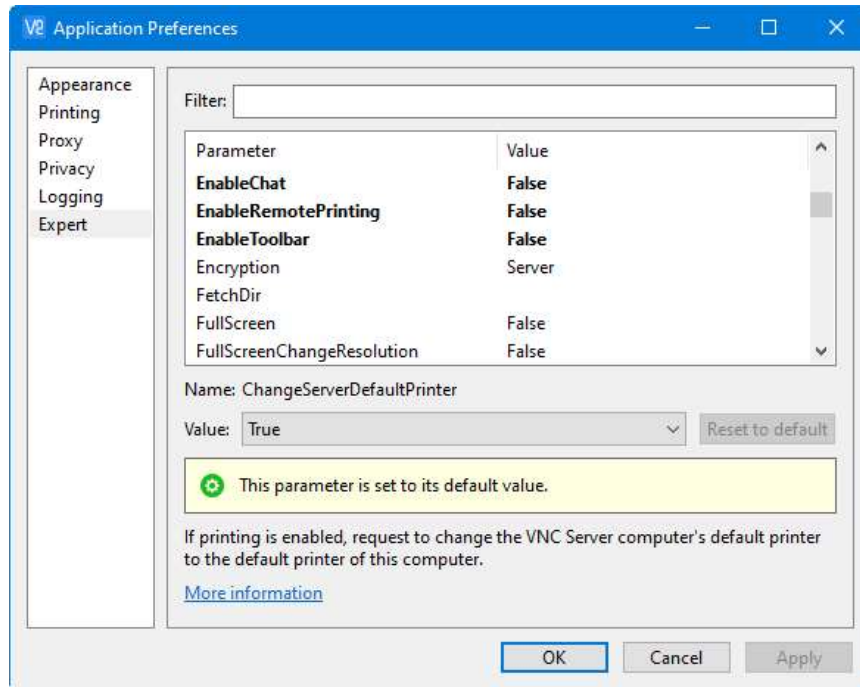


Uncheck the “Share my default printer” and click the Apply button. The EZT-570L does not support remote printing so the option is not required. The Proxy settings by default are set to use the system proxy settings and do not typically need to be changed, so proceed to the Privacy settings.



Under Privacy, uncheck the “allow copy and paste text to and from VNC server” as well as “Send anonymous usage data to help improve VNC” and click the Apply button.

If desired the VNC Server passwords options could be checked if you so wish, but are not necessary for operation with the EZT-570L. The Logging settings by default are set to the default setting so no adjustments are necessary. The final adjustments are required under the Expert settings.



Scroll through the list of settings and set the following:

- Enable Chat False
- EnableToolbar False
- PointerEventInterval 200
- SendKeyEvents False
- SendMediaKeys False
- SendSpecialKeys False

All other settings can remain at the default values. Once all the settings have been made, click the Apply button to store the changes. Click the OK button to exit the Preferences and return to the main viewer window.

9.1.4.2 Recommended VNC Viewer Settings for Tablets

The VNC clients for tablets have been found to offer limited flexibility for use with the EZT-570L. Most clients have default settings requiring security to be enabled on the server in order to connect. If you have trouble connecting with a VNC viewer through an iPad, iPhone or even an Android based phone, start by enabling the security on the EZT-570L VNC server and be sure to enter those settings in the client viewer.

Color and encoding options can also affect the connectivity. If the client offers the option, leave color and encoding options to “automatically detect” or “server decides”. If the client is still unable to connect, try default encoding of Hextile and set the color option to limited colors such as 256-bit color. We do not write or create VNC clients (3rd party software), so final selection of the client and testing is the end user responsibility.

The following settings are provided as an example for the Remotix client for the iPad. When adding an EZT-570L server to the Remotix client, use the following settings. Note that the VNC server in the EZT-570L must have security enabled in order for this client to connect.

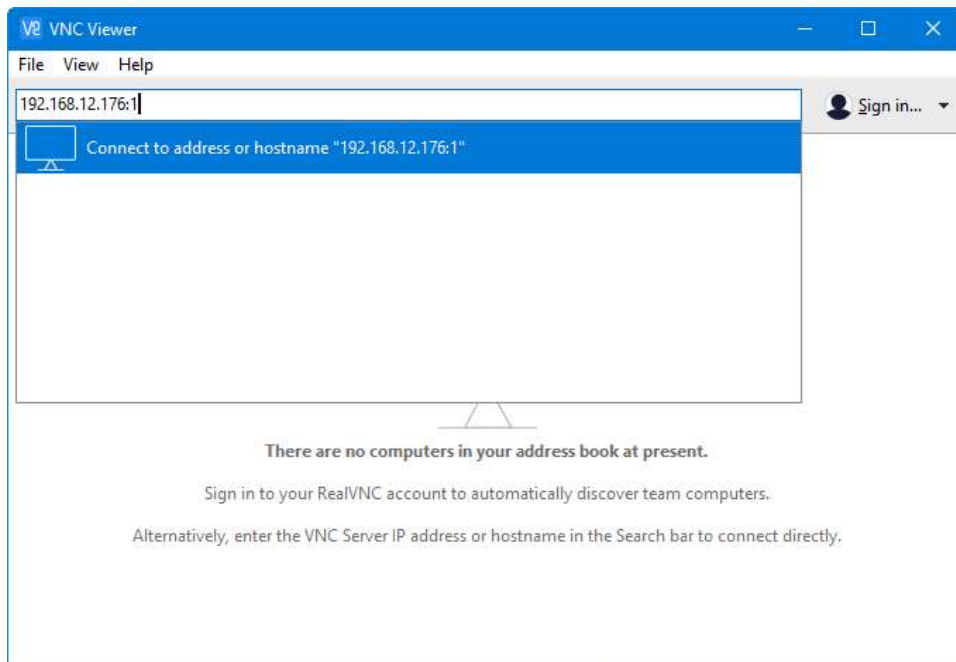
Connection Type: VNC
 Host/IP: IP address of the EZT-570L
 Port: VNC address of the EZT-570L (5900 = 0, 5901 = 1, etc...)
 Use SSH Tunnel: Off
 VNC Authentication: VNC Password
 VNC Password: VNC password of the EZT-570L
 VNC Server Type: AutoDetect
 Operating System: Windows
 Preferred Encodings: Hextile
 Color Depth: 16 bits

9.1.4.3 Accessing the EZT-570L through a VNC Viewer

The following examples are based on the use of the RealVNC viewer for PC/MAC. Once the default preferences have been entered, just enter the IP address and port number for the EZT-570L and press enter to access the chamber over the network.

Intranet Example

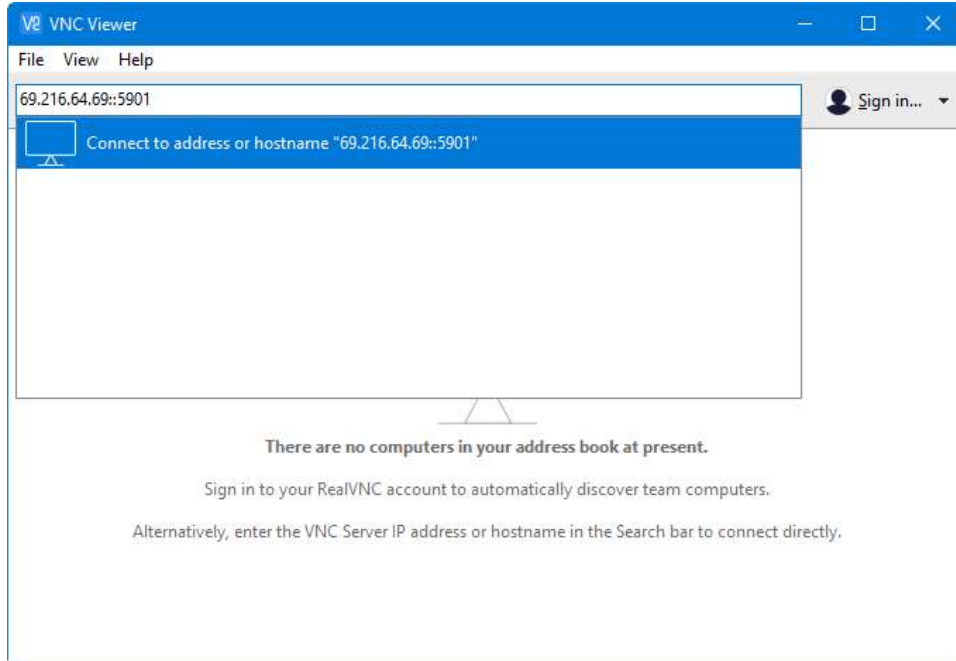
If the IP address assigned is 192.168.12.176 and the configured VNC Address is 1, from the PC's VNC Viewer address field, enter '192.168.12.176:1' (address 1 relates to port 5901, address 2 to port 5902, etc., which is the port opened by the VNC interface in order to allow communications with the EZT-570L over the network).



Internet Example

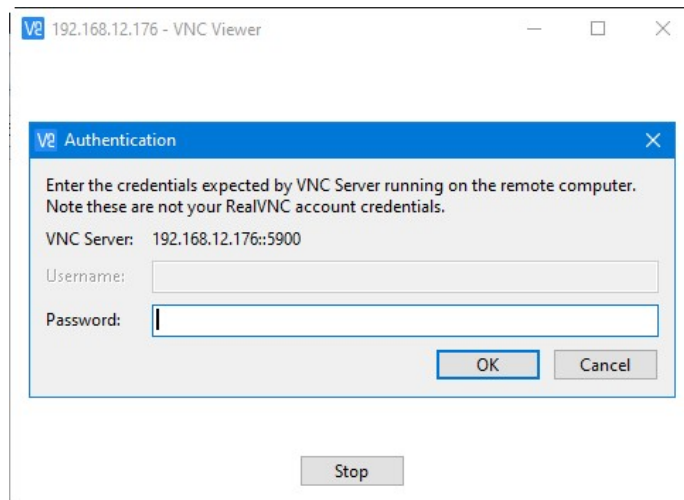
Internet connection typically requires a qualified network administrator. Typically, a permanent IP address and specific port address are assigned to the EZT-570L. Support on this action is beyond the scope of this guide. Consult your network administrator for assistance in setting up an Internet connection.

If the IP address of the LAN is 69.216.64.69 and the configured VNC Address is 1 (port 5901 has been opened and assigned to this specific EZT-570L), from the remote PC (outside of the site Servers LAN), in the VNC Viewer address field enter '69.216.64.69::5901' (5901 relates to address 1, 5902 to address 2, 5903 to address 3, etc., note the double colon).

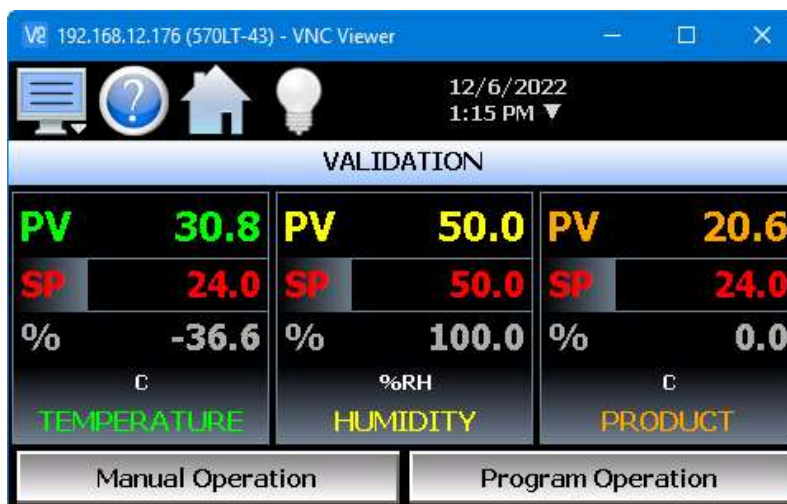


NOTE: The IP address shown on the communications screen of the EZT-570L is the LAN address and would not typically be used for an Internet connection.

Security Example: If the VNC server password is enabled on the EZT-570L, for either example above, upon entering the address of the EZT-570L, the VNC viewer will prompt for the proper password. The connection will only be established once the valid password is entered.



Once the connection is established, a duplicate image of the current EZT-570L display will be shown on your desktop. As you manipulate the screen, the display of the EZT-570L will also be manipulated so that any local operator will be able to see what is happening and vice versa.



Multiple instances of the VNC viewer can be started on your PC. By running multiple viewers, you can have access to multiple chambers right from your desktop. The heading of each VNC viewer window will use the VNC Device Name entry for the header. By entering a unique name for each EZT-570L, you can identify each VNC connection and know which chamber you are accessing.

The VNC viewer is meant to be used for short term control access. It is not meant for long term monitoring of chamber operation. If long term monitoring access is desired, use the built-in web server of the EZT-570L or a PC with EZ-View software to monitor and control the EZT-570L over its serial communications port. The web server interface and PC software is designed for long term monitoring and status updates.

Due to the nature of VNC operation, and for security reasons, the VNC viewer connection should not be left open on your desktop. The viewer connection should be opened in order to perform the necessary control and/or status check of system operation, and then closed once the task is complete. Accidental manipulation of the control or erroneous network activity could cause connection problems over the VNC interface and result in the VNC server shutting down and requiring the EZT-570L to be repowered in order to regain access.

NOTE: *Some viewers may also contain additional features for file transfer and other high-level functions. These functions are NOT compatible with the EZT-570L. Any attempt to use them may cause the VNC server to malfunction and require power to be cycled in order to reboot the EZT-570L. All viewers should be used ONLY to monitor and manipulate the EZT-570L as if you were standing directly in front of it.*

9.1.5 Using Modbus TCP/IP Communications

The EZT-570L Modbus TCP server interface allows a user to remotely monitor and control the chamber via another device or software application compatible with Modbus TCP/IP protocol. The acronym TCP stands for Transmission Control Protocol while IP stands for Internet Protocol. These protocols are used together and handle the transfer of data over the internet. When Modbus information is sent using these protocols, the data is passed to the TCP layer where additional information is attached and then passed to the IP layer. The IP layer then places the data in a packet (or datagram) and transmits it.

In order for Modbus TCP communications to function, the Master (or Client in Modbus TCP) establishes a connection with the Slave (or Server) using the IP address. In this case, the server is the EZT-570L. The EZT-570L waits for an incoming connection from the client, and once a connection is established, the EZT-570L then responds to queries from the client until the client closes the connection.

In order for a client to establish a connection with the EZT-570L, the following settings must be used by the client:

IP address (of slave) = EZT-570L IP address as displayed on the Communications screen
 Unit Identifier = EZT-570L Modbus Address as displayed on the Communications screen.
 Port Number = 502

NOTE: *The implementation and/or use of a Modbus TCP client is outside the scope of this manual. For additional information regarding Modbus TCP/IP protocol there are many resources available online (<http://www.modbus.org/specs.php>) or consult the documentation provided with your client software application.*

For a list of supported functions and data available over the Modbus TCP interface, see the EZT-570L User Communications Reference Manual.

9.2 Serial Communication Option

The optional serial interface of the EZT-570L uses Modbus RTU protocol. The EZT-570L communication address and parity can be changed on the User communications screen located under the device settings menu.



NOTE: *The EZT-570L is set by default for an address of 1 and even parity for use with CSZ's EZ-View software package. If another software package is being used, or you are writing your own custom application, see the EZT-570L User Communications Reference Manual for instructions and information on command structure and protocol usage.*

9.2.1 Adjusting Modbus Serial Communication Settings

The Modbus serial communication settings allow the EZT-570L to be used on a single (RS232) or multi-drop (RS485) serial link if an appropriate adapter is used. The settings must be set to match that of the host computer and vice versa. The serial port settings of the EZT-570L are fixed other than the controller address and parity. The host computer's serial port must be set to match the fixed EZT-570L port settings:

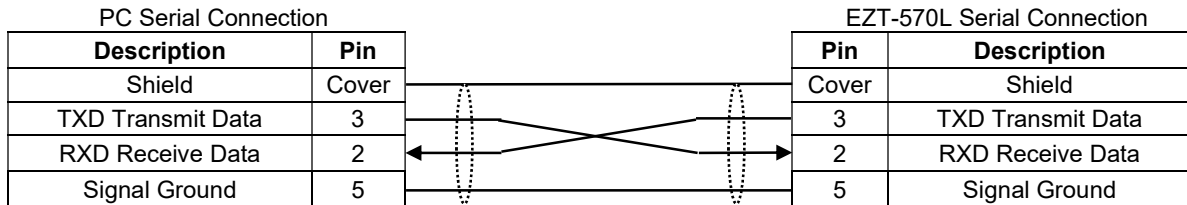
Address: 1-247 (user selectable)
 Baud Rate: 9600
 Data Bits: 8
 Stop Bits: 1
 Parity: none, odd, even (user selectable)

The **Modbus Address** is used to identify the EZT-570L on the serial link. When a multi-drop connection is used, each controller on the link must have a different address so that each one can be identified separately. If two or more devices have duplicate addresses, communications with those devices will fail because they will all try to respond to the same message. For single controller connections, the address only needs to match that of the commands being sent from the host computer.

The **Parity** setting is an extra level of error checking that the serial ports of devices can use to verify that the data received is what was sent. All devices on the serial link must be set to the same parity setting or they will not transmit and receive data the same way. Thus, communications will fail between devices that do not have the same settings.

9.2.2 EIA-232 Connections

To connect the EZT-570L to a PC's serial port, a null-modem cable is required. This type of cable is designed to allow two devices to communicate with each other via their serial ports. This cable differs from that of a standard cable because the transmit and receive wires are reversed. If one is not available, a cable can be fashioned rather easily. Use a high-quality shielded cable and connect the leads as shown below:



Connect the cable between the chamber's serial port and the desired serial port on the PC. Make sure that the serial port settings of the EZT-570L and the host computer match, and be sure to save any changes to the EZT-570L communication settings. Cycle power to the EZT-570L if any serial communication settings have been changed and the serial connection is ready for operation.

9.2.3 EIA-485 Connections

The EZT-570L serial communications interface can be converted to RS485 utilizing an external RS232/85 adapter. Note that the PC's serial port must be capable of RS-485 half duplex communication or an interface converter must also be used as the PC. CSZ has tested the following converters for compatibility with the EZT-570L.

B&B Electronics
 707 Dayton Road
 PO Box 1040
 Ottawa, IL 61350
 Phone 815-433-5100
<http://www.bb-elec.com>

RESmith
 4311 Smith Drive
 Hamilton, OH 45011
 Phone 513-874-4796
<http://www.RS485.com>

Part # **485OI9TB** for EIA-232 to EIA-85
 Part # **485PS2** (external power supply)

Part # **ASC24T-B9FPS**
 (provided with all cables and power supply)

9.3 GPIB (IEEE-488) Communication Option

The GPIB communication option is provided through the use of ICS Electronics Model 4899 GPIB-to-Modbus Controller. The 4899 is an IEEE 488.2 compatible GPIB device that can control single or multiple Modbus slave devices. It accepts simple GPIB bus commands that are used to create Modbus RTU packets which are then transmitted serially to the Modbus slave device(s). The data transmission can be to a single Modbus device over an EIA-232 link or to multiple Modbus devices over an EIA-485 network.

The controller's SCPI parser accepts IEEE-488.2 common commands, SCPI commands and Modbus commands. The IEEE-488.2 and SCPI commands are used to setup the controller's status reporting structure or to configure its GPIB and serial interfaces. Any commands that end in a '?' are a query and the controller responds by outputting the requested data on the GPIB bus the next time it is addressed as a talker.

The 4899 includes a list of commands for controlling Modbus devices. These commands specify the Modbus slave device address, a read or write operation, a register number and data or the number of registers to be read. When the Controller receives a read (R) or write (W) command, it converts the GPIB characters into HEX bytes, assembles the packet, and transmits it to the Modbus device. This simplifies communications with the EZT-570L by automatically handling the Modbus protocol.

If your chamber is equipped with the optional GPIB communications port, connect the chamber to your PC's GPIB port using the appropriate style cable. Up to 15 devices can be connected on a single GPIB bus.

NOTE: *The 4899 converter interface is configured with a default address of 4 on the GPIB bus. The address can be changed by using the proper command string.*

The EZT-570L's serial communications address should be set to 1. This is the default address that the 4899 converter will use when communicating over its serial interface to the EZT-570L.

See the EZT-570L User Communications Reference Manual for the list of data registers and their settings for controlling the EZT-570L over the GPIB interface.

9.3.1 GPIB Command Structure

There are six basic commands that are required to configure and operate the GPIB controller in order to communicate with the EZT-570L controller. These commands are listed in the table below. All commands are generated using standard ASCII text characters.

Command	Use
SYST:COMM:GPIB:ADDR <i>addr</i>	<p>GPIB Address Command</p> <p>Sets the GPIB controller's device address for subsequent commands. Value for <i>addr</i> is 1 to 31. This is the address you will use to communicate with the EZT-570L over the GPIB bus.</p>
*SAV 0	<p>Save Configuration Command</p> <p>Saves current 4899 configuration in nonvolatile memory so that on next power-up, settings such as the GPIB address will remain intact.</p>
R[?] <i>reg, num</i>	<p>Read Register Command (reads EZT-570L data values)</p> <p>Reads one or multiple EZT-570L registers. User specifies starting register <i>reg</i> and number of registers to be read <i>num</i>. The [?] is an optional symbol so programs like ICS's GPIBKbpd program can recognize the command as a query and automatically read the response. Responses are returned as 16-bit decimal values separated by commas.</p> <p>R? 61,1 reads EZT-570L loop 1 process value. Example response is 527 for 52.7 degrees.</p> <p>R? 60,3 reads three successive registers for loop 1 SP, PV and %Out. Example response is 550,527,10000 for SP of 55.0, PV of 52.7 and %Out of 100.00.</p>
W[?] <i>reg, w</i>	<p>Write Register Command (writes EZT-570L data values)</p> <p>Writes one 16-bit word, <i>w</i> to one EZT-570L register, <i>reg</i>.</p> <p>W 60, 550 writes a set point of 55.0 to loop 1.</p>
WB <i>reg, num, w(0).w(n)</i>	<p>Write Block Command (writes EZT-570L program steps)</p> <p>Writes multiple 16-bit words, <i>w(i)</i> to multiple registers. Starting register, <i>reg</i>. Number, <i>num</i> specifies how many words are to be written.</p>
E?	<p>Read Error Command.</p> <p>Reads and clears the Modbus Error Register and bit 6 in the Event Status Register. Returns an error code whose value is 0 to 255.</p> <p>0 No errors present 1 Exception Code 1 2 Exception Code 2 3 Exception Code 3 100 CRC Error 101 Timeout Error indicates no characters received 2nn Partial or corrupted message, nn is number of received bytes.</p>

10. Diagnostics

This section provides technical help for diagnosing problem conditions with your chamber. The information provided here covers typical options and accessories. If you are unable to diagnose a problem through the use of this guide, contact our Service Department.

Please have the following information available:

- Model # and Serial # for the chamber
- Software Version #'s
- All User Manuals

The software versions can be found on the "About" screen under the offline system menu.



10.1 Alarm Codes and Troubleshooting

WARNING: *Some of the procedures may require access to live circuitry. Dangerous accidental contact with line voltage is possible. Only qualified service personnel should be allowed to perform these procedures. Potentially lethal voltages are present inside the unit.*

Alarm Monitor Description	Explanation/Corrective Action
"input" A to D converter failure	(error code 40) Indicates that the analog to digital converter in the loop or limit control indicated by "input" has failed. Return to factory for repair or replace.
"Input" ALARM	User alarm is on for "input" listed. Allow process value to return within set point limits, change alarm set point values or disable alarm.
Auto tune failed for "input".	(error code 26) Indicates that auto tune was unable to execute properly for the loop control indicated by "input". Verify that PB >0 and TI >0 before starting auto tune. Try manual tuning instead of auto tuning if the process has a very slow response.
BOILER OVER TEMPERATURE	Boiler exceeded maximum operating temperature. Check water supply and water level. Verify low water float operation. Reset high temperature safety on boiler.
BOILER LOW WATER	Boiler water level low. Check water supply pressure. Check low float operation. Check operation of fill level float and water supply solenoid if applicable. Check and replace filters if necessary.
CHAMBER HIGH LIMIT	Chamber high limit safety tripped. Limit must be manually reset or power cycled to chamber to reset. Verify proper air flow and operation of air circulators in chamber. Reduce set point. Do not attempt to operate above chamber design limits.
Communications error with "input". Check cable.	Communication error occurred between the EZT-570L display unit and attached control indicated by "input". Verify that the B42/L41/monitor input module is properly configured with the correct communication address. Replace B42/L41/PCM/HLM/monitor input module.
Data file error. SD card full or missing.	Indicates that data logging could not be started or has been stopped due to an issue in accessing the SD memory card. This will occur if the memory card does not have any remaining memory space available or the maximum number of files has been reached in the data log directory. Use the USB file utilities or FTP to backup (copy) and delete data files from the EZT-570L in order to free up memory. Verify that an SD card is properly inserted into the EZT-570L. Replace SD card.
"input" EEPROM failure	(error code 29) Indicates that the memory in the loop or limit control indicated by "input" has failed. Return to factory for repair or replace.
Email Error! Check cable or server down.	Indicates that the EZT-570L was unable to send an alarm message through the mail server. Verify that the EZT-570L is properly connected to the network and that the email settings and addresses are valid. <i>This alarm will also occur if the email server limit has been reached for the number of allowed emails. The hourly/daily limits for allowed email messages is dependent upon the service provider. If the email limit is reached, the server will terminate the connection and prevent the EZT-570L from sending the email resulting in the alarm.</i>
EMERGENCY STOP	Investigate cause of stop. Verify conditions are safe. Reset emergency stop. Will require manual restart of chamber via Overview screen or

Alarm Monitor Description	Explanation/Corrective Action
	resuming program operation if an automatic ramp/soak program was operating when stop occurred.
FTP! Check cable or server down.	<p>Indicates that the FTP back-up attempt of the data files failed. Verify that the EZT-570L is properly connected to the network and that the FTP settings are valid.</p> <p><i>If the EZT-570L is not connected to a network, disable the FTP data back-up to prevent this alarm from occurring.</i></p>
LOOP COMMS FAILURE	Check communication wiring between the CPU module and 9300 loop controls. Verify proper addresses on 9300 controllers. Verify power to 9300 controllers. Check rear terminal plug on 9300 controllers and make sure it is seated properly.
Main System Error: "message"	<p>Indicates that an internal failure occurred in the module indicated in "message". All system functions associated with the module are disabled. Unit must be rebooted in order to restore operation. If problem persists, contact your OEM for assistance.</p> <p>Modules include: <i>CommsThread</i> – communications with loops/limit/monitor disabled <i>ModbusTCP</i> – user ModbusTCP communications disabled <i>DataLog</i> – data logging and automatic program operation disabled <i>GraphTrend</i> – real time trends disabled <i>Email</i> – email disabled <i>Network</i> – all Dataweb, Fileweb and FTP disabled <i>NtsServer</i> – national time server clock synchronization disabled <i>MathLogic</i> – all math/logic functions disabled</p>
Memory Error Please check SD card.	Indicates that the SD card cannot be accessed when checking available memory space. Verify that an SD card is properly inserted into the EZT-570L. Replace SD card.
MOTOR OVERLOAD	Motor overload tripped or motor drive fault. Requires manual reset of motor overload. Check drive and motor fusing. Check motor for overload condition, i.e., bearing wear binding shaft, etc. Replace fuse, repair/replace motor or drive.
NTP Ping Failed. Check Cable.	<p>Indicates that the EZT-570L was unable to synchronize its clock with the selected time server. Verify that the EZT-570L is properly connected to the network and the selected time server is accessible.</p> <p><i>If the EZT-570L is not connected to a network, disable the NTP clock to prevent this alarm from occurring.</i></p>
"input" outputs 1 and 2 incorrectly configured.	(error code 4) Indicates that the control loop configuration for the loop control indicated by "input" is not valid and must be corrected to clear the alarm. Check and correct setup values of output 2, PB, TI and output 1. If output 2 is required for cooling control, the control should use PID mode (PB > 0, TI > 0) and output 1 should use reverse mode (heat action), otherwise, don't use output 2 for cooling control.
PHASE MONITOR	<p>When equipped with a phase monitor (typically 3.5HP or 6HP scroll refrigeration systems), this alarm indicates a fault with the chamber's main power source. Check for proper phase sequence, phase loss or voltage imbalance between phases. Check system 1 compressor fuses, replace if necessary.</p> <p>The chamber will not operate until proper power input is obtained.</p>
POWER FAILURE	When equipped with an optional UPS back-up for the control system, this alarm indicates a main power failure. The EZT-570L will then automatically restart the chamber when main power is restored.

Alarm Monitor Description	Explanation/Corrective Action
PRODUCT SAFETY	Optional product safety limit tripped. Manually reset limit to clear alarm. Check limit set points and verify properly set for product testing.
PUMPDOWN DISABLED	Chamber power off for more than 30 minutes. Will automatically reset in 4 hours. Can be manually reset via alarm monitor screen. Unit will not run with pumpdown disabled.
SD card damaged or missing.	Indicates that the SD card cannot be accessed for USB file transfer. Verify that an SD card is properly inserted into the EZT-570L. Replace SD card.
SD card filled. Please use USB file transfer.	Indicates that a file was unable to be written due to lack of available free space on the memory card. Use the USB file utilities or FTP to backup (copy) and delete alarm, audit and data files from the EZT-570L in order to free up memory. Can also occur if the SD card is missing/not properly inserted.
"Input" SENSOR BREAK	<p>Check sensor wiring for the loop or limit control indicated by "input". Verify lead connections. If sensor requires power, verify power to sensor.</p> <p><i>If the EZT-570L is running a ramp/soak program when this alarm occurs, the program will be placed in hold if the sensor break occurs on a loop that is controlled by the program and must be manually resumed. If the sensor break occurs on a loop not controlled by the program, the program will remain running.</i></p>
SYSTEM # PRESSURE	<p>Refrigeration system # (# = system number) high or low pressure safety tripped. High pressure safety requires manual reset. Check condenser for blockage, clean if necessary. Low pressure will automatically reset. Check static pressure for possible leaks.</p> <p>Service and further diagnostics require authorized, certified refrigeration service personnel.</p>
SYSTEM # OIL(MODULE)	<p>Refrigeration system # (# = system number) oil pressure safety or compressor protection module tripped. Check compressor oil level. Requires manual reset.</p> <p>Check fusing and contactor for proper operation.</p> <p>Service and further diagnostics require authorized, certified refrigeration service personnel.</p>
SYSTEM # DISCHARGE	<p>Refrigeration system # (# = system number) discharge safety tripped. Check liquid injection solenoid. Automatically resets.</p> <p>Service and further diagnostics require authorized, certified refrigeration service personnel.</p>
SYS# COMP MONITOR	<p>Refrigeration system # (# = system number) compressor protection module tripped. Check fusing and contactor for proper operation. Automatically resets after approximately 30-45 minutes.</p> <p>Service and further diagnostics require authorized, certified refrigeration service personnel.</p>

NOTE: An audible alarm will sound for all system alarms other than the indication only alarms noted. The audible alarm can be disabled for loop and monitor alarms if desired by selecting the "Silent" alarm mode, see Section 5.4 Alarms.

System Status Monitor Description	Explanation/Corrective Action
WATER RESERVOIR LOW	Optional Humidity water reservoir low. Add more water. (an audible alert is associated with this indicator)
HUMIDITY TEMPERATURE DISABLE	Temperature outside allowable humidity operational limits. Turn off humidity system or set temperature set point within proper operating range. (no audible alert is associated with this indicator)
RH HI DEWPOINT LIMIT	EZT-570L is limiting the maximum humidity level based on the maximum allowable dewpoint that the chamber can operate safely without causing potential damage to the structure of the chamber. Set temperature and humidity set points to within allowable chamber range. (no audible alert is associated with this indicator)
RH LO DEWPOINT LIMIT	EZT-570L is limiting the minimum humidity level based on the minimum allowable dewpoint that the chamber can operate safely without causing potential damage to the refrigeration system. Set temperature and humidity set points to within allowable chamber range. (no audible alert is associated with this indicator)
DOOR OPEN	Chamber door is open. If the chamber is equipped with a door switch to stop chamber operations when open, the indicator will be lit.

Appendix

A.1 FTP, FileWeb, DataWeb Requirements/Installation

A.1.1 Introduction

The following describes the system requirements and components for the CSZ Cloud service and website. The CSZ cloud service provides the ability to upload data from CSZ devices to cloud storage for backup and/or further analysis. The website provides the ability to verify data, uploads, and to manage users.

A.1.2 System Overview

There are four server components; the data transfer service (FDDataService), the website (FDDataWeb), the FTP server, and a MySQL database. FDDataService and FDDataWeb are Microsoft .Net services, and use Microsoft Internet Information Services (IIS) as a web platform. The MySQL (Can be SQL, Oracle, etc.) database stores user configuration information as well as providing cloud data storage if desired.

A.1.3 System Requirements

A Microsoft Windows server is required, with the following minimum capabilities:

- Windows Server 2008 or greater
- 2 GB RAM or greater
- 2 Cores or greater
- 40GB Storage or greater (this will vary depending on the user's expected uploads)
- .Net framework version 4.5 or greater
- MySQL 5.6 or greater

The server should be setup to provide the web server role.

A.1.4 CSZ Cloud "Server" Services

Cincinnati Sub Zero does not provide direct support or hosting services; however, third party support is available from our partner **Mooseworks Software** which can provide:

1. Complete site and installation without hosting charges (includes CSZ site with custom banner, site setup, all code/data model definitions and manual). User provides the server and hosting credentials including domain name and https certificate.
 2. Purchase of #1 above with hosting using Amazon Web Services (AWS). AWS T2 small server with 30GB storage. User provides the domain name and https certificate. Support cost on a yearly basis.
 3. Purchase of #1 above with no hosting but support of client server at customer facility or customer selected location. Support cost on a yearly basis for web service and application.
 4. DIY documentation – interface/data model definitions and server setup directions. DIY experience recommendations include installation and configuration of web servers, web services, SQL language and HTML/.NET code. Support packages for DIY documentation can be purchased in 5, 10 and 25 hour increments.
- Custom development services:
 - Fixed pricing available for well-defined systems.
 - Time and material options available for less defined, continuous engagements.

For more information, please contact Cincinnati Sub Zero support for assistance.