



EZT-570i

*Environmental Chamber Controller
User Manual*



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Common Terms and Definitions

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1. Overview

This manual has been tailored to cover all of the specific features and options available on the EZT-570i 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-570i's controller prior to operating your chamber.

1.1 Safety Information

Note, caution and warning symbols that appear throughout this manual are to draw your attention to important operational and/or safety information.



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



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



A “**WARNING**” safety alert 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 chamber.

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 to prevent a runaway thermal condition whenever the chamber is not operating. (See Section 8.7.6.1, DUT Safety Relay)

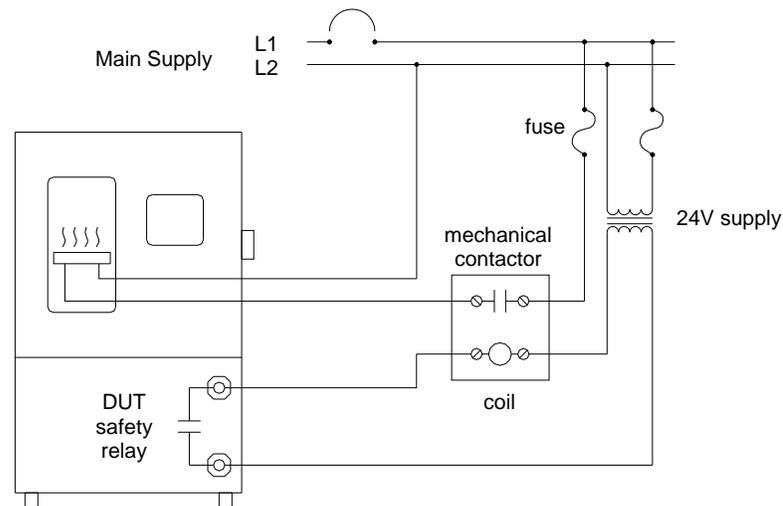


Figure 1-1 DUT Safety Connections

1.2 About the EZT-570i

The EZT-570i Environmental Controller is a DCS (Distributed Control System) which uses different hardware layers to perform the various functions needed to operate the chamber including user interface, system monitoring and protection, as well as process control. This type of platform allows for more flexibility in chamber design while providing a high level of reliability and control accuracy.

The heart of control is performed by individual Fuzzy PID controllers, one for each controlled process. This allows for the utmost in performance by providing a separate processor for each loop. The process controllers utilize the latest technology with built-in adaptive tuning. This means that the process controllers continuously monitor the operation of the chamber and adjust their control parameters to achieve the most stable control possible without any user intervention. Adjusting PID parameters is a thing of the past.

The chamber's systems and components are monitored and controlled by the control module (CM) of the EZT to insure that limits are not exceeded and profiles are executed precisely. The chamber is protected from adverse operating conditions without the need for user intervention or knowledge on system operation.

The user interface provides local operator control and monitoring of the system. It can track all user actions with its built in security module as well as log process information and store it for later use. Together, the system components form a complete SCADA (supervisory control and data acquisition) system for total chamber management.



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.

1.3 Touch Screen Interface

The EZT-570i display is divided into three main sections; the menu bar, main display area and detail window.

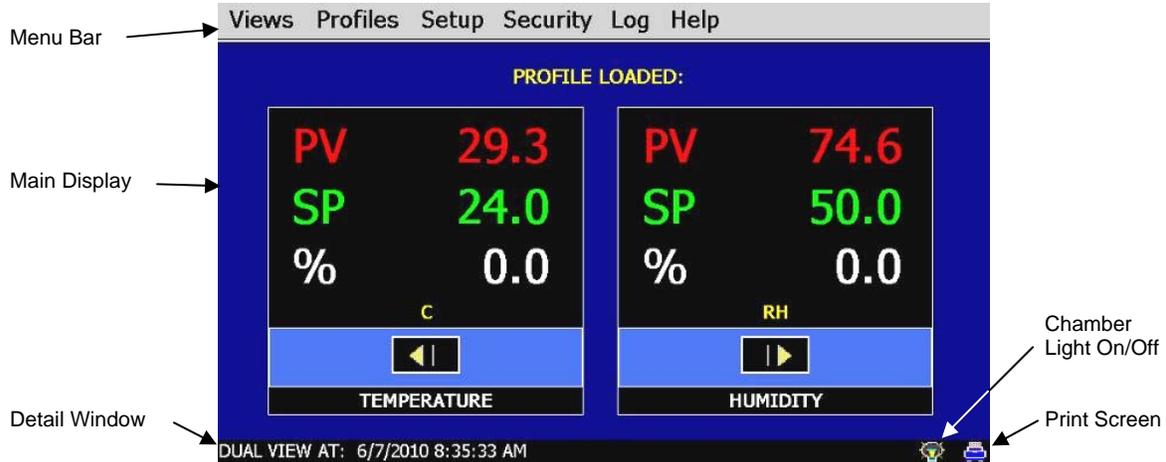


Figure 1-2 Touch Screen Interface

Menu Bar: Used to navigate through the available control, monitoring and setup screens.

Main Display Area: Contains the active items for the menu item selected.

Detail Window: Provides display specific status information.

There are two special control icons located at the lower right corner of the screen in the detail window.

Light Icon: Turns the interior chamber lighting on and off.

Printer Icon: Prints the currently displayed screen to any PCL compatible printer such as an **HP Officejet model 6000 or 8000** series color printer connected to the controller's USB port (see Section 1.4 Print Features).

To select items on the display, simply touch the desired text or numerical entry item. For detailed information regarding the different screen elements and their use, reference the following sections.



Do not use any sharp or metal objects on the touch screen as they may damage the surface. Oil and/or solvents on hands and fingers will mar the touch screen surface. Do not use chemicals to clean the surface of the touch screen. A soft, damp cloth is all that is necessary.

1.3.1 Menu Navigation

The EZT-570i display provides the user with an intuitive interface for navigating through the different menus and settings without having to go multiple levels deep in screens like other “button style” systems. The EZT-570i provides a “Windows” like feel with drop down menus and online help at all times. This section of the manual provides an overview of the menu items and structure.

Main Menu (default on power-up)

Views	Profiles	Setup	Security	Log	Help
Single Loop View	Profile Entry View	System Setup	Setup	Data Logger	Show Help
Dual Loop View	Profile Status View		Log On System		Play Help
All Loops View	Run Profile		Log Off System		Stop Help
Loop/Monitor Trends	Hold Profile		View Audit Trail		
System Event Control	Stop Profile		View Current User		
Alarm Monitor View	Stop Profile (All Off)		Change Password		
Alarm History View					
System Status Monitor					

Figure 1-3 Main Menu Navigation

Views Menu

The “Views” menu provides navigation to all standard view screens. These include loop views, loop trends, manual event control, alarm monitor and history operating screens.

Profiles Menu

The “Profile” menu provides access to the profile editing and monitor screens. From these screens a user can open, save, edit, delete and run profiles.

Setup Menu

The “Setup” menu provides access to system and controller setup options.

Security Menu

The “Security” menu provides access for user login as well as audit trail viewing if the security system is enabled with users and the proper security rights.

Log Menu

The “Log” menu provides access to data log functions and the historical data viewer.

Help Menu

The help menu provides simple help regarding settings and use of screen parameters.

Profile Menu

Screens	Edit	Run	Help
Main View	New Profile	Run Profile	Show Help
Profile Status View	Insert Step	Hold Profile	Play Help
Profile Entry	Delete Step	Stop Profile	Stop Help
GS Soak Limits	Copy Step	Stop Profile\All Off	
Profile Auto Start	Paste Step	Adjust Step Time	
Profile Plot	Select Profile	Advance Next Step	
	Save Profile	Advance Prev Step	
	Save As..		
	Delete Profile		

Figure 1-4 Profile Menu Navigation

Screens Menu

The “Screens” menu provides navigation back to the main menu and the profile view screens. These include profile status, profile entry, soak limits, autostart and plot profile screens.

Edit Menu

The “Edit” menu provides all of the functions needed to open, create, edit and save profiles.

Run Menu

The “Run” menu contains the profile control selections such as run, hold and stop.

Help Menu

The help menu provides simple help regarding settings and use of screen parameters.

Setup Menu

Screens	Setup	Email	Help
Main View	Power Recovery	Email Settings	Show Help
	Setpoint Limits	New Email Message	Play Help
	Event Tagnames		Stop Help
	Process/Alarm Tagnames		
	Alarm Settings		
	Product Control		
	Condensation Control		
	Defrost Settings		
	Web Server/Modbus/VNC		
	System Maintenance		

Figure 1-5 Setup Menu Navigation

Screens Menu

The “Screens” menu provides navigation back to the main menu screen.

Setup Menu

The “Setup” menu provides access to the EZT-570i’s setup screens and the link to the offline system maintenance area.

Email Menu

The “Email” menu provides access to the EZT-570i’s email server settings.

Help Menu

The help menu provides simple help regarding settings and use of screen parameters.

Logging Menu

Screens	Edit	Datalogging	Help
Main View	Open History File	Start/Stop Logging	Show Help
	Delete History File	Select Points For Logging	Play Help
	File Utilities	Hist View Channel Setup	Stop Help
	FTP \ WAN Setup	View History Plot	
	Add\ View Operator Events	View Averages Report	
	Add\ View Digital Signatures		
	Check Disk Space\Memory		

Figure 1-6 Logging Menu Navigation

Screens Menu

The “Screens” menu provides navigation back to the main menu screen.

Edit Menu

The “Edit” menu provides access to the history files, file utilities and FTP file transfer settings.

DataLogging Menu

The “Datalogging” menu provides access to the logging setup and historical file viewing utility.

Help Menu

The help menu provides simple help regarding settings and use of screen parameters.

System Maintenance Menu

Screens	Setup	I/O	Help
Main Setup	Degrees C\F	Monitor Input Offset	Show Help
	Maintenance Items	Analog Input Setup	Play Help
	Maintenance Items Setup	Analog Output Setup	Stop Help
	Set Date\Time	Digital Input Setup	About EZT-570i
	Calibrate Touch Screen	Digital Output Setup	
	Help\Voice Assistance		
	Special Settings		
	Exit Application		

Figure 1-7 System Maintenance Menu Navigation

Screens Menu

The “Screens” menu provides navigation back to the online chamber setup screens.

Setup Menu

The “Setup” menu provides access to the maintenance monitors and system settings.

I/O Menu

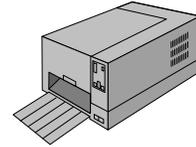
The “I/O” menu provides configuration access to the EZT-570i’s digital and analog inputs and outputs.

Help Menu

The help menu provides simple help regarding settings and use of screen parameters as well the current software version numbers under “About EZT-570i”.

1.4 Print Features

The EZT-570i interface will print a variety of graphic, trend and text reports. It can be connected to a standard “USB” printer (compatible with the Hewlett Packard PCL printer command language) via the standard USB host port provided on the chamber. No drivers are necessary and operation is “plug and play”. The USB port can be used for memory stick data backup and printing by “hot swapping” at any time during the EZT-570i’s operation.



The EZT-570i will alert the user to any problems during the print operation. After a print error (printer not connected or bad cable), the EZT-570i will return to its normal operation after alerting the user. The EZT-570i interface may change background colors during printing to prolong ink cartridge life (blue backgrounds require more ink than white backgrounds). The EZT-570i interface will be “locked” until the print function is complete and then return to normal operation.

 *The printer’s USB cable must be plugged into the EZT-570i interface after the EZT-570i is powered up and in “normal” operating mode, and the printer is powered up and ready for printing (neither device should be in startup mode).*

When the USB cable is connected to the USB port, the following dialog may appear on the EZT-570i display (each time the printer cable is plugged in).



Figure 1-8 Print Driver Notification

Press the “X” at the top right of the dialog box and the dialog will disappear. The printer is now ready for printing text or graphics from the EZT-570i interface. This dialog will not appear again unless the printer cable is disconnected and then re-inserted into the EZT-570i “USB” interface connection.

The print driver in the EZT-570i interface provides standard “USB” printing using “PCL” language support. Since printer models change so often, many manufacturers add features to new models of printers. To take advantage of these new features (Ethernet connectivity, etc.), each manufacturer supplies driver disks for different Windows “OS” versions. Since the EZT-570i is an embedded device (no hard disk or moving parts), installation of these drivers is not possible or required. The dialog box appears due to the additional functionality the USB printer is transmitting to the EZT-570i interface. Pressing the “X” at the top of the dialog instructs the EZT-570i interface to ignore the advanced printer features and skip the installation of any print drivers that are not applicable to operation with the EZT-570i.

1.5 Multi-lingual Voice Assisted Help

The EZT-570i provides a multi-lingual voice assisted help feature. This allows the user to select from any of the available languages for the display of on-screen help. By connecting headphones or amplified speakers (typical PC speakers) to the audio jack of the EZT-570i, the EZT will read the help file to the user in the selected language. This allows the user to view the screen and listen to the help at the same time.

See Section 8.5, Help\Voice Assistance for more information on selecting the on-screen help language, and adjusting the volume for the audio playback of the on-screen help.

-  *The language selection of the help\voice assistance only affects the display and audio playback of the on-screen help files. It does not alter the appearance of the EZT-570i's operating displays, which will maintain all menus and display parameters in the English language.*

2. Monitoring

The chamber view screens provide various means of verifying chamber operation and performance. The displays are accessed from the main menu under “View”.

Views
Single Loop View
Dual Loop View
All Loops View
Loop/Monitor Trends
System Event Control
Alarm Monitor View
Alarm History View
System Status Monitor

2.1 Loop Views

The loop screens provide different viewing options for the control and monitoring of chamber processes such as temperature, humidity, altitude, etc. The loop screens allow you to adjust the current setpoints (SP) and view the process variables (PV) and percentages of output (%) for each loop. The set points can be modified from these screens by touching the set point field. Upon selecting a set point, the pop-up numeric entry pad will appear from which the set point can be entered. However, if a profile is active, the set point fields are locked out from user adjustment. If the loop is a monitor input, the set point and percentage of output will not be displayed since no control is associated with the input.

2.1.1 Single Loop View

The single loop view display shows one control loop or monitor input at a time. The loop auto-tune feature is accessible from this screen.

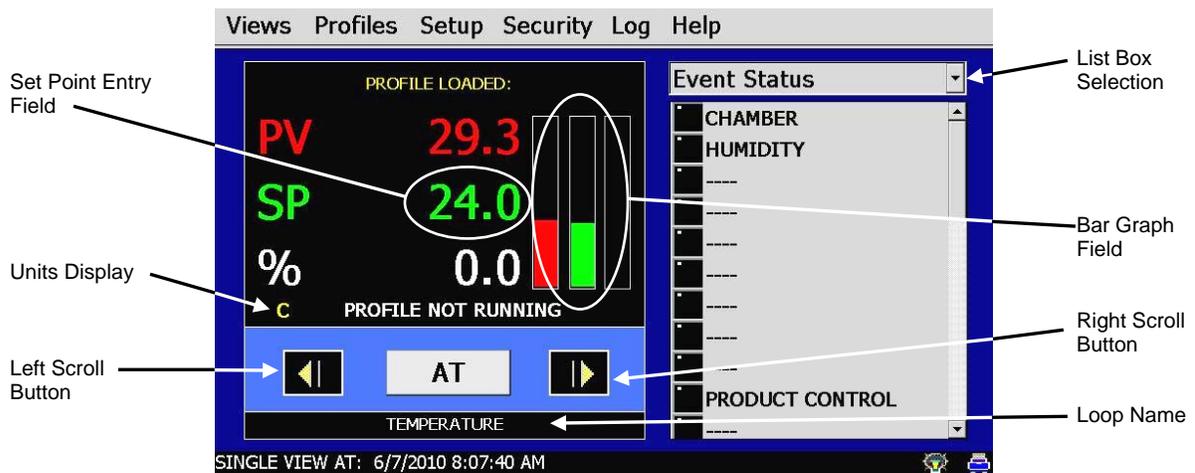


Figure 2-1 Single Loop View

The **left** and **right scroll buttons** allow you to cycle through each loop and monitor input available on the chamber. By pressing either button, the previous or next loop will appear in sequential order. When the first or last loop is reached, the EZT will automatically wrap around to the beginning or end of the list to show the next loop.

The **loop name**, shown at the bottom of the loop view, will update as each loop or monitor input is selected. The unit display field will update as well in order to provide the units of measurement for the selected loop or monitor input.

The **setpoint entry field** as indicated on Figure 2.1, shows the area where the screen can be touched in order to bring up the keypad entry screen. Using the keypad, a new setpoint can be entered. Once entered, the new set point will be shown in the setpoint entry field. Adjustment of the setpoint is locked out if the EZT-570i is running a profile.

The **bar graph field** is the display area for set point, process variable and percentage of output bar graphs. The bar graphs for the process variable (PV) and set point (SP) share a common range for minimum to maximum of the displayed value. To change this range, touch anywhere in the bar graph field. Upon doing so, low and high range entry boxes will appear. Enter the new range(s) and press the 'Set' button to accept the new values.

 *The percentage of output bar graph is fixed for a range of 0% to 100% and changes color to indicate whether the loop is heating or cooling. For example, heating is represented by a value of 0 to 100% in the %Out field; thus, the bar graph will indicate the percentage of heating output from 0% to 100% in a light red color.*

Cooling is represented by a value of 0 to -100% in the %Out field. The bar graph will indicate the percentage of output for cooling in light blue. The bar graph will fill from 0% to 100% for a cooling output of 0% to -100% which is full cooling.

The **list box** provides the ability to view event status, system monitor status or system alarms by selecting the desired item from the drop down menu. An operator can then keep one eye on the control loop status while obtaining other important operating information without having to leave the loop view screen.

The **AT** button is used to access the auto-tune function for the loop. To initiate auto-tune, press the 'AT' button and select 'Yes'. During the auto tune procedure, the AT button will be highlighted green to show the tune is in progress. When the tune is complete, the AT button will automatically return to its default gray color, to indicate the tune is off. If at any time during the tune process, you want to cancel the auto-tune, press the AT button and select "Yes" to cancel the tune.

2.1.2 Dual Loop View

The dual loop view display shows two control loops or monitor inputs at a time. It provides a large standard display for control of both temperature and humidity, common on most environmental test chambers. The screen allows manual set point entry for each loop by touching the respective setpoint entry field. As on the Single Loop View screen, the left and right scroll buttons allow you to cycle through each loop and monitor point available on the chamber.

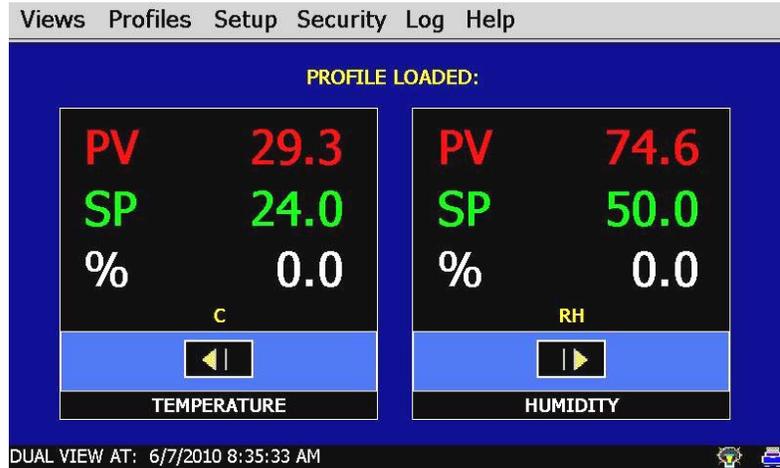


Figure 2-2 Dual Loop View

2.1.3 All Loops View

The all loops view display shows all available control and monitor inputs available on the chamber in a tabular format. From this view all setpoints, process variables and output percentages can be monitored at a glance.

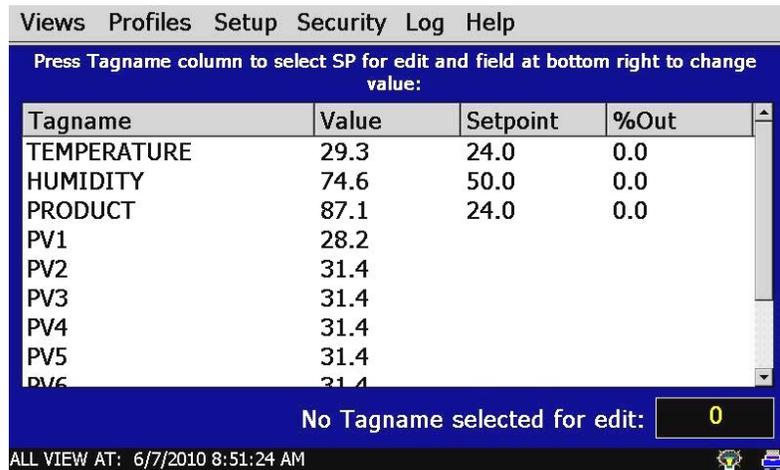


Figure 2-3 All Loops View

The setpoint entry field is located at the lower right of this screen. In order to modify a loop's setpoint, select the loop by touching its Tagname field in the table. The loop's setpoint will then be available for edit. Touch the edit field in the lower right of the screen in order to enter a new setpoint.

2.2 Trending

Each loop and monitor input of the EZT-570i has its own trend display with individual display settings. The loop trend can display the setpoint (SP), process variable (PV) and percentage of output (%) history over a 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 the trend is 4 hours. The trend plots a new point on a one minute, fixed time interval.

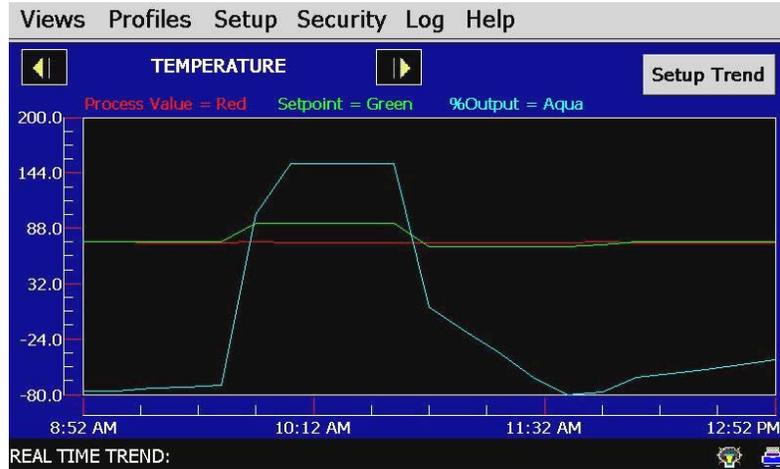


Figure 2-4 Loop Trend

The trends on the EZT-570i have a drag-n-zoom feature. By using your finger to select an area on the screen, the trend will zoom in on that area. To select a portion of the trend, touch and hold the screen with your finger. Drag your finger across the trend and a box will be drawn around the selected area. Removing your finger from the screen will cause the trend to redraw the trend with only the selected 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 trend display.

! *When a trend is “zoomed in”, the trend will not update with new information. The trend must be in normal view mode in order to update at each time interval. The trend will return to normal view automatically when selecting a different screen to view.*

If the EZT-570i’s clock updates for daylight savings time, or is corrected to the proper time by the NTS clock server settings in the EZT, the offset in time may cause the trend to display data inaccurately due to this time offset. The trend will automatically correct itself once the trend buffer is cleared of this data. The clock is updated at 2 am., so with a buffer length of 4 hours, the trend data will display accurately at 6 am.

Trend Setup

To adjust the displayed variables, range and history period, touch the “Setup Trend” button in the upper right corner of the trend display. The setup values will then be shown below the trend graph.

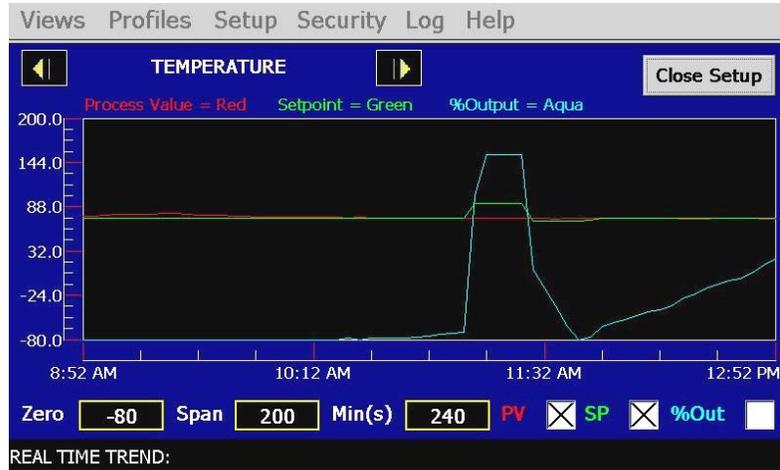


Figure 2-5 Trend Setup

Trend Zero

The zero value sets the minimum range of the vertical access for the trend variables.

Trend Span

The span value sets the maximum range of the vertical access for the trend variables.

Time(Mins)

The time interval is in minutes and adjusts the displayed time period for the trend. The allowable range is from 6 to 240 minutes (4 hours).

Trend Points

To adjust what items are shown on the trend, select/deselect the desired items by touching the check box next to the variable.

Press the “Close Setup” button to return to the normal trend view. The graph will then be updated according to any selection changes made to the trend setup values.

2.3 Alarm Monitor

The alarm monitor screen displays any current and/or previously silenced alarms according to time and date of occurrence. On each new alarm occurrence, The EZT-570i's screen background will turn red to notify the user of a new alarm. Once the alarm is silenced, the screen background will revert to the standard blue background; however, the alarm condition may still be present. The chamber will not restart until all alarms have been silenced and the alarm condition has cleared.

If the chamber does not restart upon silencing 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 from the list. If the alarm is still present, the alarm condition still exists and must be corrected.

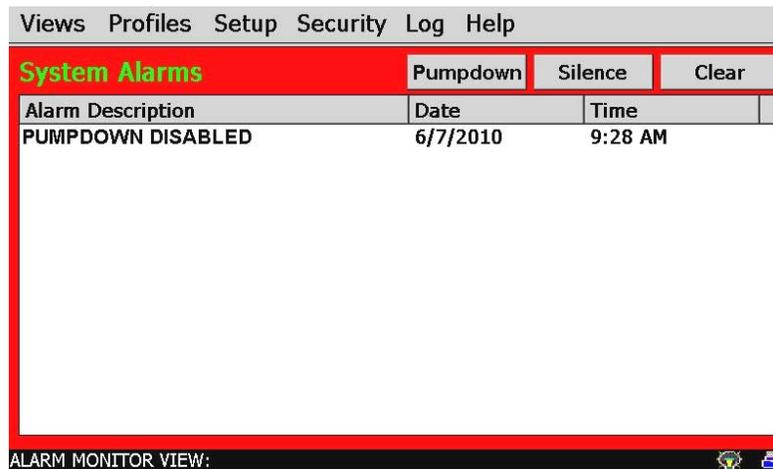


Figure 2-6 Alarm Monitor

2.3.1 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.

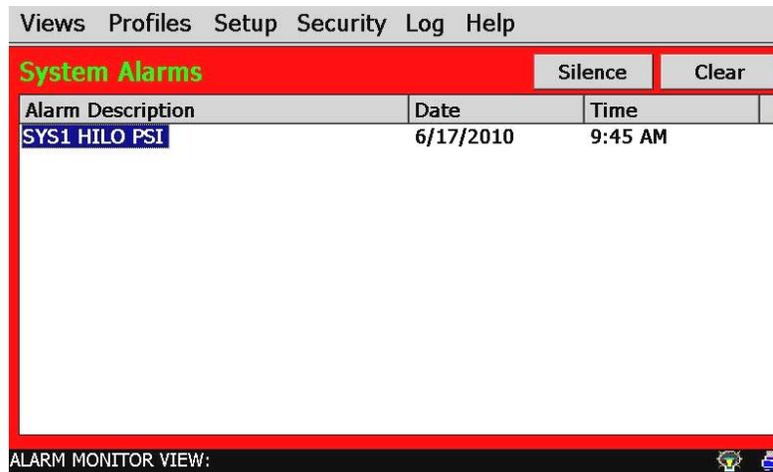
If the chamber is equipped with the pumpdown mode of operation, the "Pumpdown" button will be provided on the Alarm Monitor screen. This provides a manual way to reset pumpdown mode. Pumpdown will be automatically disabled if main power is off for more than 30 minutes. This is due to the fact that without main power, the crankcase heater will be off and can not 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.

⚠ 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 after power is applied to the unit. Only silence the alarm. Allow for the 4 hour warm-up period prior to use or damage to the compressor may result.

2.3.2 Help For Alarms

The EZT-570i 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 blue.



Once the alarm is selected, select “Show Help” from the Help menu. The help screen will then be shown with information relating specifically to the alarm.

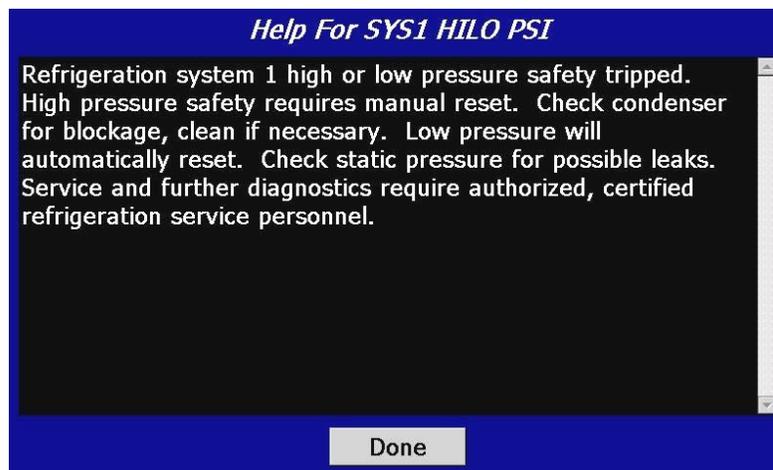


Figure 2-8 Alarm Help

If alarm specific help is not available for the particular alarm, the standard “system alarm help” will be provided. See Section 10, Diagnostics, for alarm codes and corrective actions.

2.4 Alarm History

The alarm history screen provides easy access to historical alarm data. To access an alarm file, press the “Open File” button on the upper right corner of the display. Select the desired alarm file from the list and press “Open”. All alarms that occurred on that date will be displayed in the list box.



Figure 2-9 Alarm History

To clear the alarms from the list box, press the “Clear” button. Do this to refresh the display prior to opening another alarm file. All alarm files are stored by day using the day’s date for the file name. Thus, a new file will be created every day in order to store any alarms for that day. If no alarms occurred on a given day, an alarm file will not be created for that day.

The email icon  provides the ability to send a copy of the currently opened alarm history file to any of the email addresses entered into the EZT-570i. When the email icon is pressed, an “Add Recipients” window will be displayed where the user can select the recipients for the file from any of the email addresses programmed in the EZT-570i. For information on how to add email recipients to the EZT-570i, see Section 5.10, Email.

2.5 System Status Monitor

The system status monitor provides non-critical alarm information or alerts to indicate specific operational conditions or limits that have been reached in the chamber's operation.

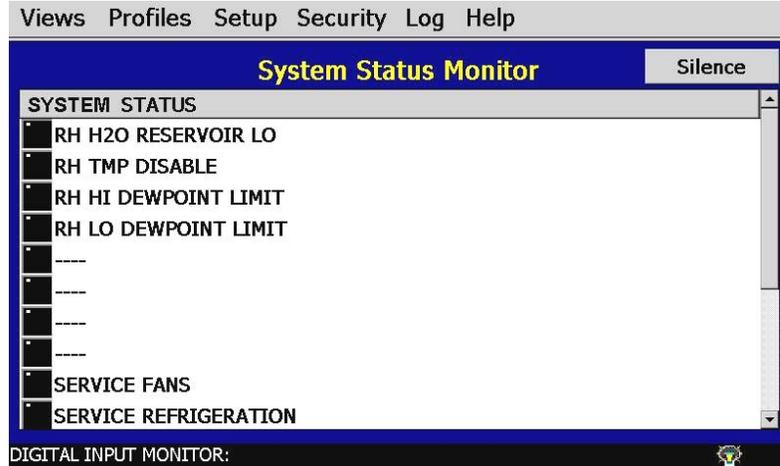


Figure 2-10 System Status Monitor

The LED next to the system status description will be green to indicate that the status is active. Non-critical alarms and alerts that require operator attention will be indicated by an intermittent beeping of the chamber's audible alarm. This alert can be silenced through the use of the "Silence" button. See Section 10, Diagnostics, for alarm codes and corrective actions.

3. Manual Operation

The EZT-570i controller can function as either a static setpoint controller or as a profile controller. The EZT-570i is in static mode (single setpoint operation) when it is not running a profile. This section describes how to operate the chamber in this mode.

3.1 Setpoint Adjustment

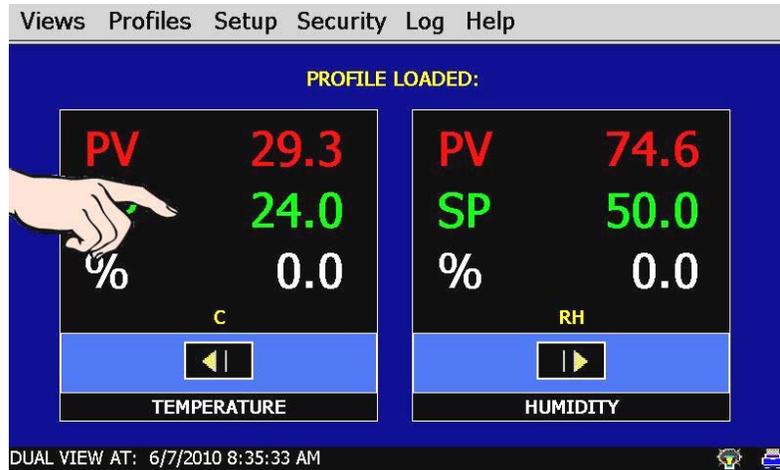


Figure 3-1 Single Setpoint Adjustment

To adjust the setpoint:

1. Select one of the loop views from the main View menu.
2. Input the setpoint temperature.

Press the numeric display for the setpoint (SP) for temperature. The setpoint adjust keypad will be shown on the screen. Enter the desired setpoint value and press the “Done” button.



Figure 3-2 Numeric Entry

3. Turn the Chamber event on to start the chamber, see Section 3.2, Manual Event Control.

3.2 Event Control (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 profiles so that they can be turned on and off at set time intervals.



Figure 3-3 System Event Control

To turn the chamber and optional events on/off:

1. Select “System Event Control” from the main View menu.
2. Select the events you want to turn on by touching the event name in the list view and changing the “User State” from ‘OFF’ to ‘ON’. To turn the event off, touch the event name again to switch the user state back to off.
3. Press the Update button to set the new event status. Note that the events will not turn on or off until the update button is pressed.

The LED next to each event name will illuminate green to indicate that the event is turned on and that the associated chamber systems are operating.

3.2.1 Standard Chamber 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 setpoint value. The humidity system will not operate unless the chamber event is also turned on.

The operating limits of the humidity system are dependant 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-570i 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 setpoint.

When humidity is disabled due to the chamber air temperature, the corresponding System Status Monitor indicator (RH TMP 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 setpoint 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-570i 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 setpoint 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 (RH LO 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 (RH HI 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-570i 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 setpoint 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 setpoint is below the minimum achievable temperature for the refrigeration system, the EZT-570i 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 setpoint is below the capabilities of the refrigeration system on an ultra low temperature chamber, the chamber will not be able to reach setpoint 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-570i. The humidity system can not control the humidity level within the chamber if the purge system is continuously trying to dry out the chamber. However, if the humidity setpoint is below the minimum achievable humidity (low dewpoint limit), the EZT-570i will turn on 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-570i controller based on the air temperature and humidity setpoints. When required to obtain low humidity levels, the frozen coil and dry air purge systems will start in order to achieve the target setpoint. 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.

3.2.2 Special Chamber Options

Depending upon the type of chamber or installed options, there are several other events that may be listed on the manual event screen. They will be used in conjunction with the optional equipment to initiate or control the process related to that option.

3.2.2.1 Altitude Operation

The altitude event turns the chamber's altitude system components on and off. Altitude chambers are specifically built to withstand atmospheric pressures. They have heavy gauge liners with additional internal structure for reinforcement. They simulate altitude by utilizing a vacuum pump to draw air out of the chamber and may also use compressed air to increase chamber pressure if altitudes below site level are required.

The EZT-570i can provide a direct pressure reading in Torr (millimeters of mercury) or convert the resultant pressure within the chamber into feet, which allows the altitude setpoint to be entered directly in feet. The altitude system can operate independently of the chamber conditioning system; thus, the chamber event does not have to be on for the altitude system to operate.

Chamber Temperature Control Limitations

As altitude increases, the air density within the chamber decreases. The heating and cooling systems require a minimum amount of air flow in order to operate correctly and control the internal chamber air temperature. The altitude system will inhibit the operation of the heating and cooling systems when the altitude increases beyond the design limits. This limit is typically around 65Kft.

Humidity Control Limitations

On most altitude chambers with the humidity system option, operation of the humidity system is inhibited when the altitude system is enabled. The vacuum system used to control the internal chamber pressure, can not operate with the addition of moisture. Only altitude chambers with vacuum systems specifically designed to operate with the presence of moisture will allow humidity control with the altitude system enabled.



Unless the vacuum system was specifically designed to operate in conjunction with humidity, the chamber must be dried out before entering into altitude operation. Any standing water in the chamber must be eliminated or possible damage and premature failure of the vacuum pump may occur.

3.2.2.2 Thermal Shock Transfer Mechanism Operation

For chambers designed to perform specific thermal shock testing, a transfer cart/basket is used to shuttle the product under test between different extreme environments. The transfer mechanism typically transfers between two or three different zones.

The location for the shuttle to transfer to is set by two or three events which describe the desired location. Vertical thermal shock (VTS) chambers, typically operate with a hot and a cold chamber. The events then relate to these locations as "XFR HOT" or "XFR COLD". Double duty thermal shock (DTS) chambers, also shuttle product between hot and cold chambers; however, these chambers are equipped with a center cold chamber and two outer hot chambers. Since DTS chambers shuttle product from left to right and vice versa, the events describe the transfer positions as "XFR LEFT" and "XFR RIGHT". Liquid bath thermal shock (TSB) chambers typically include a third position which is an ambient zone. The "ambient" zone removes the basket from the liquid baths and allows the operator to load product into the basket. This position uses the "UNLOAD" event.

When a position event is selected, the other event(s) will be automatically turned off and the basket will transfer to the selected location. If there is a failure in the mechanism and the basket does not reach its intended position, the “TRANSFER ERROR” alarm will indicate this fault. The selected transfer event will then be turned off automatically, and the transfer mechanism will not try to transfer the shuttle again until the operator enters a new position selection.

Manual Transfer Selection

When operating thermal shock chambers, the typical operation involves transferring product from a “hot side” to a “cold side”. Since the transfer event selections work like “radio buttons”, that is when one is pressed the other turns off, you can use this for repetitive manual transfers without having to select and deselect the different events.

For example, if you set the “User State” to “ON” for both the transfer hot and transfer cold events, each time the update button is pressed, the selected position for the transfer mechanism will alternate back and forth between the hot and cold chambers.

Profile Transfer Selection

When running a profile, only one transfer position should be selected in a step. In most cases, since the object of the test is to cycle between two chambers with fixed temperature conditions, a two or three step profile is all that is required. Each step will have the same setpoints, but the transfer cart position events will alternate between the two steps.

3.2.2.3 Defrost Operation

If the chamber is equipped with the hot-gas defrost option, the “INITIATE DEFROST” event will allow for programmed or manually initiated defrost of the chamber’s cooling coil(s). See Section 5.8, Defrost Settings, for more information on using the defrost option.

3.2.2.4 Remote Setpoint Operation

If the chamber is equipped with the analog input (remote setpoint) option, there will be an event listed for each available input. When the event is enabled, “REMOTE SETPOINT 1, REMOTE SETPOINT 2”, etc., it will enable that input. The input will then drive the setpoint for the loop it is set to control. See Section 8.7.3, Analog Inputs, for more information on configuring and using the remote setpoint inputs.

3.2.3 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 profile or just manually via the manual event screen. See Section 5.6, Product Control, for more information on settings and use of this feature.

3.2.4 Customer Events Option

The EZT-570i controller has the ability to control up to 15 event output relays. These outputs can be manually turned on and off or controlled programmatically through a running profile. 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. In order for the EZT-570i’s optional digital outputs to function as events, they must be configured to do so. By default, the digital outputs, when available, are configured as customer event outputs. See Section 8.7.6, Digital Outputs, for more information on setting the operational mode for the optional digital outputs.

3.3 One-Touch Tuning

All of the EZT-570i control loops feature the one-touch tune. No more tuning parameters to adjust or settings to change. The EZT-570i loop controls utilize fuzzy logic to adapt to the process in order to maintain the chamber temperature, humidity, altitude, etc., as close to setpoint as possible. The controls merely need base-line knowledge on the performance of the chamber and test load. To obtain this performance knowledge, the controller can be tuned using the one-touch tune.

All Cincinnati Sub-Zero 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.

The one-touch tune makes it easy to tune the chamber to your product and performance needs. Just run the chamber at ambient conditions and press the “AT” button on the single loop display screen for the process to be tuned. The “AT” button will remain green for the duration of the tune to indicate it is working. Once complete, you are ready to test product.

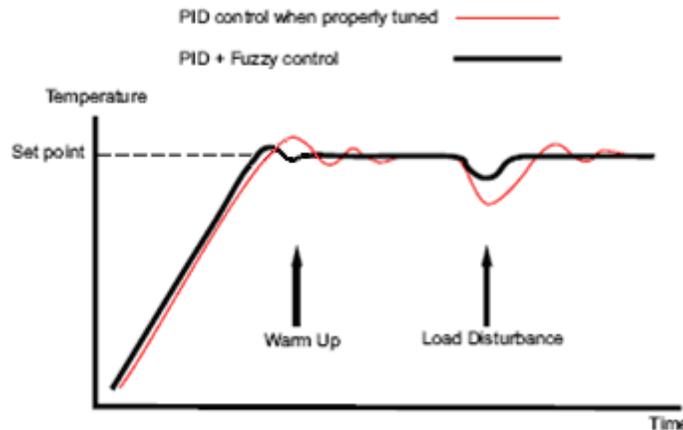


Figure 3-4 Tune Control Response

As you change product configurations or other loads within the chamber, you can re-tune to the new configuration. All subsequent tests with that configuration will perform optimally. It is recommended that only one loop be tuned at a time so that they do not interfere with the tune of the other loops.

It is recommended that only one loop be tuned at a time. Temperature for example, affects humidity. If the EZT-570i 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 insure that the humidity control loop gets an accurate base-line performance reading on the chamber.

4. Profile Operation

A profile is a set of instructions programmed as a sequence of steps. The EZT-570i handles the profile steps automatically, in sequence. The EZT-570i can store hundreds and even thousands of profiles with up to 99 steps in each profile. This section covers the use and operation of the EZT-570i profiler. To access profile utilities, select “Profile Entry” from Profiles menu.

Profiles
Profile Entry View
Profile Status View
Run Profile
Hold Profile
Stop Profile
Stop Profile (All Off)

4.1 Profile Entry

Profiles are created and edited from the Profile Entry screen. The following instructions describe the steps involved for programming profiles.

1. To create a profile, go to the Profile Entry screen.
2. From the Edit menu, select “New Profile” and select “Yes” to create a new profile.
3. Enter the number of steps for the profile you want to create. Note that the number of steps can be changed at any time during profile entry to shorten or lengthen the profile as required. Profiles can be from 1 to 99 steps in length.
4. For each step, enter the events, setpoints and time duration of the step.
5. Save the profile.

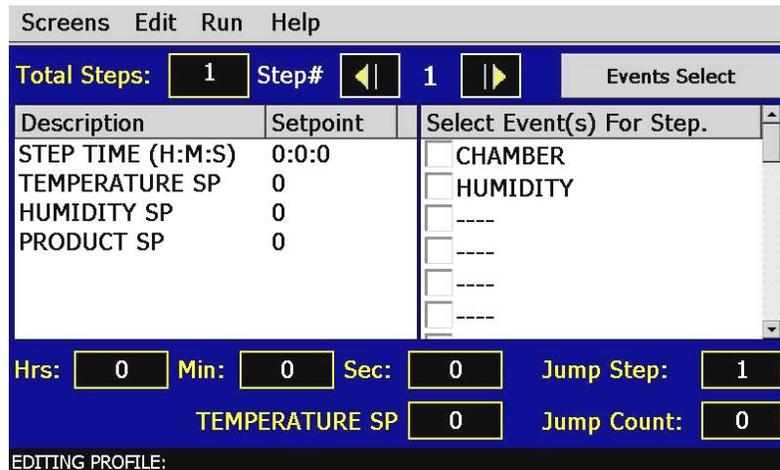


Figure 4-1 Profile Entry

Edit Menu Options

- New Profile:* Clears any existing profile entry data so that a new profile can be entered.
- Insert Step:* Inserts a step into the profile at the current step number.
- Delete Step:* Deletes the current step.
- Copy Step:* Copies the current step data.
- Paste Step:* Pastes previously copied step data to the current step.
- Select Profile:* Opens the file explorer window so that the user can select a profile from the profiles currently stored in memory.
- Save Profile:* Saves any changes made to the current profile under the existing name. If no name exists (new profile), the user must enter one in order to save the profile.
- Save As..:* Allows the user to save the current profile to a different file name. This is useful for making different versions of the same profile that only requires minimal changes.
- Delete Profile:* Allows the user to delete the current profile.

4.1.1 Selecting Step Events

For each step of the profile, you must select which events are to be on during the step. To enter the step events, press the “Events Select” button at the top right of the screen and select “Step Events”. This selects the step events for the list view. The events for the step can then be selected by placing a check mark in the check box next to the event name. The step events list is the default list view and will be shown when creating a new profile, opening a saved profile or when selecting the next step during profile edit.

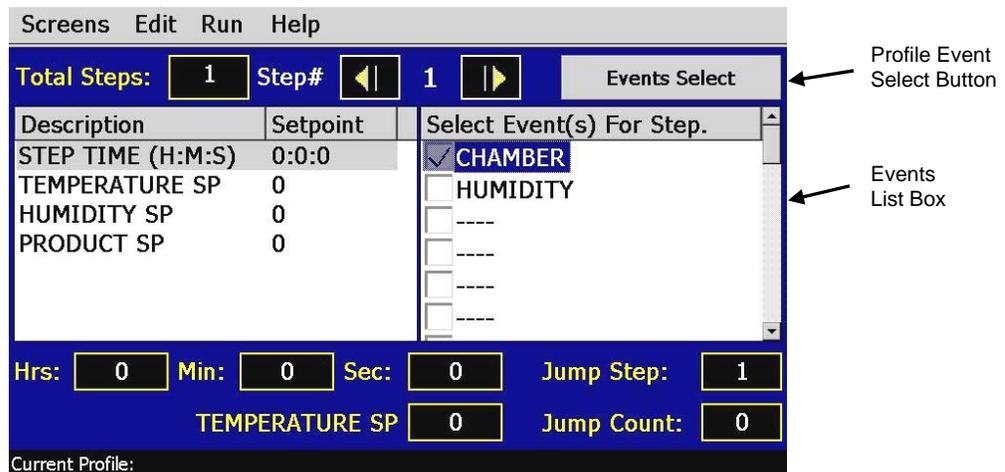


Figure 4-2 Profile Step Events

! *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 profile may be in operation, if the events are not set, the chamber will not run.*

4.1.2 Selecting Guaranteed Soak (GS) Events

The GS Events are used to turn on the guaranteed soak option for one or more of the controlled loops. In order to enable a guaranteed soak in a step, you must select the loop(s) to be monitored by turning on the corresponding event. To enter the GS events, press the “Events Select” button and select “Gaur Soak Events”. This selects the guaranteed soak events for the list view. The soak events can then be selected for the step.

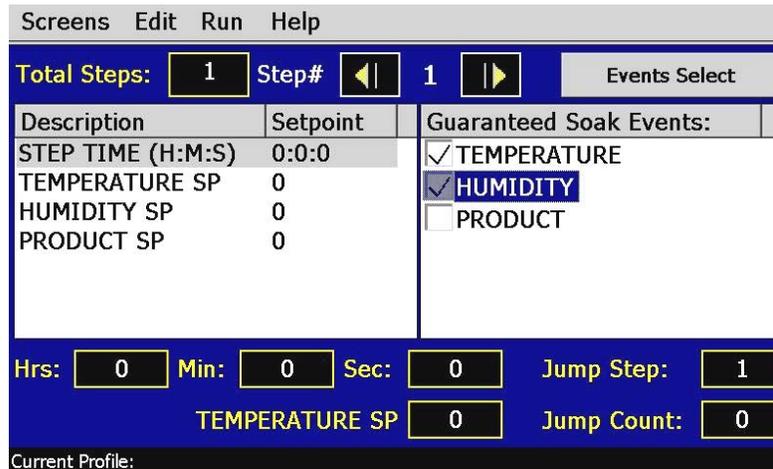


Figure 4-3 Profile Guaranteed Soak Events

! *Guaranteed soak is should not be used on ramping steps. The ramp rate will be affected if the process variable deviates from the soak band because the profile will be placed in hold. When the profile is in hold, the step length will be extended and the setpoints 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 setpoint, within the soak band, for the full time duration of the step.*

4.1.3 Using Wait For

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

A profile can also be set to wait for a digital input. This allows any of the eight optional digital inputs to be selected. When the EZT-570i reaches the step, it will wait for the input to change state before continuing the step.

To enable a wait for in a step, press the “Events Select” button and select “Wait For Events”. This opens the wait for entry window. From this window, select the input to wait for, and if a process variable is selected (Loop or monitor input), enter the setpoint for the wait. This is the setpoint that the process variable must reach in order for the step to continue. Once the entries have been made, return to the profile entry screen by pressing the “Back to Step Data” button.

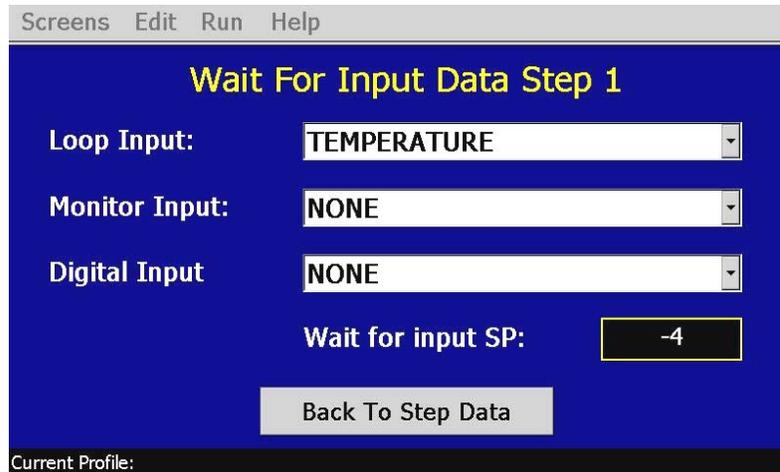
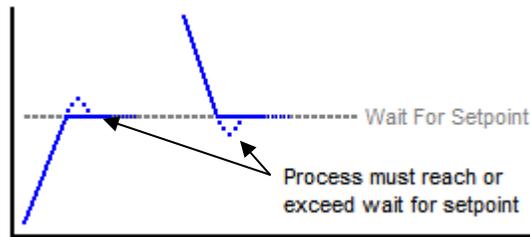


Figure 4-4 Profile Wait For Input

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The setpoint entry for a “wait for” 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 setpoint in order for the profile to resume operation.



The monitor input and digital input selections are only available if the option is available on your chamber. When using the digital input wait for selection, the digital input must be configured as a “wait for event” input. If it is not configured as a “wait for event” input, the profile will ignore the wait for selection and continue through the step. See Section 8.7.5, Digital Inputs, for information on setting the digital input mode.

4.1.4 Setting Setpoints and Step Time

To enter the set point for a loop, select the loop by touching its name in the table. The selected loop will be highlighted in blue. The loop's set point will then be available for edit and the current value displayed in the setpoint entry field. Touch the setpoint field in order to access the keypad and enter the desired setpoint. To enter the time for a step, touch the individual hours (Hrs), minutes (Min) and seconds (Sec) fields to enter in the desired time duration. As the values are entered, they will also be updated in the table.



Figure 4-5 Profile Setpoint Entry

Entering a Soak Step

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

Entering a Ramp Step

A ramp step is merely a step with a setpoint that is different from the previous step. The chamber will ramp from the previous setpoint, to the setpoint of the current step linearly over the time entered for the step. This creates a ramp step.

Determining Ramp Rate

In order to enter a ramp rate, you must calculate the time it will take to go from the previous step's setpoint to the current step's setpoint. For example, if you desire a ramp rate of 5 degrees per hour from the previous step's 20 degree setpoint to the new 85 degree setpoint, the step time will be the difference in temperature (65 degrees) divided by the rate of 5 degrees per hour. This equates to a time period of 13 hours. Thus, the step will have a setpoint of 85 degrees with a step time of 13 hours.



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

The wait for 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 setpoint before starting the soak time.

4.1.5 Using Jumps

The jump allows the profile 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 profile will first execute the step as a normal step; however, once the step time is complete, the profile will jump to the specified “jump step” rather than continuing on to the next step in the profile. After all of the programmed jumps have been completed, the profile will then continue to the next sequential step in the profile without making any further jumps.

To program a jump, enter the step number that you want the profile to jump to when the step is complete, along with the total number of jumps to be made. A jump 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 Step: Sets the step number that the profile will jump to upon the completion of the step. The profile will only jump to this step if the number of jump counts is greater than zero.

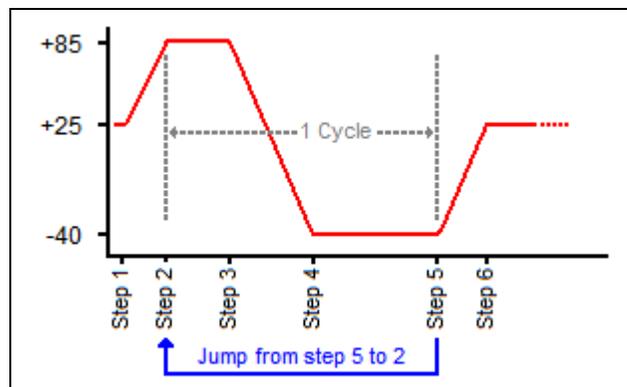
Jump Count: Sets the number of jumps that will be made from the step. Once all jumps have been made, the profile will continue on to the next step in sequential order.

! *The jump count defines how many jumps will be made. Thus, if you wish to perform 10 cycles within a profile, your jump count will be set to 9, 10 minus the 1 you performed prior to reaching the jump.*

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 Step=2
Set Jump Count=9
- Step 6 End at +25



With the jump programmed on step 5, the profile will jump from step 5 back to step 2 after the soak time has completed. The profile 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 profile 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.

4.2 Autostart

Autostart is used to start a profile on a specified date or day, and time (of a 24-hour-clock). The autostart settings are stored with the profile. To enter the desired start date or day, select "Profile Auto Start" from the profile Screens menu. Choose the desired autostart method, date or day, and enter the start time settings. Once the desired entries have been made, press the "Done" button to return to the profile entry screen.



Figure 4-6 Profile AutoStart

Autostart by Date: When this mode 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 profile is to start. The day of week is not required to be set. It is not used for this function.

Autostart by Day: When this mode is selected, only the day of week and time is required to be entered. The date settings are ignored so the values are irrelevant.

! *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.*

The autostart settings are stored with the profile; however, autostart can be used as a one time setting. Select a profile that you wish to autostart at a particular time, make the desired autostart selections and run the profile. The original profile settings will not be affected unless you save the profile.

4.3 Guaranteed Soak Limits

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

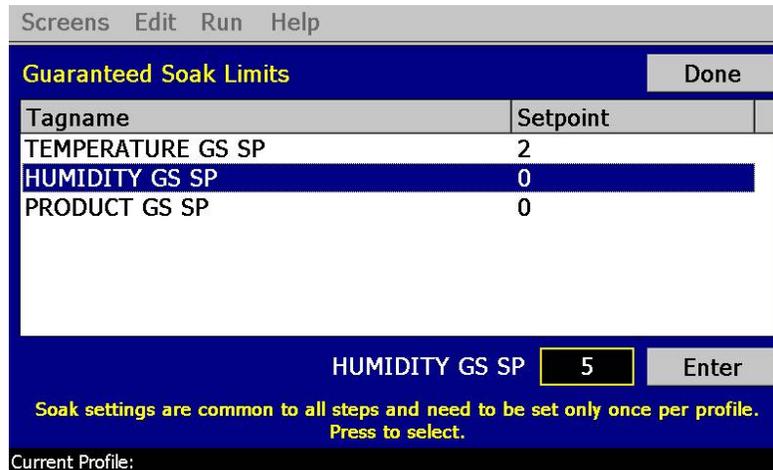


Figure 4-7 Profile Guaranteed Soak Limits

To change the limits, select each loop by touching its tagname in the table. The soak band for that loop will then be available for edit, and its current value will be shown in the setpoint field. To change the soak limit value, touch the entry field and enter the new value via the keypad. Once complete, the new value will be shown in the setpoint field. Press the “Enter” button to save the new limit setting. Once entered, the value will be shown in the table.

If the “Enter” button is not pressed before selecting a different loop or leaving the screen, the value will not be used and the loop will retain its previous soak limit value. The soak limits are saved with the profile. When changing the soak band settings, be sure to save the profile in order to update the profile with the new settings. This insures that each time the profile is loaded and run, the chamber will control to the proper band settings.

4.4 Plot Profile

The profile can be viewed by using the plot profile utility. This allows you to see if the profile you programmed matches the expected profile appearance. To view the profile, select “Plot Profile” from the profile Views menu.

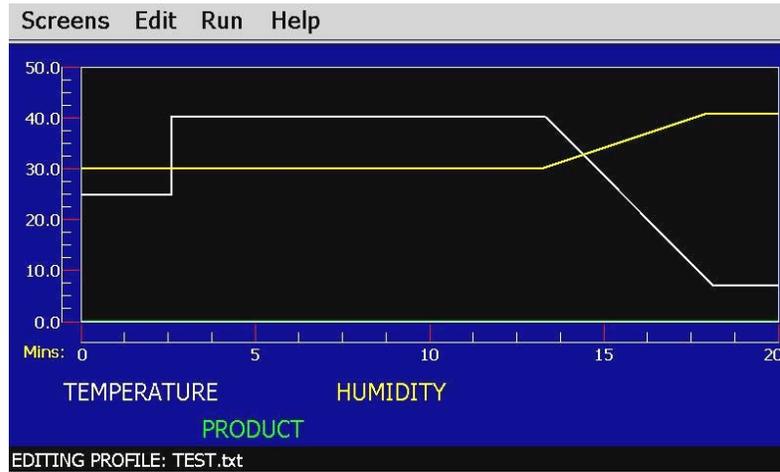


Figure 4-8 Profile Plot

The EZT-570i will automatically generate a graphical representation of your profile and display it on the screen. The Y-axis auto-scales to fit the range of setpoints entered in the profile. The X-axis auto-scales to the total time duration of the profile. Note that jump steps are not shown on the plot profile graph.

4.5 Start/Stop Profile

To **start** a profile, it must first be loaded into the EZT-570i's CM. In order to do this, you must run the selected profile by selecting "Run Profile" from the profile Run menu.



Upon doing so, the EZT-570i will automatically display the Profile Status View screen. At the bottom of the screen, there will be an entry field to set the step number for the profile to start on (default is step 1) and a "Start" button. Use the scroll buttons to adjust the start step if required, and press the "Start" button. The profile will then be transferred into the profiler memory of the CM and started once the transfer is complete.

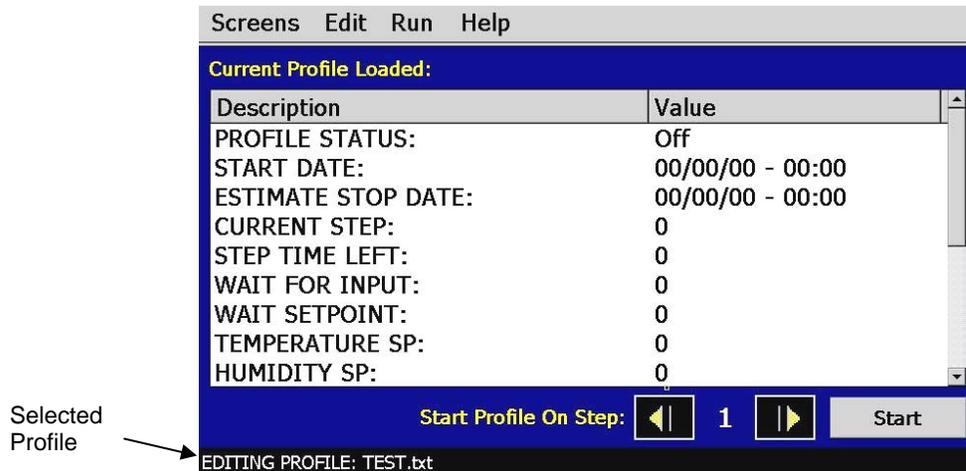


Figure 4-9 Profile Start

! *If the profile was programmed with AutoStart enabled, the profile will enter the autostart mode immediately upon starting the profile. Upon reaching the set date or day and time, the profile will begin running. The "Start Date" field will be updated with the future start date and time.*

To **stop** a profile, there are two options. These selections are available from the "Run" menu.

Stop Profile: Stops the running profile, but leaves the setpoints and events at their current values when the profile stops. This allows you to stop a profile and continue running the chamber in manual mode.

Stop Profile (All Off): Stops the running profile and turns all events off. The setpoints will remain at their current values when the profile stops; however, the chamber will turn off. This allows you to immediately stop a profile and shut down the chamber with a single entry.

4.5.1 Hold/Resume a Profile

At any time during the operation of a profile, the profile can be manually put into hold. This stops the profile timer; however, the chamber continues operation under the current step settings at the time the profile was put into hold. To put a profile into hold, select “Hold Profile” from the Run menu and select “Yes” to put the profile into hold. To resume the profile at the point in which it was put into hold, select “Run Profile” from the Run menu and select “Yes” to continue the profile.

! *When a profile is in hold, the setpoints and events can be manually changed; however, once profile operation is resumed, the setpoints and event status will return to those defined by the step.*

4.5.2 Advance Previous/Next Step

The advance step functions allow you to skip certain profile steps or repeat them by advancing to the desired step. To advance to a previous or next step in the profile, the profile must be first put into hold. Once the profile is in hold, the advance step menu items are enabled under the Run menu.

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

4.5.3 Adjusting Step Time

During profile 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 profile must be first put into hold. Once the profile is in hold, the “Adjust Step Time” menu item is enabled under the Run menu.

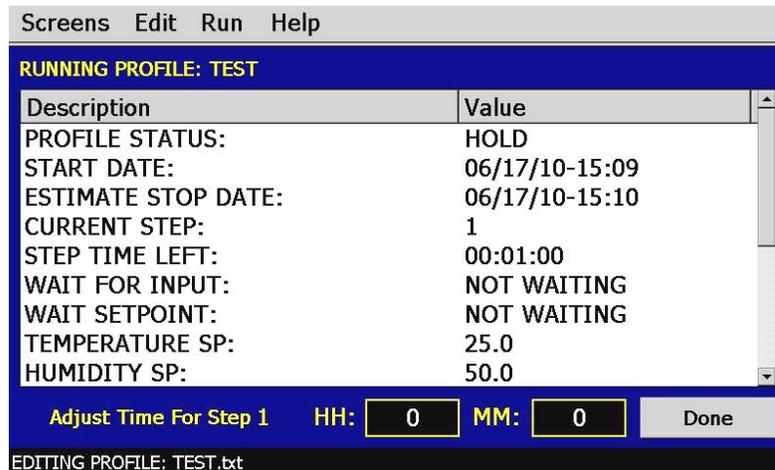


Figure 4-10 Adjust Step Time

When selected, the adjust time entry fields will be shown at the bottom of the Profile Status View screen. Enter the time in hours and/or minutes and press “Done” when finished. The time remaining in the step will be adjusted by the total time entered. Once complete, resume the profile by selecting “Run” from the run menu.

! *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 negative values for hours and/or minutes.*

4.6 Profile Status View

The profile status view provides all information regarding the operation of the current profile. It can be accessed from the main Profiles menu as well as the profile Screens menu.

Description	Value
PROFILE STATUS:	OFF
START DATE:	00/00/00-00:00
ESTIMATE STOP DATE:	00/00/00-00:00
CURRENT STEP:	0
STEP TIME LEFT:	00:00:00
WAIT FOR INPUT:	NOT WAITING
WAIT SETPOINT:	NOT WAITING
TEMPERATURE SP:	0.0
HUMIDITY SP:	0.0
PRODUCT SP:	0.0

Figure 4-11 Profile Status View

- Profile Status:* Displays the current operating mode of the profile (ramp, soak, etc.).
- Start Date:* Displays the date and time at which the profile was started.
- Estimated Stop Date:* Displays the calculated stop date/time of the profile. The estimated stop date can vary due to 'wait for' or guaranteed soak steps set in the profile.
- Current Step:* Indicates the step number currently being executed.
- Step Time Left:* Displays the time remaining in the current step.
- Wait for Input:* Indicates the input being monitored if a wait for condition is present.
- Wait Setpoint:* Indicates the setpoint or digital input number of the wait for condition.
- Target Setpoints:* Displays the step setpoints for each controlled process of the chamber, i.e., temperature, humidity, altitude, etc.
- Current Jump Step:* Dynamic field that is active only if the step is a jump step. Displays the step number that profile will jump to at completion of the step.
- Current Jumps Remaining:* Dynamic field that is active only if the step is a jump step. Displays the number of jumps remaining for the step.
- Last Jump from Step:* Dynamic field that is active only if a jump has been made. Displays the last step a jump was made from.
- Last Jump to Step:* Dynamic field that is active only if a jump has been made. Displays the last step a jump was made to.
- Total Jumps Made:* Dynamic field that is active only if a jump has been made. Displays the total count of all jumps made.

4.8 Frequently Asked Questions About Profiles

1. How do I start or run a profile?

To select and start a profile, you must be on the Profile Entry or Profile Status View screen. Using the Edit menu, choose the “Select Profile” menu item to open the list box containing all available profiles in the EZT’s memory. Open the desired profile from the list, and then select “Run” from the Run menu. Enter the desired start step and press the “Start profile” button.

2. How do I know which profile is running?

When a profile is running, the profile name is displayed on Profile Status View screen as well as the single and dual loop view screens. The EZT will indicate that the profile is running when the profile is in operation. If a profile is not running, the EZT will indicate which profile is loaded, i.e., currently in memory and ready to be started.

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

The profiler in the EZT-570i was designed to operate the chamber based on the defined profile. Since the chamber can be at random setpoints when a profile is started, this could cause the chamber to not follow the selected profile properly or the same each time it is run. To insure that the profile is executed in the same manner each time, the chamber setpoints are immediately set to the first step’s setpoints 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 profile. This eliminates the need for the operator to set the chamber to the proper setpoints prior to starting a profile.



For instances where only a single ramp is required, or a remote software package is being used to send ramping sequences to the EZT-570i, the profiler is designed to except a one step profile. If a one step profile is run, the chamber will ramp from its current setpoints to the setpoints of the step. It will not immediately take the setpoints of the step. Thus, by executing one step profiles, 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. How do I enter a jump step?

A “jump step” is a normal profile step; however, instead of continuing to the next step of the profile when the step is complete, the profile “jumps” to a specified step. To enter a jump, set the step number you want the profile to jump to, and the number of times that the jump is to take place, into the step you want to jump from. When that step is complete, the jump settings will tell the profile 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 profile will continue on to the next step of the profile.

5. Why is the profile not coming out of Hold?

If an alarm condition is present on the EZT, the profile is automatically placed into hold. The alarm condition must be cleared in order for the profile to resume operation.

6. Why is the profile not coming out of a Wait For?

When a “wait for” condition is applied to a step, the step will not begin until the wait for condition is met. If the wait for condition is an input to the EZT, the input must reach and/or exceed the wait for setpoint. If the input does not reach the setpoint, 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 for is applied to the ramp step, the profile will not continue because the setpoint will not change until the wait for condition is met, i.e., the ramp can not take place until the step is executed. Since the setpoint does not change, the input will not change to meet the wait for setpoint and the profile will wait indefinitely.

If the wait for condition is a digital input, the selected input must meet its configured transition state after the wait for has been initiated. If the input turns on or off before the wait for has begun, the profile will not continue because the change in state of the input must be seen after the wait for has been initiated.

7. Why does my profile not start immediately when “run” is selected?

When a profile is started, the EZT scans the profile and calculates the overall run length of the profile in order to provide an estimated date of completion. Depending upon the total number of steps in the profile (including the number of jump steps used), it may take the EZT a minute to process all of the steps in order to calculate this time. Profiles can easily reach into the 1000’s of steps when multiple jumps are used, and it takes time to process through all of the step data.

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

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

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

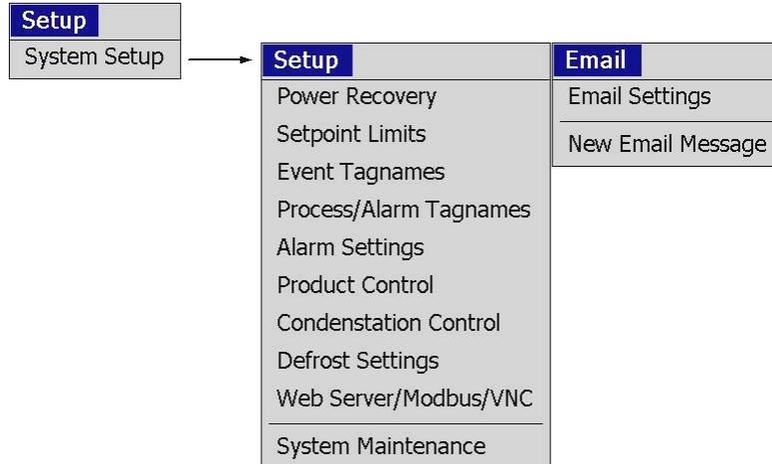
9. I have guaranteed soak turned on, why is the chamber not following the ramp step?

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 setpoint. 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 setpoint is no longer changing. It will hold at that setpoint until the input returns to the soak band.

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

5. System Setup

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



5.1 Power Recovery

The power recovery settings direct the EZT-570i’s response to the interruption of electrical power. The EZT-570i’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 Power-Out 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 Power-Out Time to this time. If power is returned in less time than this setting, the chamber will automatically continue operation where it left off. If it takes longer than the recovery time setting for power to be restored, it will take action based on the Recovery State selection.



Figure 5-1 Power Recovery

- Terminate** Select terminate to have the chamber default to the off state on power-up. If a profile was active prior to the power outage, the profile 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 profile was running, the profile 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 profile was running prior to the power outage, it will resume where it left off and continue through the rest of the profile.

- Reset** Select reset to automatically restart the profile that was running at power failure. Use this option if it is critical for a profile 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 profile was running prior to the power outage, the EZT-560i will advance forward through the profile to the point where it would be, at the current time, and resume operation from that point.

5.2 Setpoint Limits

The setpoint limits screen allows for the adjustment of the minimum and maximum operating setpoints allowed 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.

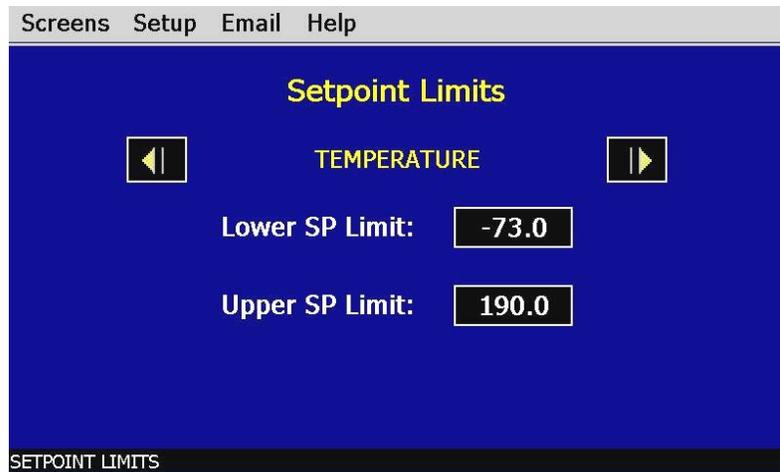


Figure 5-2 Setpoint Limits



The setpoint limits are factory set for the maximum safe operating range of the chamber. These limits are locked out from user adjustment by default at the factory. User adjustment of these limits, which exceed those limits set by the factory, may result in damage to system components and will void the chamber warranty.

5.3 Event Tagnames

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 Tagnames” from the Setup menu.

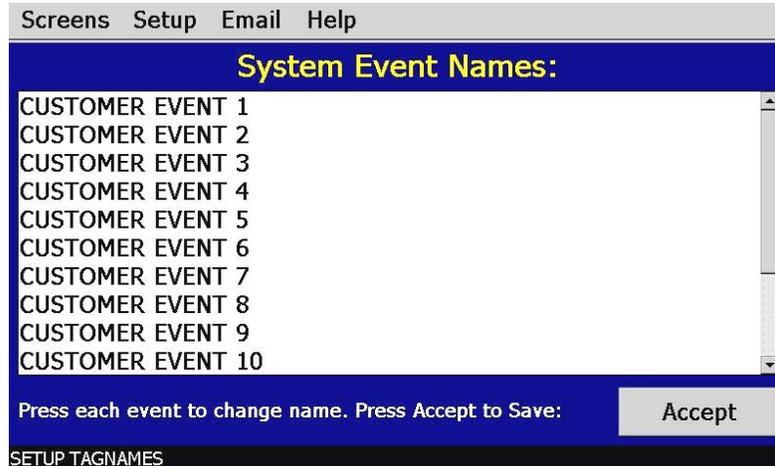


Figure 5-3 Event Tagnames

To change the name of the event, select the event by touching it in the list view. A keypad will appear allowing you to enter a new description (up to 16 characters long). Once complete, select “Done” and the new name will appear in the event tag name list box. Once all changes have been made, press the “Accept” button to begin using the new event names. If the changes are not accepted, the new tag names will not be used and the EZT-570i will continue to use the previous event names.

5.4 Process/Alarm Tagnames

The names of the optional monitor inputs as well as all loop and monitor alarm descriptions can be changed to indicate what function you have chosen for them to perform or what they are monitoring. To alter the tag names, select “Process/Alarm Tagnames” from the Setup menu.



Figure 5-4 Process/Alarm Tagnames

To change a tag name, select it by touching its current description. Use the keypad to enter a new description (up to 16 characters). Once complete, select “Done” and the new name will appear in the tag name list field. Once the change is complete, press the “Set” button to save the changes to memory and begin using the new tagname and/or alarm message. If the changes are not accepted, the new descriptions will not be used and the EZT-570i will continue to use the previous labels.

5.5 Alarm Settings

The EZT-570i provides 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.

The screenshot shows the 'ALARM SETTINGS' screen for 'TEMPERATURE'. At the top, there are navigation arrows and an 'Accept' button. The settings are as follows:

- Alarm Type: NO ALARM
- Alarm Mode: SELF CLEARS
- Select: AUDIBLE OFF
- Output Assign: NOT USED
- Low SP: -80.0
- Hi SP: 200.0
- DB: 1.0

Figure 5-5 Alarm Settings

Alarm Type

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

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

 *The deviation alarm type is not available for the optional monitor inputs. The monitor inputs are not associated with a control setpoint.*

Alarm Modes

Self Clear/Latching: A latched alarm will remain active after the alarm condition has passed. It can only be deactivated by the user. An alarm that is not latched (self-clearing) will deactivate automatically when the alarm condition has passed.

Close/Open on Alarm: An open on alarm condition means that the event output assigned to the alarm will be energized in a non-alarm condition, i.e., fail-safe. A close on alarm settings means that the output is normally open and will close in an alarm condition.

Annunciate On/Off: This is used to control the method by which an alarm is reported. When the annunciate alarm is on, an alarm condition will trigger the audible horn on the chamber and the screen background will turn red to indicate the alarm condition. The audible alert must then be manually silenced by pressing the silence button on the alarm monitor screen.

If the annunciate alarm is off, there will be no audible signal when an alarm condition is present. In addition, if the alarm is set to self clear and continue (see below), the screen background will not turn red. 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 screen background will turn red in order to provide a visual alert to the operator that user intervention is required.

Shutdown/Continue: An alarm set to continue will not affect the operation of the chamber when in alarm condition. If the alarm is set for the shutdown mode of operation, the chamber will turn off all systems in an alarm condition. If a profile is operating, the profile will also go into hold.

Output Assignment

If the EZT-570i is equipped with the customer event option, the alarm can be assigned to one of the event outputs. Utilizing the “close on alarm” or “open on alarm” mode settings, the event output will turn on and off with the alarm it is assigned to.

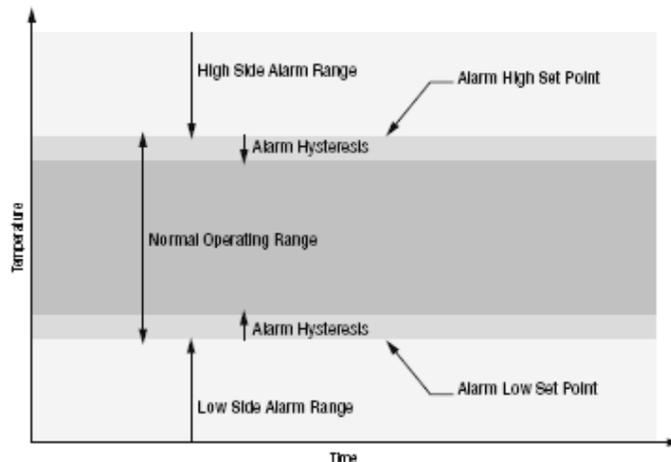
 *The event output must be configured to be used as an alarm output. If the alarm output selected is not configured to be an alarm output, it will not function according to the alarm settings. See Section 8.7.6, Digital Outputs, for information on how to configure the operational mode of the customer event outputs.*

Alarm Setpoints

High Setpoint (Hi SP): The alarm high setpoint defines the process value that will trigger a high side alarm. It must be higher than the alarm low setpoint.

Low Setpoint (Low SP): The alarm low setpoint defines the process value that will trigger a low side alarm. It must be lower than the alarm high setpoint.

Hysteresis (DB): An alarm state is triggered when the process value reaches the alarm high or alarm low setpoint. The alarm hysteresis or deadband (DB) defines how far the process must return into the normal operating range before the alarm can be cleared:



5.6 Product Control

If the chamber is equipped with a product control loop, this screen will be accessible from the System Setup menu.

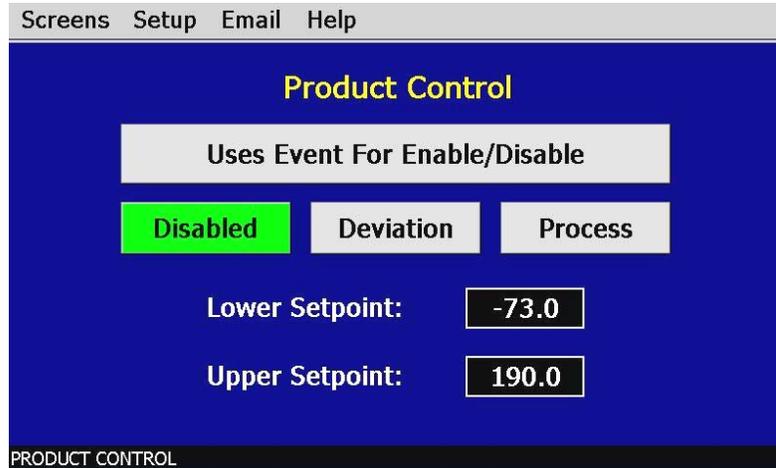


Figure 5-6 Product Control

Product control is a control strategy in which one control loop provides the setpoint 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 setpoint 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 this rate of heat transfer.

The product control feature can be used to speed up this process and insure 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 setpoint for product temperature, generates a setpoint for the air temperature control loop. This setpoint 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 setpoint is calculated.

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

Process: This mode uses the lower and upper setpoints as the upper and lower range of the air temperature setpoint. The output of the product control loop is then used to calculate a linear setpoint between these two values in order to provide the setpoint for the air temperature loop.

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

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 setpoint 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 setpoint 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 “use event for enable/disable” button is chosen in addition to the product control mode.

Uses Event For Enable/Disable: When this 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.



The use event for enable/disable selection allows product control to be turned on and off during different steps of a profile or from the manual event screen without having to disable it altogether. This can be a useful function for varying product testing in which specific profiles are used for different product tests. It allows a profile, where product control is required, to turn it on through the event when run, and does not require the operator to insure that the correct control mode is selected.

5.6.1 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.

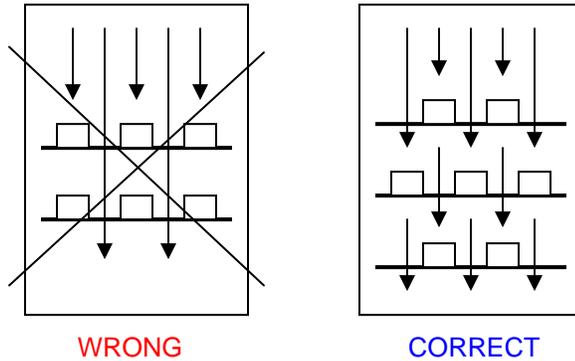
5.6.1.1 Should I Use Product Control for My Test

It is important to remember that it is the chamber air that is adding or removing heat from your product, and that in order to do this, there must be a difference in temperature between them. The larger this difference, the more heat that flows. In addition, the more air moving across your product, the more heat that 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 profile 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 profile is an unknown, the exact settings for every situation can not 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.

5.6.1.2 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 setpoint.

In determining the upper and lower setpoint 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 setpoint, 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 setpoints.

Deviation Control

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

Therefore, as the product setpoint is changed, the deviation band changes with it so you always maintain an air temperature control range around the product setpoint. This provides a stable and accurate control method throughout the product's test range. Knowing what values to set for the lower and upper setpoints 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 setpoint (no product control) to the upper test setpoint and then the lower test setpoint 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 setpoint. The upper setpoint should then be set to four times that difference.

The reason for the larger offset on the heating side (upper setpoint) is due to the fact that when air temperature increases, its density decreases. Cooler air is denser and thus has a 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 setpoint limits that the air temperature is allowed to reach regardless of the product temperature setpoint.

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 setpoints to 75 and -25. The air temperature loop will then be sent a setpoint between 75 and -25 regardless of what the product setpoint is. This will maximize the rate of change of the product temperature by allowing the air temperature setpoints to reach maximum limits. However, once the product reaches setpoint, the larger air temperature control range may cause undesired oscillation once setpoint is achieved.

5.6.1.3 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 setpoint. The upper setpoint 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 setpoint 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 setpoint and use three times the deviation for the lower setpoint. 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.

5.6.1.4 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 insure the quality of your product. However, it is important to consider all of the factors that may affect the test results.

Product Sensor Placement

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.

Humidity Control

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 affect 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 dependant 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 setpoint adjustments may be required.

5.7 Condensation Control

The optional condensation control feature is for situations in which condensation is undesirable or detrimental to the product being tested. When enabled, the rate of rise in temperature is limited in order to allow the humidity control system to strip moisture from the chamber in order to keep the dewpoint of the air below the product temperature. If the dewpoint of the air were to exceed the product temperature, moisture could form on the product's surface.

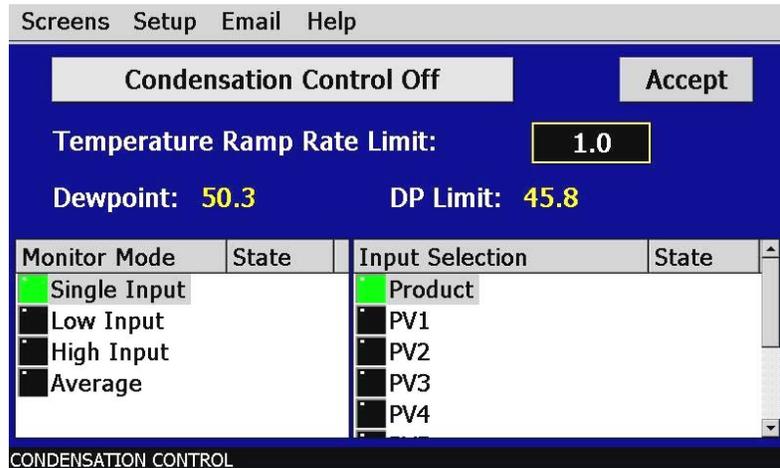


Figure 5-7 Condensation Control

There are many factors that can affect the performance of the chamber including product placement, mass of product and air distribution throughout the chamber. The required ramp rate limit will be affected by these factors. It may take a little trial-and-error to determine what setting is best for your testing needs.

Ramp Rate Limit: Adjustable ramp rate limit. Valid range is from zero to 10.0°C (18.0°F). Note that a limit setting of zero will have no limiting affect on rate of rise.

Dewpoint: Read only parameter which displays current dewpoint of the air within the chamber.

DP Limit: Read only parameter which displays the maximum dewpoint that can be maintained without causing condensation on product.

Monitor Mode: Defines the method of part temperature monitoring.

Single Input: Uses single input, i.e., single sensor located on part.

Low Input: Uses input with the lowest part temperature.

Hi Input: Uses input with highest part temperature.

Avg: Uses average of all selected part temperature inputs.

Input Selection: Used to select which inputs will be used for monitoring part temperature. Note that the standard system has only one selection, the product control loop input. If the EZT-570i is equipped with the input monitor option, the additional inputs will be listed for selection.

5.8 Defrost Settings

These settings will be available on chambers equipped with the hot-gas defrost option. This option is typically provided on systems that must operate at ultra-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 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.

Hot-gas 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 prechills 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-570i will monitor the conditions of operation and automatically start defrost based on the parameters the user has entered.

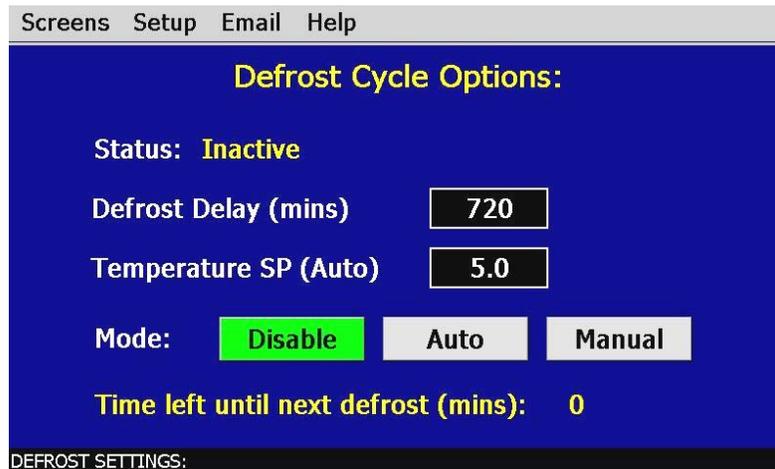


Figure 5-8 Defrost Settings

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 setpoint temperature, the delay timer will be reset and the countdown will begin anew the next time the chamber temperature drops below the setpoint.

This prevents defrost from starting at temperature above which ice does not form on the cooling coils.

5.9 Web Server/Modbus/VNC

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



Figure 5-9 Web Server/Modbus/VNC

The **Modbus Add/Parity** settings are used to configure the EZT-570i's serial interface. The Modbus address sets the address of the EZT-570i on the serial communications link. Valid addresses are 1 to 31. The parity setting allows the EZT-570i's serial port to be set for even, odd or no (none) parity.

The **Modbus Timeout** setting is used to adjust the timeout of the EZT-570i's serial interface.

The **VNC Add/Pwd** settings are used to configure the EZT-570i's VNC server. The VNC address sets the address of the EZT-570i in the server. Valid addresses are from 0 to 255. The VNC password selection defines the connection mode for the server. The selections are none and "pwd" which requires users to enter the password when logging in to the EZT-570i over the VNC interface.

The **VNC Device Name** field is used to enter a name (up to 35 characters) that can better identify the chamber for 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 28 characters) that a user must enter for the VNC interface to connect to the EZT-570i if the VNC password is enabled.

The **Web Server On/Off** button is used to enable or disable the EZT-570i's web server. When the server is enabled, the button will be green. When the button is gray, the web server is disabled.

The **VNC Server On/Off** button is used to enable or disable the VNC server. When the server is enabled, the button will be green. When the button is gray, the VNC server is disabled.

The **Device IP Address** shown in the status window at the bottom of the screen, provides the IP address of the EZT-570i which is required for connecting to the VNC and web server interfaces.

 *Any changes made to the communications settings must be saved in order for them to take affect. When changes are completed, press the "Save" button, and then cycle power to the EZT-570i. The new settings will only take affect when the EZT-570i boots up.*

5.10 Email

The EZT-570i 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. Whenever an alarm occurs, the EZT-570i will send an alert to the specified address for each user in the list.

5.10.1 Address Entry

Select the "Address Entry" tab to add new addresses to the system. For each entry, enter the recipient's name, email address and/or SMS address (up to 50 characters each). Then check the email alarms and/or SMS alarms check box(es) to specify which address(s) the alarms are to be sent to. Press the "Create Address" button to add the user to the list.

Figure 5-10 Create Email Address



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. Below are common examples for some of the more common cell phone providers. 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.

Cell Phone Provider	Maximum message length	SMS Address to use (where 0123456789 is an example for a 10 digit cell phone number)
Cingular	150 characters	0123456789@mobile.mycingular.com
Cingular (GSM)		0123456789@cingularme.com
Cingular (TDMA)		0123456789@mmode.com
Nextel (now part of Sprint Nextel)	140 characters	0123456789@messaging.nextel.com
Sprint		0123456789@sprintpaging.com
Sprint PCS (now Sprint Nextel)	160 characters	0123456789@messaging.sprintpcs.com
T-Mobile	140 characters	0123456789@tmomail.net
Verizon	160 characters	0123456789@vtext.com
Verizon PCS		0123456789@myvzw.com

5.10.2 Email Addresses

Selecting the “Email Addresses” tab allows the user to view the list of addresses entered into the EZT-570i. By using the scroll bar at the bottom of the list box, you can view the name, addresses, and notification selections for each user. 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.



Figure 5-10 Email Addresses

5.10.3 Email Settings

The “Email Settings” tab provides access to the email server configuration, which is how the EZT-570i is able to connect and send email messages over its network connection. Each field can be entered with up to 50 characters.

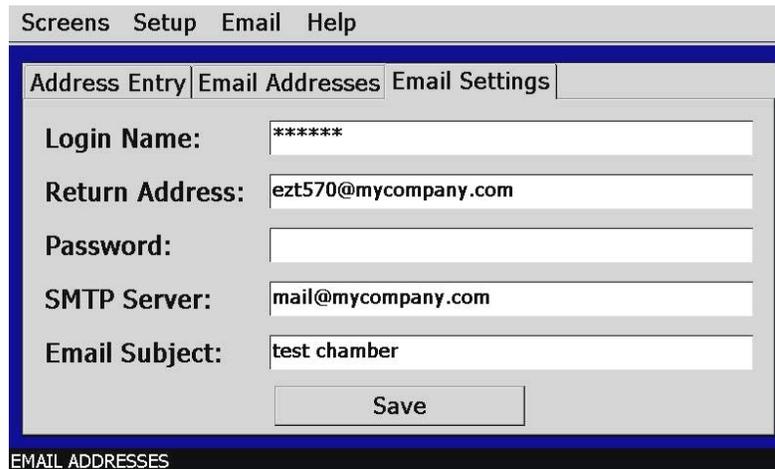


Figure 5-11 Email Settings



These settings may require authorization and/or assistance from your system administrator. Contact your system administrator for proper settings and network authorization from your network server (if required) to allow the EZT-570i to send email/SMS text messages.

Login Name: The login name is the name required for the EZT-570i to log into your company's mail server. You can use your login if one is not set up specifically for the EZT-570i on your network. The login name will be displayed in password format as "*****" for security. Contact your system administrator for assistance.

Return Address: The return address is the address given for the EZT-570i on your company's mail server. The EZT-570i does not except 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-570i on your network. Contact your system administrator for assistance.

Password: The password field is used for entering a password, if required by your network server, to send email. Typically a password is not required for sending email, only to receive email. The password will be displayed as "*****" for security.

 *If a password is required, it is recommended to contact your system administrator and have them set up an account specifically for the EZT-570i for security purposes.*

SMTP Server: This 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 the EZT-570i access. Contact your system administrator for assistance.

Email Subject: This 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.

 *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 chamber on the factory floor.*

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

 *The EZT-570i must have a valid connection to your network for the email server to operate. The EZT-570i receives its IP address from DHCP on your network and this only occurs during boot. Therefore, make sure the EZT-570i is properly connected to your network and cycle power to the EZT-570i in order to obtain a valid IP address and be properly connected to the network.*

5.10.4 Sending Email Messages

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



Figure 5-12 Send Email Message

Press the “Compose” button to create a brief message using the pop-up, text keypad (up to 100 characters). The completed message will be shown in the message window. Press the “Send” button to access the “Select Email Address” window and select the email recipients you wish to send the message to.



Figure 5-13 Select Email Address

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

6. Security

The EZT-570i provides an enhanced array of security features. The 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 levels of users are provided which include system, operator, supervisor and administrator levels. Specific access rights can be assigned to each user level as well as password aging for each user.

Re-authentication is provided (if enabled) for any parameters that will change a control parameter which could upset the process (i.e. setpoint, tuning, etc...). Re-authentication 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 re-authentication 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 control setpoint on any loop the system will require another login (by an authorized user for that level) before the control setpoint is actually changed. This provides an extra level of protection to make the system more "tamper proof".



Default **UserID** is "FACTORY".
Default **Password** is "CONTROL"

6.1 Security Setup

All security parameters are accessed via the Security menu.

Security
Setup
Log On System
Log Off System
View Audit Trail
View Current User
Change Password

6.1.1 Add User

The “Add User” tab provides the ability to add up to 30 users to the system. Select the type of user from the “user group” drop down list (System, Operator, Supervisor or Administrator). Press each field to add the user ID, full name and password (no spaces allowed with a 4 character minimum and 16 character maximum). If the password and confirm password entries do not match, or the user ID is already used, the EZT-570i will alert the operator and not accept the entry.

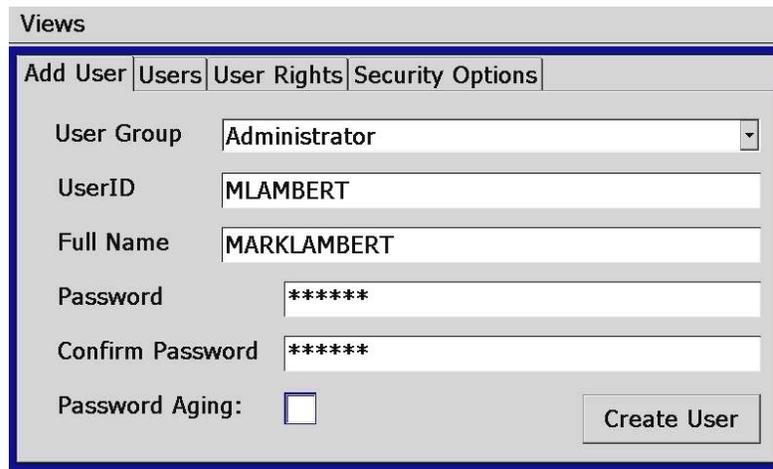


Figure 6-1 Security (Add User)

Check the password aging checkbox if you wish to enable password aging for the user. If password aging is enabled and the password has expired, a new password must be entered for the user by the system administrator before that user can log into the system again.

! *The system administrator can not use the “Password Aging” option. This will lock the administrator out of the system, thereby preventing the system administrator from managing passwords for the system users. The EZT-570i will prevent administrators from using this option.*

6.1.2 User List

The “Users” tab provides the administrator 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 the password for each user can also be changed from this area.

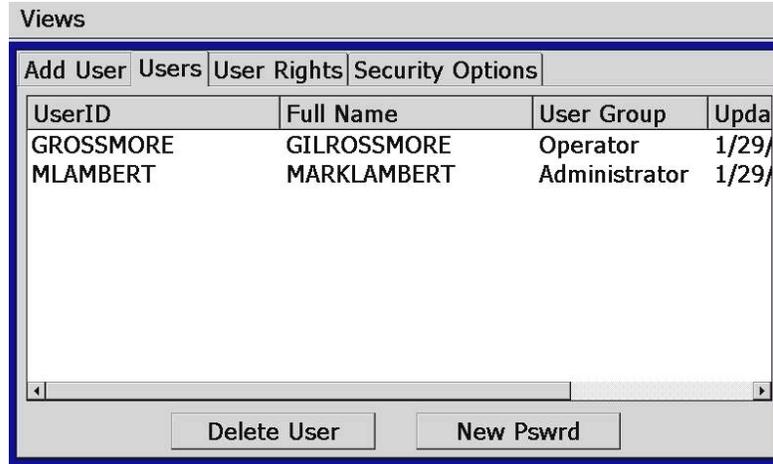


Figure 6-2 Security Users List

6.1.2.1 Delete User

The administrator can delete a user by selecting the user from the list. To select a user, touch the UserID in the list box. The selected user will then be highlighted blue. Press the “Delete User” button to remove the user from the system.

6.1.2.2 Change User Password

The administrator can also change the password of a user in the system. This may have to be done if password aging is set up for the user or for other security reasons. To change a password, select the user by touching the UserID in the list box and press the “Change Pswrd” button. Enter the new password and confirm the password. Press the “Accept” button to assign the new password or “Cancel” to exit the screen without altering the current user password.

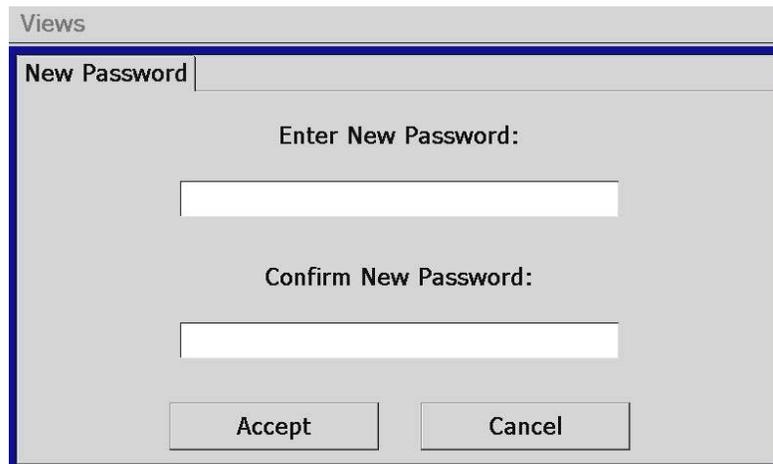


Figure 6-3 Change User Password

6.1.3 User Rights

The “User Rights” tab provides the administrator the ability to assign rights to each user level (System, Operator, Supervisor and Administrator). Select the user group from the drop down box and then enable or disable the “User Rights” by selecting the checkbox next to the function. If the checkbox is selected, the user right will be enabled for the user level currently being edited.

The “Select All” and “Clear All” buttons will select or clear all rights in the “user rights” list view. You must press the “Accept” button for each user level to save the selections for that user group, before selecting another user group from the drop down list, or entries made will not be saved.



Figure 6-4 Security User Rights

! You must have at least one user with administrator access and the “Access Security” right option enabled in order to turn on security. There is no “back door” to the system. If the password is lost or forgotten, you must contact Cincinnati Sub-Zero’s Service Department for support.

6.1.3.1 User Group Access Rights

The following table describes the available user rights provided by the EZT-570i security module, what permissions are granted by them and where they apply.

User Right	Menu Location	Description
Trend Setup	Views\Loop\Monitor Trends	configure PV, SP & % output, scale & time for Trend
Email Settings	Setup>Email>Email Settings	configure email settings and addresses
Change Setpoints	Views\Single, Dual & All loop View	temperature, humidity, product, etc., setpoints (does not apply to alarm corresponding setpoints)
Open Files	see description	Alarm, Profile, Audit & Historical files
Save Files	see description	Profile “save” and “save as”; note files may be copied from system with File Utilities
Delete Files	see description	Historical Data files & Profiles; note files may be deleted with File Utilities
Edit Profiles	Profiles\Profile Entry	no data entry or access to Events/GS/Wait for, step setpoint/time fields or GS Soak Limits, Auto Start Profile; can't insert/delete/copy/paste step.
Edit Bargraphs	Views\Single Loop View	configure bargraph settings per loop
Adjust SP Limits	Setup\Setpoint Limits	Temperature, humidity, product, etc., min/max setpoint limits (does not apply to alarm setpoints)
Adjust Alarms	Setup/Alarm Settings	applies to all loop and monitor input alarms
System Event Control	Views\System Event Control	applies to enable or disable manual events

User Right	Menu Location	Description
Touch calibration	Setup\Offline\Calibrate Touch Screen	access to touch calibration is required for obtaining MAC address, serial port & backlight settings
Silence Alarms	Views\Alarm Monitor View & System Status Monitor; Silence button	prevents alarms from being acknowledged and the audible alarm from being silenced
Clear Alarms	Views\Alarm Monitor View; Clear button	prevents alarm list view from being cleared
Data Logging and Settings	Log/	applies to all data logging actions & settings; does not affect digital input functions
Start/Stop/Hold Profiles	Profiles\Run, Hold, Stop actions	applies to all profile control functions
Profile Power Recovery	Setup\Power Recovery	applies to setting recovery mode and power-out time
Access Security	Security\Setup	applies to security setup
Exit Application	Setup\Offline\Exit Application	prevents EZT-570i application from being stopped
Condensation Settings	Setup\Condensation Control	configure ramp rate limit, monitor mode and input selections
Defrost Settings	Setup\Defrost Settings	configure defrost delay, temperature setpoint and mode settings
File Utilities	Log\Edit\File Utilities	allows USB I-stick memory to copy/delete historical, alarm, profile & audit trail files & to import profiles
Offline Mode	Setup\System Maintenance	access to offline menu system: Degrees C/F, Maintenance Items, Maintenance Items Setup, Set Date\Time, Calibrate Touch Screen, Help\Language, Special Settings, Exit Application, Monitor Input Offsets, Analog Input & Output Setup, Digital Input & Output Setup
Change Units	Setup\System maintenance\Degrees C/F	temperature units configuration - C/F
Maints Setup	Setup\System Maintenance\Maintenance Items Setup	Maintenance Counter Setup; elapsed interval, life total and alert settings
Set Date/Time	Setup\System Maintenance\Set Date\Time	Set Date/Time, Time Zone, DST and NTS connection
Edit Cascade Mode	Setup\Product Control	configure use event for enable/disable, control mode and lower/upper setpoints
Monitor Points Offset	Setup\System Maintenance\Monitor Input Offsets	enter bias for monitor inputs
Analog Outputs	Setup\System Maintenance\I/O\Analog Output Setup	configuration of PV, SP or %out retransmission from chamber control loops
Web/Modbus/VNC Settings	Setup\Web Server/Modbus/VNC	configure web page, Modbus address, parity & VNC settings
FTP Settings	Log\Edit\FTP\WAN Setup	configure FTP client settings
NTS Clock Settings	Setup\System Maintenance\Set Date\Time	enable & choose National Time Server location
DST Settings	Setup\System Maintenance\Set Date\Time	enable Daylight Savings Time (DST)
Config Analog Inputs	Setup\System Maintenance\I/O\Analog Input Setup	configure Analog Input(s) to act as remote set points for specific loops
Config Digital Inputs	Setup\System Maintenance\I/O\Digital Input Setup	configure optional digital input functions
Config Digital Outputs	Setup\System Maintenance\I/O\Digital Output Setup	configure optional customer event output functions
Help\Voice Assistance	Setup\System Maintenance\Help\Voice Assistance	Select language and adjust volume for help
Edit Special Settings	Setup\System Maintenance\Special Settings	access to optional special settings
Auto Tune Enable/Disable	Views\Single Loop View	enable or disable loop auto-tune (AT button)
User Composed Email	Setup\Email\New Email Message	access to compose & send email message
Add Operator Events	Log\Edit\Add\View Operator Events	access to add operator events to active log file
Add Digital Signatures	Log\Edit\Add\View Digital Signatures	access to add digital signature to historical data file
Verify Digital Signatures	Log\Edit\Add\View Digital Signatures	access to verify digital signature of historical data file

6.1.4 Security Options

The “Security Options” tab provides the administrator the ability to set the global security options.

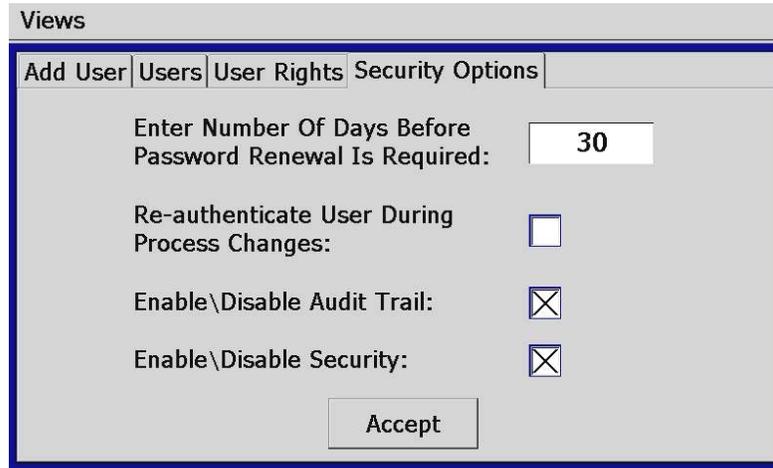


Figure 6-5 Security Options

Enter Number Of Days Before Password Renewal Is Required

This is a global setting for all users. If the user was created with password aging enabled, password aging takes affect from the day the user is entered into the system. The time period can be set from 1 to 365 days.

Re-authenticate User During Process Changes

This feature requires that the logged in user must log in again before the entered value will actually be changed.

Enable\Disable Audit Trail

This is a global setting that turns the audit trail on or off. When the audit trail is turned on, all operator actions are written to a daily log (security must be enabled for this feature).

Enable\Disable Security

This is the global setting that turns the EZT-570i security system on or off.

6.2 User Log On/Off

When security is enabled, a user must log on to the system in order to gain access to privileged items. To log on to the system, select “Log On System” from the Security menu. Enter the user “UserID” and “Password” on the login screen and press “Done” when finished. If the entries made are valid, the user will be logged onto the system. In order for a user to log off the system, select “Log Off System” from the Security menu.

6.3 View Audit Trail

The “View Audit Trail” selection from the Security menu allows the user to view all audit trail files stored in memory. This selection opens the audit trail viewer. Press the “Open Audit Trail” button to open the explorer window. Select the desired audit trail file and press the “Open” button. The audit trail files are stored by date. One file will be created for each day. If no activity occurred during a given day, no file will be available.

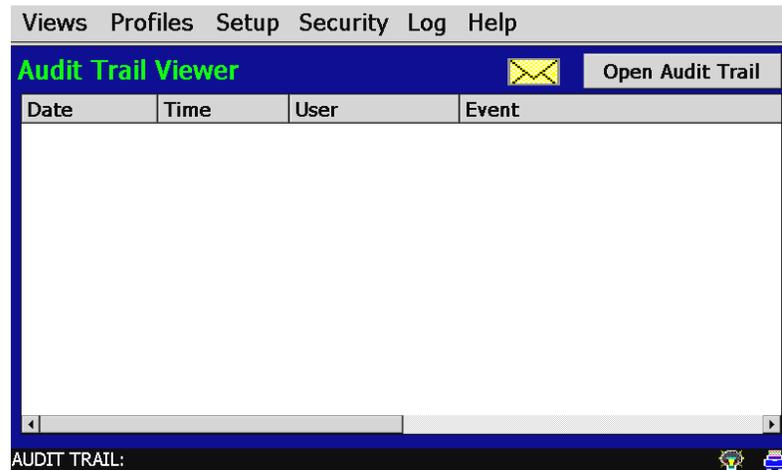


Figure 6-6 Audit Trail Viewer

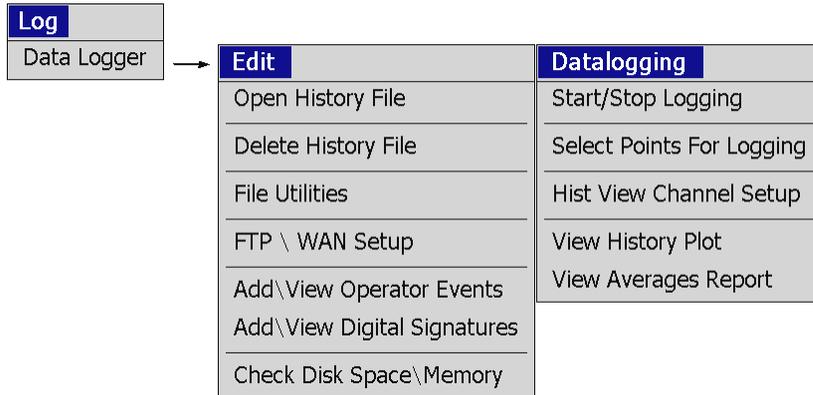
The email icon  provides the ability to send a copy of the currently opened audit trail file to any of the email addresses entered into the EZT-570i. When the email icon is pressed, an “Add Recipients” window will be displayed where the user can select the recipients for the file from any of the email addresses programmed in the EZT-570i. For information on how to add email recipients to the EZT-570i, see Section 5.10, Email.

6.4 Current User

The “Current User” selection merely provides a means of identifying the current user logged into the system. If none of the users configured in the system are logged on, the current user will be displayed as “CSZ System”.

7. Logging

The EZT-570i logging features are accessed via the “Log” menu item. The system data logging provides the ability to select individual points for logging, view datalog files and start/stop logging operations. The logging ability of the EZT-570i provides an easy-to-use, convenient method to obtain electronic data without the need for additional equipment.



7.1 Start/Stop Logging

The main system data logging screen is used to start and stop the logger, set the logging rate and add a prefix to the file name. Batch and Lot numbers can also be added from this screen. File names are automatically generated using a mm_dd_yy_hh_mm_ss format. To enter Filename, Batch and/or Lot information, touch the appropriate field and enter the desired values (up to 16 characters each) and the files will be saved as Filename_Batch_Lot_mm_dd_yy_hh_mm_ss.

! If “log during profile run” is selected under the logging setup, the entry in the Filename field will be ignored and the profile name will automatically be used as the filename prefix for the log file.

To manually start the logger, press the “Logging On” button (log points must be assigned first by selecting the “Select Points For Logging” menu item). Any time logging is operational, the “Logging On” button will be green; otherwise, the “Logging Off” button will be green to indicate logging is off.

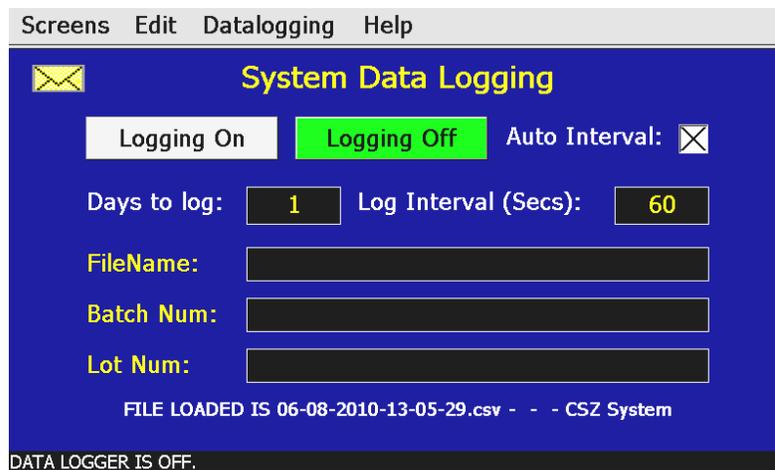


Figure 7-1 Start/Stop Datalogging

The logging rate can be adjusted on this screen by changing the values for the “Days to log” and “Log Interval” parameters. These allow you to select how long the data file will be as well as what logging rate to use.

Days to log: The length of a data file 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.

Log Interval (Secs): When the “auto” checkbox is selected, 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-570i’s data viewer.

The logging rate can also be manually set to any rate between 6 and 1860 seconds in any combination with the number of days before a new file is started. To do this, de-select the auto logging rate field and enter in the desired logging rate in seconds.

 *Logging at shorter intervals allows the EZT-570i to capture fast changing processes within the chamber, but the data files can become large. Files that exceed the capability of the EZT-570i’s data viewer will have to be extracted from the EZT-570i using a USB memory stick or FTP file transfer in order to be viewed remotely on a PC.*

These files are also not able to be digitally signed by the EZT-570i. If the files are to be digitally signed, this must be done using the data viewer program on a PC.

The email icon  provides the ability to send a copy of the currently opened historical data file to any of the email addresses entered into the EZT-570i. When the email icon is pressed, an “Add Recipients” window will be displayed where the user can select the recipients for the file from any of the email addresses programmed in the EZT-570i. For information on how to add email recipients to the EZT-570i, see Section 5.10, Email.

 *The email utility has a file transfer capacity of 500KB. Files that were created using a user set log rate can easily exceed this file size. 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 Select Points for Logging

The “Select Points for Logging” screen allows the user to select any point(s) from the system for data logging. The “Select All” and “Clear All” buttons provide a quick way to select or deselect all points in the system.

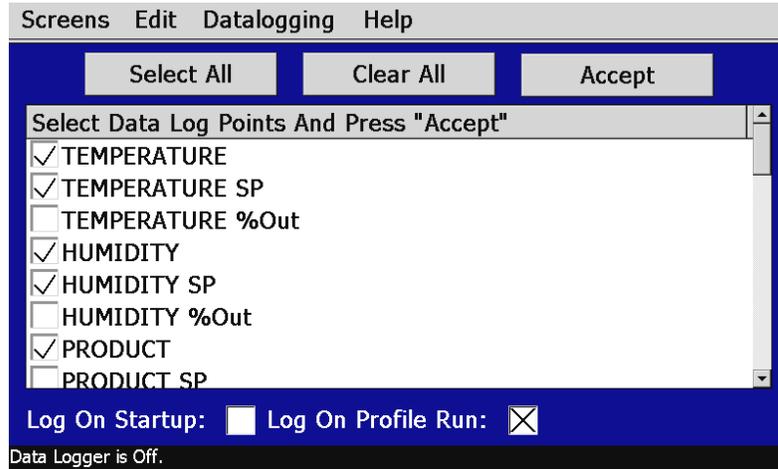


Figure 7-2 Logging Setup

Use the checkbox to enable/disable a point for logging. When selections are completed, press the “Accept” key to write the point selection to memory. This is important so that the EZT-570i saves the settings for power-up operation. New settings will not take effect until the “Accept” button is pressed.

Log On Startup: The log on startup option automatically turns logging on whenever the chamber is powered on.

Log On Profile Run: The log on profile run option is a convenient method for gathering information that pertains only to the operation of a profile. When selected, the EZT-570i will turn the logger on at the beginning of a profile and off once the profile is completed.



The EZT-570i will automatically use the profile name as the prefix for the log file. This provides an easy identifier for log files that pertain only to a profile run.

7.3 History Files

Historical files are stored on the internal SD memory card of the EZT-570i. The files can be opened and viewed in a trend graph. The data logging “Edit” menu provides four options for handling stored historical files.

- Open History File:** Allows the user to select a history file for review.
- Delete History File:** Allows the user to delete the currently selected history file. This function will not delete a currently running data file.
- File Utilities:** Allows the user to copy files to a memory stick from internal storage as well as delete files. See Section 7.4, File Utilities, for more information.
- FTP \ WAN Setup:** Allows the user configure the EZT-570i to automatically back-up data files to a designated FTP server and erase local copies of files. See Section 7.5, FTP\WAN Setup, for more information.

7.3.1 Viewing Historical Data

In order to view a historical data file, it must first be selected by using “Open History File” from the Edit menu. Once the file has been opened, the user has the ability to adjust the time period to plot from the file and select what points from the file are to be plotted.

 *If a data file is too large for the EZT-570i’s viewer, a message box will indicate that the file must be retrieved by using the FTP server or a memory stick for remote viewing on a PC. If regular logging operations generate files of a large size, it is recommended that the files be removed from the EZT-570i after retrieval to keep memory usage under control for continued data logging operation.*

7.3.1.1 History View Channel Setup

The history view channel setup allows the user to select any time frame from the historical data file as well as select up to 8 channels of data from the file to plot. The start and end dates for the currently loaded file are shown along with file ‘Start’ and ‘End’ sliders which are used to select a time span from the file to plot. The minimum time for plotting data is 5 minutes.

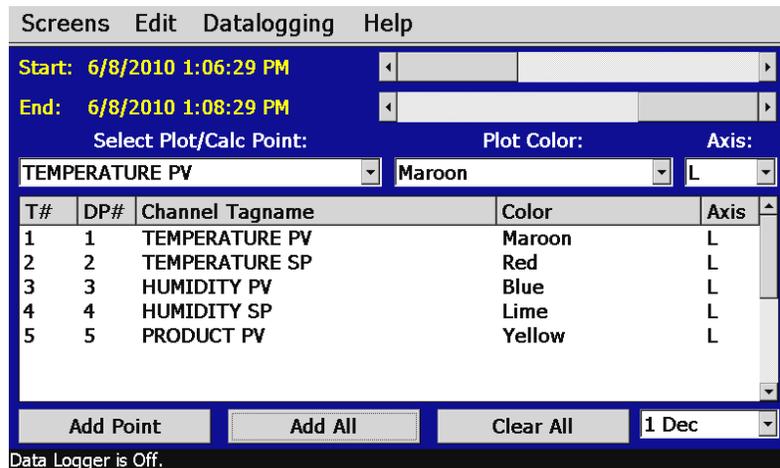


Figure 7-3 History Plot Channel Setup

Any point from the data file can be selected along with the color and vertical axis to be used for each channel to be plotted. Use the drop down boxes to select a channel for the plot, the color to use for the channel and whether to use the left or right axis for the plot range. Press the “Add Point” button to add the point to the current list of historical plot channels.

The “Clear All” button will clear the list of all points so a new group can be added for plotting. The “Add All” button can be used to automatically add the first 8 data points from the historical log file to the channel plot list. Note that all channels are assigned to the left axis when using this feature.

7.3.1.2 Plotting Historical Data

The “View History Plot” screen plots the data from the currently opened history file according to the selections made on the History View Channel Setup screen. If a file has not been opened or data points have not been assigned for the plot, the EZT-570i will alert the user to make the necessary selections prior to creating the plot. The ‘X’ and ‘Y’ axis scales are set to auto-scale based on current values for each plot so no user action is required.

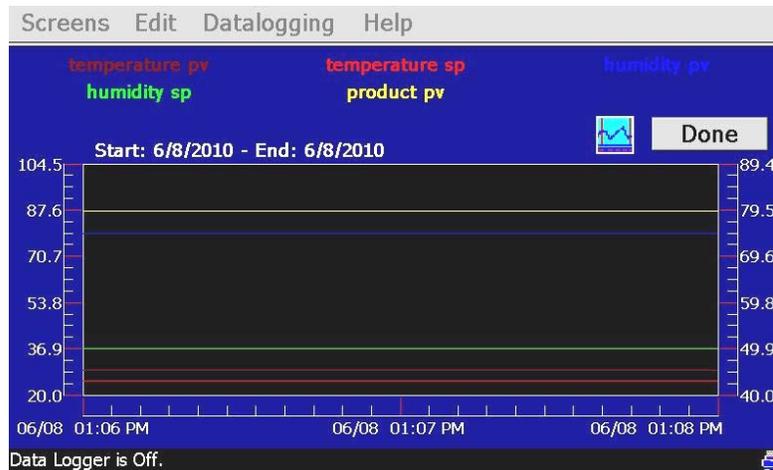


Figure 7-4 History Plot

The “cursor” icon (small trend icon with vertical bars next to the ‘Done’ button) displays a vertical data cursor that can be dragged (from the bottom of the cursor) from left to right in the trend area. When this vertical cursor is dragged, the trend labels at the top of the screen change to the actual values that correspond to the point the vertical cursor line is positioned over. This feature makes it very easy to “zero in” on any actual value within the trend plot. Pressing the cursor icon again will make the trend cursor disappear. The icon acts as a toggle button to show/hide the data cursor.



When finished viewing the historical data, you must press the “Done” button to exit the historical plot and return to the main data logging screen.

7.3.2 View Averages Report

The “View Averages Report” provides a text report that displays the average value over time for each channel selected in the “History Plot Channel Setup” screen for the period of time specified for the plot. The report supplies the average value for each channel over time as well as the combined average for all channels selected. This is a useful tool when used with the monitor option because it can be used for analyzing temperature uniformity within the chamber or within the product under test.

To view the averages report, select “View Averages Report” from the Datalogging menu.

Tagname	Timed Totals	Min Value	Max Value
TEMPERATURE PV	29.2	29.2	29.2
TEMPERATURE SP	25.0	25.0	25.0
HUMIDITY PV	74.5	74.5	74.5
HUMIDITY SP	50.0	50.0	50.0
PRODUCT PV	87.1	87.1	87.1
AVG OF ALL CHANNELS	53.2		

Figure 7-5 Averages Report

7.4 File Utilities

The “File Utilities” screen allows the user to copy and erase files from the EZT-570i’s internal storage memory. The basic file utilities, allow complete file directories for all EZT-570i file types to be copied to the USB memory stick and erased from the internal memory card. Complete status for file functions as well as progress bar status is displayed for the operator during copy/erase operations.

It is important to note that the files (data log files, alarm history files and audit files) require periodic maintenance. After a period of time, storage devices fill up and files require backup or file deletion when no longer needed. The “File Utilities” section of the EZT-570i provides all the functionality required for maintaining the internal storage memory. The internal memory card should not be removed from the EZT-570i interface. Any change to the directory structure (moving or deleting files) will cause the EZT-570i interface to stop operating and a new memory card will need to be ordered. Never move or delete files unless using the EZT-570i file utilities.

To copy files to the USB memory stick:

Insert the USB memory stick into the EZT-570i’s USB port. Select the file type you wish to copy from the “Select Export Type” drop down menu. Available file selections are profile files, alarm files, audit trail files and data files. Once the selection is made, press the “Copy Files” button. All related files will be copied to the USB memory stick with progress status displayed to user.

To copy files to the USB memory stick and then delete files from internal memory:

Insert the USB memory stick into the EZT-570i’s USB port. Select the file type you wish to copy and erase from the EZT-570i’s internal memory, by selecting it from the “Select Export Type” drop down menu. Available file selections are profile files, alarm files, audit trail files and data files. Once the selection is made, press the “Copy\Delete Files” button. All related files will be copied to the USB memory stick and then erased with progress status displayed to user.



Figure 7-6 File Utilities (simple)



The 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-570i. CSZ has tested and validated these memory devices for proper operation and performance. Due to manufacturing variations in the various USB memory sticks, It may take up to 10 seconds for the EZT-570i 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-570i will indicate a file transfer/memory stick error.

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

Profile files directory: Profiles_mm_dd_yyyy-hh_mm_ss
Alarm files directory: AlarmFiles_mm_dd_yyyy-hh_mm_ss
Audit files directory: AuditFiles_mm_dd_yyyy-hh_mm_ss
Log files directory: DataFiles_mm_dd_yyyy-hh_mm_ss

The reason 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. This also prevents the possible loss or corruption of files by preventing them from being overwritten if an existing file has the same name as one being copied.

The data 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 in the USB memory stick in a PC's USB port. This device then becomes like any removable disk attached to the computer and can be manipulated while plugged into the PC. Most memory sticks require no drivers when using Windows operating systems. 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 CSZ.



Alarm and Audit files are also written in a ".csv" format and can be opened directly with Excel after the memory stick is inserted into the PC (after files are copied from internal compact flash to the memory stick). No additional software is required to view alarm or audit files.

The Audit Trail files and Data files also have corresponding ".sig" files. These are digital signature files that are created during the copy process. When using the CSZ Data Viewer program, these files are used to verify the validity of the file, i.e., has the file been altered since being copied.

The Data files are also copied with a corresponding ".evt" file. These are the operator event files that will contain any operator events that were entered. If no operator events were entered for the log file, the ".evt" file will be empty.

When files are deleted from the EZT-570i, they are gone and can not be retrieved. Once again, do not edit, move or delete any other files from the internal compact flash card unless using the EZT-570i "File Utilities". The EZT-570i will not operate properly if you do so.



To prevent possible data loss from the USB memory stick, do not unplug the device from the EZT-570i or a PC when the indicator light is flashing. The flashing indicates data transfer in progress, and interrupting it by unplugging it can cause data loss.

7.4.1 Advanced File Utilities

The “Advanced File Utilities” screen is accessed by pressing the “Show Advanced” button on the File Utilities screen. The advanced file utilities allow the user to select individual files for the copy and delete functions rather than copying and deleting all files of the selected file type when performing a copy or copy\delete function.

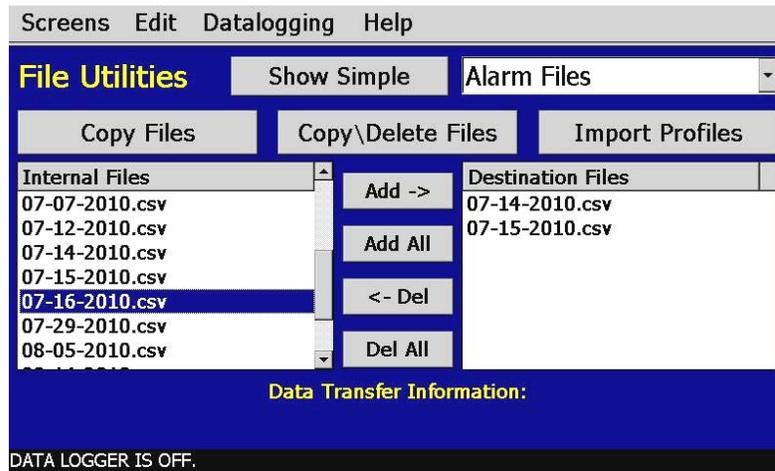


Figure 7-7 File Utilities (advanced)

To copy individual files, select the file type to export from the “Select Export Type” drop down menu just as with the simple file utilities transfer. The available files stored in memory will then be shown in the left “Internal Files” list box. Depending on the number of files stored in memory for the selected file type, it can take upwards of 30 seconds for the EZT-570i to list all of the files.

Once the files have been loaded, files can be individually selected for transfer to the USB memory stick by selecting it from the list and pressing the “Add” button. Selected files will then be shown in the “Destination Files” list box. If you need to remove a destination file, select the file from the list and press the delete (Del) button. Note that this only removes the file from the list of those to copy. It does not delete the file from internal memory.

Once all files have been selected, press the “Copy Files” or “Copy\Delete Files” button to perform the desired file utility function. Only the files shown in the “Destination Files” list will be copied or copied\deleted.



The “Import Profiles” function will import all profiles from the selected directory on the USB memory stick. It does not allow for individual file selection for import. However, by using the individual file copy, it allows individual profiles to be copied from one EZT-570i to the USB memory stick, and then only those specific profiles copied will be imported to another EZT during the profile import.

7.5 FTPWAN Setup

The “FTP\Wan Setup” screen allows the user to configure automatic back-up of all data files contained in the EZT-570i’s memory to a user designated FTP site. When enabled, the EZT-570i will automatically back up all history files at 2:00AM everyday, and with an optional delete files selection, the EZT-570i will automatically delete the files from its internal memory after back up. This will maintain the EZT-570i’s memory so that continuous data logging can be performed without filling up the available memory space.

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

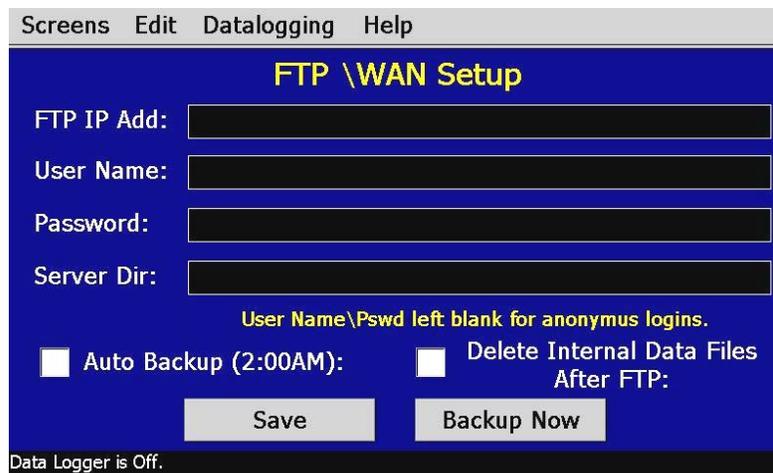


Figure 7-8 FTPWAN Setup

- FTP IP Add:** This field is used to enter the IP address of the FTP site for which the EZT-570i is to send the files to. The field allows for a maximum of 35 characters.
- User Name:** This field allows you to enter a user name for FTP site access with a maximum of 35 characters. When the EZT-570i connects to the FTP site to transfer data files, the user name will be used to identify the connection. If a security login is required, the proper user name will have to be entered in this field.
- Password:** The password field is used for entering a password, if required by your FTP site, for the EZT-570i to access the site. The password will be shown as “*****” for security. The field allows password entry of up to 35 characters.
- Server Dir:** This field is used to enter the server directory with a maximum of 50 characters. This is the file folder designated within the FTP site for the storage of the data files. When the automated back-up occurs, the EZT-570i will place the data files in this directory on the FTP site.
- Auto Backup (2:00AM):** When this check box is checked, the EZT-570i will perform an automated back-up of all data files contained in internal memory to the designated FTP site. Note that if data logging is currently active, the active file will not be copied.

Delete Internal Data Files After backup: When this check box is checked, the EZT-570i will delete all data files within its memory after completing the back-up to the FTP site. Note that if data logging is currently active, the active file will not be deleted.

Once all settings have been made, be sure to press the “Save” button to store the settings, so that on the next power-up, the values will be maintained. The “Backup Now” button can be used at any time to perform a manual data back-up. The EZT-570i will copy all data files stored in internal memory on each back-up session. If the files already exist on the FTP site, they will be overwritten on the subsequent back-up. If the FTP site is down, or the EZT-570i is not connected to the network, a local alarm message on the EZT-570i will indicate a transmission failure.



The EZT-570i must have a valid connection to your network for the FTP server to operate. The EZT-570i receives its IP address from DHCP on your network and it only occurs during boot. Therefore, make sure the EZT-570i is properly connected to your network and cycle power to the EZT-570i in order to obtain a valid IP address and be properly connected to the network.

7.6 AddView Operator Events

The “AddView Operator Events” screen allows the user to add operator events to the running data log file and view any operator events currently associated with a loaded historical data file.

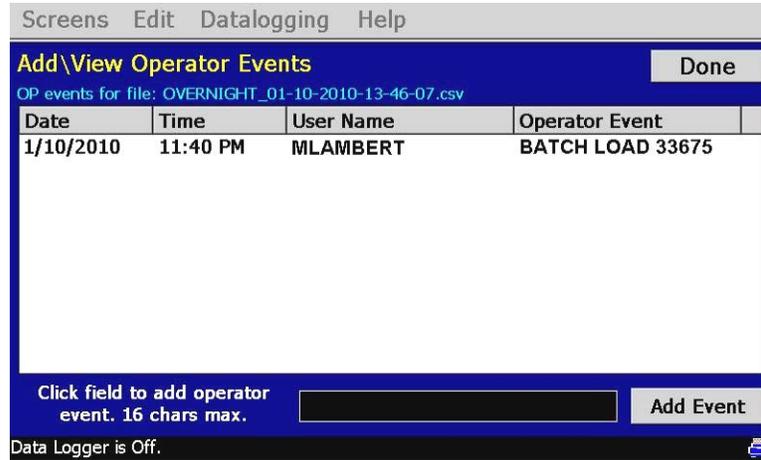


Figure 7-9 AddView Operator Events

When a historical data file is loaded, the AddView Operator Events screen will display any operator events that were written to the file. The date, time, user name and description of the event are shown. Note that the currently running data log file can be opened as a historical data file, and the current operator events for the running file will be shown.

To add an operator event to the running log file, touch the operator event entry field at the bottom of the screen and enter in the description of the operator event. Press the “Add Event” button and the event will be added to the current log file. If the running log file was opened as the historical log file, the operator event will be shown immediately on the screen as it is added. If logging is not currently running, the “add operator event field” will be disabled.

To exit the screen and return to the main data logging screen, press the “Done” button.

7.7 AddView Digital Signatures

The “AddView Digital Signatures” 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.

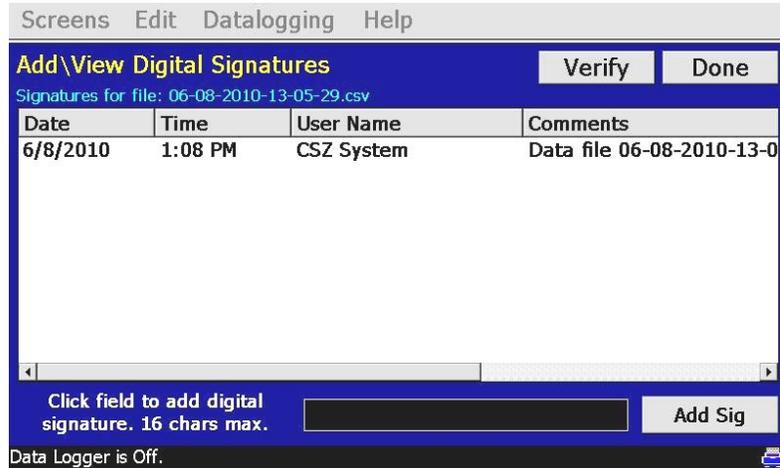


Figure 7-10 AddView Digital Signatures

When a historical data file is loaded, the AddView Digital Signatures screen will display any signatures currently associated with the file. To verify a digital signature and insure that the data file has not been altered, touch a signature in the list box and press the “Verify” button. The EZT-570i will compare the signature to the log file to see if any alterations to the data have been made. The EZT-570i 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-570i automatically signs a data file when logging is stopped; however, this only occurs if “auto interval” is selected on the Start/Stop Logging screen. If a different logging interval is used, the EZT-570i 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 digital signature entry field at the bottom of the screen and enter in the comment line for the signature. Press the “Add Sig” 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 ‘CSZ System’ will be used as the user.

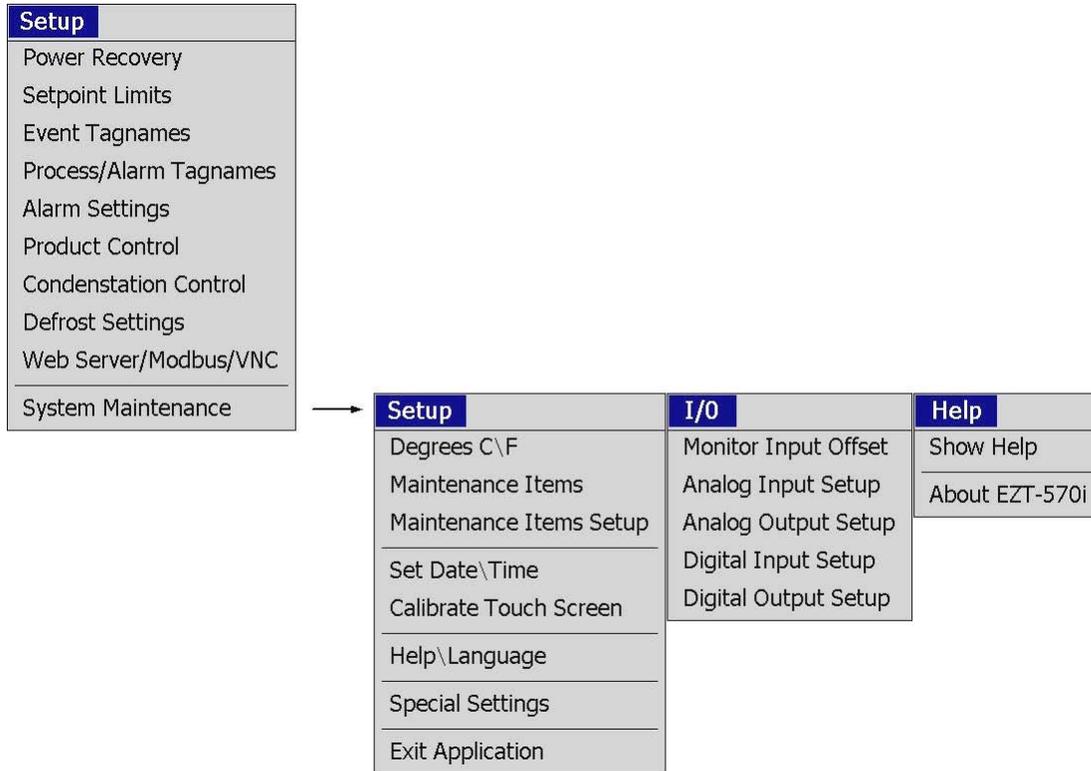
To exit the screen and return to the main data logging screen, press the “Done” button.



The AddView Digital Signatures screen is not available if security is disabled. The EZT-570i's security must be enabled in order to digitally sign data log files. See Section 6, Security.

8. System Maintenance

System maintenance options are available from the Chamber Setup menu. To access system maintenance, select System Maintenance from the chamber setup menu.



Upon selecting system maintenance, an alert will tell the user that the chamber will be taken off line. The user can select “No” to return to the chamber setup menu without shutting down any current operations. If the user selects “Yes”, all operating systems of the chamber will stop.

! *Prior to entering system maintenance, all automatic chamber operations must be stopped. This includes data logging and profile operation.*

8.1 Degrees C/F Selection

The EZT-570i can display temperatures in either degrees C or F. To change the units, select "Degrees C\F" from the Setup menu.



Figure 8-1 Degrees C/F Selection

Press the button to select the desired units. A message box will appear to acknowledge the units change. Press OK to close and make the switch. The button for the selected unit will be illuminated green once selected.



When changing display units, profile setpoints will not be converted between units. Separate profiles are required for each temperature range. The chamber and/or product under test may be damaged as a result of operating profiles that have been written using alternate temperature units.

8.2 Maintenance Items

The service monitors provide service interval alerts and life total service numbers for chamber components and systems. The service intervals are set by CSZ at the optimum period for system performance and reliability. When a component exceeds its service interval, a notification alarm can be generated. This alert will notify the operator that service should be performed at the next available down period.

Description	Interval	Elapsed
AIR CIRCULATOR HRS	4392	0
----	4392	0
----	4392	0
SYS 1 COMPRESSOR HRS	8784	0
SYS 2 COMPRESSOR HRS	8784	0
HUMIDITY SYSTEM HRS	8784	0
DRY AIR PURGE HRS	4392	0
----	0	0
----	0	0
----	0	0
HEATER CYCLES	100000000	0

SERVICE MONITORS

Figure 8-2 Service Monitors

When a service interval is exceeded, an alert can be set to illuminate the corresponding indicator on the System Status Monitor screen. An audible alert can also be turned on to get the operator's attention. In order to clear the service alert, the elapsed service counter must be cleared.

To clear the service interval count, you must select the count that has been exceeded by touching its description on the Service Monitor screen. A pop-up window will ask if the count is to be cleared for the item you selected. Select "Yes" to clear the count. Note that the Service Monitor screen must be showing the "Elapsed" count.

The service monitor screen can be set to display the elapsed service interval or the life total for the component based on the selection made in the Service Info Setup screen. The alert method can also be disabled if this feature is not desired.

8.2.1 Maintenance Items Setup

The service monitor display options as well as alert action can be adjusted from the “Maintenance Items Setup” screen.

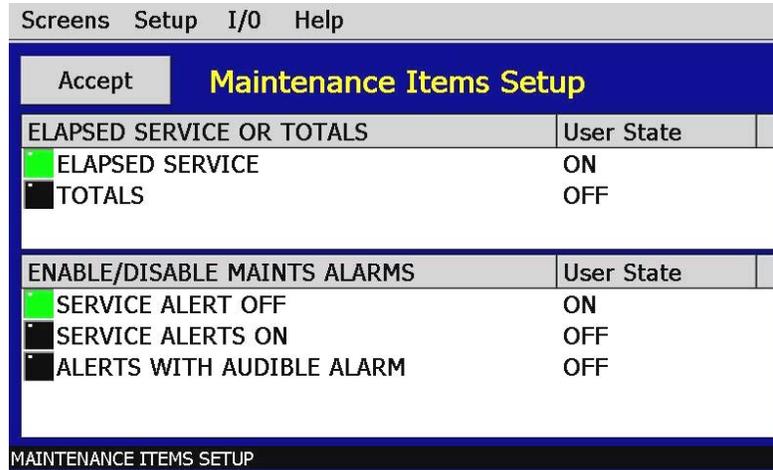


Figure 8-3 Service Monitor Setup

Elapsed Service or Totals: Selects which count is to be displayed on the Service Monitor screen.

Enable/Disable Service Alarm: Selects the method of service notification or disables alerts completely.

Service alerts are disabled by default. To make changes, set the user state to “On” for the desired selections and press the “Accept” button. For information regarding the service monitors and what they mean, see Section 10, Diagnostics.

8.3 Set Date\Time

The date and time can be adjusted by selecting “Set Date\Time” from the maintenance setup menu. The current date and time will be displayed in the field entry windows under the “set time” tab.

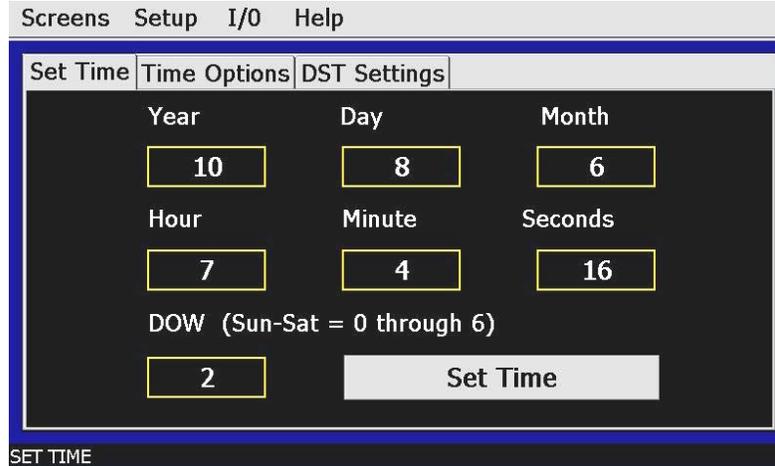


Figure 8-4 Set Time

To make adjustments, touch the desired field entry box. The pop-up keypad will appear allowing a new value to be entered. Once all corrections are made, press the “Set Time” button. An alert window will appear stating that setting the date/time will reset all trends back to zero. Press “Yes’ to continue or “No” to not accept the new time changes.

- ! 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, 1pm will be a value of 13 (1 + 12) for hours. A time of 5:30pm will be 17 hours, 30 minutes.

8.3.1 Time Options

Select the “Time Options” tab to configure the atomic clock settings. If the EZT-570i is connected to the internet, these settings can be used to have the EZT-570i automatically synchronize its time with one of the many nationally provided time servers.

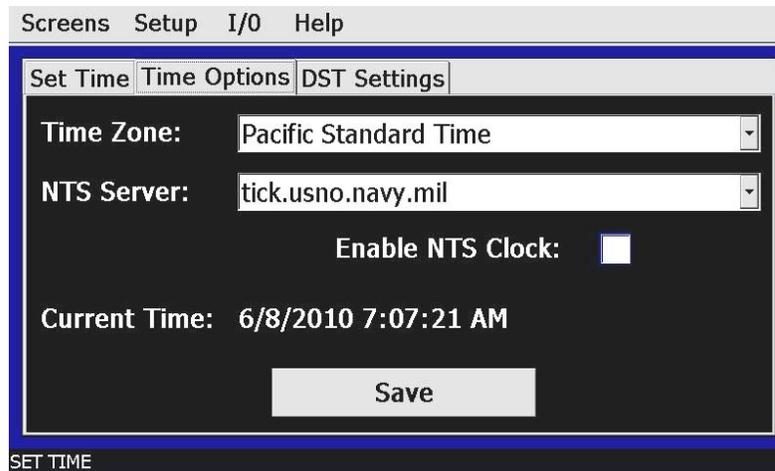


Figure 8-5 Time Options

To enable the atomic clock, select your time zone and which time server you wish to use from the drop down menu selections. Place a check in the check box by touching it and press the “Save” button. The EZT-570i will synchronize its time with the selected national time server at 2:00AM each day. If the EZT-570i is not connected to the internet, a local alarm message will occur, “NTS Ping Failed. Check Cable”, to indicate that the time server could not be located.

! *The EZT-570i must have a valid connection to your network for the timer server to operate. The EZT-570i receives its IP address from DHCP on your network and it only occurs during boot. Therefore, make sure the EZT-570i is properly connected to your network and cycle power to the EZT-570i in order to obtain a valid IP address and be properly connected to the network.*

8.3.2 DST Settings

Select the “DST Settings” 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.

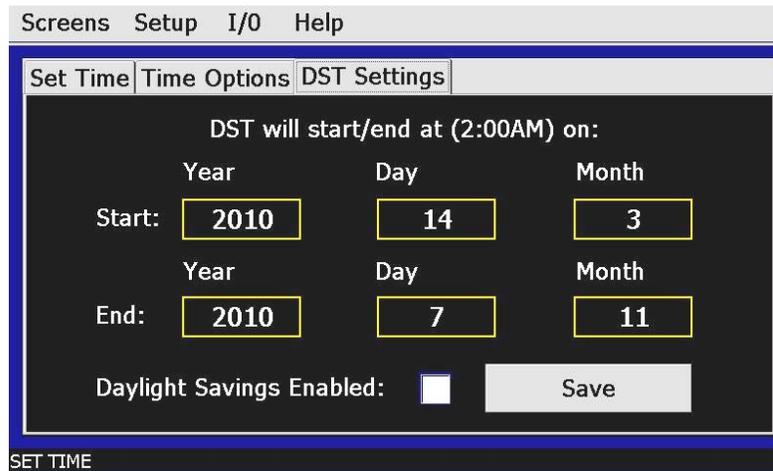


Figure 8-6 Daylight Savings Time Settings

If your area utilizes daylight savings time, set the start and stop dates for daylight savings and check the “Daylight Savings Enabled” checkbox. Press the “Save” button to store the settings. The EZT-570i will then automatically update its clock for daylight savings time.

! *If the NTS time server setting is enabled, and the selected time zone uses daylight savings time, daylight savings must be enabled or the clock will not be set correctly.*

8.4 Touch Screen Calibration

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

! *Even after calibration, some fields may require finesse to operate. Check boxes require precise presses even when the screen is in full calibration. Use the tip of your finger or a stylus if necessary to operate the unit.*

To access the screen calibration utility, select “Calibrate Touch” from the Setup menu, then push the “Calibrate Touch” button.

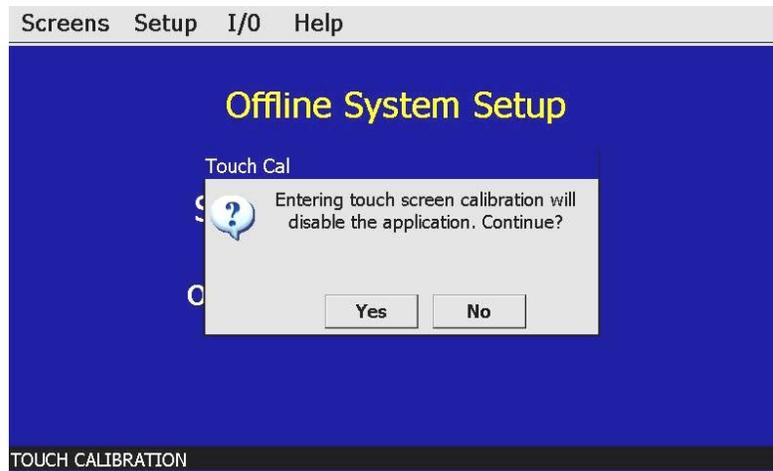


Figure 8-7 Touch Screen Calibration

From the “CECP” utility window, touch the “Touch Screen” icon to start the calibration utility. A message box will appear with a choices of “Calibrate” and “Test”. To begin calibration, press the “Calibrate” button. To only test the screen calibration, press the “Test” button.



Figure 8-8 Touch Screen Settings

When calibration is started, crosshairs will appear on the screen. At each crosshair position, touch the screen at the center of the crosshairs and hold position until the crosshairs move to the next calibration point. Repeat this for each position in order to set the calibration. The calibration requires five points, the center and four corners.

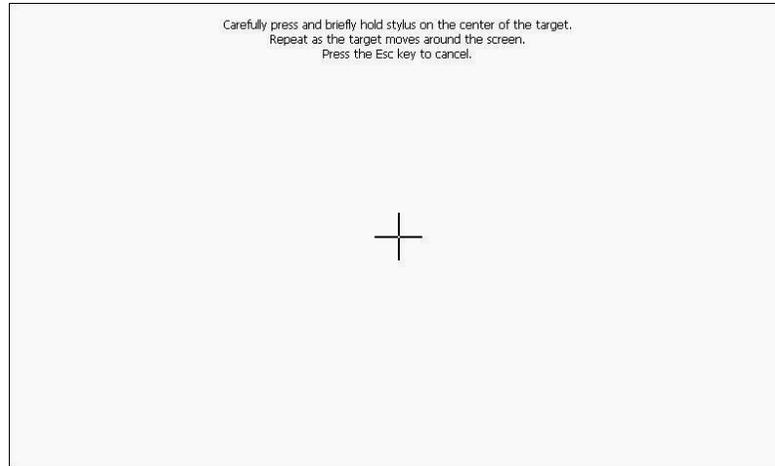


Figure 8-9 Calibration Screen

Once complete, the calibration utility will exit and return to the CECP utility window. Press the 'Quit' icon to close the utility and return to the EZT-570i application to resume normal operation.

8.4.1 LCD Settings

The "CECP" utility also provides access to the backlight adjustment of the EZT-570i touch screen. To access these settings, perform the procedure above to access the CECP utility; however, do not perform the calibrate touch procedure.

The backlight is set to turn off after 30 minutes by default. To adjust the backlight setting, touch the "Screen Saver" icon. Using the drop down menu, select the time period for which the backlight should turn off after no activity.



Figure 8-10 LCD Settings

Once the selection has been made, press the 'OK' button to accept the entry and close the Screen Saver window. Press the "Quit" icon to exit the CECP utility and return to the EZT-570i application to resume normal operation.

8.5 Help\Voice Assistance

The Help\Voice Assistance screen allows the user to select the language for the on-screen help and enable/disable the voice assisted help feature. At the printing of this manual, available languages include; English, Spanish, French and Chinese (simplified).



Figure 8-11 Help\Voice Assistance

Make the desired language selection from the drop down menu. This selection will affect the display of the on-screen help and the audio playback of the help file. To turn the voice assisted help on and off, press the on/off button. Note that when voice assistance is turned on, the audio playback will only occur when "Play Help" is selected from the Help menu.

Selecting "Stop Help" from the Help menu will stop playback of the help file at any point during playback. The volume slider can be used to adjust the volume level for a more suitable listening level depending upon the type of listening device used, i.e., headphones or amplified speakers.

! *The voice assisted help feature requires the end user to connect a pair of headphones or amplified speakers (typical PC speakers) to the audio jack of the EZT-570i.*

8.6 Special Settings

The “Special Settings” screen is available for special applications when custom settings may be required for certain operating parameters. If available on your system, the “tagnames” for the fields will describe what the setting is for. The value can be changed by touching the field entry window and entering the new setting via the keypad.



Figure 8-12 Special Settings

 For most systems, these settings will not be available. If the settings are present on your system and you have questions regarding these settings, contact Cincinnati Sub-Zero’s service department for assistance.

8.7 I/O

The “I/O” menu provides access to EZT-570i’s optional analog and digital inputs and outputs. The available selections under this menu are dependant upon the options present on the chamber.

8.7.1 Control Inputs

The analog inputs associated with the control loops, i.e., temperature, humidity, product, etc., are not accessible through this menu item. They must be accessed directly from the PID loop controllers. See Chapter 4, “Calibration”, of the Future Design, FDC-9300 Self-Tune Fuzzy / PID Process / Temperature Controller User’s Manual provided with your chamber for procedures and instructions on calibrating the control inputs.



Do not alter any other parameters or settings within the 9300 controllers. Any changes made to CSZ factory settings may cause unpredictable operation of the chamber which can result in damage to equipment and will void the chamber warranty.

8.7.2 Monitor Inputs

This menu item will appear if your chamber is equipped with the monitor inputs package. The monitor option provides up to eight, separate type “T” thermocouple inputs for monitoring temperatures throughout the chamber. The calibration range is fixed within the EZT-570i hardware; however, the user can input an offset in order to adjust for sensor tolerances and lead affects.

Through the use of a simple ice bath, all sensors can be corrected within a matter of minutes without having to disconnect leads or have expensive calibration equipment. With the chamber at ambient temperature, place a bucket of ice filled with water in the chamber. Place all monitor input thermocouples into the ice bath. Allow the probes to soak for a minimum of 30 minutes BEFORE entering an offset.

To enter an offset, select “Monitor Inputs” from the I/O menu. Enter the number of the input in the “Input Num” field. The current reading from the input will be shown in the “Cur PV” field.

Figure 8-13 Monitor Inputs

The reading should be 0°C (32°F), i.e., the ice bath temperature. To “zero” the input, enter the offset value in the “+- Offset” field and verify the reading. Be sure to press the “Accept” button to save the new offset value before proceeding onto other inputs or exiting the monitor inputs screen or the offset

value will be lost. The total error for the monitor inputs is $\pm 3.5^{\circ}\text{C}$ (6.3°F). The input types are fixed and cannot be changed. If replacing sensors, be sure to replace with the same type.

8.7.2.1 Refrigeration Monitor Option

If the chamber is equipped with the refrigeration monitor option, the monitor inputs will be used to display the suction and discharge temperatures and pressures of the refrigeration system compressors. The pressure sensor inputs are in absolute pressure (PSIA), not gauge pressure (PSIG). In order to display the refrigeration system pressures in gauge pressure, the offsets for the pressure monitor inputs will be set to a default value of 14.7 (standard atmospheric pressure). This converts the absolute pressure readings to gauge pressure.

- ! The EZT-570i uses 9300 controllers to monitor the refrigeration system temperatures and pressures. One 9300 is used for each suction and discharge line. Input 1 of the 9300 is temperature and input 2 is pressure. The monitor input offset can be used to correct for slight errors in readings; however, actual calibration of the inputs must be performed at the 9300.

8.7.3 Analog Inputs

The EZT-570i can have up to five analog inputs which are used for remote setpoint inputs. This menu item will appear if your chamber is equipped with the remote setpoint option. With this option, electrical connections are provided on the chamber for external connection to each available input.

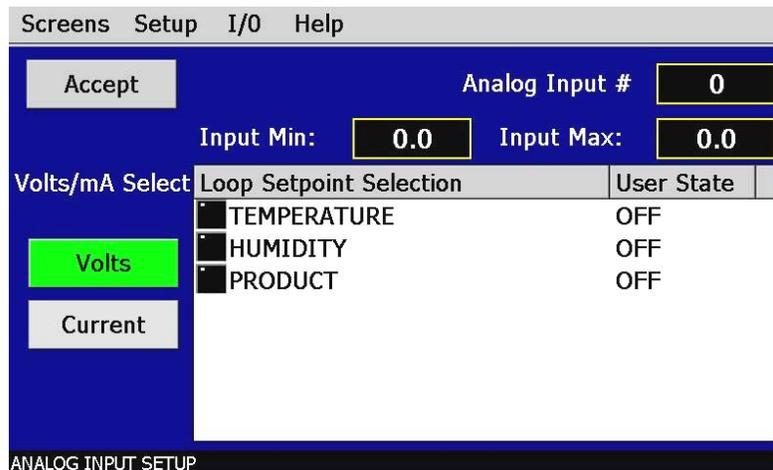


Figure 8-14 Analog Inputs

To configure an input, first select the input number by entering the value in the “Analog Input #” field. Upon entering the value, the inputs current configuration will be loaded and indicated by the LED’s next to the loop setpoint selection. The minimum and maximum values will be shown in the “Input Min” and “Input Max” fields.

To make changes to the analog input’s configuration, select the desired input type by pressing the “Volts” or “Current” button to select either a 0-10V or a 4-20mA input signal. Select the desired loop by changing its user state to “On” and then enter the desired minimum and maximum values for the loop set point that the input is to represent. Once all modifications have been made, press the “Accept” button to save the changes. If you do not press the “Accept” button, all changes will be lost if you leave the screen or enter a new analog input number.



If you change the analog input type, change from voltage to current or vice versa, power must be cycled to the EZT-570i controller in order for the input to switch types.

As the analog input signal is varied, it will provide a linear setpoint change from the minimum to maximum value over the range of the input. Note that if the minimum or maximum setpoint generated by the input exceeds the setpoint limits for the control loop, see Section 5.2, Setpoint Limits, the EZT-570i will limit the setpoint to the minimum or maximum setpoint limits value as defined in system setup.

Reversing Setpoint Operation

For added flexibility with any type of setpoint sourcing device, the EZT-570i allows the setpoint generated by the remote source to be inverted, meaning the minimum input signal, 0V or 4mA, will set the maximum setpoint while the maximum input signal, 10V or 20mA, sets the minimum setpoint. This is done by simply reversing the setpoint entries for the “Input Min” and “Input Max” fields.

For example, an input programmed to generate a setpoint between -40 and 100 for a 0-10V input signal would be programmed with an “Input Min” of -40 and an “Input Max” of 100. By simply setting the “Input Min” for 100 and the “Input Max” to -40, the setpoint generated by the 0-10V signal is reversed.

8.7.3.1 Enabling Remote Setpoint Inputs

Once an analog input is configured for a particular loop, it must be enabled for use. By default, the EZT-570i uses the setpoint entered manually from the loop view screen, or from an operating profile. The remote setpoints are enabled through events.

The event allows the user to manually select the use of the remote setpoint or control its use through a profile. Each analog input has its own remote setpoint event. If the event is on, the setpoint selected for the input is overwritten and controlled by the input signal. The EZT-570i uses chamber events 11 through 15 for remote setpoint 1 through remote setpoint 5.

8.7.3.2 Analog Input Wiring

Locate the analog input connector on your chamber. Figure 8-15 is a representation of the typical analog input connection provided on most chambers; however, as changes and/or improvements are made, your specific connection style may vary. To connect your input signal, first make sure that the input type is set correctly on the EZT-570i as described above.

Next, using a quality, twisted-pair shielded cable, connect your input signal to the correct input number. Make sure to observe proper polarity when connecting your signal leads. Only connect the drain wire of your shielded cable at your signal source, or the chamber, not both. Connecting the shield to ground at both ends of the cable can induce unwanted “noise” into the signal leads.

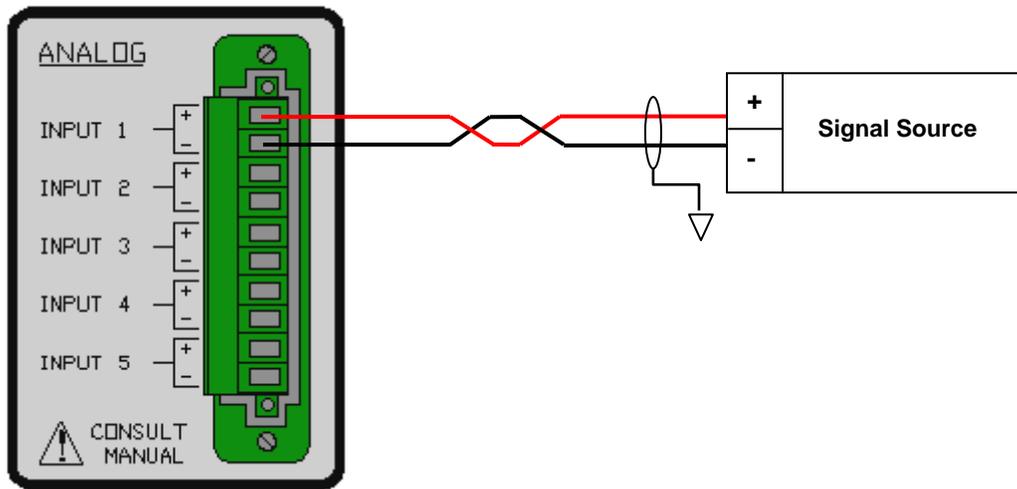


Figure 8-15 Analog Input Wiring

Connect only one signal source to each input. Note that the provided connection may have terminals for all five available inputs; however, your chamber may be equipped with only one based on purchased options. If you are having trouble with getting an input to operate, first make sure that it is available on your chamber.



Exceeding maximum allowed overload ratings can cause permanent damage to the input. Use care when connecting remote signal generators and make sure they can not overload the EZT-570i's inputs.

Configure the EZT-570i's input for the desired signal level and cycle power prior to connecting the source signal or damage to the input may result.

Input Specifications	Voltage Input	Current Input
Input Range	0-10Vdc	4-20mA
Input Impedance	1M ohm minimum	10 ohm maximum
Maximum Allowed Overload	13Vdc	40mA
Total Error	±1% of full scale	

8.7.4 Analog Outputs

The EZT-570i can have up to four analog outputs which can be used to retransmit setpoints, process variables or percentages of output from the installed control loops. If your chamber is equipped with optional analog outputs, this menu item will appear in the I/O menu list. With this option, electrical connections are provided on the chamber for external connection to each available output.



Some outputs may be provided for specific control functions depending upon the design of your chamber. Do not alter these output settings unless you are sure that they are used for monitoring purposes only. If you have any questions regarding the use of the output, contact Cincinnati Sub-Zero's customer service department for assistance.

The analog outputs can be configured to retransmit signals either in a 0-10V or 4-20mA range. The minimum and maximum values of the output can be set to correspond to a specific value of the retransmitted source. The output will retransmit this source linearly from the minimum to maximum range. To configure an analog output, select "Analog Outputs" from the I/O menu.

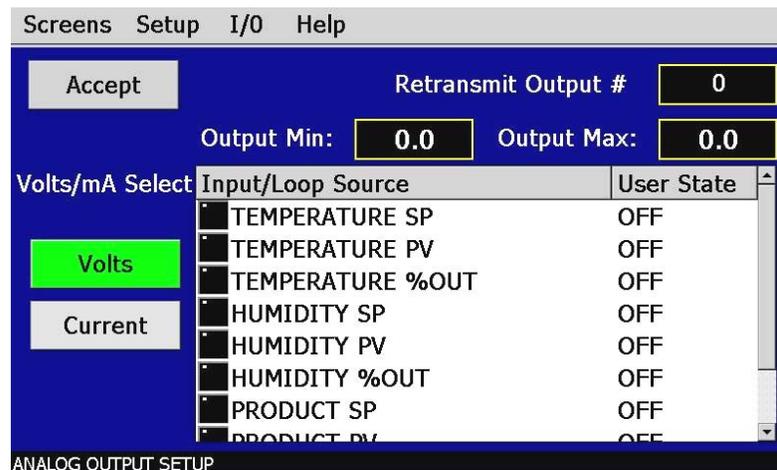


Figure 8-16 Analog Outputs

To configure an output, first select the output number by entering the value in the "Retransmit Output #" field. Upon entering the value, the output's current configuration will be loaded and indicated by the LED's next to the selected type and source. The minimum and maximum values will be shown in the "Out Min" and "Out Max" fields.

To make changes to the output's configuration, select the desired output type by pressing the "Volts" or "Current" button to select a 0-10V or a 4-20mA output signal. Select the desired loop source by setting its User State to "On" and enter the new minimum and maximum values for which the output is to retransmit. Once all modifications have been made, press the "Accept" button to save the changes. If you do not press the "Accept" button, all changes will be lost if you leave the screen or enter a new analog output number.



If you change the analog output type, change from voltage to current or vice versa, power must be cycled to the EZT-570i controller in order for the output to switch types.

Reversing Output Operation

For compatibility with external monitoring and control devices, the EZT-570i allows the output signal generated by the input/loop source selection to be inverted, meaning the minimum output signal, 0V or 4mA, will be transmitted when the selected loop source is at its maximum value, and the maximum output signal, 10V or 20mA, will be transmitted when the selected loop source is at its minimum value. This is done by simply reversing the output entries for the “Output Min” and “Output Max” fields.

For example, an application requires a 0-10V output signal from the temperature loop for a cooling output of 0 -100%. On the EZT-570i, 0-100% cooling is represented as a value of 0 to -100%, while heating is 0-100%. In order to transmit the cooling output, set the “Output Min” to 0 and the “Output Max” to -100. The output will then produce a signal from 0 volts at an output of 0% (output minimum) to a signal of 10V at an output of -100% (output maximum).

8.7.4.1 Analog Output Wiring

Locate the analog output connector on your chamber. Figure 8-17 is a representation of the typical analog output connection provided on most chambers; however, as changes and/or improvements are made, your specific connection style may vary. To connect the output signal, first make sure that the output type is set correctly on the EZT-570i as described above.

It is recommended that a quality, twisted-pair shielded cable, is used to connect the output signal to your device. Make sure to observe proper polarity when connecting the signal leads. Only connect the drain wire of the shielded cable at your device, or the chamber, not both. Connecting the shield to ground at both ends of the cable can induce unwanted “noise” into the signal leads.

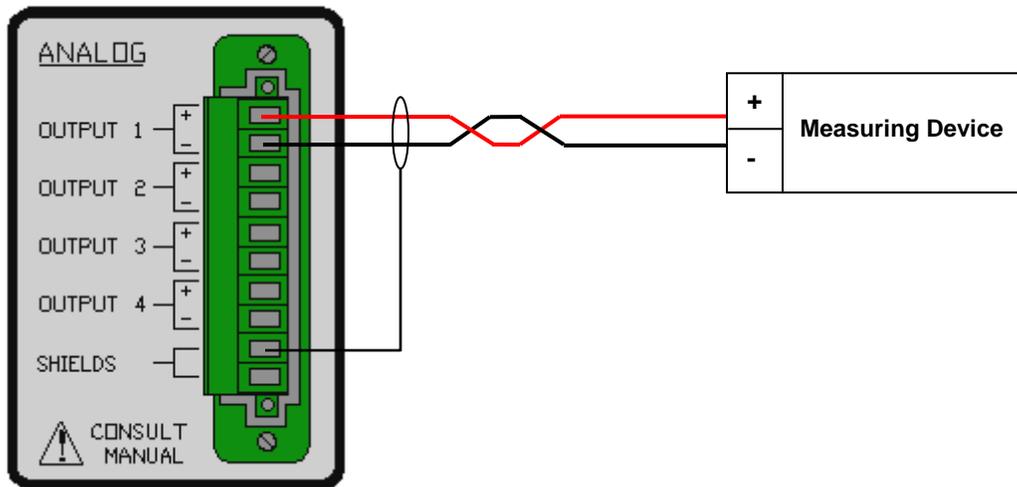


Figure 8-17 Analog Output Wiring

If you connect more than one device to each output make sure that you do not exceed the output capabilities of the EZT-570i. Note that the provided connection may have terminals for all four available outputs; however, your chamber may be equipped with only one based on purchased options. If you are having trouble with getting an output to operate, first make sure that it is available on your chamber.

⚠ Exceeding the recommended load impedance for the output will cause signal degradation and may damage the output. Use care when connecting remote devices and make sure they stay within output capability. Configure the EZT-570i's output for the desired signal level and cycle power prior to connecting the load device.

Output Specifications	Voltage Output	Current Output
Output Range	0-10Vdc	4-20mA
Load Impedance	2K ohm minimum	300 ohm maximum
Applicable Load	resistive	
Total Error	+1% of full scale	

8.7.5 Digital Inputs

The EZT-570i digital input option provides eight digital inputs which can be used to start and stop a profile, hold a profile or control optional event outputs. If your chamber is equipped with the digital input option, this menu item will appear in the I/O menu list. With this option, electrical connections are provided on the chamber for external connection to each input.

The digital inputs can be configured to work on either a low to high transition or a high to low transition. Upon seeing the selected transition, the input will perform the action selected from the input mode list. To configure a digital input, select “Digital Inputs” from the I/O menu.

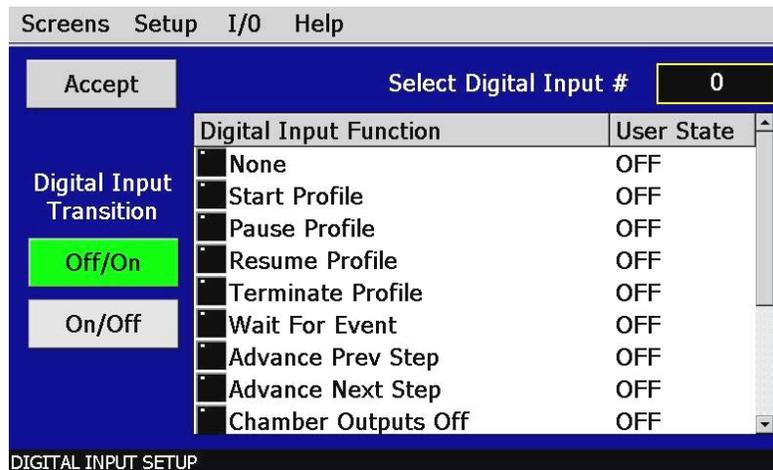


Figure 8-18 Digital Inputs

To configure an input, first select the input number by entering the value in the “Digital Input #” field. Upon entering the value, the input’s current configuration will be loaded and indicated by the LED’s next to the selected transition mode and function.

To make changes to the input’s configuration, selected the desired transition mode by pressing the “Off/On” (off to on) or “On/Off” (on to off) button, and set the User State to “On” for the desired input function. Once the selections have been made, press the “Accept” button to save the changes. If you do not press the “Accept” button, all changes will be lost if you leave the screen or enter a new digital input number.

 *More than one digital input can be configured for the same function. If more than one is set for the same function, make sure that they do not interfere with each other or the selected function they are to perform may not operate correctly.*

Transition

The transition mode selects the change in input state that makes the input perform the required function. The profile functions, as defined below, are triggered by this transition.

Off to On: This setting sets the input up to perform the desired function when the input goes from an off state to an on state. That requires the application of 24Vdc power to the input.

On to Off: This setting sets the input up to perform the desired function when the input goes from an on state to an off state. That requires the removal of 24Vdc power from the input.

Input Functions

The input function defines what event is to happen when the input meets the “on” state as defined by the transition mode. Note that the profile functions are defined by this transitional state; however, the output control functions are held, not transitional.

Start Profile: When selected, the input will start the currently loaded profile at step one.

Pause Profile: When selected, the input will put a running profile, into the hold state.

Resume Profile: When selected, the input will put a profile that is in hold, into run state.

Terminate Profile: When selected, the input will terminate the profile. This will turn off all events and shut down the chamber. If a profile is not running, no action will occur and event status will not be affected.

Wait for Event: When selected, the input acts as a trigger input for the profile wait for function. The input can then be selected in the profile to pause the current step until the input changes state according to the transition mode selection. See Section 4.1.3, *Using Profile Wait For*.

 *The profile must be in the “waiting for input” state prior to the input making the desired transition. If the input makes the transition prior to the profile entering the wait for input state, the profile will not continue.*

Advance Previous Step: When selected, the input will advance the profile to the next step. The profile must first be placed in hold prior to the input turning on in order for the step change to take place.

Advance Next Step: When selected, the input will advance the profile to the previous step. The profile must first be placed in hold prior to the input turning on in order for the step change to take place.

*** Chamber Outputs Off:** When selected, the input will cause all chamber control outputs to turn off. The outputs will stay off as long as the input is on. When the input turns off, all outputs will return to normal operation.

*** All Outputs Off:** When selected, the input will cause all chamber control and event outputs to turn off. This includes all optional digital outputs configured as customer events. The outputs will stay off as long as the input is on. When the input turns off, all outputs will return to normal operation.

*** Event Outputs Off:** When selected, the input will cause all optional digital outputs configured as customer events to turn off. The outputs will stay off as long as the input is on. When the input turns off, all event outputs will return to normal operation.

*** Digital Output Control:** When selected, the input becomes a “switch” which can be used to control optional digital outputs. When a digital output is configured to be controlled by the digital input, it will turn on when the input is on and off when the input is off.

 ** For the output control modes, the “on” state for the input is defined by the transition mode. If “Lo to Hi” is selected, the input is on when voltage is applied to the input. If “Hi to Lo” is selected, the input is on when voltage is removed from the input.*

8.7.5.1 Digital Input Wiring

Locate the digital input connector on your chamber. Figure 8-19 is a representation of the typical digital input connection provided on most chambers; however, as changes and/or improvements are made, your specific connection style may vary.

It is recommended that all wiring be of the shielded type. Only connect the drain wire of the shielded wiring at your device, or the chamber, not both. Connecting the shield to ground at both ends of the cable can induce unwanted “noise” into the input wiring. Improper and/or poor wiring practices can cause interference on the digital inputs which may cause erratic or uncontrolled operation.

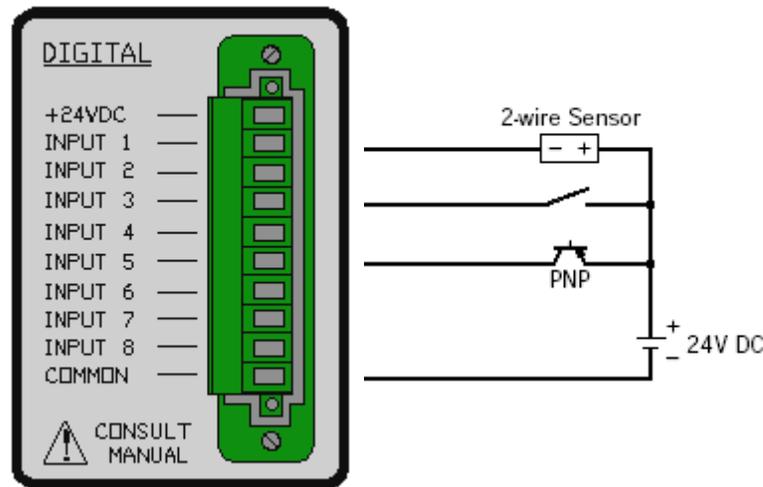


Figure 8-19 Digital Input Wiring

The digital inputs will work with either transistor or potential free (relay) contacts. The input connection provides both 24Vdc power and common terminals for use with the digital inputs. Power can also be provided by a separate source. In order for a separate source to work properly, the common terminal of the external power supply must be connected to the common terminal on the input connector.



Do not connect the +24Vdc terminal on the chamber to the output of another power source or in series with an external source. Doing so can cause irreparable damage to the EZT-570i and may result in a hazardous shock or fire.

Do not exceed the digital input voltage range or damage to the input may occur. The +24Vdc supply is of limited power and for sourcing the inputs only. Do not use this to power other devices or short the +24Vdc and common terminals together. Damage to the power supply may occur.

Digital Input Specifications	Voltage Input
Input Range	20.4 to 28.8Vdc
Input Impedance	3.4K ohm
Rated Input Current	7mA/point
Response Time	1 second maximum

8.7.6 Digital Outputs

The EZT-570i digital output option provides 15 digital outputs which can be used as event outputs, alarm outputs or for other signaling needs. This is a common menu item and will be present even if your chamber is not equipped with the optional digital outputs. If your chamber is equipped with the optional digital outputs, electrical connections will be provided on the chamber for external connection to each of the outputs.

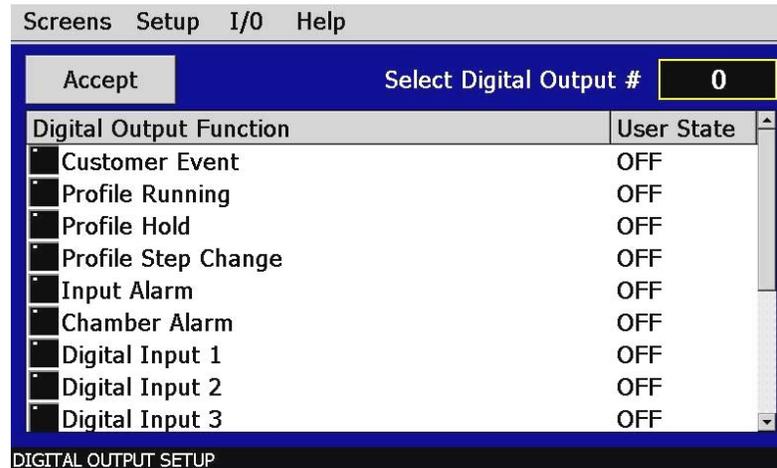


Figure 8-20 Digital Outputs

To configure an output, first select the output number by entering the value in the “Select Digital Output #” field. Upon entering the value, the output’s current configuration will be loaded and indicated by the LED next to the selected function.

To make changes to the output’s configuration, set the User State to “On” for the desired output function. Once the selection has been made, press the “Accept” button to save the change. If you do not press the “Accept” button, the change will be lost if you leave the screen or enter a new digital output number.

Output Functions

The output function defines what condition causes the output to turn on and off. All digital outputs are configured as event outputs by default. More than one output can be set for the same function.

Profile Running: When selected, the output will turn on when the profile is operating. The operating condition is defined as a ramp, soak, guaranteed soak or wait for condition. The output will not be on if the profile is in autostart and has not yet started, or when placed in hold by an operator.

Profile Hold: When selected, the output will turn on when the profile is in hold. When the profile is in any other condition, the output will be off.

Profile Step Change: When selected, the output will provide a one-shot pulse each time the profile changes steps. This also includes an output pulse each time the profile is manually advanced to the previous or next step while in hold.

 *When a profile is started, the output will pulse when the first step of the profile is started.*

Input Alarm: When selected, the output can be controlled by an input alarm. The input alarm must be configured to control the output. See Section 5.5, Alarm Settings, for information on assigning the alarm to the event output. This output mode provides a way of controlling devices at specific temperature or humidity levels for example.



If more than one alarm is assigned to the output, the output will not operate correctly and may cycle on and off uncontrollably. Do not assign more than one input alarm to an output.

Chamber Alarm: When selected, the output will turn on when a critical alarm occurs. The output will stay on until the alarm is silenced. This output mode provides a remote alarm notification that operates in conjunction with the chamber's audible alarm. Note that the alarm condition may still exist with the output turned off.

Digital Input 1-8 These mode selections are used to assign the output to one of the digital inputs. It allows a digital input to turn the output on and off directly. Any of the eight available inputs can be selected for control of the output.



The digital input must be configured for event output control for the output to be controlled by the assigned digital input. If the input is not configured for event output control, the output will remain off.

8.7.6.1 DUT Safety Relay Output Wiring

The DUT safety relay connection is provided as standard on most chambers. To connect to this relay, locate the digital output connector on your chamber. The DUT connection is located on the digital output connector panel (see Figure 8-21).

The DUT safety relay is an isolated dry contact rated for up to 2A of current (resistive) at 24V AC/DC. It provides an effective and safe method of removing power from test items within the chamber any time the chamber is not running. 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.

8.7.6.2 Digital Output Wiring

Locate the digital output connector on your chamber. Figure 8-21 is a representation of the typical digital output connection provided on most chambers; however, as changes and/or improvements are made, your specific connection style may vary.

If using the digital outputs for low level signals to solid state circuitry, it is recommended that all wiring be of the shielded type. Only connect the drain wire of the shielded wiring at your device, or the chamber, not both. Connecting the shield to ground at both ends of the cable can induce unwanted "noise" into the wiring and subsequently, your device.

If using the digital inputs for controlling other relays coils or powering small devices, the wiring method is at the operator's discretion, but a minimum of #24AWG wire is recommended. Low voltage signals can become quickly degraded when using smaller gauge wire due to the resistance of the wire over long distances.

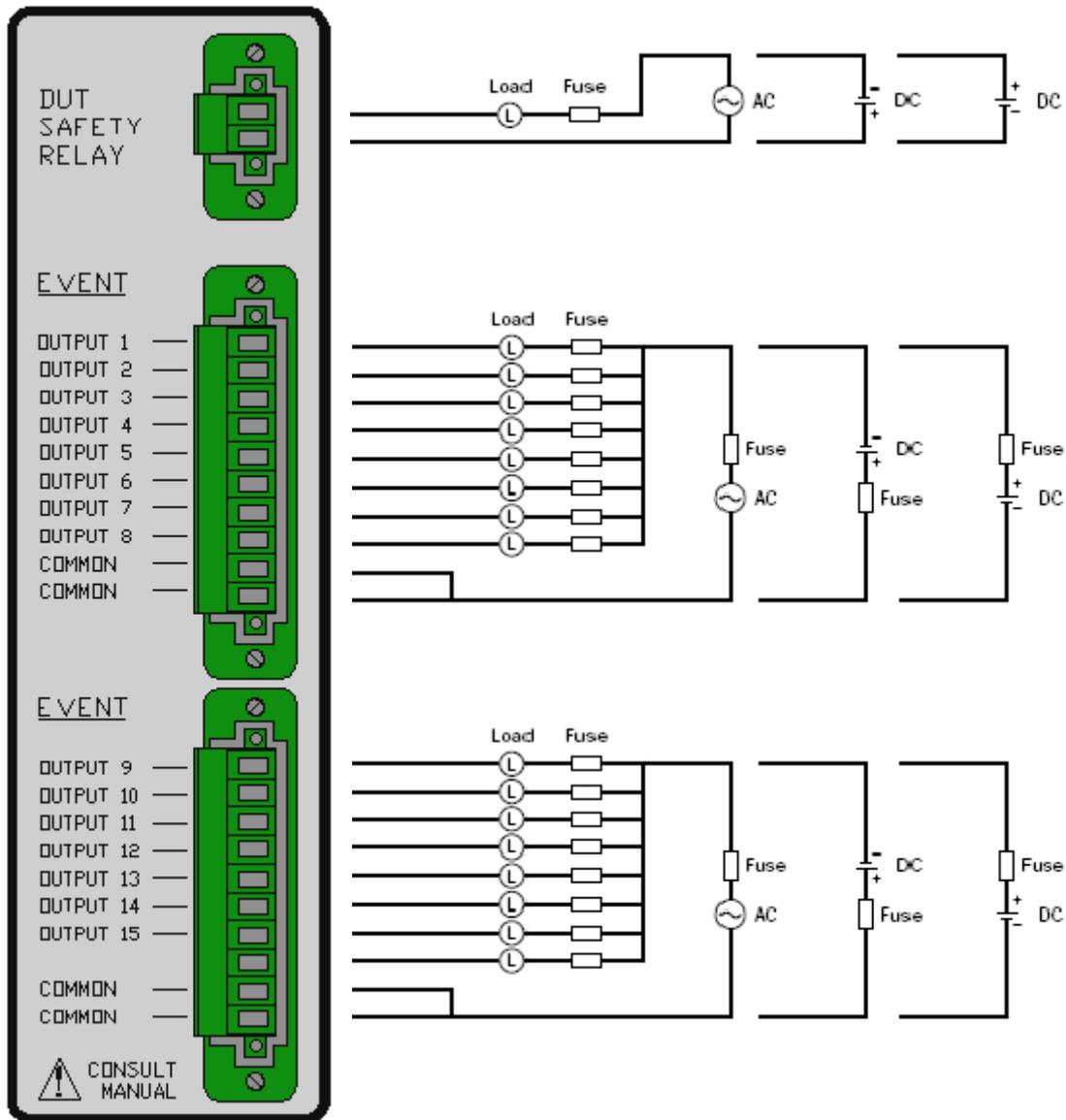


Figure 8-21 Digital Output Wiring



The digital outputs are potential free dry contacts divided between two common headers. Each output is rated for 2A of current with a maximum of 8A per common line. If all outputs are being used, the sum of the current must not exceed 8A.

Digital Output Specifications	Voltage Input
Maximum Load Current	2A/point 8A per common line
Minimum Switching Load	0.1mA/0.1Vdc (reference value)
Response Time	1.7 seconds maximum

9. Communications

This section covers the connection to, and basic use of, the EZT-570i communication interfaces. As a standard, the EZT-570i is equipped with both EIA-232 and EIA-485 serial interfaces as well as the standard network communications port. The EZT-570i can also provide an IEEE-488 (GPIB) communication port through the use of an optional interface converter.

To connect to the available communication ports, locate the communications connector panel on the chamber.

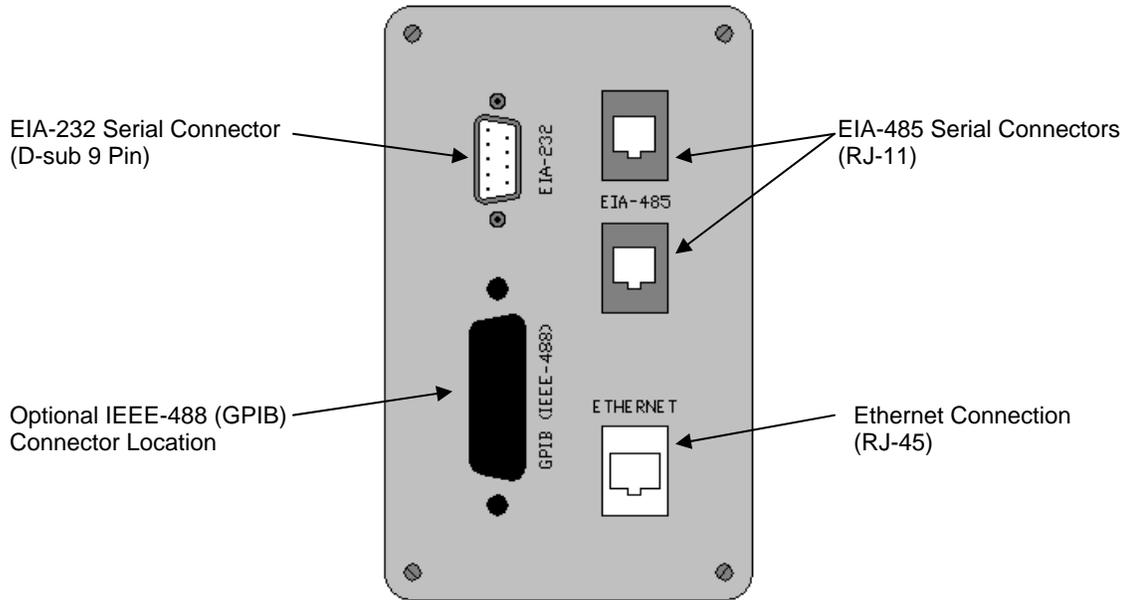


Figure 9-1 Communications Connector

9.1 Serial Communications

The EZT-570i uses Modbus RTU protocol for serial communications. The EZT-570i's communication address, parity and timeout can be changed on the Web Server/Modbus/VNC screen located under the chamber setup menu.

Figure 9-2 Modbus Settings



The EZT-570i is set by default for an address of 1, even parity and 200ms timeout 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-570i User Communications Reference Manual for instructions and information on command structure and protocol usage.

9.1.1 Adjusting Modbus Serial Communication Settings

The Modbus serial communication settings allow the EZT to be configured for a single (RS232) or multi-drop (RS485) serial link. The settings must be set to match that of the host computer and vice versa. The serial port settings of the EZT-570i are fixed other than the controller address, parity and timeout settings. The host computer's serial port must be set to match the fixed EZT-570i port settings:

Address: 1-31 (user selectable)
 Baud Rate: 9600
 Data Bits: 8
 Stop Bits: 1
 Parity: none, odd, even (user selectable)
 Timeout: 200ms (user adjustable)

The address is used to identify the EZT 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 EZT's have duplicate addresses, communications with those controllers 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.

The *timeout* setting is the receive timeout for the EZT and defines how long it will wait to receive a valid message before clearing its serial port buffer. Once the EZT sees data being sent over the serial communication link, the timeout begins. If the data the EZT receives is not valid or addressed to it, the buffer will be cleared after the timeout setting. If the data was valid and was addressed to the EZT, it will take the data upon receiving it and perform the command.

The timeout period should not be adjusted unless communication errors are repeatedly occurring between the EZT and the host computer. For connections to a single EZT-570i, the default timeout setting should be sufficient. When multiple EZT's are on the same RS485 link, the timeout setting may have to be adjusted to optimize communications.

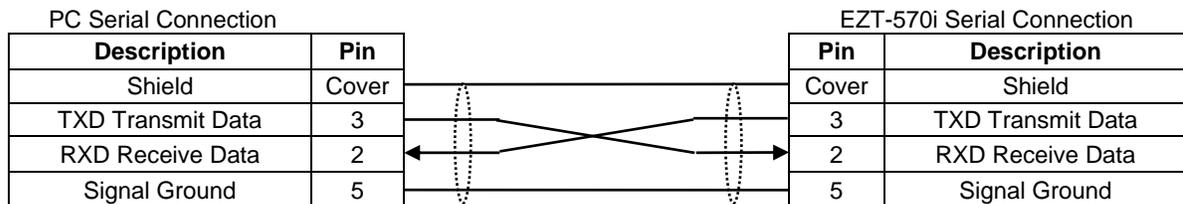
Depending on other activity that the EZT-570i may be performing at the time, data logging, FTP, VNC connections, etc., the timeout may have to be increased due to the additional work that the EZT has to perform. The additional processes may require more time for the EZT to respond to the message so a longer timeout period is needed.

! *When multiple EZT's are on the same serial connection, each EZT will receive the response of every other EZT on the link when they respond to a command from the host computer. Since the response of an EZT is not a valid command, the data will not clear from the EZT's buffer until the timeout expires. If a command is then sent to an EZT prior to the timeout period, it will not respond to the command because it would be appended to the previous data in the buffer, and thus makes it an invalid command.*

The communication rate of the host computer must be set to take this into account when multiple EZT's are on the same serial link. Once the host computer receives a response from an EZT, it must wait a minimum of the timeout period before sending a command to the next EZT on the link. Otherwise, the command may not be seen by the desired controller and it will not respond causing a communication failure.

9.1.2 EIA-232 Connections

To connect the EZT-570i 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 in the fact that 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 EZT-570i's serial port and the desired serial port on the PC (COM1 if using CSZ EZ-View). Make sure that the serial port settings of the EZT-570i and the host computer match, and be sure to save any changes to the EZT's Modbus settings. Cycle power to the EZT if its address has been changed and the serial connection is ready for operation.

9.1.3 EIA-485 Connections

The EZT-570i's serial communication interface is configured for EIA-232 by default. The Modbus slave can only communicate via one mode or the other (232 or 485) at a given time. In order to use the EIA-485 connection, you must change the serial communications mode.

To do this, enter system maintenance and select "Calibrate Touch Screen" from the system maintenance, setup menu. Press the "Calibrate Touch" button to enter the CECP utility and touch the "Serial" icon at the top right of the CECP window. Set "COM3" to RS485 by touching the radio button next to the description.



Figure 9-3 Serial Port Mode

Once the change is made, press the "Quit" icon to exit the CECP utility and return to the EZT-570i application to resume normal operation. The EZT-570i is now set to use EIA-485 for serial communications.



DO NOT change the serial port mode for COM1. It must remain set for RS232 communications or the EZT-570i will fail to operate correctly. COM1 is used by the EZT for communications between the control module (CM) and touch screen interface.

The EZT-570i's communication interface supplies two RJ-11 connectors for convenient daisy-chaining of multiple chambers to a single PC's serial port. The connection requires only two wires, pins 3 and 4 of the RJ11 connector. The PC's serial port must be capable of RS-485 half duplex communication or an interface converter must be used. CSZ has tested the following converters for compatibility with the EZT-570i.

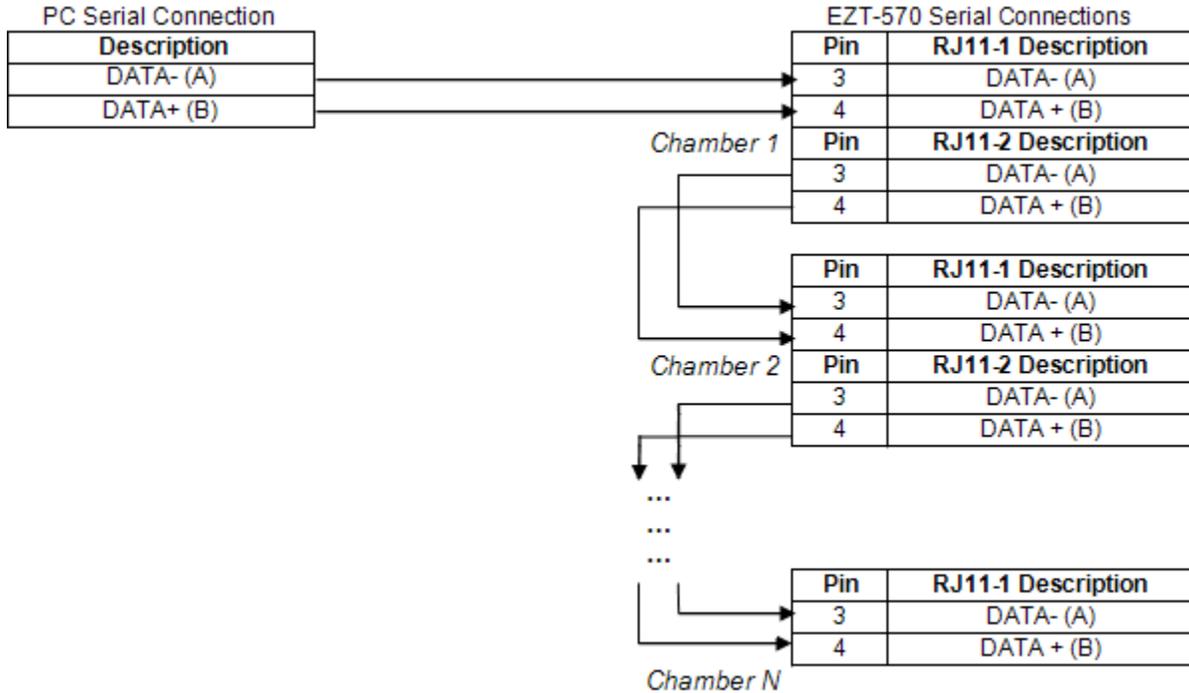
B&B Electronics
707 Dayton Road
PO Box 1040
Ottawa, IL 61350
Phone 815-433-5100
<http://www.bb-elec.com>

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

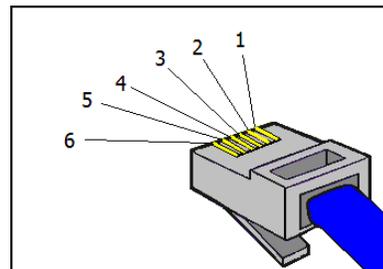
Part # **485OI9TB** for EIA-232 to EIA-85
Part # **485PS2** (external power supply)

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

A maximum of 31 chambers can be linked together on a single EIA-485 link. When connecting multiple chambers together, do not run separate cables from the PC to each chamber. Follow the diagram below for proper connections. Running multiple connections from the host PC will degrade the signal and could prevent communications from operating correctly.



Hold the RJ11 connector in your hand, tab side down, with the cable opening towards you. The pins are numbered 1-6, from right to left:



! *Either RJ-11 connector on the chamber can be used for the connection from or to another chamber. There is not a designated “in” and “out” connection. Keep the communication wires as short as possible between chambers. The total length adds up quickly, and longer runs will degrade performance. Maximum recommended total length is 350 feet, but is by no means guaranteed. The total length depends on many factors including the quality of wire used, the number of chambers on the link and the presence of electrical equipment in the area that may generate electrical interference.*

For longer runs and when multiple chambers are used on the same link, a line terminator may be required at the end of the cable run. This is typically a 220 ohm resistor connected across the A and B terminals of the last chamber on the link. See the manufacturer’s instructions for your specific EIA-485 communications interface used with your PC for any requirements that they may have to be followed.

9.2 GPIB (IEEE-488) Communications

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-570i 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.



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-570i'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-570i.

The EZT-570i's serial communication mode must be set to RS485. The 4899 converter is factory wired to communicate with the EZT-570i over this serial connection.

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

9.2.1 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-570i controller. These commands are listed in the table below. All commands are generated using standard ASCII text characters.

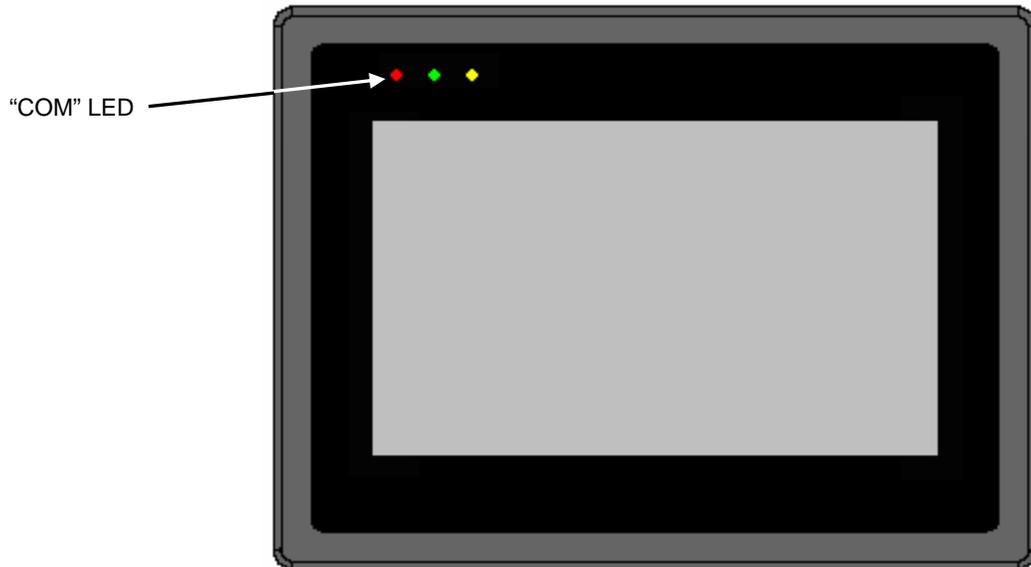
Command	Use
SYST:COMM:GPIB:ADDR <i>addr</i>	<p>GPIB Address Command</p> <p>Sets the GPIB controller's device address for subsequent commands. Value for <i>addr</i> is 1 to 31. This is the address you will use to communicate with the EZT-570i over the GPIB bus.</p>
*SAV 0	<p>Save Configuration Command</p> <p>Saves current 4899 configuration in nonvolatile memory so that on next power-up, settings such as the GPIB address will remain in tact.</p>
R[?] <i>reg, num</i>	<p>Read Register Command (reads EZT-570i data values)</p> <p>Reads one or multiple EZT-570i 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 GPIBKybd 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-570i 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-570i data values)</p> <p>Writes one 16-bit word, <i>w</i> to one EZT-570i register, <i>reg</i>.</p> <p>W 60, 550 writes a setpoint of 55.0 to loop 1.</p>
WB <i>reg, num, w(0).w(n)</i>	<p>Write Block Command (writes EZT-570i profile 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>

9.3 Ethernet Communications

The EZT-570i provides two forms of Ethernet communication interfaces for monitoring and controlling the chamber across a network. The web server interface provides a monitor only interface while the VNC server interface allows a user to manipulate and control the chamber remotely by viewing the EZT-570i display directly on their PC screen.

! *In order to use Ethernet communications, the EZT-570i must be properly connected to a network. To connect the EZT-570i to a network, connect the chamber's Ethernet port to your network using a standard CAT5 cable connection. After connecting the network cable, you must cycle power to the EZT-570i.*

The EZT-570i receives its IP address using DHCP on your network and it only occurs during boot. Therefore, make sure the EZT-570i is properly connected to your network and cycle power to the EZT-570i in order to obtain a valid IP address or the Ethernet communications will not operate.



The 'COM' LED on the EZT-570i display flashes to indicate that communications are taking place. However, this LED not only indicates Ethernet communications, but also indicates the normal serial communications that take place between the HMI and the CM. This indicator can be used as a tool to verify that communications are operating; however, it does not necessarily indicate that the EZT-570i is part of the network or that data is being transmitted over the Ethernet link.

Remember that power must be cycled to the EZT-570i after it is connected to the network in order to automatically obtain its IP address. Without a valid IP address, the EZT-570i will not be part of your network.

9.3.1 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 in the world. The flexibility and convenience that this provides makes it a very desirable feature for new equipment. The EZT-570i provides this ability, but there are considerations that should 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 probable cause of problems is not a hacker trying to sabotage your test, but more likely 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 chamber, by placing it on the office LAN, also opens the door for accidental shutdown, damage to product, loss of data and lost test time. 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 most important and best advice, is to never mix your office LAN with your control LAN. The control LAN should be a separate network that consists of your chambers and possibly any other test equipment that you may have. 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 device themselves have any security features at all. Separating the control LAN from the office LAN using a firewall, only allows 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 with 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 limits 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 test equipment in the area, could easily corrupt transmitted data over the network and cause devices to "lock up," which then requires the machine 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 noisy power supplies of a factory. Capacitance imbalance 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 and fewer glitches.

9.3.2 Obtaining the EZT-570i's MAC Address

For certain network configurations, the MAC address of the EZT-570i may be required for proper routing of information to/from the EZT-570i. The MAC address of the EZT-570i can be obtained from the CECP utilities window. To do this, enter System Maintenance from the System Setup menu.

Select "Calibrate Touch Screen" from the setup menu under System Maintenance and press the "Calibrate Touch" button to open the CECP utility. Touch the "System Information" icon to open the system information window.

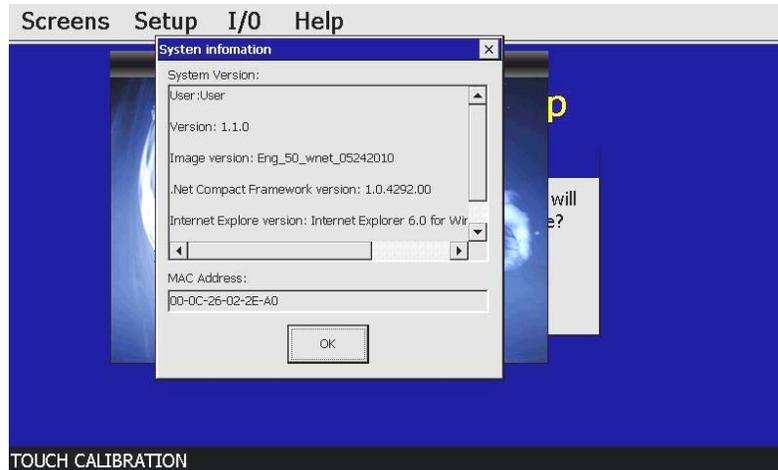


Figure 9-4 MAC Address

The "MAC Address" will be shown near the bottom of the system information window. When finished, press the "OK" button to close the window and then touch the "Quit" icon to return to the EZT-570i application to resume normal operation.

9.3.3 Setting a Static IP Address

Under some situations, it may be necessary to set a static IP address for the EZT-570i on a network. A static IP address can be set in the EZT-570i; however, it requires exiting the EZT-570i application and entering the "Network and Dial-up Connections" settings of the CE operating system.



When performing this procedure, do not alter, change or delete any other files or settings of the system. Doing so may render the EZT-570i inoperable.

To begin, you must be logged on to the EZT-570i as an administrator in order to exit the application. The default user ID and password is supplied in the security section of this manual. If the default security settings have been altered, get the proper authorization from the administrator of the chamber.

Once logged on with the proper security access, proceed to the “System Maintenance” section of the EZT-570i. From the setup menu under system maintenance, select “Exit Application”.

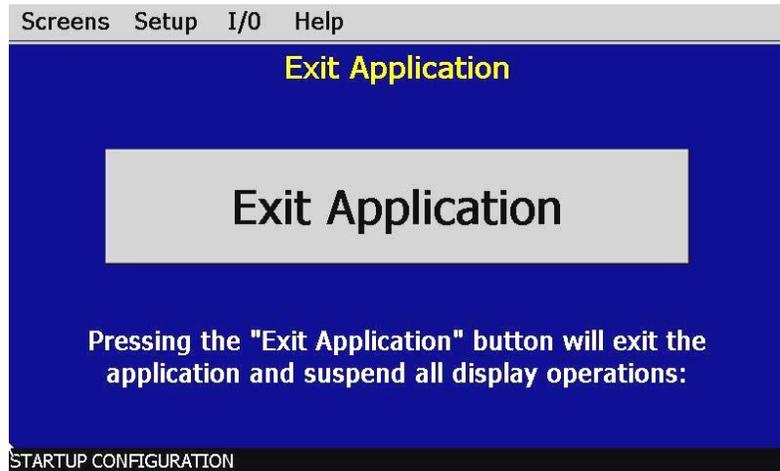


Figure 9-5 Exit Application

Press the “Exit Application” button. This will stop the EZT-570i application and take you to the Windows CE desktop. From the desktop, touch the narrow, gray bar at the bottom of the screen to show the taskbar. Before proceeding, enable the keyboard so that it will be available to enter in the IP address. If you do not enable it now, you will not be able to access the taskbar later once in the Ethernet Drivers screen.

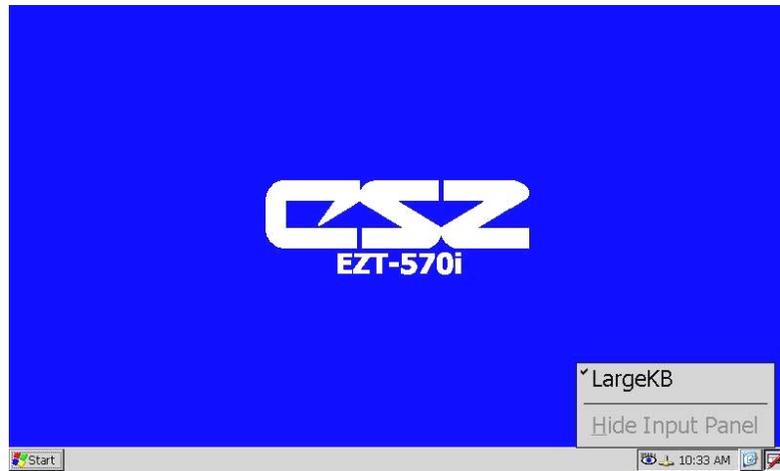


Figure 9-6 Enabling the Keyboard

To enable the keyboard, touch the keyboard icon at the lower right of the taskbar and select keyboard from the menu. This will make the keypad visible.

Next, press the “Start” button and select “Settings” then “Network and Dial-up Connections” to bring up the connections window.

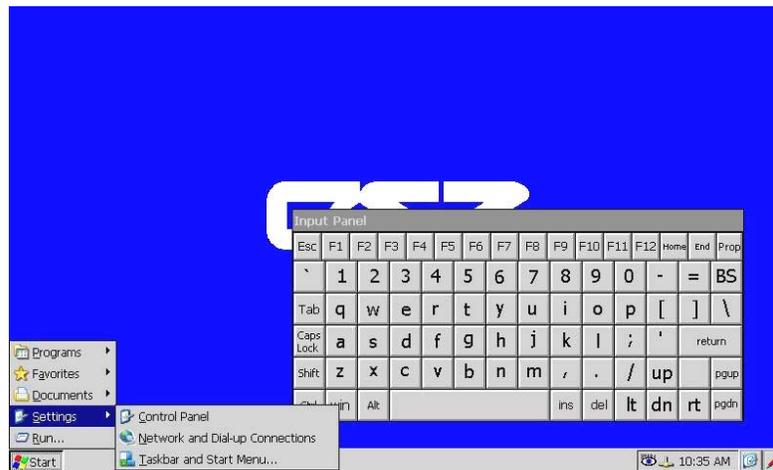


Figure 9-7 Network and Dial-up Connections

From the “Connection” window, select the current network connection by “double-clicking” the connection icon to bring up its property window. DO NOT create a new connection.

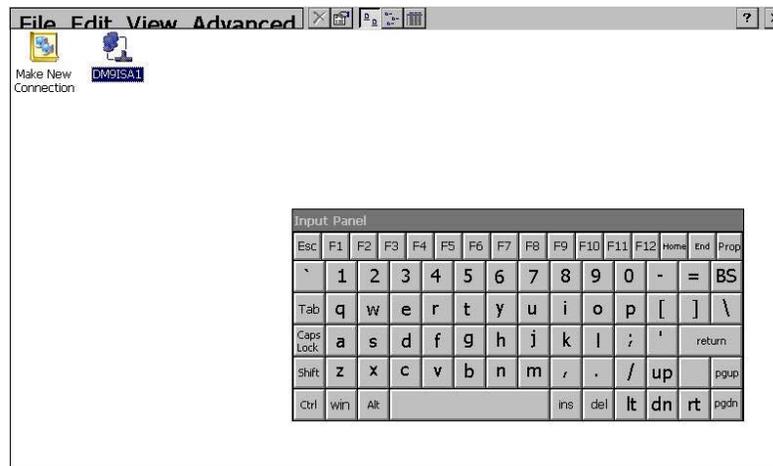


Figure 9-8 Network Connections

The “Ethernet Drivers” property window will allow you to set the IP address as well as name primary and secondary DNS and WINS servers from the “servers” tab if necessary.

Select “Specify IP Address” and enter in the desired IP address and subnet mask and/or default gateway as required.

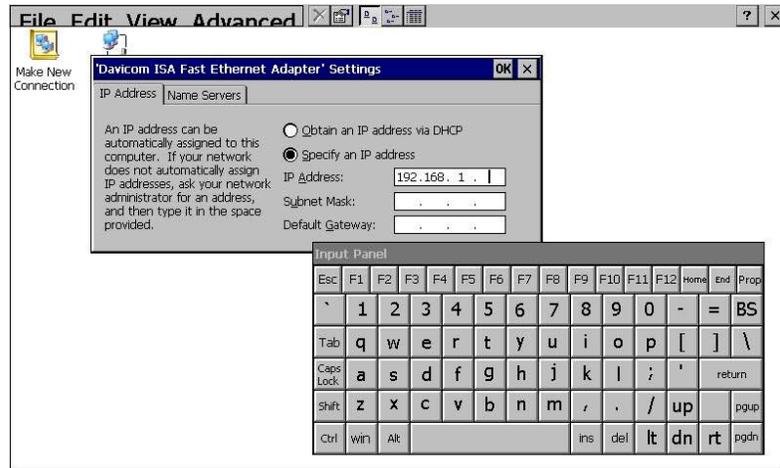


Figure 9-9 Ethernet Driver

You can drag the keyboard around on the screen to position it as necessary to access the different fields. Once complete, close the “Ethernet Drivers” window by pressing the “OK” button at the top right of the window. Next, close the Connection window by pressing the “X” button at the top right of the window.

Access the taskbar and hide the keyboard by pressing the keyboard button at the bottom right of the taskbar and select “Hide Input Panel”. DO NOT cycle power at this time. You must first save these changes to the registry or they will be lost and the EZT-570i will not use the IP address you specified to connect to the network.

To save the registry, you must access the CECP utility. To do this, press the “Start” button on the taskbar, select ‘Programs’ and then select “CECP”. This will open the “CECP” window.



Figure 9-10 Start CECP

Touch the “Registry Save” icon on the CECP window to open the utility.

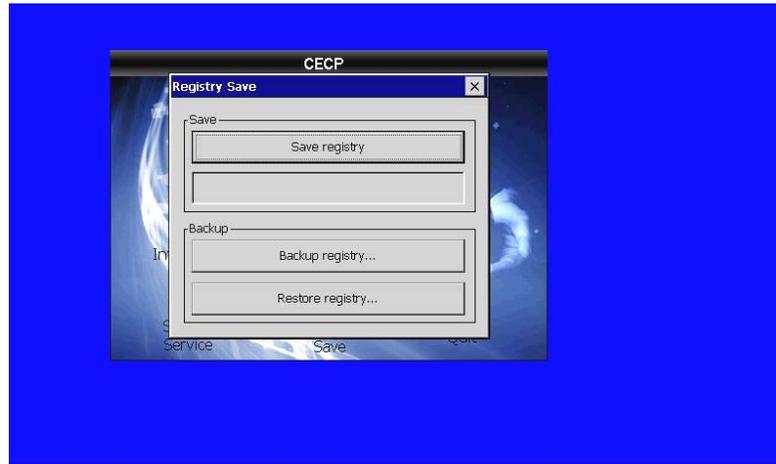


Figure 9-11 Registry Save

Press the “Save Registry” button to save the network settings to the Windows CE registry. When the registry save is complete, press the ‘X’ button in the top right of the window and then touch the “Quit” icon in the CECP utility. Cycle power to the EZT-570i and when it boots up, it will be running with the new network configuration settings.

9.3.4 Using the Web Server

The EZT-570i’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-570i’s current operating conditions. The web server can be enabled and disabled by simply touching the “Web Server On/Off” button.

You must use the assigned IP address to access the EZT-570i. To obtain the correct IP address, go to the Web Server/Modbus/VNC screen selection under the chamber setup menu. Write down the IP address so you will have it to enter into your web browser.

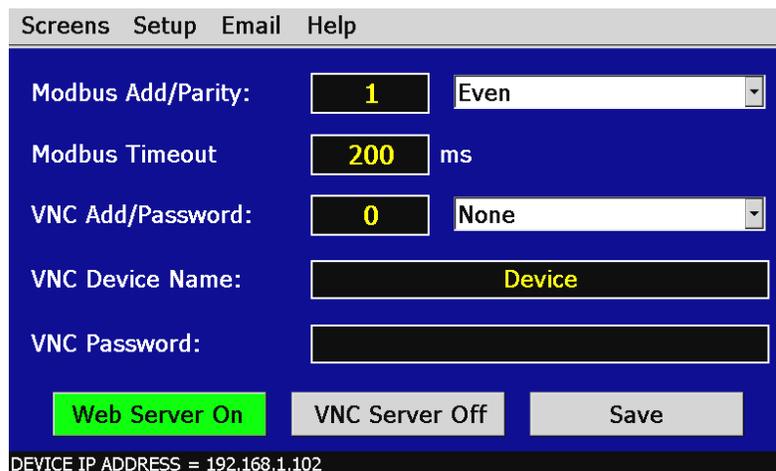
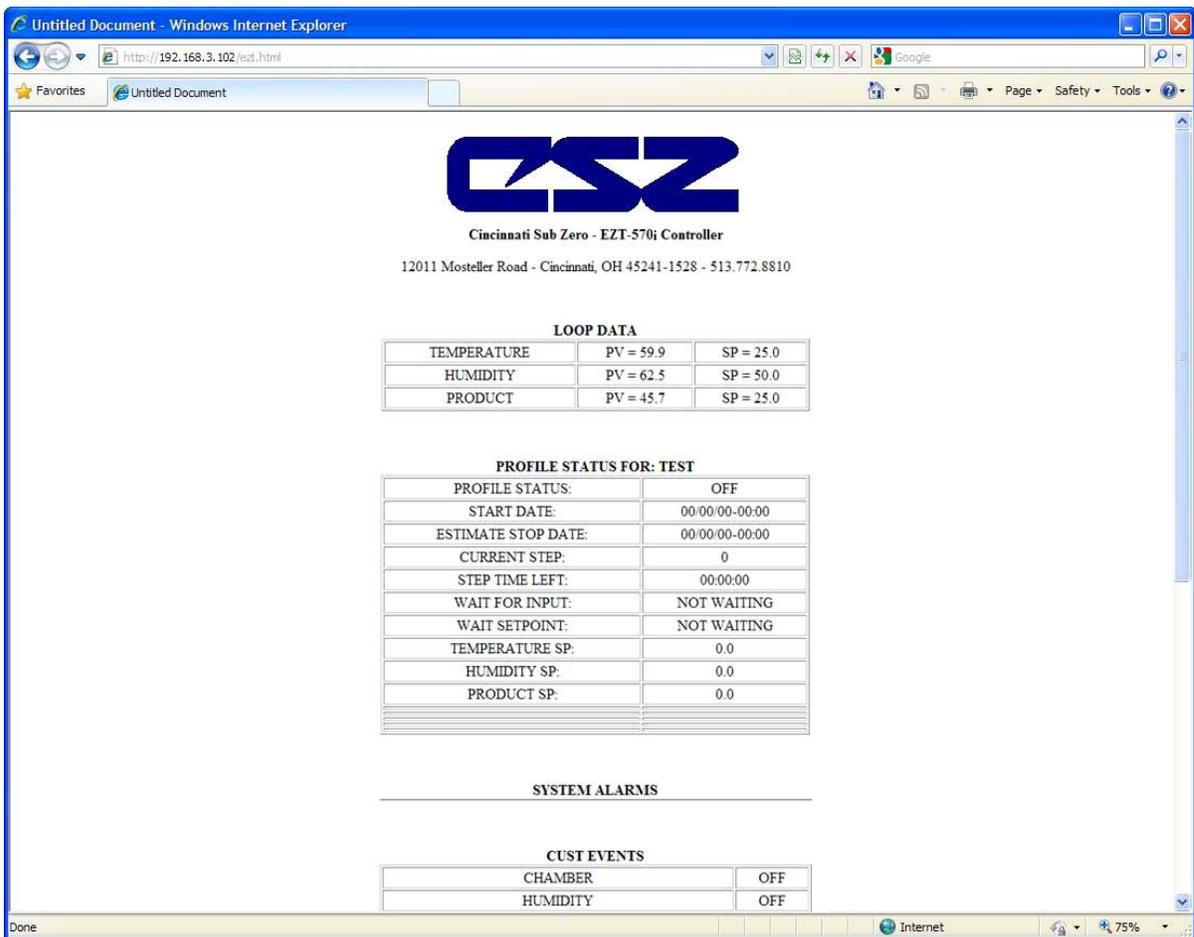


Figure 9-12 Web Server Settings

! Contact your IT department prior to enabling the web server of the EZT-570i. Company policy may prohibit the use of web servers for security reasons. Cincinnati Sub-Zero is 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-570i web server is the responsibility of the end user.

To access and view the EZT-570i's status web page, enter the following link in your PC's browser address window: <http://IPaddress/ezt.html> (from example address, <http://192.168.1.102/ezt.html>). The following example is typical of the EZT-570i web page appearance. The web page updates automatically every 30 seconds and provides information on each individual loop, profile status, alarm status and event status.



9.3.5 Using the VNC Server

The EZT-570i's VNC server allows a user to remotely monitor *and* control the chamber by directly viewing and manipulating the EZT-570i's touch screen over the network. All activity performed by either local or remote operators over the network will be viewed as if the user was actually touching the EZT-570i's screen. The VNC server can be enabled and disabled by simply touching the "VNC Server On/Off" button.

You must use the assigned IP address to access the EZT-570i. To obtain the correct IP address, go to the Web Server/Modbus/VNC screen selection under the chamber setup menu. Write down the IP address so you will have it to enter into your VNC viewer.

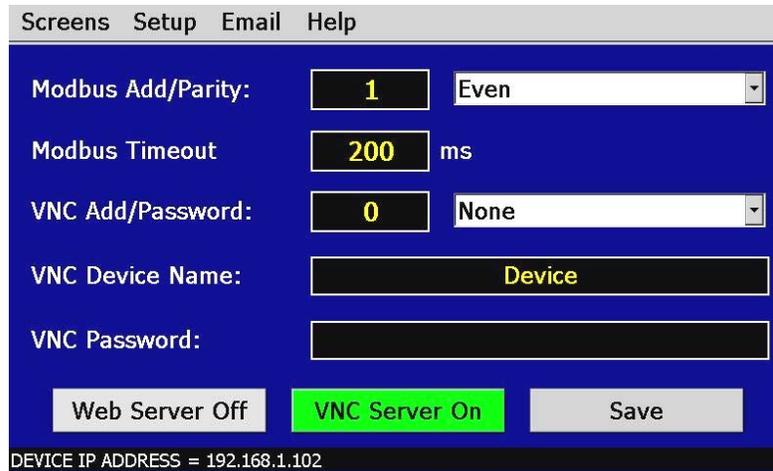


Figure 9-13 VNC Server Settings



Contact your network administrator prior to enabling the VNC server of the EZT-570i. Company policy may prohibit the use of VNC servers and/or viewers for security reasons. Cincinnati Sub-Zero 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-570i VNC server is the responsibility of the end user.

9.3.5.1 Accessing the EZT-570i through a VNC Viewer

There are many types of VNC viewers on the market. CSZ uses and recommends the use of RealVNC's viewer. A free version can be obtained from www.realvnc.com. Once installed, run the VNC viewer and enter the IP address for the EZT-570i in the "Server" field (see following examples).

Intranet Example

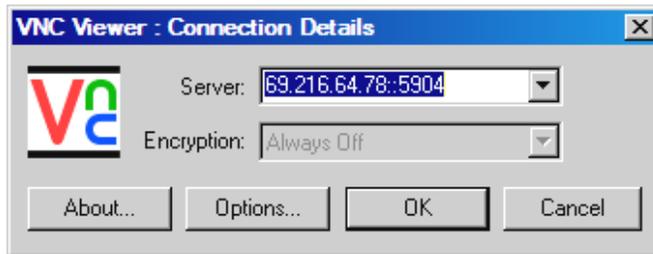
If the IP address of the EZT-570i is 192.168.3.102 and the configured VNC Address is 0, in the PC's VNC Viewer server field, enter "192.168.3.102:0" to access the EZT-570i (address 0 relates to port 5900, address 1 to port 5901, etc., which is the port opened by the VNC interface in order to allow communications with the EZT-570i over the network).



Internet Example

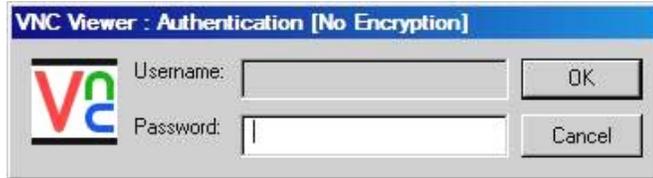
Internet connection typically requires a qualified network System Administrator. In typical applications, a permanent IP address and specific port address are assigned to the EZT-570i. Support on this action is beyond the scope of this manual. *Consult your network system administrator for assistance in setting up an Internet connection.*

If the IP address of the LAN is 69.216.64.78 and the configured VNC Address is 4 (port 5904 has been opened and assigned to this specific EZT-570i), from the remote PC (outside of the site Servers LAN), in the VNC Viewer server field enter “69.216.64.78::5904” to access the EZT-570i (5900 relates to address 0, 5901 to address 1, 5902 to address 2, etc., note the double colon). The IP address shown on the Web Server/Modbus/VNC screen is the LAN address of the EZT-570i and would not typically be used for an Internet connection.

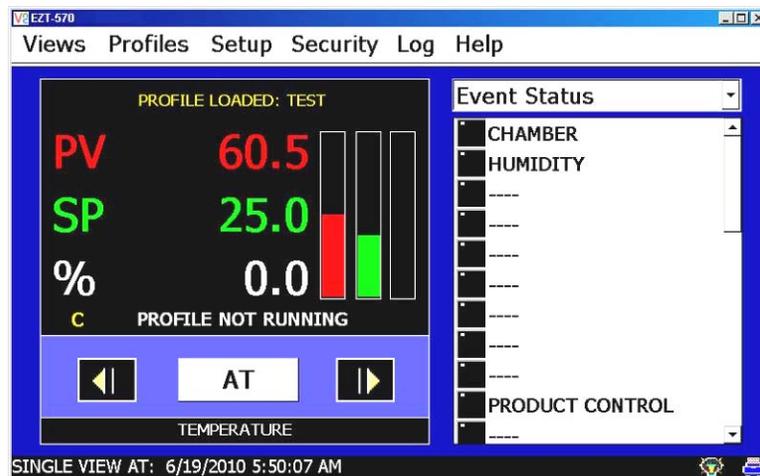


Security

If the VNC server password is enabled on the EZT, upon pressing the “OK” button in either example above, the VNC viewer will prompt you for the proper password. The connection will only be established once the valid password is entered.



Once the connection is established, the current EZT-570i display will be shown on your desktop. The image will be a duplicate of what is on the EZT-570i. As you manipulate the screen, the display of the EZT-570i will also be manipulated so that any local operator would 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 on the EZT-570i’s Web Server/ModbusVNC screen for the header. By entering in unique names for each chamber, you can identify each VNC connection and know which chamber you are manipulating.

The VNC viewer should be closed when it is not being used to control the chamber. If continuous monitoring of the chamber is desired, the web server interface is the recommended means of doing so. Leaving a VNC connection open to a chamber for extended periods of time is not recommended. Accidental manipulation of the control or erroneous network activity can cause connection problems over the VNC interface and result in chamber malfunction.



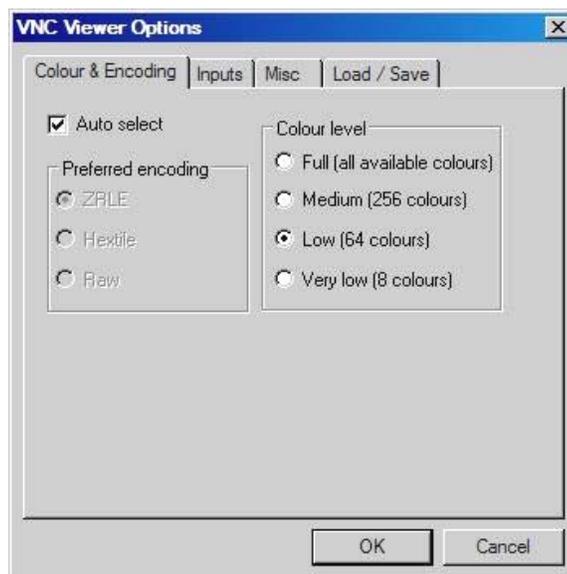
Some viewers contain additional features for file transfer and other higher level functions. These functions are NOT compatible with the EZT-570i. Any attempt to use them may lock up the EZT-570i’s display and will require power to be cycled in order to reboot the system. Cincinnati Sub-Zero can not take responsibility for other manufacturer’s software and will only provide support, within CSZ’s discretion, for connection issues arising from using software other than that recommended by CSZ.

Only one VNC connection should be opened to an EZT-570i at a time. More than one VNC viewer connection at a time may cause the VNC server to shut down due to the use of extensive system resources. Power will then have to be cycle to the EZT-570i in order to allow the server to be restarted and the connection restored.

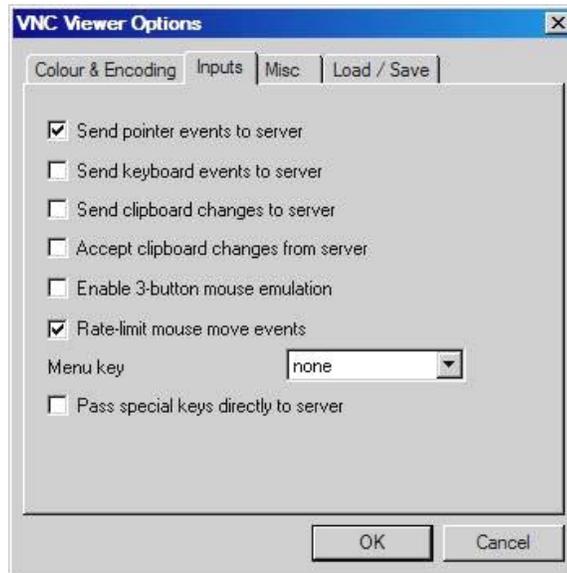
9.3.5.2 Recommended VNC Viewer Settings

The following information applies to viewer options of the RealVNC viewer recommended by CSZ. These settings have been tested and evaluated in order to provide the best performance and fastest response to user input when using the VNC viewer with the EZT-570i. After installing the VNC viewer software on your PC, it is recommended that the following changes be made to the default viewer settings and then saved as the default configuration for the viewer.

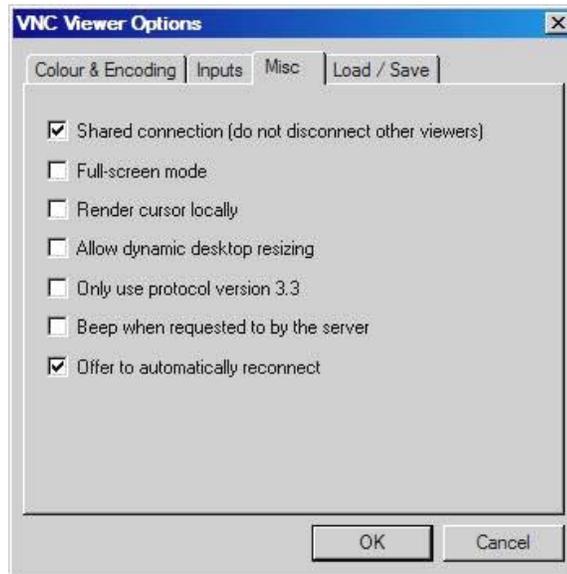
To begin, start the VNC viewer and click on the “Options” button in order to open the “VNC Viewer Options” window. On the “Colour & Encoding” tab, make sure the “Auto Select” check box is checked for the encoding method and set the “Colour level” to ‘Low’ as shown below.



Next, select the “Inputs” tab and deselect all entries except for “Send pointer events to server” and “Rate-limit mouse move events”. Set the “Menu key” to “none”.



On the “Miscellaneous (Misc)” tab, deselect all entries except for the “Shared connection (do not disconnect other viewers)” and “Offer to automatically reconnect” options.



Finally, proceed to the “Load/Save” tab and click on the “Save” button under the defaults heading. This will set the preferred options selections to the default start settings for the VNC viewer. Once complete, press the “OK” button to exit the options window. The VNC viewer will then connect to the EZT-570i using the optimized settings each time it is started.

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 Cincinnati Sub-Zero's 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 "Help About" screen under the system maintenance Help menu.

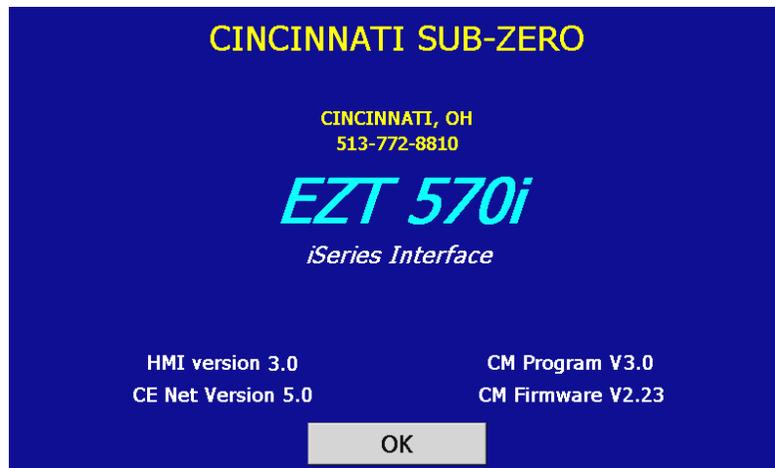


Figure 10-1 Help About

10.1 Alarm Codes and Troubleshooting



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	Corrective Action
"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.
BOILER OVERTEMP	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 HI 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.
Comm alm at PLC. Check Cable.	<p>Communication wiring between HMI and PLC faulty or not properly connected. If alarm will not clear, check wiring. Exit EZT-570i application and verify that COM1 serial port is set to RS485.</p> <p>If intermittent alarm (can be cleared and returns at random intervals), then remote PC communicating too fast with EZT-570i. Reduce rate at which PC sends commands to the EZT-570i or reduce number of communication connections.</p> <p> <i>Random alarms when communications are being used are not a sign of a hardware problem. It indicates that the EZT-570i is being loaded down with excess work. The purpose of the EZT is to control the chamber. Maintain a reasonable level of interface activity in order to keep your chamber running at an optimum condition.</i></p> <p><i>Intermittent alarms do not affect the operation of the chamber or shut down the chamber. However, data logging may be affected depending upon the logging rate selected. No audible alert is associated with this alarm.</i></p>
DEHUMID SYSTEM FAULT	Optional dehumidifier system fault. Check manufacturer's manual provided with the chamber for troubleshooting and diagnostic information.
Email Error! Check cable or server down.	<p>Indicates that the EZT-570i was unable to send an alarm message through the mail server. Verify that the EZT-570i is properly connected to the network and that the email server entered is valid.</p> <p> <i>This alarm does not affect chamber operations. It is an indication only alarm. No audible alert is associated with this alarm.</i></p>

Alarm Monitor Description	Corrective Action
EMERGENCY STOP	Investigate cause of stop. Verify conditions are safe. Reset emergency stop. Will require manual restart of chamber via manual event screen or resuming profile if profile was operating when stop occurred.
FLUID SYS TEMP	Fluid system high temperature safety tripped. Limit must be manually reset or power cycled to chamber to reset. Verify fluid level and flow. Do not set temperature setpoint above fluid system design limits.
FLUID SYS HI PSI	Fluid system exceeded operating pressure limits. Check for restrictions in fluid system. Verify all isolation valves are open. Reset high pressure safety.
FLUID SYS LOW FLOW	Fluid flow safety tripped. Verify fluid level. Check for restrictions in system. Check pump operation and service if necessary.
FTP! Check cable or server down.	<p>Indicates that the FTP back-up attempt of the data files failed. Verify that the EZT-570i is properly connected to the network and that the FTP site is valid.</p> <p> <i>This alarm does not affect chamber operations. It is an indication only alarm. No audible alert is associated with this alarm.</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.
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.
NTS Ping Failed. Check Cable.	<p>Indicates that the EZT-570i was unable to synchronize its clock with the selected national time server. Verify that the EZT-570i is properly connected to the network and time server selected is accessible.</p> <p> <i>This alarm does not affect chamber operations. It is an indication only alarm. No audible alert is associated with this alarm.</i></p>
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-570i will then automatically restart the chamber when main power is restored.
PRODUCT SAFETY	Optional product safety limit tripped. Manually reset limit to clear alarm. Check limit setpoints and verify properly set for product testing.

Alarm Monitor Description	Corrective Action
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.
"Input" SENSOR BREAK	Check sensor wiring for indicated "input". Verify lead connections. If sensor requires power, i.e., humidity, altitude, etc., verify power to sensor. Replace sensor.
SYS# HILO PSI	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. Service and further diagnostics require authorized, certified refrigeration service personnel.
SYS# LOW OIL PSI	Refrigeration system # (# = system number) oil pressure safety tripped. Check compressor oil level. Requires manual reset. Service and further diagnostics require authorized, certified refrigeration service personnel.
SYS# HI DISCHARGE	Refrigeration system # (# = system number) discharge safety tripped. Check liquid injection solenoid. Automatically resets. Service and further diagnostics require authorized, certified refrigeration service personnel.
SYS# COMP MONITOR	Refrigeration system # (# = system number) compressor protection module tripped. Check fusing and contactor for proper operation. Automatically resets after approximately 30-45 minutes. Service and further diagnostics require authorized, certified refrigeration service personnel.
TRANSFER ERROR	Transfer fault. Check for mechanical obstructions in basket transfer mechanism. Verify proper sensor locations and operation for proper basket position indication.



An audible alarm will sound for all system alarms other than the indication only alarms noted. The audible alarm can be disabled for input alarms if desired by selecting "Audible Off" for the input's alarm mode, see Section 5.5, Alarm settings. All view screen backgrounds will turn red on alarm.

System Status Monitor Description	Corrective Action
RH H2O RESERVOIR LO	Optional Humidity water reservoir low. Add more water. (an audible alert is associated with this indicator)
RH TMP DISABLE	Temperature outside allowable humidity operational limits. Turn off humidity system or set temperature setpoint within proper operating range. (no audible alert is associated with this indicator)
RH HI DEWPOINT LIMIT	EZT-570i 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 setpoints to within allowable chamber range. (no audible alert is associated with this indicator)
RH LO DEWPOINT LIMIT	EZT-570i 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 setpoints to within allowable chamber range. (no audible alert is associated with this indicator)
DOOR AJAR	Chamber door is open. If the chamber is equipped with a door switch to stop chamber operations when open, the indicator will be lit.
SERVICE FANS	Service alert, if enabled, indicating that the prime air movers of the chamber require regular maintenance. Perform service and clear elapsed service count for corresponding components.
SERVICE REFRIGERATION	Service alert, if enabled, indicating that the heating and/or cooling system components require regular maintenance. Perform service and clear elapsed service count for corresponding components.
SERVICE HUMIDITY	Service alert, if enabled, indicating that the humidity system components require regular maintenance. Perform service and clear elapsed service count for corresponding components.
SERVICE PURGE	Service alert, if enabled, indicating that the dry air purge system components require regular maintenance. Perform service and clear elapsed service count for corresponding components.
SERVICE ALTITUDE	Service alert, if enabled, indicating that the altitude system components require regular maintenance. Perform service and clear elapsed service count for corresponding components.
SERVICE TRANSFER CART	Service alert, if enabled, indicating that the basket transfer mechanism components require regular maintenance. Perform service and clear elapsed service count for corresponding components.



An audible alarm can be associated with the service alerts. See Section 10.2, Service Monitors, for detailed information on the service alerts.

10.2 Service Monitors



Perform lock-out, tag-out procedures and remove main power from the chamber prior to performing any service procedures. Service should only be performed by qualified service personnel.

Elapsed Service Counter Description	Service Action
AIR CIRCULATOR HRS	<p>Inspect locking collars on fans. Tighten if necessary.</p> <p>Inspect fan blades for damage and/or loose blades. Replace fan blade if necessary. DO NOT attempt repair.</p> <p>Inspect motor bearings for excessive wear (slop). Lubricate if applicable.</p> <p>Inspect heaters for corrosion and replace if insulators are cracked or damaged.</p>
RC BLOWER HRS	<p>Inspect locking collars on blower wheel. Tighten if necessary.</p> <p>Inspect blower wheel for damage and/or loose blades. Replace wheel if necessary. DO NOT attempt repair.</p> <p>Inspect motor bearings for excessive wear (slop). Lubricate if applicable.</p>
ALTITUDE SYS HRS	<p>Change vacuum pump oil filter.</p> <p>Check oil level in vacuum pump. Check for leaks. Add oil if needed.</p> <p>If applicable, inspect drive belts and replace if worn. Re-tension belts. Inspect motor bearings for excessive wear (slop). Lubricate if applicable.</p>
SYS # COMPRESSOR HRS	<p>Check compressor oil level. Verify static pressures.</p> <p>Clean air cooled condenser if applicable (air cooled units).</p> <p>Inspect condenser water connections if applicable (water cooled units). Verify proper temperature and differential pressure.</p>
HUMIDITY SYSTEM HRS	<p>Inspect water connections and filter cartridge if applicable.</p> <p>Clean humidity water reservoir if option present.</p> <p>If atomizer system, remove spray nozzle and clean. Inspect compressor motor and diaphragm for wear. Clean water filter.</p> <p>Inspect for build-up of deposits on humidity sensor. Clean filter tip of sensor. Use caution so as not to damage sensor tip.</p>
DRY AIR PURGE HRS	<p>Inspect air lines for leaks.</p> <p>Inspect filters and clean if necessary.</p>
HEATER CYCLES	<p>Inspect electrical connections and heater SSR for loose or frayed wiring. Tighten loose connections.</p>

Elapsed Service Counter Description	Service Action
SYS # CMP STARTS	Inspect wiring and power contactors for loose connections. Tighten or repair as necessary. Inspect compressor mounts/vibration isolators for wear. Tighten loose mounts or replace isolators if worn.
COOL VALVE CYCLES	Inspect valve body for corrosion. Look for cracks in valve stems. Inspect electrical connections on solenoid coil. Requires authorized refrigeration service personnel to replace.
RHCOOL VALVE CYCLES	
HUMIDIFY CYCLES	If boiler system, inspect electrical connections and heater SSR for loose or frayed wiring. Tighten loose connections.
DEHUMIDIFY CYCLES	Inspect valve body for corrosion. Look for cracks in valve stems. Inspect electrical connections on solenoid coil. Requires authorized refrigeration service personnel to replace.
LOW RH VALVE CYCLES	
DIVE VALVE CYCLES	Inspect valve body and fittings for cracks or leaks
VACUUM VALVE CYCLES	Verify pressure regulator settings.
TRANSFER CYCLES	Inspect transfer mechanism for wear. Adjust slide mechanisms and/or lubricate as necessary. Inspect cables for fraying and replace if applicable.



The elapsed service intervals are set based on CSZ recommended operating conditions for the chamber. These intervals may not be suitable to all applications due to varying operating conditions and environmental factors. It is recommended that these be used as a guide only, and that the end user determine and set up their own maintenance program based on use to insure reliable and long term chamber operation.

If you have any questions regarding maintenance procedures or would like recommendations for service procedures or programs, contact Cincinnati Sub-Zero's Service Department.

Appendix

Common Terms and Definitions

autotune — A feature that automatically sets process control PID values to match a particular process in a system.

baud rate — The rate of information transfer in serial communications, measured in bits per second.

accuracy — Closeness between the value indicated by a measuring instrument and a physical constant or known standard.

offset — An adjustment to eliminate the difference between the indicated value and the actual process value.

cascade — Control algorithm in which the output of one control loop provides the setpoint for another loop. The second loop, in turn, determines the control action.

derivative control (D) — The last term in the PID control algorithm. Action that anticipates the rate of change of the process, and compensates to minimize overshoot and undershoot. Derivative control is an instantaneous change of the control output in the same direction as the proportional error. This is caused by a change in the process variable (PV) that decreases over the time of the derivative (TD). The TD is in units of seconds.

DHCP (Dynamic Host Configuration protocol) — Permits auto-assignment of temporary IP addresses for new devices logging in to the network.

DNS (Domain Name Server) — Associates names with IP addresses over a network.

droop — In proportional controllers, the difference between setpoint and actual value after the system stabilizes.

EIA — See Electronics Industries of America.

EIA/TIA -232 and -485 — Data communications standards set by the Electronic Industries of America and Telecommunications Industry Association. Formerly referred to as RS- (Recognized Standard).

Electronics Industries of America (EIA) — An association in the US that establishes standards for electronics and data communications.

FTP (File Transfer Protocol) — The most popular mechanism for bulk movement of files on TCP/IP.

fuzzy logic — A mathematical control algorithm that monitors past response of a system to predict future response and automatically adjust PID parameters in order to adapt to process.

hysteresis — A change in the process variable required to re-energize the control or alarm output. Sometimes called switching differential.

integral control (I) — Control action that automatically eliminates offset, or droop, between setpoint and actual process temperature.

IP Address — Address of a TCP/IP enabled device on an Intranet or Internet.

LAN (Local Area Network) — A group of computers and associated devices that share a common communications line or wireless link.

Common Terms and Definitions (cont'd)

limit or limit controller — A highly reliable, discrete safety device (redundant to the primary controller) that monitors and limits the temperature of the process, or a point in the process. When temperature exceeds or falls below the limit setpoint, the limit controller interrupts power through the load circuit. A limit controller can protect equipment and people when it is correctly installed with its own power supply, power lines, switch and sensor.

MAC (Media Access Control) — The physical components which disassemble Ethernet message frames.

MAC Address — The physical address of an Ethernet node.

Modbus™ — A digital communications protocol owned by AEG Schneider Automation for industrial computer networks.

Modbus™ RTU — Remote Terminal Unit, an individual Modbus™-capable device on a network.

overshoot — The amount by which a process variable exceeds the setpoint before it stabilizes.

PID — Proportional, integral, derivative. A control mode with three functions: proportional action dampens the system response, integral corrects for droop, and derivative prevents overshoot and undershoot.

process variable (PV)— The parameter that is controlled or measured. Typical examples are temperature, relative humidity, altitude, etc. The high process variable is the highest value of the process range, expressed in engineering units. The low process variable is the lowest value of the process range.

proportional control (P)— Output effort proportional to the error from setpoint. For example, if the proportional band is 20° and the process is 10° below setpoint, the heat proportioned effort is 50 percent.

ramp — A programmed increase in the temperature of a setpoint system.

range — The area between two limits in which a quantity or value is measured. It is usually described in terms of lower and upper limits.

(RTD) resistance temperature detector — A sensor that uses the resistance temperature characteristic to measure temperature.

serial communications — A method of transmitting information between devices by sending all bits serially over a single communication channel.

setpoint (SP) — The desired value programmed into a controller. For example, the temperature at which a system is to be maintained.

TCP/IP (Transmission Control protocol / Internet protocol) — A suite of commands used for handling the transmission of Internet data.

(T/C) thermocouple — A temperature sensing device made by joining two dissimilar metals. This junction produces an electrical voltage in proportion to the difference in temperature between the hot junction (sensing junction) and the lead wire connection to the instrument (cold junction).

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