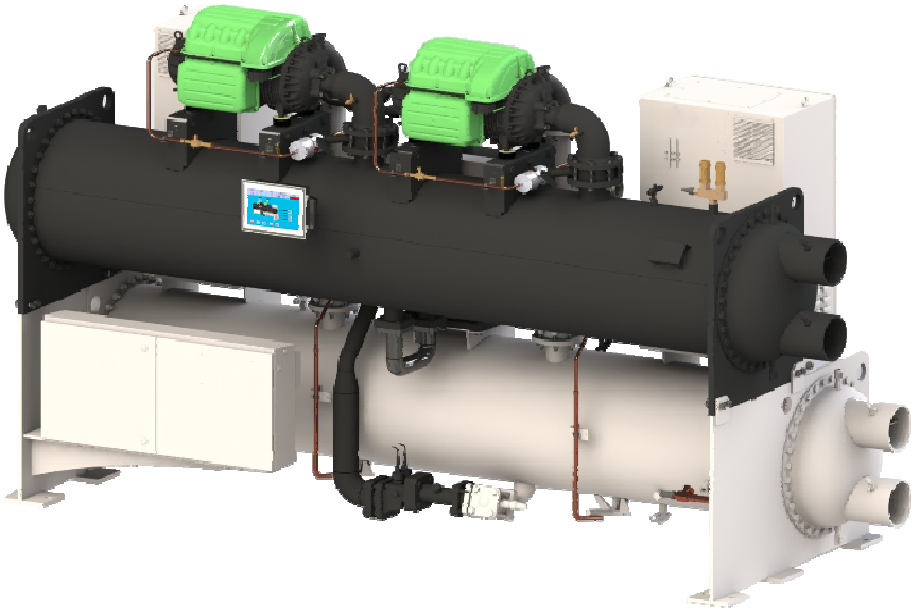
Operating and Maintenance Manual	OMM HXETG
	Group: Chiller
	Date:2023.08
	New Part No.: Z8100380-02
	Old Part No.: Z8100380-01

Magnitude™ Magnetic Bearing Chillers

Model HXETG



(All pictures in manual are taken from HXE Dual)

Thanks for purchasing DAIKIN chiller.

The Manual specifies safety, installation and maintenance precautions.

Please read through the manual before installation and operation.

For future reference, please be sure to keep it safe.

Engineered for Flexibility and performance

DAIKIN

Table of Contents

1 Introduction

This manual provides setup, operating, and troubleshooting information for Daikin Magnitude™ centrifugal chillers with the MicroTech controller.

Do not touch the screen with sharp objects.

It needs time to transmit data from controller to HMI for one or two seconds. Enter the password, then please wait three seconds to push the setting button again.

Disclaimer:

Be sure to read this manual carefully before using the unit to understand your legal rights and interests, responsibilities and safety instructions. Otherwise, property loss, safety accidents and personal safety risks may be caused. Once you use the unit, you will be deemed to have read and fully understood, approved and accepted all the terms and contents of this statement. Users promise to be responsible for their actions and all the consequences. Users promise to use the unit for legitimate purposes only in accordance with laws and regulations, use standards and common sense of life, and agree to this clause.

DAIKIN shall not be liable for any direct or indirect personal injury and property damage caused by using the unit in accordance with the safety precautions. Users should read, understand and implement safety precautions including but not limited to this manual.

Software Version
Software Code: Reference to specific program

⚠ WARNING

1. Electric shock hazard. Improper handling of this equipment can cause personal injury or equipment damage. This equipment must be properly grounded.
2. Connections to and service of the MicroTech control panel must be performed only by personnel that are knowledgeable in the operation of the equipment being controlled.

⚠ CAUTION

1. Static sensitive components. A static discharge while handling electronic circuit boards can cause damage to the components. Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work.
2. Never unplug any cables, circuit board terminal blocks, or power plugs while power is applied to the panel.
3. Do not install any non-Daikin International authorized software or alter operating systems in any unit microprocessor, including the interface panel. Failure to do so can cause malfunction of the control system and possible equipment damage.

⚠ NOTICE

1. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause interference to radio communications.
2. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the owner will be required to correct the interference at the owner's own expense.
3. Daikin disclaims any liability resulting from any interference or for the correction thereof.

Chiller Location

The chillers are intended only for installation in an indoor or weather protected area consistent with the NEMA 1 rating on the chiller, controls, and electrical panels. Equipment room temperature for operating and standby conditions is 0°C to 40°C with a maximum relative humidity of 90% (non-condensing).

2 Features of the Control Panel

- Control of leaving chilled water within a ±0.2°C tolerance.
- Display of the following temperatures and pressures on a 12-inch touch-screen operator interface
  - Entering and leaving chilled water temperature
  - Entering and leaving condenser water temperature
  - Suction pressure
  - Discharge pressure
  - Suction line, calculated superheat for discharge and suction lines
  - Economizer temperature and pressure
  - EXV opening position
  - Condenser liquid level
- Automatic control of primary and standby evaporator and condenser pumps.
- Control of up to 4 stages of cooling tower fans plus modulating bypass valve and/or tower fan VFD. Although fan staging is available, continuous, modulated control of tower capacity is preferred and recommended.
- History trend feature that will constantly log chiller functions and setpoints. The touchscreen will store and display all accumulated data for recall in a graphic format on the screen. Data can be downloaded for archival purposes.
- Three levels of security protection against unauthorized changing of setpoints and other control parameters.
- Plain language warning and fault diagnostics to inform operators of most warning or fault conditions. Warnings, problems and faults are time and date stamped for identification of when the fault condition occurred. In addition, the operating conditions that existed just prior to shutdown can be recalled to aid in resolving the cause of the problem.
- Twenty-five previous faults and related operating conditions are available from the display. Data can be exported for archival purposes via a USB driver.
- Remote input signals for chilled water reset, demand limiting and unit enable.
- Manual control mode allows the service technician to command the unit to different operating states. Useful for system checkout.
- BAS communication capability via Modbus, BACnet standard open protocols for most BAS manufacturers.
- Service Test mode for troubleshooting controller outputs.
- Preemptive control of low Suction and high discharge pressure conditions to take corrective action prior to a fault trip.

3 Definitions

Active Setpoint

The active setpoint is the parameter setting in effect at any given moment. This variation can occur on setpoints that can be altered during normal operation. Resetting the chilled water leaving temperature setpoint by one of several methods such as return water temperature is an example.

Active Capacity Limit

The active capacity setpoint is the setting in effect at any given moment. Any one of several external inputs can limit a compressor's capacity below its maximum value.

Active-Amp-Limit

Active amp limit is the actual amp limit imposed by an outside signal such as the load limit function.

Dead Band

The dead band is a set of values associated with a setpoint such that a change in the variable occurring within the dead band causes no action from the controller. For example, if a temperature setpoint is 44°F and it has a dead band of ± 0.2 degrees F, nothing will happen until the measured temperature is less than 43.8°F or more than 44.2°F.

Discharge Superheat

Discharge superheat is calculated using the following equation:

Discharge Superheat = Discharge Temperature – Condenser Saturated Temperature

Error

In the context of this manual, "Error" is the difference between the actual value of a variable and the target setting or setpoint.

Evaporator Approach

The evaporator approach is calculated for each circuit. The equation is as follows:

Evaporator Approach = LWT – Evaporator Saturated Temperature

Evap Hold-loading

This is a setpoint that establishes the minimum Suction Pressure to which the chiller is allowed to go. It signals that the unit is at full load so the no further loading will occur that would lower the pressure even further.

Evap Recirc (Evaporation Recirculation) Timer

A timing function, with a 30-second default, that holds off any reading of chilled water for the duration of the timing setting. This delay allows the chilled water sensors to take a more accurate reading of the chilled water temperature.

EXV

Electronic expansion valve, used to control the flow of refrigerant to the evaporator, controlled by the circuit microprocessor.

Load Limit

An external signal from the Touch screen, or a 4-20mA signal that limits the compressor loading to a designated percent of full load. Used to limit unit power input.

Load Balance

Load balance is a technique that equally distributes the total unit load between two or more running compressors.

Low Pressure Hold (Inhibit) Setpoint

The psi Suction Pressure setting at which the controller will not allow further compressor loading. "Hold" and "Inhibit" are used interchangeably.

Low Pressure Unload Setpoint

The psi Suction Pressure setting at which the controller will unload the compressor in an effort to maintain the minimum setting.

LWT

Evaporator leaving water temperature. The “water” is any fluid used in the chiller circuit.

LWT Error

Error in the controller context is the difference between the value of a variable and the setpoint. For example, if the LWT setpoint is 44°F and the actual temperature of the water at a given moment is 46°F, the LWT error is +2 degrees.

LWT Slope

The LWT slope is an indication of the trend of the chilled water temperature. It is calculated by taking readings of the temperature every few seconds and subtracting them from the previous value over a rolling one-minute interval.

ms

Milli-second

Maximum Saturated Condenser Temperature

The maximum saturated condenser temperature allowed is calculated based on the compressor operational envelope.

Offset

Offset is the difference between the actual value of a variable (such as temperature or pressure) and the reading shown on the microprocessor as a result of the sensor signal.

HMI

Operator Interface Touch Screen, one screen per unit provides operating data visually and accommodates setpoint entry.

Refrigerant Saturated Temperature

Refrigerant saturated temperature is calculated from the pressure sensor readings. The pressure is fitted to an R134a temperature/pressure curve to determine the saturated temperature.

Suction Superheat

Suction superheat is calculated for each circuit using the following equation:

Suction Superheat = Suction Temperature – Evaporator Saturated Temperature

Stageup/Stagedown Delta-T

Staging is the act of starting or stopping a compressor or fan when another is still operating. Startup and Stop is the act of starting the first compressor or fan and stopping the last compressor or fan. The Delta-T is the “dead band” on either side the setpoint in which no action is taken.

Stage Up Delay

The time delay from the start of the first compressor to the start of the second.

Startup Delta-T

Number of degrees above the LWT setpoint required to start the first compressor.

Stop Delta-T

Number of degrees below the LWT setpoint required for the last compressor to stop.

VDC

Volts, Direct Current; sometimes noted as vdc.

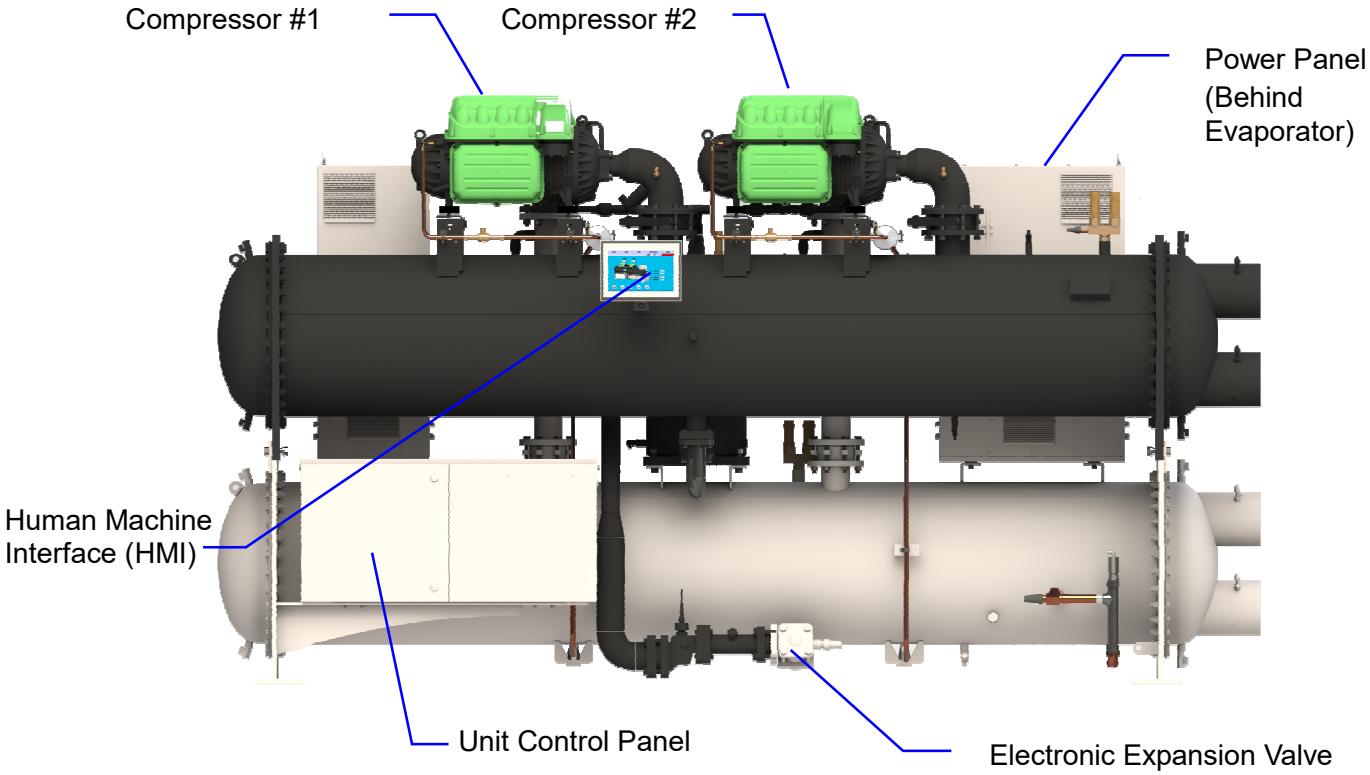
VFD

Variable Frequency Drive, a device located on the compressor used to vary the compressor speed.

4 General Description

Major Components

Figure4-1, Major Component Location



General Description

The centrifugal MicroTech control system consists of a microprocessor-based controller in the control panel, as well as on-board the compressors, providing monitoring and control functions required for the controlled, efficient operation of the chiller. The system consists of the following components:

- Human Machine Interface (HMI), one per unit-provides unit information and is the primary setpoint input instrument. It has no control function.
- Unit Controller, controls unit functions and communicates with other auxiliaries. It is the secondary location for setpoint input if, and only if, the HMI is inoperative.
- On-board compressor controller mounted on each compressor that monitors compressor operation and controls bearing operation.

The operator can monitor all operating conditions by using the unit-mounted HMI. In addition to providing all normal operating controls, the MicroTech control system monitors equipment protection devices on the unit and will take corrective action if the chiller is operating outside of its normal design conditions. If a fault condition develops, the controller will shut a compressor, or the entire unit, down and activate an alarm output. Important operating conditions at the time an alarm condition occurs are retained in the controller's memory to aid in troubleshooting and fault analysis.

The system is password protected and only allows access by authorized personnel. The operator must enter the password into the touch screen (or one of the controller's keypad) before any setpoints can be altered.

5 Operating the Control System

5.1 Interface Panel On/Off

The Operator Interface Panel is turned on and off with a switch located in the panel.

The screen is equipped with a screen saver that blackens the screen. Touching the screen anywhere reactivates the screen.

5.2 Start/Stop Unit

Upper right-hand corner of the screen has AUTO and STOP button that are only active when the unit is in "LOCAL CONTROL." When these buttons are pressed, the unit will cycle through its normal starting or stopping sequence.

5.3 Change Setpoints

Setpoints are easily changed on the Operator Interface Touch Screen (HMI). Setpoints can also be changed in the unit controller, but this is not recommended except in an emergency when the HMI is unavailable.

5.4 Alarms

ALARM Button in the lower middle of any HMI screen is illuminated red if there is an alarm. If the optional remote alarm is wired in, it too will be energized.

There are three types of alarms:

- **Fault**, equipment protection alarms that shut a unit or compressor off.
- **Problem**, limit alarms that limit compressor loading in response to an out-of-normal condition. If the condition that caused a limit alarm is corrected, the alarm light will be cleared automatically.
- **Warning**, notification only, no action taken by controller.

Any type will light the ALARM light. Procedures for dealing with alarms are shown below:

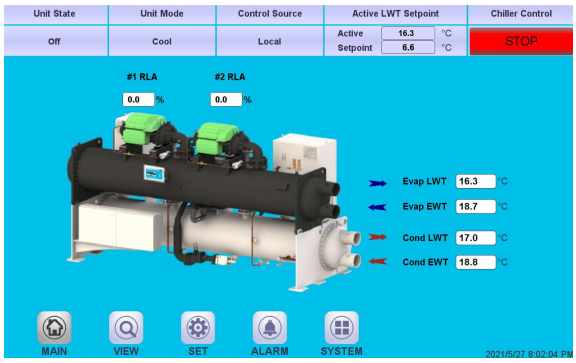
1. Press the alarm light button. This will go directly to the ACTIVE ALARMS screen.
2. The alarm description (with date stamp) will be shown.
3. Correct the condition causing the alarm.
4. Press the ‘Clear Alarm’ button to clear the alarm from the controller. If the fault condition is not fixed, the alarm will continue to be on and the unit will not be able to be restarted.

5.5 Chiller Operation without the Operator Interface Panel

The Touch Screen communicates with the unit controller, displaying data and transmitting touch screen inputs to the controllers. All normal inputs and outputs will remain functional. The unit controller can be used to view operational data, to clear alarms and to change setpoints, if necessary.

6 Component Description

6.1 Human Machine Interface



Human Machine Interface (HMI) is the primary device for entering commands and entries into the control system. (Settings can also be made directly into the unit controller.) The HMI can also display controller data and information on a series of graphic screens. A single HMI is used per unit.

Selected information from the HMI panel can be down-loaded via a USB port on HMI panel.

The HMI panel is mounted on a moveable arm to allow placement in a convenient position for the operator.

There is a screen-saver programmed into the system. The screen is reactivated by touching it anywhere.

6.2 Controller Description

Hardware Structure

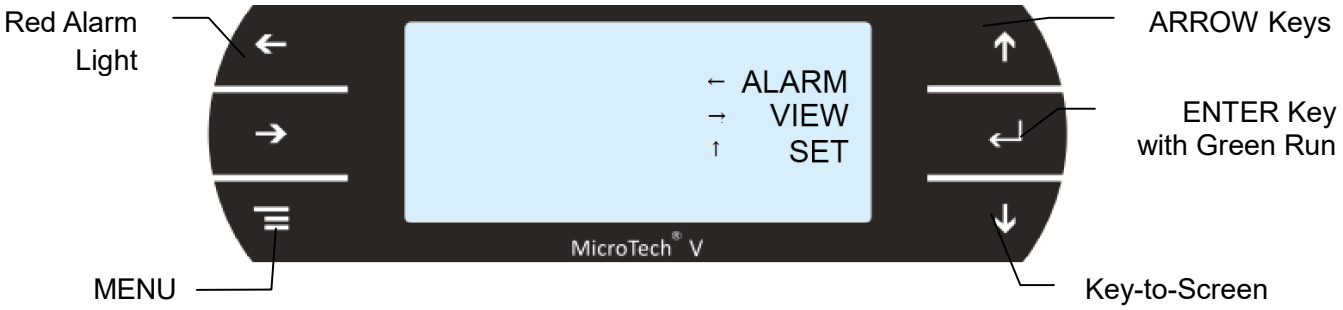
The controller is fitted with a microprocessor for running the control program. There are terminals for connection to the controlled devices (for example: solenoid valves, tower fans, pumps). The program and settings are saved permanently in FLASH memory, preventing data loss in the event of power failure without requiring a back-up battery.

The controller connects to other control boards, the on-board compressor microprocessors and the HMI via a local communications network (RS485).

Keypad

A 4-line by 20-character/line liquid crystal display and 6-button keypad is mounted on the controller. Its layout is shown below.

Figure6-1, Controller Keypad



The four arrow keys (UP, DOWN, LEFT, RIGHT) have three modes of use:

- Scroll between data screens in the direction indicated by the arrows (default mode).
- Select a specific data screen in the menu matrix using dynamic labels on the right side of the display such as ALARM, VIEW, etc (this mode is entered by pressing the MENU key). For ease of use, a pathway connects the appropriate button to its respective label on the screen.
- Change field values in setpoint programming mode according to the following table:

  LEFT key = Default RIGHT key = Cancel

UP key = Increase (+) DOWN key = Decrease (-)

These four programming functions are indicated by one-character abbreviation on the right side of the display. This programming mode is entered by pressing the ENTER key.

Getting Started

There are two basic procedures to learn in order to utilize the MicroTech controller:

1) Navigating through the menu matrix to reach a desired menu screen, and knowing where a particular screen is located.
2) Knowing what is contained in a menu screen and how to read that information, or how to change a setpoint contained in the menu screen.

6.3 Navigating

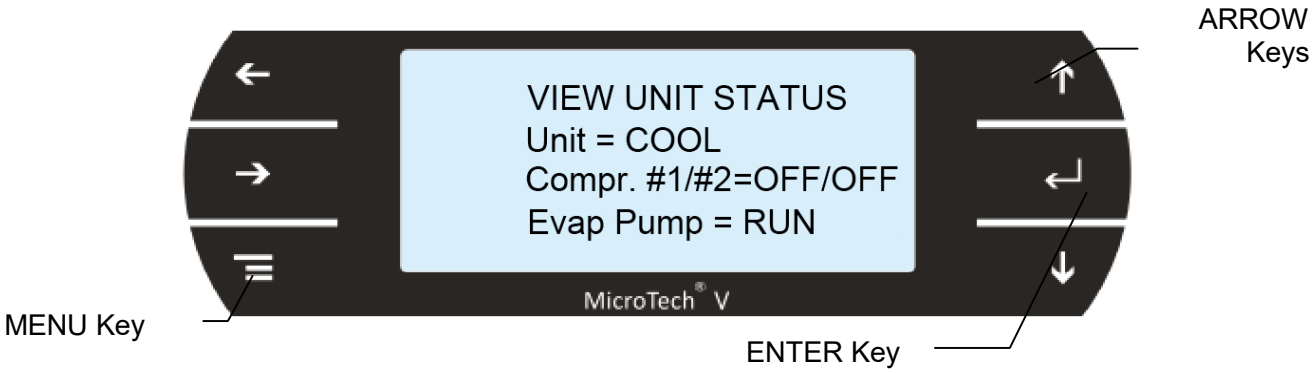
The menus are arranged in a matrix of screens across a top horizontal row. Some of these top-level screens have sub-screens located under them.

There are two ways to navigate through the menu matrix to reach a desired menu screen.

1) One is to scroll through the matrix from one screen to another using the four ARROW keys.
2) Another way is to use shortcuts to work through the matrix hierarchy. From any menu screen,
   a) Pressing the MENU key will take you to the top level of the hierarchy. The display will show ALARM, VIEW, and SET as shown in Figure4. One of these choices can then be selected by pressing the key connected to it via the pathway shown in the figure.
   b) Depending on the top-level selected, a second level of screens will appear. For example, selecting ALARM will go the next level of menus under ALARM (ALARM LOG or ACTIVE ALARM). Selecting VIEW will go the next level of menus (VIEW COMPRESSOR STATUS, VIEW UNIT STATUS, VIEW EVAPORATOR, or VIEW CONDENSER). Selecting SET will go to a series of menus for looking at and changing setpoints.
   c) After selecting this second level, the desired screen can be acquired using the arrow keys. A typical final screen is shown below.

Pressing the MENU key from any menu screen will automatically return you to the MENU mode.

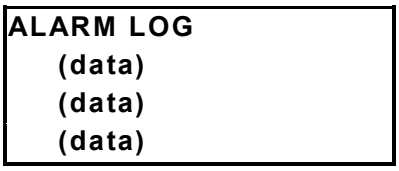
Figure6-2, Typical Menu Display and Keypad Layout



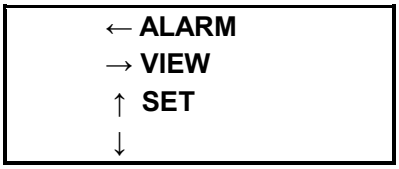
Menu Screens

A hierarchical menu structure is used to access the various screens. Each menu screen can have one to four lines of information. Optionally, the last menu selection can access one of a set of screens that can be navigated with the UP/DOWN arrow keys (see the scrolled menu structure below). Menu selection is initiated by pressing the MENU key, which changes the display from a data screen to a menu screen. Menu selections are then made using the arrow keys according to labels on the right side of the display (the arrows are ignored). When the last menu item is selected,

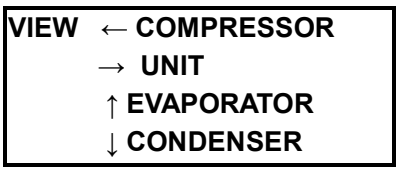
the display changes to the selected data screen. An example follows showing the selection of the "VIEW COMPRESSOR (n) screen. Suppose the initial screen is:



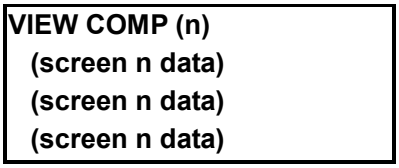
After pressing the MENU button, the top-level menu screen will show:



After pressing the "VIEW" menu button, a menu screen will show:



After pressing the "COMPRESSOR" menu button, the selected data screen will show;



Where "n" is the number of the last viewed COMPRESSOR screen. The arrow keys will automatically return to the "scroll" mode at this time. Different compressor screens can then be selected with the UP/DOWN arrow keys.

7 Unit Controller

7.1 Unit Faults, Problems, Warnings

Faults (Equipment Protection Shutdowns)

Equipment protection faults cause rapid compressor shutdown. The compressor is stopped immediately (if the compressor was running).

Table7-1 Unit Faults

Description	Occurs When:	Action Taken
High Discharge Pressure-Stop	Discharge Pressure > High Discharge Pressure SP	Rapid Stop
Mechanical High Pressure	Digital Input = High Pressure	Rapid Stop
Leaving Evaporator Water Temperature Sensor Fault	Sensor shorted or open	Rapid Stop
Leaving Condenser Water Temperature Sensor Fault	Sensor shorted or open	Rapid Stop
Evaporator Water Flow Loss	Evaporator Flow DI = No Flow for > 10 sec	Rapid Stop
Condenser Water Flow Loss	Condenser Flow DI = No Flow for > 10 sec	Rapid Stop

Problems (Limit Alarms)

The following alarms limit operation of the chiller in some way as described in the Action Taken column.

Table7-2, Unit Limit Alarms

Description	Occurs When:	Action Taken	Reset
Evaporator Pump #1 Fault	No flow indicated for (5 sec) with Evaporator Pump #1 ON AND [the other pump is available (per the Evap Pump SP) AND has not faulted]	Start pump #2	Manual
Evaporator Pump #2 Fault	No flow indicated for (5 sec) with Evaporator Pump #2 ON AND [the other pump is available (per the Evap Pump SP) AND has not faulted]	Start pump #1	Manual
Condenser Pump #1 Fault	No flow indicated for (5 sec) with Condenser Pump #1 ON AND [the other pump is available (per the Evap Pump SP) AND has not faulted]	Start pump #2	Manual
Condenser Pump #2 Fault	No flow indicated for (5 sec) with Condenser Pump #2 ON AND [the other pump is available (per the Evap Pump SP) AND has not faulted]	Start pump #1	Manual
Entering Evaporator Water Temperature Sensor Fault	Sensor fault AND leaving water reset is based on entering water	Reset mode is set to No Reset	Manual. (Reset mode goes back to Entering Water)

Warnings

The following “alarms” only generate a warning message to the operator. Chiller operation is not affected.

Table7-3, Unit Warnings

Description	Occurs When:	Action Taken	Reset
Entering Evaporator Temperature Sensor Fault	Sensor is open or shorted	Annunciation	Automatic
Entering Condenser Temperature Sensor Fault	Sensor is open or shorted	Annunciation	Automatic
Economizer Temperature Sensor Fault	Sensor is open or shorted	Annunciation	Automatic
Economizer Press Sensor Fault	Sensor is open or shorted	Annunciation	Automatic
Air Input Press Sensor Fault	Sensor is open or shorted	Annunciation	Automatic

7.2 Compressor Faults, Problems, Warnings

Faults (Equipment Protection Shutdowns)

Equipment protection faults cause rapid compressor shutdown. The compressor is stopped immediately (if the compressor was running).

The following table identifies each alarm, gives the condition that causes the alarm to occur, and states the action taken because of the alarm. All equipment protection alarms require a manual reset. These faults are accessed on the controller screen

Table7-4, Compressor Faults (Equipment Protection Shutdowns)

Description	Occurs When:	Action Taken
Low Suction Pressure	Suction Pressure < Low Suction Pressure SP	Rapid Stop
High Discharge Temperature	Discharge Temp > High Discharge Temperature SP	Rapid Stop
High Motor Temperature	Motor Temp> High Motor Temp SP, from compressor	Rapid Stop
Motor Current High	%RLA > Motor Current Threshold SP with Compressor OFF for 300 sec	Annunciation
Starter Fault	Starter Fault from Compressor = Fault AND Compressor State = START, INTLOK, RUN, or UNLOAD	Rapid Stop

Compressor Events (Limit Alarms)

The following alarms do not cause compressor shutdown but limit operation of the chiller as described in the Action Taken column.

Table7-5, Compressor Events

Description	Occurs When:	Action Taken	Automatic Reset
Evaporator Freeze Protect	Evap Sat Refr Temp < Evaporator Freeze setpoint	Start evaporator pump	Temp > (Evaporator Freeze SP + 2°F)
Condenser Freeze Protect	Cond Sat Refr Temp < Condenser Freeze Setpoint	Start condenser pump	Temp > (Condenser Freeze SP + 2°F)

Warnings

Warnings advise that a non-catastrophic problem exists, such as failed temperature sensor that provides a signal for information, not control purposes.

7.3 Controller Functions

Leaving Water Temperature (LWT) Reset

The Active Leaving Water variable shall be set to the current Leaving Water Temperature (LWT) setpoint unless modified by one of the reset methods below. (The current LWT setpoint is Cool LWT as determined by the chiller mode.) The type of reset in effect is determined by the LWT Reset Type setpoint.

Reset Type – NONE

The Active Leaving Water variable is set equal to the current LWT setpoint.

Reset Type – RETURN

The Active Leaving Water variable is adjusted by the return water temperature.

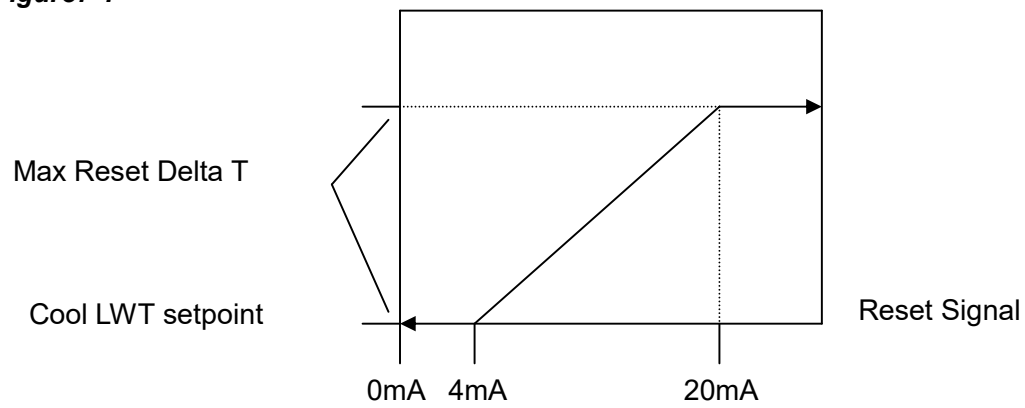
When the chiller mode = COOL, the Active Leaving Water variable is reset using the following parameters:

- Cool LWT setpoint
- Max Reset Delta T setpoint
- Start Reset Delta T setpoint

Reset is accomplished by changing the Active Leaving Water variable from the (Cool LWT setpoint) to the (Cool LWT setpoint + Max Reset Delta T setpoint) when the evaporator (return – leaving) water temperature delta varies from the (Start Reset Delta T setpoint) to 0.

The Active Leaving Water variable is set equal to the Cool LWT setpoint if the reset signal is less than or equal to 4 mA. It is set equal to (Cool LWT setpoint + Max Reset Delta T setpoint) if the reset signal equals or exceeds 20 mA. The Active Leaving Water variable will vary linearly between these extremes if the reset signal is between 4 mA and 20 mA. An example of this action is shown below.

Figure7-1



8 Compressor On-Board Controllers

Each compressor is equipped with microprocessor controllers and sensors that provide control and data acquisition. The data is transmitted to other controllers and the HMI via the multi-unit communication network. The on-board controllers consist of:

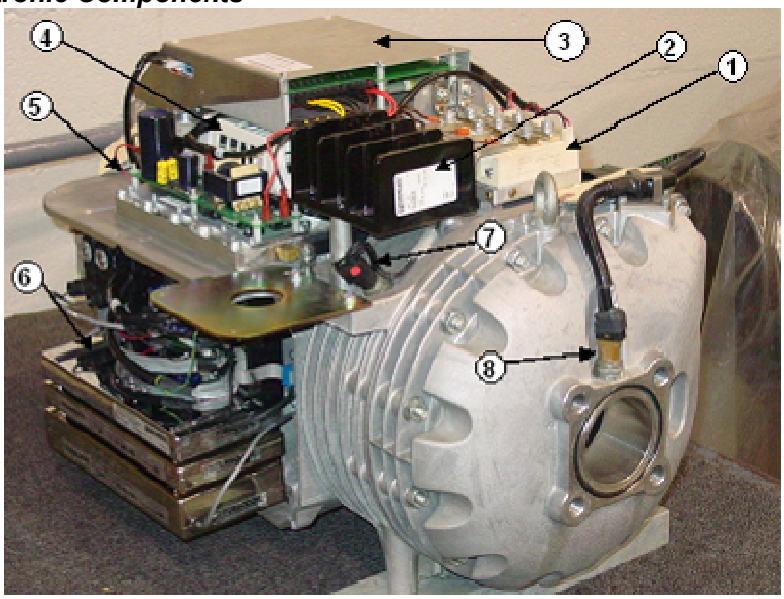
- Compressor Controller: the compressor controller is the central processor of the compressor. It is continually updated with critical data from the motor/bearing controller and external sensors. An important function is to control the compressor speed and guide vanes operation in order to satisfy load requirements, to avoid surge and to provide for optimum efficiency. The controller monitors over 60 parameters, including:

Refrigerant pressures and temperatures	Line voltage
Phase failure detection	Motor temperature
Silicone Rectifier (SCR) temperature	Speed
Line currents	Guide vane position

- Soft-Start Controller: the soft-start controller limits current inrush by temporarily inserting a charging resistor between the ac line and the +DC bus. It works in conjunction with the variable-speed function.
- Motor/Bearing Controller: the motor/bearing system provides the measurements and control to calculate and maintain the desired shaft position. An RS-485 link connects the bearing controller and the compressor controller.
- Backplane: although not a controller, the backplane connects the on-board control modules with the soft-start controller, power electronics, motor cooling solenoids and pressure/temperature sensors.

Figure8-1, Compressor Electric/Electronic Components

1. Rectifiers
2. Main Power Block
3. Soft Start Controller
4. Insulated-gate Bipolar Transistor
5. High Voltage DC-DC Converter
6. Compressor Bearing/ Motor Controller
7. Discharge Pressure/ Temperature sensor
8. Suction Pressure/ Temperature sensor



Only when all the compressors were stopped, cutting off the main power to maintain any of the compressors would be permitted. Before turn on the main power to the maintained compressor, all other compressors of the chiller must be stopped.

9 Human Machine Interface

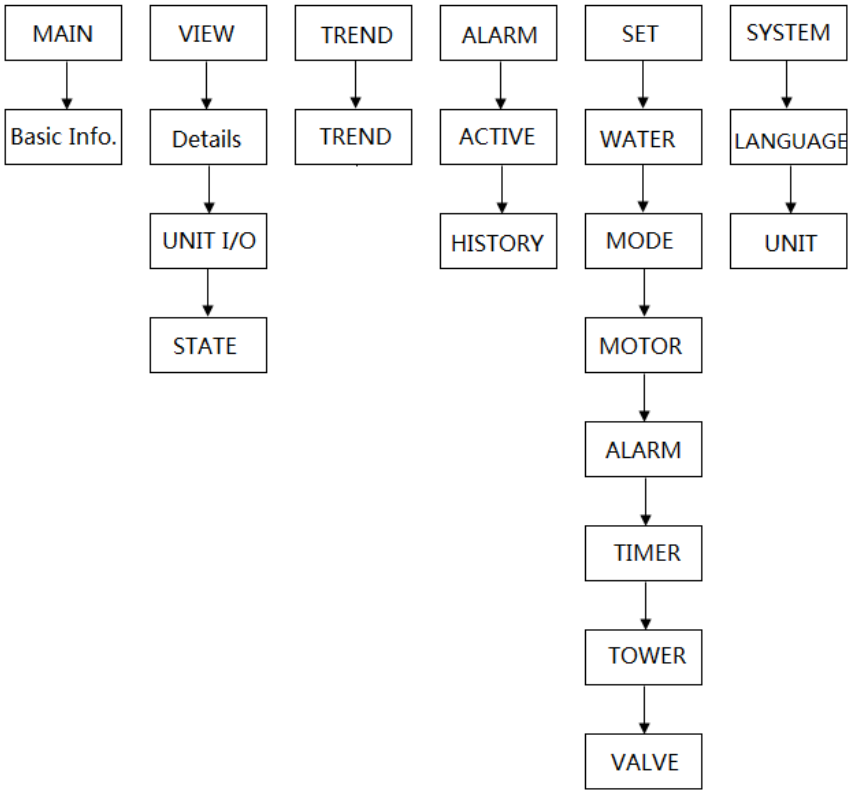
9.1 Navigation

There is a screen-saver built in that is reactivated by touching the screen anywhere. Every screen contains the STOP and AUTO buttons used to start and stop the unit when in Local control. Other groups of screens can be accessed from the Home screen by pressing one of six buttons on the bottom of the screen: MAIN, VIEW, SET, TREND, ALARM, SYSTEM.

- ALARM will go to the active alarm screens viewed and can toggle between the Active alarm and History alarm screens.
  - Active alarm
  - History Alarm
- MAIN will go to the home View screen used to check the basic information of chiller.
- VIEW will go to the detail View screen used to look in detail at settings and the operation of the chiller.
- SET will go to the Set screen.
- TREND will go to check a period of operation situation.
- SYSTEM will go to set some settings about screen display.

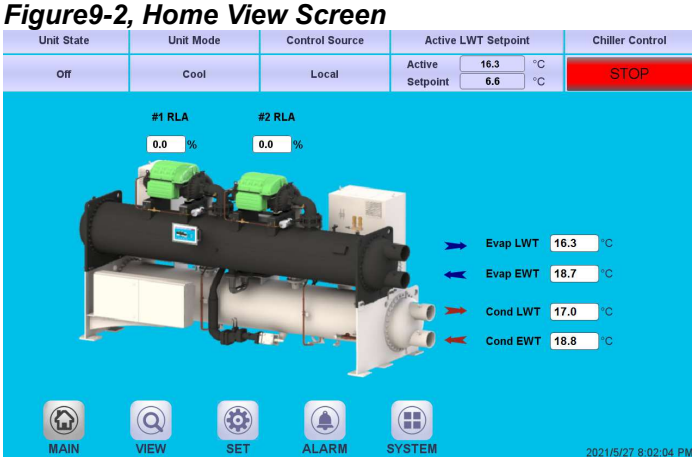
Figure9-1 illustrates the arrangement of the various screens available on the HMI. A few minutes practice on an actual HMI should provide an acceptable level of confidence in navigating through the screens.

Figure9-1, HMI Screen Layout



9.2 Screen Descriptions

Figure9-2, Home View Screen



9.3 Main Screens

Main screens are used for looking at unit status and conditions.

Main Screen

The Home View Screen shows the basic operating condition of the chiller .

Alarm

A red “ALARM” light will blink to the right of the “SET” button should an alarm occur. Pressing it will bring up the active alarm screen to view the alarm details.

Information

- Chilled water setpoint (Active LWT Setpoint)
- Entering and leaving chilled water temperatures
- Entering and leaving condenser water temperatures
- Percent motor amps
- UNIT STATUS is MODE followed by STATE followed by the SOURCE that is the device or signal that created the STATE. The possible combinations are in the following table:

Table9-1, UNIT STATUS Combinations

STATES	MODES	SOURCES
STOP	COOL	Local
AUTO	ICE	Switch
Shutdown (Note1)	HEAT	BAS

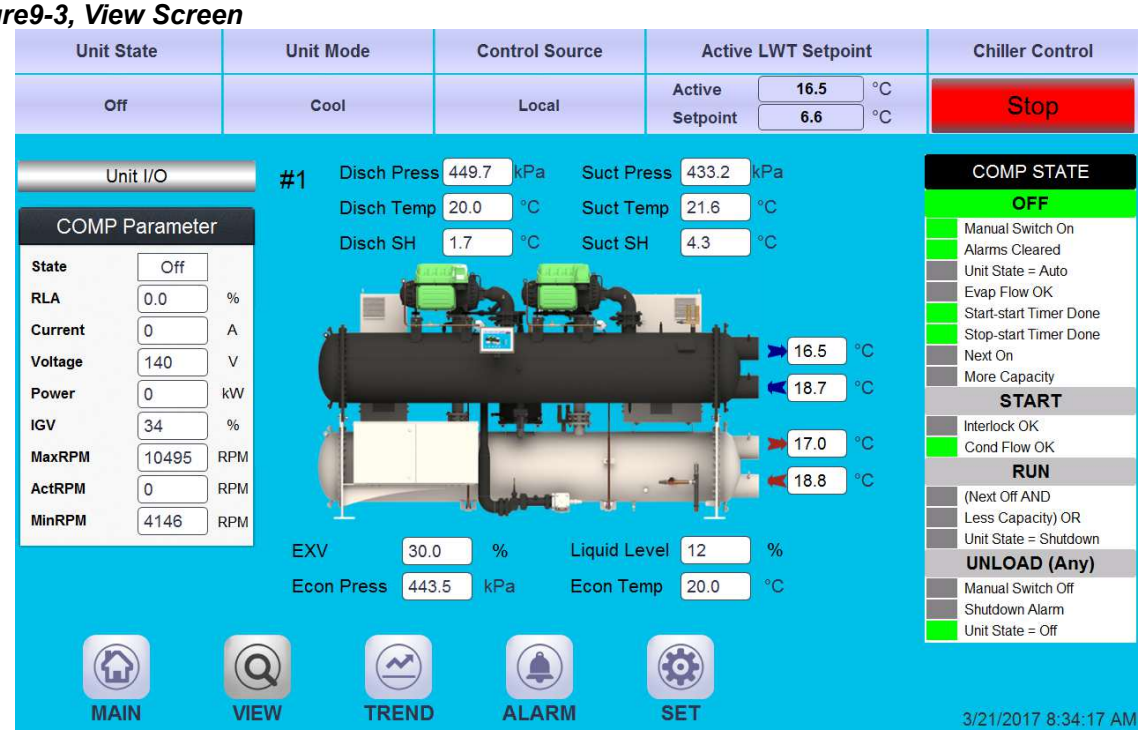
Note 1: Shutdown is the state of shutting down; vane close, etc.

Action Buttons for:

- Chiller Control: normal start (AUTO button) and stop (STOP button). The STOP button activates the normal shutdown sequence. These buttons are only active when the control is in the "Local Control" mode.
- ALARM will go to the active alarm screens viewed and can toggle between the Active alarm and History alarm screens.
    - Active Alarms
    - Alarms History
- MAIN will go to the home view screen used to check the basic information of chiller.
- VIEW will go to the detail View screen used to look in detail at settings and the operation of the chiller.
- SET will go to the Set screen.

- SYSTEM will go to set some settings about screen display.

Figure9-3, View Screen



9.4 View Screen

Data for one compressor is shown at a time on this screen. Pressing the Model of Compressor in the screen will toggle compressor.

Pressing the VIEW button on the bottom of the MAIN screen accesses the detail View Screen shown above. This screen gives additional information on the refrigerant pressures and temperatures.

Pressing the Unit I/O button displays the status of the unit inputs and outputs as described in Figure9-4 on the same page.

Pressing the Model of Compressor will bring up a display of the compressor state as described in Figure9-5.

This screen will be superimposed on the right side of the VIEW screen. This screen will remain visible until another display button is pressed.

Figure9-4, Unit I/O

This Unit Digital Input is accessed on the right side of the Detail View screen by pressing the Unit I/O button from the Detail View Screen.

The screen shown in Figure9-4 to the right gives the status of the *unit* controller digital inputs and outputs.

The unit controller in concerned with the operation of the entire unit and its I/Os reflect this. Note that operation of condenser and evaporator water pumps and tower operation constitute most of the data flow. An illuminated block (gray in the figure) indicated that either an input or output signal exists.

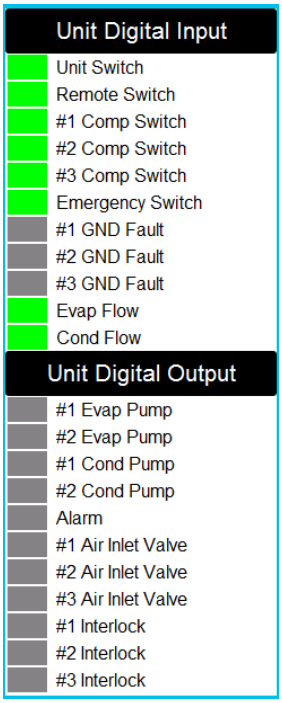
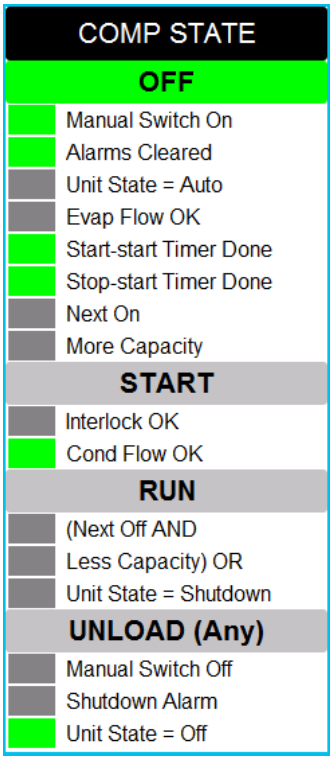


Figure9-5, View Compressor State Screen

For example, pressing the Compressor-Modle on the VIEW screen in Figure9-3 will display the screen shown in Figure 9-5 on the right side of the Detail View screen. The Compressor State screen is basically a compilation of the events that the chiller sequences through at startup. A green light (light gray in the figure) indicates that a particular sequence requirement has been satisfied. It is recommended that this screen be viewed during the start up sequence. One can see the requirements light up as they are met and quickly see why a non-start may have occurred. For example, The Evap Flow OK will light when the evaporator flow switch is closed by flow.

The bottom sections (from "RUN" down) are in effect during the shut down process. The sequence transitions back to OFF at this point and the OFF light will be illuminated.

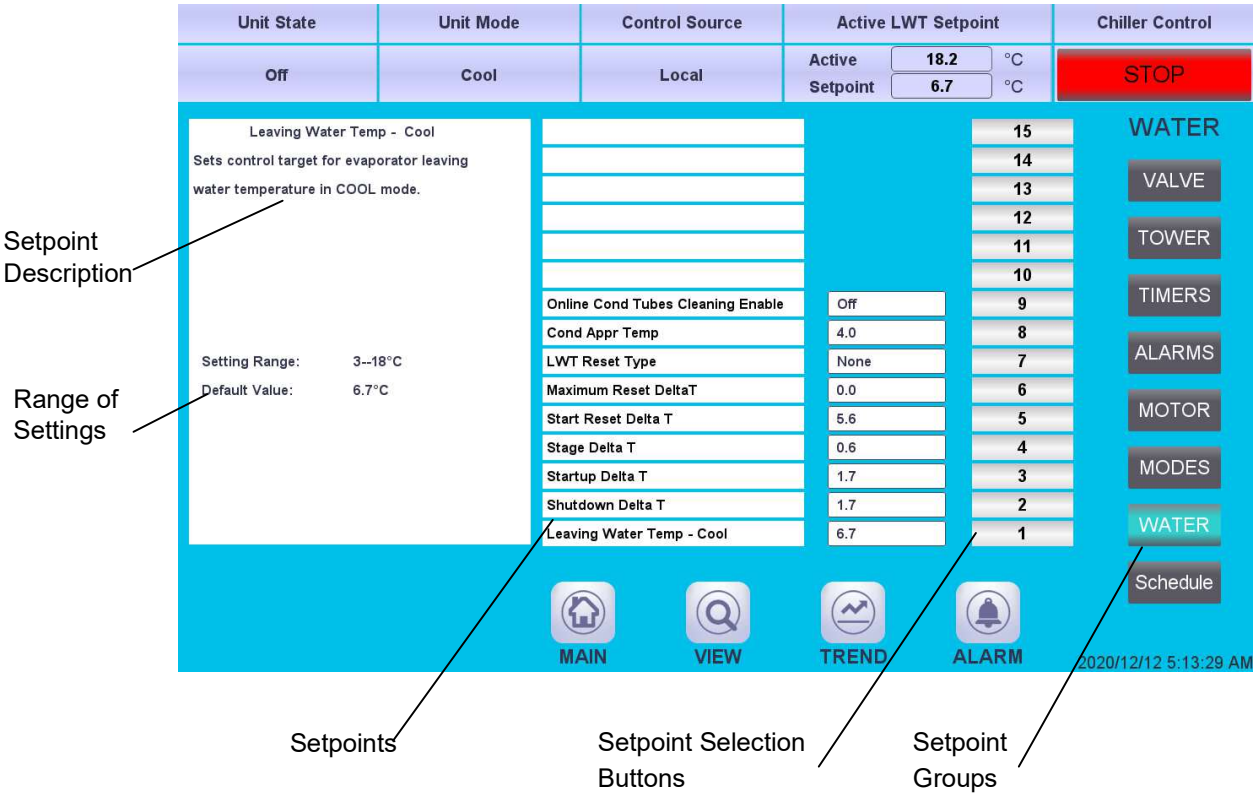


9.5 SET Screens

The set screens on the Interface Panel are used to input the many setpoints associated with equipment of this type. MicroTech V provides an extremely simple method for accomplishing this. (NOTE: If the Interface Panel is unavailable, the unit controller can be used to change setpoints.) Appropriate setpoints are factory set and checked by Daikin Factory Service or Factory Authorized Service Company during commissioning. However, adjustments and changes are often required to meet job conditions. Certain settings involving pumps and tower operation are field set.

Pressing the SET button found on almost every screen accesses the SET screen.

Figure9-6, A Typical SETPOINT Screen



The above figure shows the Water screen with Leaving Water Temp setpoint selected. The various setpoint groups are in a column on the right side of the screen. Each button contains a number of setpoints grouped together by similar content. The WATER button (as shown) contains various setpoints relating to water temperature setpoints.

NOTE: Some setpoints that do not apply to a particular unit application may still be listed on the screen. They will be inactive and can be ignored.

The numbered buttons in the second from right column are pressed to select a particular setpoint. The selected setpoint will appear in blue on the screen and a description of it (with the range of available settings) will appear in the upper left-hand box.

A list of setpoints, their default value, their available setting range, and password authority are in Table8-5.

Press the SET button indicating that you wish to change a setpoint value. The KEYBOARD screen will be turned on automatically to facilitate entering the password.

- O = Operator level password is 100
- M = Manager level password (For Service)
- T = Technician level password

1) Press the appropriate numbers in the numeric keyboard to enter the password. There is a small delay between pressing the keypad and recording the entry. Be sure that an asterisk appears in the window before pressing the next number. Press ENTER to return to the SETPOINT screen. The password will remain open for 15 minutes after initiation and does not need to be re-entered.
2) Setpoints with numeric values can be changed by pressing the numbered buttons.
3) Some setpoints are text rather than numeric values. For example, LWT Reset Type can be "None" or "4-20 mA." The selection can be made by toggling Drop-Down list to select.
   a) Once CHANGE is selected, the CANCEL or ENTER buttons must be pressed before another setpoint can be selected.
4) Additional setpoints can be changed by selecting another setpoint on the screen or by selecting an entirely new group of setpoints.

Explanation of Setpoints

Each of the seven setpoint group of screens is detailed in the following section.

1) TIMERS, for setting timers such as start-to-start, etc.
2) ALARMS, for setting the limit and shutdown alarms.
3) VALVE, sets the parameters for operation of an optional field-installed tower bypass valve.
4) TOWER, selects the method of controlling the cooling tower and sets the parameters for fan staging/VFD.
5) MOTOR, selects motor related setpoints such as amp limits. Also has maximum and minimum rate of change of chilled water temperature.
6) MODES, selects various modes of operation such as control source, pump staging, BAS protocol, etc.
7) WATER, leaving water temperature setpoint, start and stop delta-T, resets, etc.

TIMERS Setpoint

Figure9-7, TIMERS Setpoint Screen

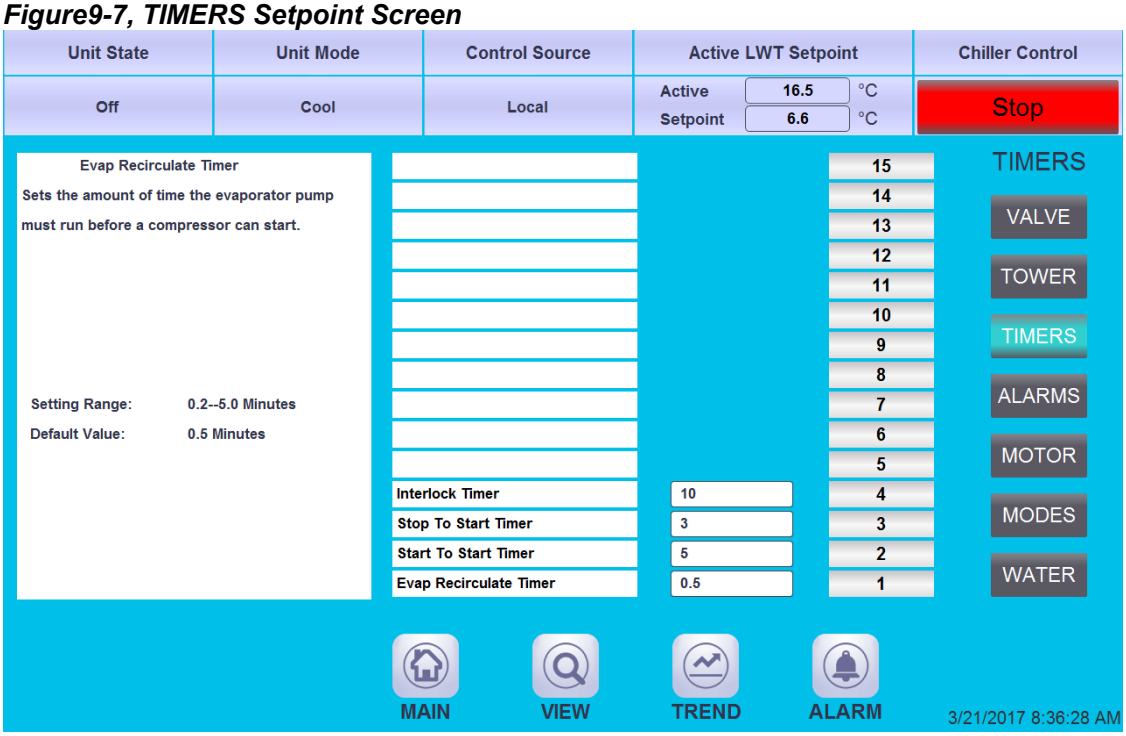


Table9-2, TIMER Setpoints

Description	No.	Default	Range	Pass-word	Comments
Interlock Timer	4	10 sec	10 to 240 seconds	NA	Maximum time allowed before interlock confirmation from compressor start
Stop To Start Timer	3	3 min	1 to 20 min	M	Time from when compressor stops to when it can restart
Start To Start Timer	2	5 min	2 to 60 min	M	Time from when compressor starts to when it can start again
Evap Recirculate Timer	1	0.5min	0.2 to 5 min	M	Time that evaporator pump must run before compressor start

ALARMS Setpoint

Figure9-8, ALARMS Setpoint Screen

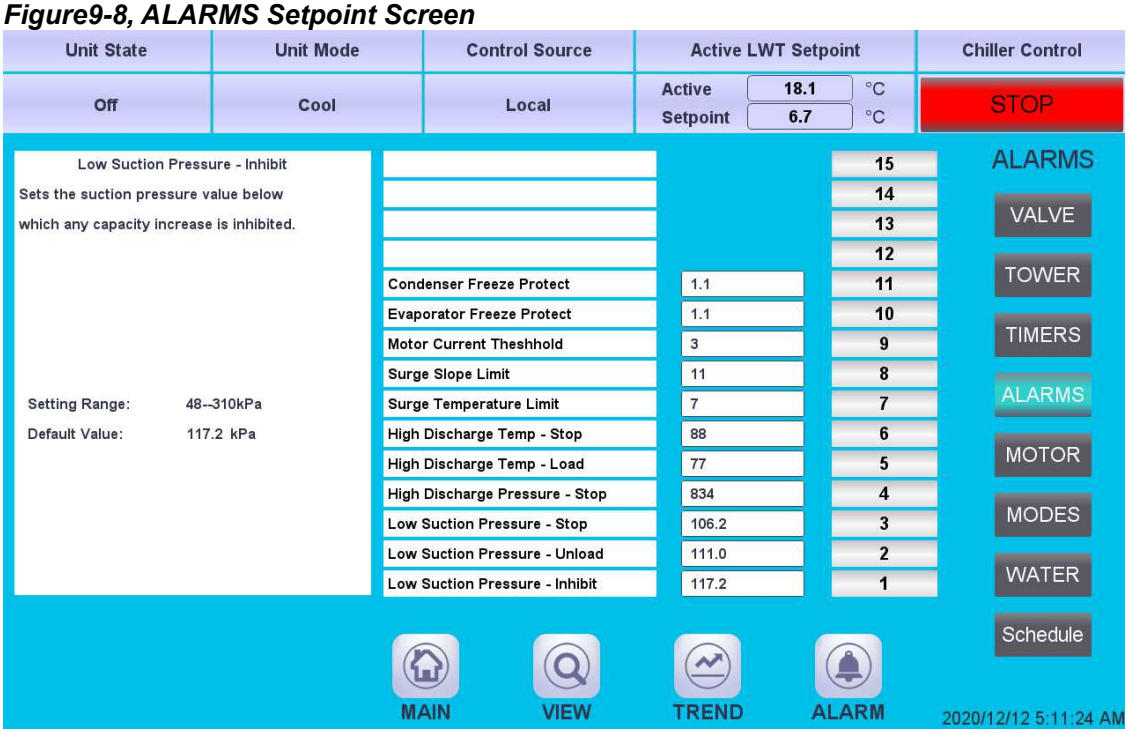


Table9-3, ALARM Setpoints

Description	No.	Default	Range	Pass-word	Comments
Condenser Freeze Protect	11	1.1 ℃	-22.7 ~ 7.2 ℃	NA	Minimum cond. sat. temp. to start pump
Evaporator Freeze Protect	10	1.1 ℃	-22.7 ~ 7.2 ℃	NA	Minimum evap. sat. temp. to start pump
Motor Current Threshold	9	3 %	3% ~ 99%	NA	Min %RLA to consider that the is motor off
Surge Slope Limit	8	11℃/min	0.6 ~ 55 ℃/分.	NA	Surge temperature (ST) slope value above which alarm occurs. Active only if ST>SP7 at start
Surge Temperature Limit	7	7 ℃	1.1 ~ 13.9 ℃	NA	At start, Surge Temp (ST) is compared to this SP. Alarm at ST>2x SP.
High Discharge Temp-Stop	6	88 ℃	49 ~ 115 ℃	NA	Max discharge temp to shut down compressor
High Discharge Temp-Load	5	77 ℃	49 ~ 115 ℃	NA	Sets discharge temp above which a forced capacity increase occurs.
High Discharge Pressure-Stop	4	834kPa	689 ~ 1200kpa	M	Max discharge pressure, stop compressor
Low Suction Pressure-Stop	3	117.2kPa	34 ~ 310 kPa	T	Min Suction pressure – stop compressor
Low Suction Pressure-Unload	2	111.0kPa	41 ~ 310 kPa	T	Min Suction pressure – unload compressor
Low Suction Pressure-Inhibit	1	106.2 kPa	48 ~ 310 kPa	T	Min Suction pressure – inhibit loading

Cooling Tower Bypass VALVE Settings

Figure9-9, Tower Bypass VALVE Setpoint Screen

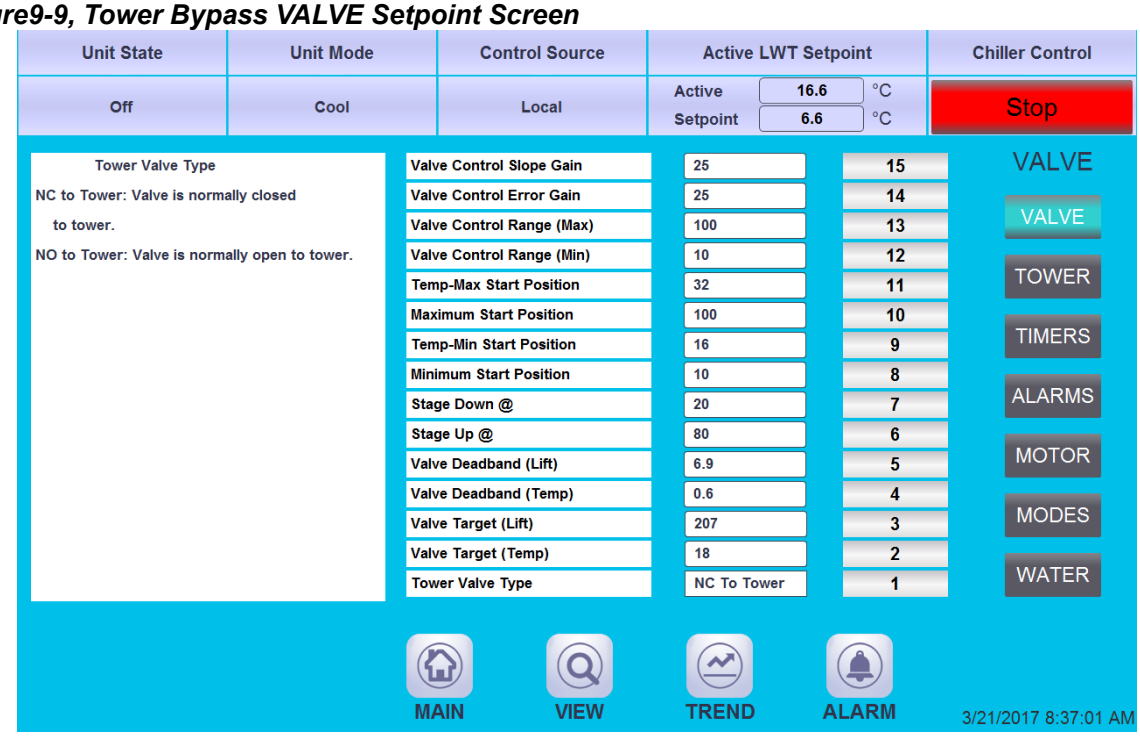


Table9-4, Tower Bypass VALVE Setpoints

Description	No.	Default	Range	Pass-word	Comments
Valve Control Slope Gain	15	25	10~99	M	Control gain for temperature (or lift) slope
Valve Control Error Gain	14	25	10~99	M	Control gain for temperature (or lift) error
Valve Control Range(Max)	13	100%	0~100%	M	Maximum valve position, overrides all other settings
Valve Control Range (Min)	12	10%	0~100%	M	Minimum valve position, overrides all other settings
Temp - Max Start Position	11	32℃	-7~37 ℃	M	Condenser EWT at which valve should be open to tower. Valve position is set to SP10
Maximum Start Position	10	100%	0~100%	M	Initial valve position when condenser EWT is at or above Setpoint # 11
Temp – Min Start Position	9	16℃	-7~37 ℃	M	Condenser EWT at which initial valve position is set to Setpoint # 8
Minimum Start Position	8	10%	0~100%	M	Initial position of valve when condenser EWT is at or below Setpoint # 9
Stage Down @	7	20%	0~100%	M	Valve position below which the fans can stage down (Tower - Setpoint #2 = Valve Stage Down VFD speed below which the next fan speed can turn off (Tower - Setpoint # 2 = valve/VFD
Stage Up @	6	80%	0~100%	M	Valve position above which the fans can stage up (Tower - Setpoint #2 = Valve Stage Down VFD speed above which the next fan speed can turn on (Tower - Setpoint # 2 = valve/VFD
Valve Deadband (Lift)	5	6.9 kPa	0~137kPa	M	Control deadband, Tower - Setpoint #1=Lift
Valve Deadband (Temp)	4	0.6 ℃	0.0~5.5℃	M	Control deadband, Tower Setpoint #1=Temp
Valve Target (Lift)	3	207 kPa	69~896kPa	M	Target for lift pressure (Tower - Setpoint #1= Lift), Works with Setpoint # 5
Valve Target (Temp)	2	18 ℃	4~48℃	M	Target for condenser EWT (Tower Setpoint #1= Temp), Works with Setpoint # 4
Tower Valve Type	1	NC To Tower	NC , NO	M	Normally closed (NC) or normal open (NO) to tower

Cooling TOWER Fan Settings

Figure9-10, Cooling TOWER Fan Setpoint Screen

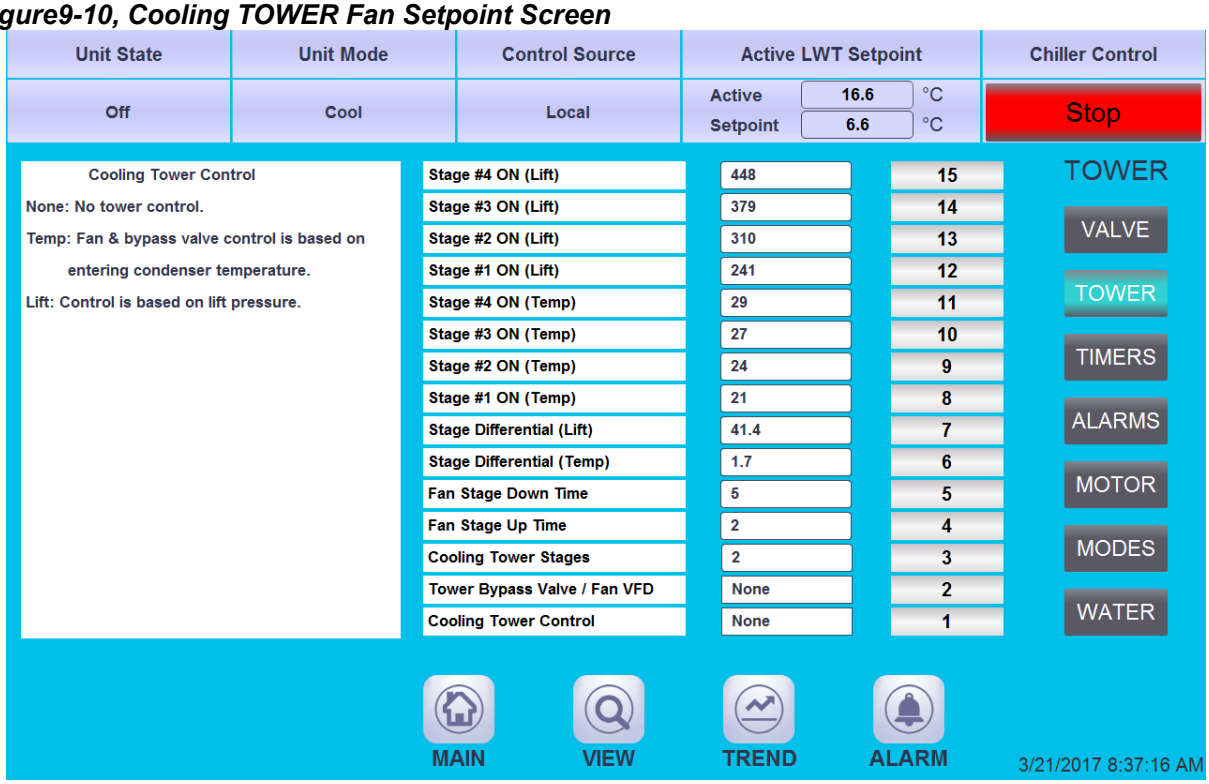


Table9-5, Tower Fan Settings

Description	No.	Default	Range	PW	Comments
Stage #4 On (Lift)	15	448kPa	69~896kPa	M	Lift pressure for fan stage #4 on
Stage #3 On (Lift)	14	379kPa	69~896kPa	M	Lift pressure for fan stage #3on
Stage #2 On (Lift)	13	310kPa	69~896kPa	M	Lift pressure for fan stage #2 on
Stage #1 On (Lift)	12	241kPa	69~896kPa	M	Lift pressure for fan stage #1on
Stage #4 On (Temp)	11	29℃	4~48℃	M	Temperature for fan stage #4 on
Stage #3 On (Temp)	10	27℃	4~48℃	M	Temperature for fan stage #3 on
Stage #2 On (Temp)	9	24℃	4~48℃	M	Temperature for fan stage #2on
Stage #1 On (Temp)	8	21℃	4~48℃	M	Temperature for fan stage #1 on
Stage Differential (Lift)	7	41.4kPa	7~137kPa	M	Fan staging deadband with Setpoint # 1=Lift
Stage Differential (Temp)	6	1.7℃	0.6~11.1℃	M	Fan staging deadband with Setpoint #1=Temp
Stage Down Time	5	5min	1 to 60 min	M	Time delay between stage up/down event and next stage down
Stage Up Time	4	2 min	1 to 60 min	M	Time delay between stage up/down event and next stage up
Tower Stages	3	2	1 to 4	M	Number of fan stages used
Valve/VFD Control	2	None	None, Valve Setpoint, Valve Stage, VFD Stage, Valve SP/VFD Stage	M	None: No tower valve or VFD Valve Setpoint: Valve controls to VALVE SP3(4) & 5(6) Valve Stage: Valve control setpoint changes to fan stage setpoint VFD Stage: 1st fan is VFD controlled, no valve Valve Setpoint/VFD Stage: Both valve and VFD
Tower Control	1	None	None, Temperature, Lift	M	None: No tower fan control Temperature: Fan and valve controlled by EWT Lift: Fan and valve controlled by lift pressure

Explanation of Tower Control Settings

The MicroTech V controller can control cooling tower fan stages, a tower bypass valve, and/or a tower fan VFD if the chiller has a dedicated cooling tower.

The Tower Bypass Valve position will always control the Tower Fan Staging if Valve Setpoint or Stage Setpoint is selected.

There are five possible tower control strategies as noted below and explained in detail later in this section. They are selected from SETPOINT TOWER SP2.

1) NONE, Tower fan staging only, which is not recommended. In this mode the tower fan staging (up to 4 stages) is controlled by either the condenser Entering Water Temperature (EWT) or LIFT pressure (difference between the Discharge and Suction Pressure). Tower bypass or fan speed are not controlled.
2) VALVE SP, Tower staging with low-limit controlled bypass valve. In this mode the tower fans are controlled as in #1, plus a tower bypass valve is controlled to provide a minimum condenser EWT. There is no interconnection between the fan control and the valve control.
3) VALVE STAGE, Tower staging with stage controlled bypass valve. In this mode the bypass valve controls between fan stages to smooth the control and reduce fan cycling.
4) VFD STAGE, In this mode a VFD controls the first fan. Up to 3 more fans are staged on and off and there is no bypass valve.
5) VALVE/VFD, Tower fan control with VFD plus bypass valve control.

1) Tower Fan Staging Only (NONE); This is not a recommended control strategy.

The following settings are used for the Tower Fan Staging Only mode, (SP= setpoint)

a) TOWER SETPOINT Screen
   i) SP1. Select TEMP if control is based on condenser EWT or LIFT if based on compressor lift expressed in degrees.
   ii) SP2. Select NONE for no bypass valve or fan VFD control.
   iii) SP3. Select one to four fan outputs depending on the number of fan stages to be used. More than one fan can be used per stage through the use of relays.
   iv) SP4. Select STAGE UP TIME from 1 to 60 minutes. The default value of 5 minutes is probably a good starting point. The value may need to be adjusted later depending on actual system operation.
   v) SP5. Select STAGE DOWN TIME from 1 to 60 minutes. The default value of 2 minutes is probably a good starting point. The value may need to be adjusted later depending on actual system operation.
   vi) If TEMP is selected in SP1, use
      (1) SP6. Select STAGE DIFFERENTIAL in degrees F, start with default of 3 degrees F.
      (2) SP8-11. Set the STAGE ON temperatures consistent with the temperature range over which the condenser EWT is desired to operate. The default values of 70°F, 75°F, 81°F and 84°F are a good place to start in climates with moderate wet bulb temperatures. The number of STAGE ON setpoints used must be the same as SP3.

b) If LIFT is selected in SP1, use
   i) SP7. Select STAGE DIFFERENTIAL in PSI. Start with default of 6 PSI.
   ii) SP12-15. Start with default setpoints. The number of STAGE ON setpoints used must be the same as SP3.

See Figure8 for fan staging field wiring connection points.

2) Tower Fan Staging With Bypass Valve Controlling Minimum EWT (VALVE SP).

TOWER SETPOINT Screen

a) SP1. Select TEMP if control is based on condenser EWT or LIFT if based on compressor lift expressed in pressure.
b) SP2. Select Valve SP for control of bypass valve based on temperature or lift.

c) SP3. Select one to four fan outputs depending on the number of fan stages to be used. More than one fan can be used per stage through the use of relays.

d) SP4. Select STAGE UP TIME from 1 to 60 minutes. The default value of 5 minutes is probably a good starting point. The value may need to be adjusted later depending on actual system operation.

e) SP5. Select STAGE DOWN TIME from 1 to 60 minutes. The default value of 2 minutes is probably a good starting point. The value may need to be adjusted later depending on actual system operation.

f) If TEMP is selected in SP1, use

   i) SP6. Select STAGE DIFFERENTIAL in degrees F, start with default of 3 degrees F.

   ii) SP8-11. Set the STAGE ON temperatures consistent with the temperature range over which the condenser EWT is desired to operate. The default values of 70°F, 75°F, 81°F and 84°F are a good place to start in climates with moderate wet bulb temperatures. The number of STAGE ON setpoints used must be the same as SP3.

g) If LIFT is selected in SP1, use

   i) SP7. Select STAGE DIFFERENTIAL in PSI. Start with default of 6 PSI.

   ii) SP12-15. Start with default setpoints. The number of STAGE ON setpoints used must be the same as SP3.

VALVE SETPOINT Screen

a) SP1, Select NC or NO depending if valve is closed to tower with no control power or open to tower with no control power.

b) If TEMP was selected for fan control above, use

   i) SP2, Set the VALVE TARGET (setpoint), usually 5 degrees below the minimum fan stage setpoint established in TOWER SP11. This keeps full flow through the tower until the last fan is staged off.

   ii) SP4, Set VALVE DEADBAND, the default of 2 degrees F is a good place to start.

   iii) SP8, Set MINIMUM VALVE POSITION when EWT is at or below SP9. Default is 0%.

   iv) SP9, Set the EWT at which the valve position will be at (SP8). Default is 60°F.

   v) SP10, Set the initial valve position when EWT is at or above SP11. Default is 100%.

   vi) SP11, Set the EWT at which initial valve position is set to SP10. Default is 90°F.

   vii) SP12, Set the minimum position to which the valve can go. Default is 10%.

   viii) SP13, Set the maximum position to which the valve can go. Default is 100%.

   ix) SP14, Set the control gain for error. Default is 25.

   x) SP15, Set the control gain for slope. Default is 25.

If LIFT was selected for fan control, use:

   i) SP3, Set the VALVE TARGET (setpoint), usually 30 psi below the minimum fan stage setpoint established in TOWER SP15. This keeps full flow through the tower until the last fan is staged off.

   ii) SP5, Set VALVE DEADBAND, the default of 6 psi is a recommended initial setting.

   iii) SP12, Set the minimum position to which the valve can go. Default is 10%.

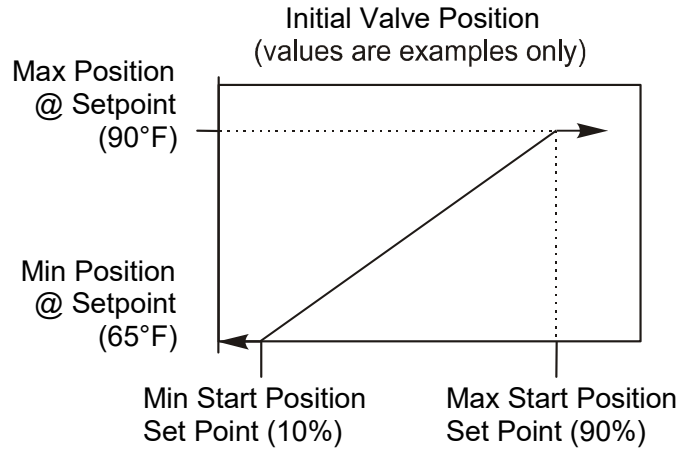
   iv) SP13, Set the maximum position to which the valve can go. Default is 100%.

   v) SP14, Set the control gain for error. Default is 25.

   vi) SP15, Set the control gain for slope. Default is 25.

NOTE: Setpoints 14 and 15 are site specific dealing with system fluid mass, component size and other factors affecting the reaction of the system to control inputs. These setpoints should be set by personnel experienced with setting up this type of control.

Figure9-11, Bypass Valve Positions



3) Tower staging with bypass valve controlled by fan stage (VALVE STAGE)

This mode is similar to #2 above except that the bypass valve setpoint changes to be set at the same point of whatever fan stage is active rather than just maintaining a single minimum condenser EWT. In this mode the valve controls between fan stages and tries to maintain the fan stage setting in effect. When it is max open or max closed (staging up or down) and the temperature (or lift) moves to the next fan stage, the valve will go the opposite max setting. This mode reduces fan cycling.

This mode is programmed the same as Mode #2 above except that in SETPOINT, TOWER, SP2, VALVE STAGE is selected instead of VALVE SP and:

- SP6, Set the valve position (% open) above which the first fan can stage on (fan stage ON temperature and STAGE UP TIMER must also be satisfied). Default is 80%.
- SP7, Set the valve position (% closed) below which the first fan can stage off (the fan stage temperature and STAGE DOWN TIMER must also be satisfied). Default is 20%.

4) Fan VFD, no bypass valve (VFD STAGE)

The fan VFD mode assumes the tower is driven by one large fan. Set up is as above except in SETPOINT, TOWER, SP2, VALVE/VFD is selected.

MOTOR Setpoint Screen

Figure9-12, MOTOR Setpoint Screen

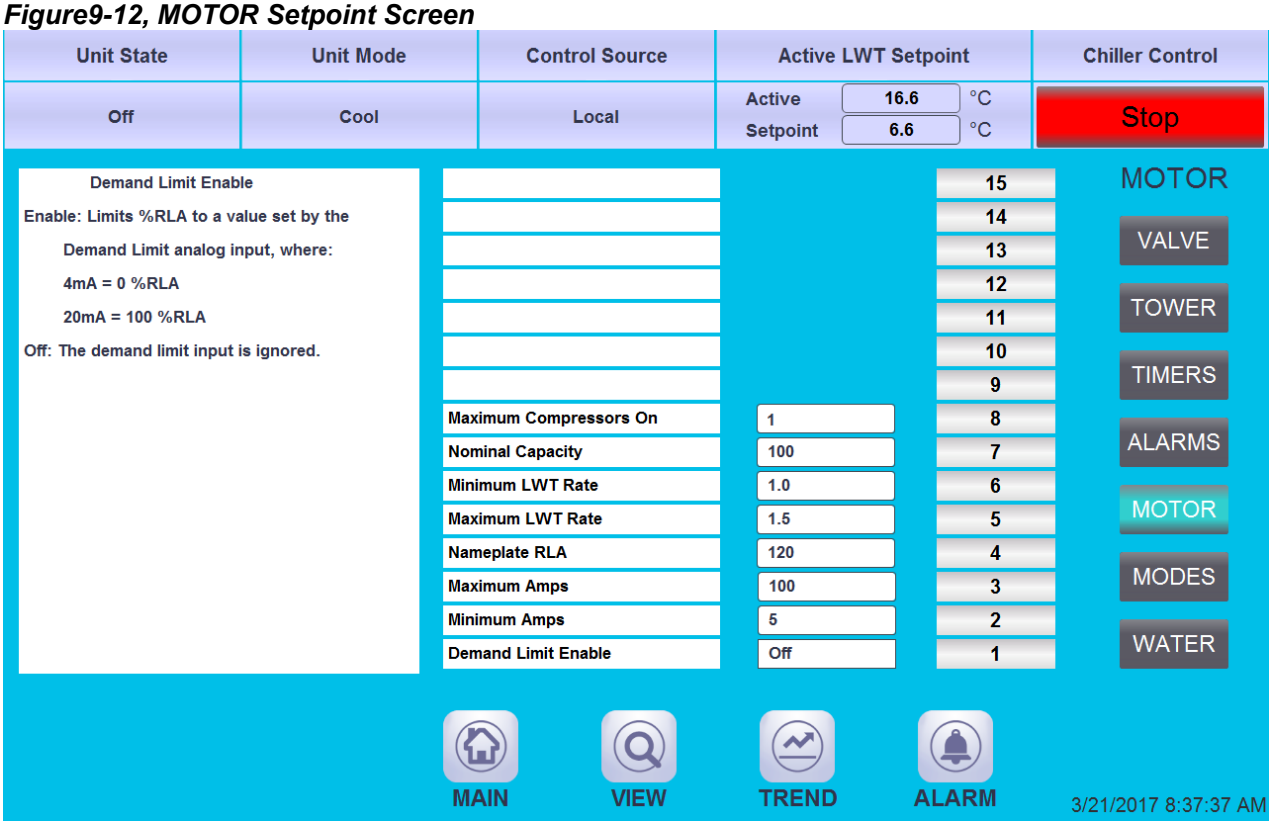
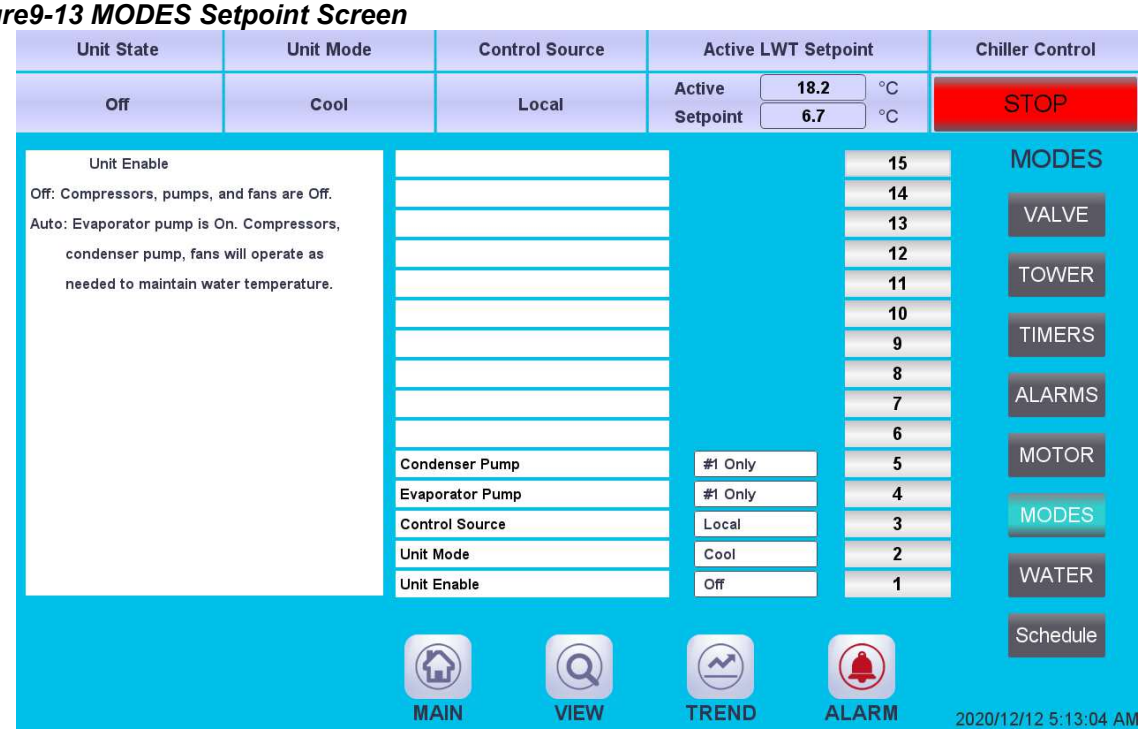


Table9-6, MOTOR Setpoint Settings

Description	No.	Default	Range	Pass-word	Comments
Maximum Compressor ON	8	--	1 to 4	M	Set maximum compressor on the chiller
Nominal Capacity	7	100	0 to 999 Tons	M	Determines when to shut off a compressor
Minimum LWT Rate	6	1.0 ℃ /min	0.1 ~ 2.8℃/min	M	Additional compressor can start if LWT change is below setpoint.
Maximum LWT Rate	5	1.5 ℃ /min	0.1 ~ 2.8 ℃ /min	M	Inhibits loading if LWT change exceeds the setpoint value.
Nameplate RLA	4	120	85 to 1000 Amps	M	RLA value from compressor nameplate
Maximum Amps	3	100%	10 to 100%	M	% RLA above which loading is inhibited (Load Limit) SP + 5% unloads compressor
Minimum Amps	2	5%	0 to 20%	M	% RLA below which unloading is inhibited
Demand Limit Enable	1	OFF	OFF, ON	O	ON sets %RLA at 0% for 4 mA external signal and at 100% RLA for 20 mA signal OFF – signal is ignored

MODES Setpoints

Figure9-13 MODES Setpoint Screen



NOTE: Gray setpoints are not used with Magnitude chillers.

Table9-7, MODES Setpoint Settings

Description	No.	Default	Range	Pass-word	Comments
Cond Pump	5	#1 Only	#1 Only, #2 Only, Auto, #1 Primary, #2 Primary	M	Same to SP4
Evap Pump	4	#1 Only	#1 Only, #2 Only, Auto, #1 Primary, #2 Primary	M	Pump #1 Only, Pump #2 Only, use only these pumps AUTO, balance hours between #1 and #2 #1 Primary, #2 Primary, if primary fails, use other
Control Source	3	LOCAL	LOCAL, BAS, SWITCH	O	Sets control source
Unit Mode	2	Cool	None/Ice/Cool/Heat	O	Sets Unit work mode
Unit Enable	1	OFF	OFF, AUTO	O	OFF, everything is off. AUTO, Evap pump on, comp, cond pump and tower on as required to meet LWT

WATER Setpoints

Figure9-14, WATER Setpoint Screen

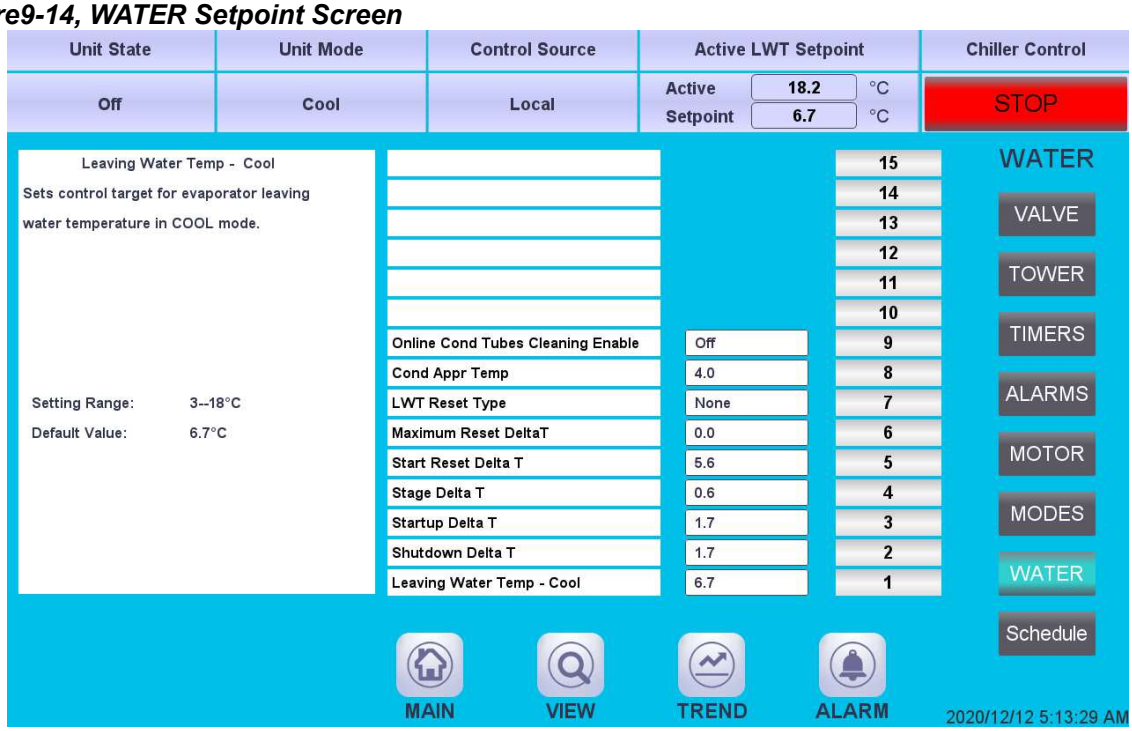
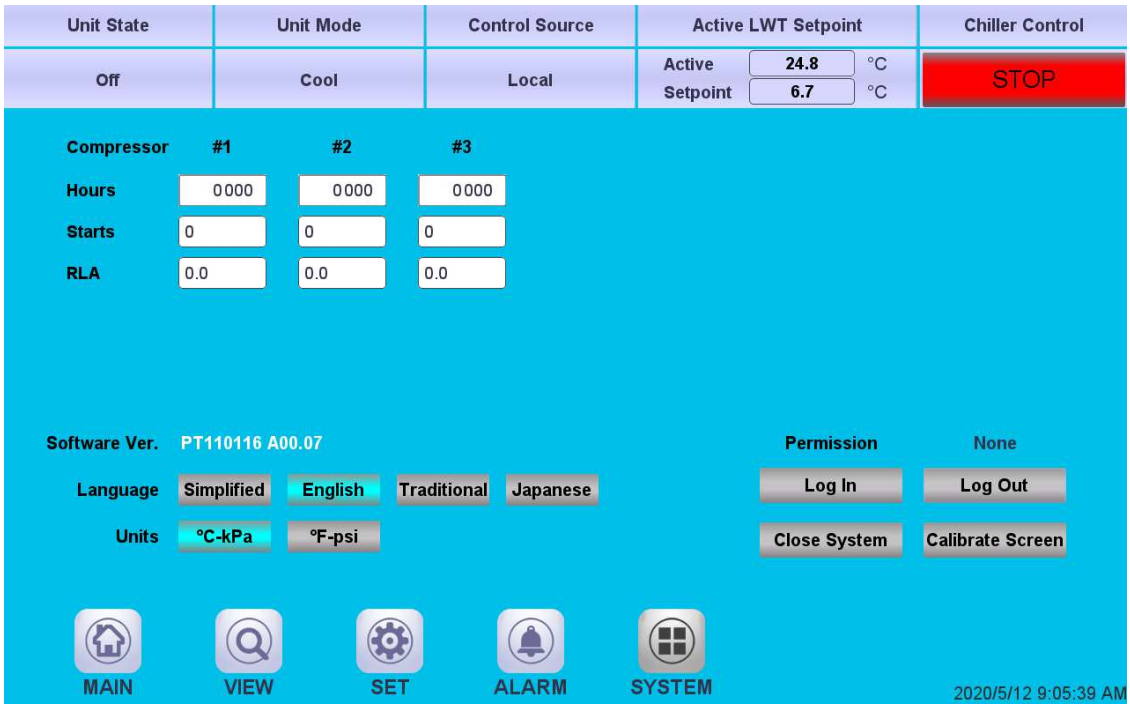


Table9-8, WATER Setpoint Settings

Description	N0.	Default	Range	Pass-word	Comments
Online Cond Tubes Cleaning Enable	9	Off	Off, Enable	M	Set the Online Cond Tubes Cleaning Enable
Cond Appr Temp	8	4.0℃	2.0~8.0℃	M	Cond Saturated Temp—Cond leaving water temp high delta means tube fouling
LWT Reset Type	7	NONE	NONE, RETURN, 4-20mA	M	Select reset type, NONE for none, RETURN for resetting chilled water based on the entering water, or 4-20 mA for external analog signal
Maximum Reset DeltaT	6	0.0℃	0.0 ~11.2℃	M	Set the maximum reset that can occur, in degrees F if LWT reset is selected or max reset at 20 mA input if 4-20 mA is selected in SP7
Start Reset Delta-T	5	5.6℃	0.0 ~11.2℃	M	Sets the evap delta-T above which Return reset begins.
Stage Delta-T	4	0.6	0.0~5.5℃	M	Sets the temperature the leaving water must be above setpoint for next compressor to start.
Startup Delta-T	3	1.7℃	0.0~5.6℃	O	Degrees above setpoint for compressor to start.
Shutdown Delta-T	2	1.7℃	0.0~1.7℃	O	Degrees below setpoint for compressor to stop.
Leaving Water Temp-Cool	1	6.7℃	3~18℃	O	Evaporator LWT setpoint in COOL mode

9.6 SYSTEM Screen

Figure9-15, System Screen

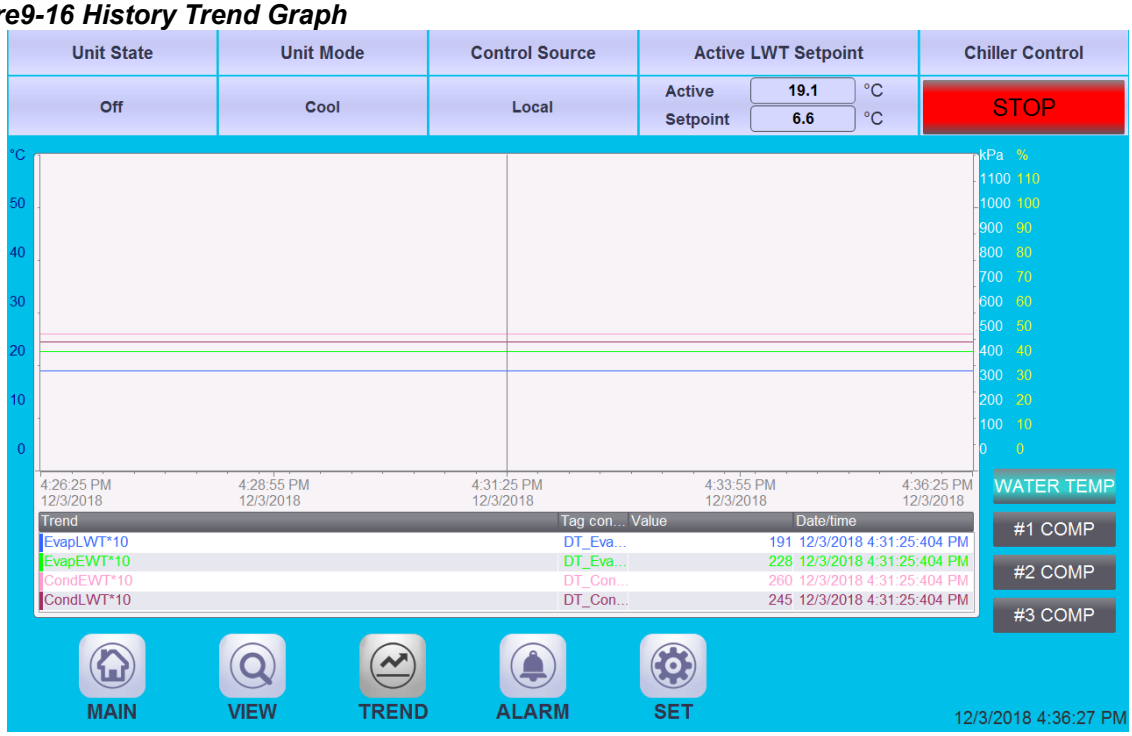


The SYSTEM screen is accessed by pressing SYSTEM from MAIN screen. While containing information and activity buttons for the service technician, it also has valuable information for the operator.

- The upper left corner contains compressor information such as number of starts and operating hours and RLA for each compressor.
- Display software version.
- UNITS button allows selection of Inch-Pounds or Metric units of measure on the HMI.
- LANGUAGE allows toggling between the available languages.
- The Log In and Log Out button is used to access the Keyboard screen to enter a password.

9.7 TREND Screens

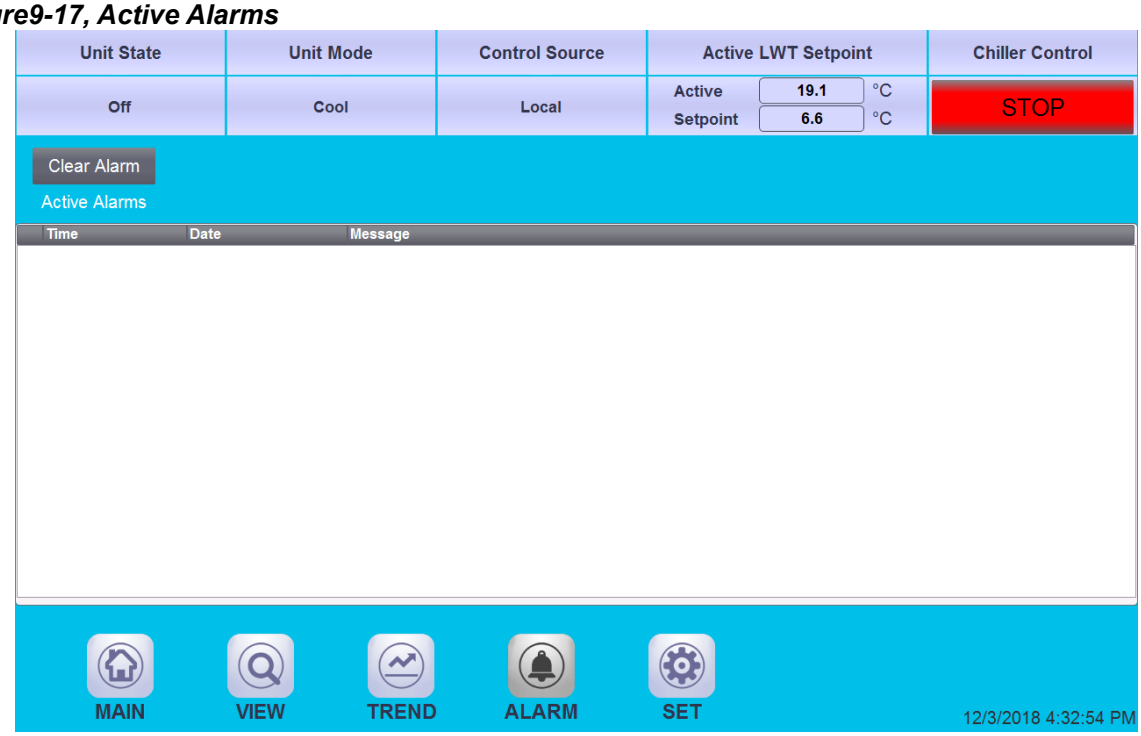
Figure9-16 History Trend Graph



The Trend History Overview allows the user to view the various parameters listed on the right side of the screen. The temperature scale in ℃ is on the left. Pressure in kPa and % RLA are represented by the right-hand scale.

9.8 ACTIVE ALARM Screen

Figure9-17, Active Alarms



The Active Alarms screen is only accessible when an active alarm exists on the unit. Pressing the ALARM button on any screen will access this screen.

Alarms are arranged in order of occurrence, with the most recent on top. Once the abnormal condition is corrected, pressing the "Clear Alarm" key will clear the alarm.

The current active alarms (there may be more than one) are displayed. Note that the alarms are FAULT (equipment protection control) that causes a rapid compressor shutdown, PROBLEM (limit alarm) that will inhibit loading, or load or unload the compressor, and WARNING which is information only and takes no action.

The date/time and cause of the alarm are displayed.

After eliminating the cause of the alarm, clear the alarm by pressing the Clear Alarm button. This will clear the alarm from the register and allow the unit to restart after going through the start sequence. The alarm notice will be deleted from the screen.

However, if the cause of the alarm is not remedied, the alarm is still active and the alarm message will remain open. The unit will not begin its starting sequence.

10 Controller Menu Screens

The unit controller, located in the control panel adjacent to the HMI, is the only controller used by the unit operator. In addition to unit functions, most compressor parameters are viewable on it, and all setpoints can be accessed from it.

Unit of Measure

SI units of measure can be selected with the appropriate setpoint screen but will appear only on the HMI. The controller LCD screens read only in inch-pounds unit of measure.

Menu Structure (Hierarchical)

A hierarchical menu structure is used to access the various screens. Each menu screen can have one to four lines of information. Optionally, the last menu selection can access one of a set of screens that can be navigated with the UP/DOWN arrow keys (see the scrolled menu structure below). Menu selection is initiated by pressing the MENU key, which changes the display from a data screen to a menu screen. Menu selections are then made using the arrow keys according to labels on the right side of the display (the arrows are ignored). When the last menu item is selected, the display changes to the selected data screen. An example follows showing the selection of the "VIEW COMPRESSOR" (n) screen.

Suppose the current screen is:

ALARM LOG
(data)
(data)
(data)

After pressing the MENU button, the top-level menu screen will show:

← **ALARM**
→ **VIEW**
↑ **SET**
↓

After pressing the "VIEW" menu button, a menu screen will show:

VIEW ← **COMPRESSOR**
→ **UNIT**
↑ **EVAPORATOR**
↓ **CONDENSER**

After pressing the "COMPRESSOR" menu button, the selected data screen will show:

VIEW COMP (n)
(screen n data)
(screen n data)
(screen n data)

Where "n" is the number of the last viewed COMPRESSOR screen. The arrow keys will automatically return to the "scroll" mode at this time. Different compressor screens can then be selected with the UP/DOWN arrow keys.

The complete menu structure follows. Data screens are shown as [data] when a single screen is at the bottom of the menu structure and as [data n] when multiple screens are available (using UP/DOWN keys).

Menu Structure (Scrolled)

As an alternate to selecting screens with the menu function, it is be possible to scroll through all of them with the 4 arrow keys.

Menu Matrix

Table 10-1, Unit Controller Menu Matrix

View Unit Information				View Compressor Information		View Evaporator
VIEW UNIT STATUS(1) UNIT= OFF COMP#1 OFF #2RUN Ev/Cn Pmps=OFF/OFF	VIEW UNIT WATER(1)°F In Out Delta Evap 00.0 00.0 00.0 Cond 00.0 00.0 00.0	VIEW UNIT REFRG (1) psi °F Sat Evap 000.0 000.0 Sat Cond 000.0 000.0	VIEW UNIT TOWER (1) Stages ON= 0 of 2 Setpoint= XXX °F	VIEW COMP 31 (1) State = OFF % RLA = 000% Evap LWT = 054.0°F	VIEW COMP#2 (1) State = RUN % RLA = 095% Evap LWT = 054.0°F	VIEW EVAPORATOR Suct SH = 000.0°F Approach = 00.0°F See NOTE 1
VIEW UNIT STATUS(2) Comp#1 OFF Start-Start Tmr Clr Inhibits None	VIEW UNIT WATER (2) IN OUT DELTA HtRc NA NA NA Cond NA	VIEW UNIT REFRG (2) Suct Line = 000.0°F Liquid Line = 000.0°F Lift Press = 000.0psi	VIEW UNIT TOWER (2) Bypass Valve= XXX% VFD Speed = XXX%	VIEW COMP (2) psi Cond Press = 000.0 Evap Press = 000.0 Lift Press = 000.0	VIEW COMP#2 (2) psi Cond Press = 000.0 Evap Press = 000.0 Lift Press = 000.0	
VIEW UNIT STATUS(3) Comp#2 RUN Start-Start Tmr Clr Inhibits None	VIEW UNIT WATER (3) Water Flow Rates Evap = XXXXX GPM Cond = XXXXX GPM			VIEW COMP (3) psi WMC Compressor Oilless Design (blank mask page)	VIEW COMP#2 (3) psi WMC Compressor Oilless Design (blank mask page)	
VIEW UNIT STATUS(3) Comp#3 OFF Start-Start Tmr Clr Inhibits None	VIEW UNIT Econ 155 Econ Temp XXX.X Econ Press XXX.X Liq Lv XXX%			VIEW COMP (4) °F Cavity Temp=000.0°F Invert Temp=000.0°C Lift Temp = 00.0°F	VIEW COMP#2 (4) °F Cavity Temp=000.0°F Invert Temp=000.0°C Lift Temp = 00.0°F	
VIEW UNIT STATUS(4) Comp#4 OFF Start-Start Tmr Clr Inhibits None				VIEW COMP (5) °F Temp SH Suction 000.0 00.0 Discharge 000.0 00.0	VIEW COMP#2 (5) °F . Temp SH Suction 000.0 00.0 Discharge 000.0 00.0	
				VIEW COMP (6) psi °F SatEvap 000.0 000.0 SatCond 000.0 000.0	VIEW COMP#2 (6) psi °F SatEvap 000.0 000.0 SatCond 000.0 000.0	
				VIEW COMP (7) Hours = 00000 x10 Starts = 00000 AirInletP= 000.0psi	VIEW COMP#2 (7) Hours = 00000 x10 Starts = 00000 AirInletP= 000.0psi	

The right half of the matrix is continued on next page

NOTE: There is a VIEW CONDENSER menu to the right of VIEW EVAPORATOR with basically the same information, but omitted from this matrix due to space limitations.

ALARMS	SET SETPOINTS				PASSWORD
Alarm Log: 01 description HH:MM:SS MM/DD/YY	SET UNIT SPs (1) Unit Enable = Off Unit Mode = Cool Source = Local	SET COMP#1 SPs (1) Demand Limit=OFF Minimum Amps=05% Maximum Amps=100%	SET ALARM LMTs (1) LowEvPrHold=27psi LowEvPrUnld=26psi LowEvPrStop=25psi	SET TOWER SPs (1) TowerControl=**(type?)** Tower Stages=4 StageUP/Dn=080/020	SET PASSWORD Enter Password:00000 No Access Given
Alarm Log: 02 description HH:MM:SS MM/DD/YY	SET UNIT SPs (2) Available Modes = COOL Select w/Unit Off	SET COMP SPs (2) StageMode =Normal StageSequence# = 01 Max Compr ON = 01	SET ALARM LMTs (2) HighCondPr =140psi HiDschT-Load=170°F HiDschT-Stop=190°F	SET TOWER SPs (2) Stage ON #1 #2 #3 #4 xxx xxx xxx xxx	SET PASSWORD (2) Tech Password 00000 00000 No Access Given
Alarm Log: 03 to 25 description HH:MM:SS MM/DD/YY	SET UNIT SPs (3) Cool LWT = 44.0°F Ice LWT = 25.0°F Heat LWT = 113.0°F	SET COMP SPs (3) StageDeltaT = 1.0°F Stop-Start = 03 min Start-Start = 05 min	SET ALARM LMTs (3) WMC Compressor Oilless Design (blank mask page)	SET TOWER SPs (3) VFD Min Spd=020% StageDiff=**(type Psi/F)** StageUp=02Dn=05 min	
^	SET UNIT SPs (4) Leaving Water Temp StartDelta = 3.0°F StopDt= 3.0°F SlopT=300s	SET COMP SPs (4) UL Surg Ofs=990RPM Name Plate RLA 120	SET ALARM LMTs (4) Surge Slp Str=20°F Surge Tmp Run=20°F MtrCurThrshld=05	SET TOWER SPs (4) Valve/VFD Control= None Valve Type=NC	
^	SET UNIT SPs (5) Rest Type = NONE MaxResetDT =00.0°F StrtResetDT = 10.0°F	SET COMP SPs (5) Lead Staging=030% Nom Capacity = 0100T HG Bypass=20% RLA	SET ALARM LMTs (5) Evap Freeze= 34.0°F Cond Freeze= 34.0°F	SET TOWER SPs (5) Valve Sp= 065F Reset=20.0psi Sensor=ECWT-B3)	
^	SET UNIT SPs (6) Templifier Src Water No Start = 070°F Delta Reset = 055°F	SET COMP SPs (6) InterLokTmr= 010sec UnloadTimer = 5 sec Max Str LWT=10.0°F		SET TOWER SPs (6) ValveStartPosition Min=010% @ 060°F Max=100% @ 090°F	
Alarm Log: 25 description HH:MM:SS MM/DD/YY	SET UNIT SPs (7) Max/Min LWT Rates Max = 2.7°F/min Min = 1.8°F/min	SET COMP SPs (7) Vane Control Lead Start=040% Lag Start=040%		SET TOWER SPs (7) Valve Control Range Min = 010% Max = 100%	
	SET UNIT SPs (8) EvapRecTmr = 0.5min EvapPump = #1 ONLY CondPump = #1 ONLY	SET COMP SPs (8) Start Speed Lead Str Spd=015% Lag Str Spd=003%		SET TOWER ByP (8) FB +075.4 Intg Derv Trg +075.0 010s 010s K1500 Db01Tc 1000mS	
	SET UNIT SPs (9) Run Mode=Normal Mode OfsEP=X.X CP=X.X EcoTOfs=X.X °F	SET COMP SPs (9) Protocol=M-BUS MSTR Ident Number= 001 Baud Rate = 19200		SET TOWER VFD (9) FB +075.4 Intg Derv Trg +075.0 030s 030s K1500 Db01 Tc 0500mS	
	SET UNIT SPs (10) Remote Sw Valid ELWT Changed by BAS= No AlmOut = AllComp Alarm	SET COMP SPs (10) Refrg Sat Pressure Evp Offset =+00.0 psi Cnd Offset = +00.0psi		SET TOWER SPs (10) CAF*+013 +012 UT250 Spd 120 000% S0200 RLA-05 CsP+002 m1000	
	SET UNIT SPs (11)	SET COMP SPs (11) Orbit Limit = C			
	SET UNIT SPs (12) Time				
	SET UNIT SPs (13) Units = °F/psi WXETT Eco Offs= 0.0psi SS=Auto 1# 2# 3# 4#				
	SET UNIT SPs (14) Protocol = MODBUS Id #= 001 Units =SI Baud Rate = 19200				
	SET UNIT EX-Val(15)				
	SET UNIT SPs (16) Sensor Offset ELWT=0.0 CLWT=0.0 EEWT =0.0 CEWT=0.0				
	SET UNIT SPs (17) AirInPOft 1#=X.Xpsi 2#=X.Xpsi 3#=X.Xpsi 4#=X.Xpsi				

Selection can then be made by using the LEFT/RIGHT keys to move between columns and the UP/DOWN keys to move between rows.

If the VIEW COMP#2 (3,4) screen is being viewed and the RIGHT arrow key is pressed, the display will show VIEW EVAP. If the LEFT arrow key is then pressed, the display will show VIEW COMP#2 (3,4) again (not VIEW COMP (1)).

Attempts to scroll past the limits of the matrix are ignored.

Screen Definitions – VIEW

The following screens are shown in °F/psi. When the Display Units setpoint is set to °C/kPa, the units of measure on the HMI will change accordingly. The unit controller will always be in inch-pounds.

View Unit Status

VIEW UNIT STATUS (1)
Unit=COOL
COMP#1 OFF #2 RUN
Ev/Cn Pmps=STRT/RUN

Unit states can be OFF, COOL, SHUTDOWN, and ALARM as determined from the Unit State variable, the Unit Mode setpoint, and the presence of a unit shutdown alarm.

Compressor states can be OFF, START, HOLD, LOAD, UNLOAD, SHUTDN, and ALARM as determined from the Comp State variable, the Load and Unload outputs, and the presence of a compressor shutdown alarm.

Evap and Cond Pump states can be OFF, STRT (start), & RUN.

VIEW UNIT STATUS (2)
COMP#1 = OFF
Start-Start Tmr Cir
Inhibits-None

Inhibits are signals that prevent further loading such as Load Limit, High Discharge Pressure, etc.

View Water Status

VIEW UNIT WATER°F(1)
In Out Delta
Evap XX.X XX.X XX.X
Cond XX.X XX.X XX.X

VIEW UNIT WATER°F(2)
Evap = XXXXX GPM
Cond = XXXXX GPM

VIEW UNIT Econ xxx
Econ Temp = XX.X °F
Econ Press = XX.Xpsi
Liq Lv = XXX%

View Refrigerant Status

VIEW UNIT REFRG (1)
psi °F
Sat Evap XXX.X XX.X
Sat Cond XXX.X XX.X

VIEW UNIT REFRG (2)
Suct Line = XXX.X°F
Liquid Line= XXX.X°F
Lift Press =XXXX psi

View Tower Status

Tower Control = Temp/None Tower Control = Lift

VIEW UNIT TOWER (1)	**VIEW UNIT TOWER (1)**
Stages ON = 2 of 4	**Stages ON = 2 of 4**
Setpoint = XXX °F	**Setpoint = XXXX psi**

The first Stages ON value is the number of fan stages ON. The second number is the Tower Stages setpoint (0 if Tower Control = None).

VIEW UNIT TOWER (2)
Bypass Valve = XXX%
VFD Speed = XXX%

The Bypass Valve value is “None” (in place of XXX%) if the Valve/VFD Control setpoint = None or VFD Stage. The VFD Speed value shall be “None” if the Valve/VFD Control setpoint = None, Valve Setpoint, or Valve Stage.

View Compressor Status

NOTE: In the following VIEW COMP screens, the #N field indicates which compressor (#1, or #2,) is being viewed. There are two columns of menus, the first for compressor #1, the second for #2.

VIEW COMP#N (1)
State = RUN
% RLA = XXX %
Evap LWT =000.0°F

State settings can be OFF, START, INTLOK, HOLD, LOAD, UNLOAD, SHUTDOWN, STOP, and ALARM as determined from the Comp State variable, the Load and Unload outputs, and the presence of a compressor shutdown alarm.

VIEW COMP#N (2)psi	**VIEW COMP#N (3)TC Temp**
Cond Press =XXXX	**BCMM PCB =XXX°F Backplane**
Evap Press =XXXX	**=XXX°F**
Lift Press = XXX	**VFD Assembly = XXX°F**

VIEW COMP#N (4) °F
Cavity Temp=XXX.X°F
Invert Temp=XXX.X°C
Lift Temp = XX.X°F

```
VIEW COMP#N (5) °F
      Temp   SH
Suction  XXX.X XX.X
DischargeXXX.X XX.X
```

```
VIEW COMP#N (6)
      psi   °F
SatEvap XXX.X XXX.X
SatCond XXX.X XX.X
```

```
VIEW COMP#N (7)
Hours  = XXXXX
Starts = XXXXX
AirInletP= XXX.Xpsi
```

```
VIEW COMP#N (8)HW_Lok
Compressor Comm Err
Mode9 Units0 Float0
Auto Demand 000.0%
```

View Vessel Status

```
VIEW EVAPORATOR
Suct SH  = XXX.X °F
Approach =  XX.X °F
```

Press right arrow to view the condenser data.

```
VIEW CONDENSER
Disch SH = XXX.X °F
Approach =  XX.X °F
Subcooling= XX.X °F
```

View Alarms

```
ALARM LOG 01
Description

hh:mm:ss dd/mmm/yyyy
```

```
ALARM LOG 02 to 25
Description

hh:mm:ss dd/mmm/yyyy
```

```
ACTIVE ALARM
 Time     Date
Fault Description
```

Set Unit Setpoints

The following screens are only shown in °F/psi. Setpoint default vales and available setting range can be found in Table6. Values/selections shown on the following screens are typical values.

SET UNIT SPs (1)
Unit Enable = OFF
Unit Mode = COOL
Source = Local

Unit Enable settings can be OFF and ON as determined from the Unit Enable setpoint.

Unit Mode settings can be COOL or TEST as determined from the Unit Mode setpoint.

Source settings can be Local, SWITCHES, or NETWORK as determined from the Mode Source setpoint.

SET UNIT SPs (2)
Available Modes
= COOL
Select w/Unit Off

Available Modes settings for Magnitude chillers can be COOL. The unit must be turned off to change this setpoint.

SET UNIT SPs (3)
Cool LWT = XX.X°F
Ice LWT = XX.X°F
Heat LWT = XX.X°F

Ignore any setting other than COOL LWT should they appear on this menu.

SET UNIT SPs (4)
Leaving Water Temp
StartDelta= XX.X°F
StopDelta = XX.X °F

SET UNIT SPs (5)
Reset Type =none
MaxResetDT =XX.X°F
StrtResetDT=XX.X°F

Reset Type settings can be NONE, RETURN, or 4-20 as determined by the LWT Reset Type setpoint.

SET UNIT SPs (6)
Templifier Src Water
No Start =68°F
Delta Reset =54 °F

Used for Templifier Chiller Setpoint.

SET UNIT SPs (7)
Max/Min LWT Rates
Max = X.X°F/min
Min = X.X °F/min

Pump Selection

SET UNIT SPs (8)
EvapRecTmr =X.Xmin
EvapPump = #1 ONLY
CondPump = #1 PRIM

The Evaporator Water Pump outputs will be controlled in a Primary/Standby manner according to the Evap Pump setpoint which may be set to #1 Only, #2 Only, Auto, #1 Primary/#2 Standby, or #2 Primary/#1 Standby.

- If #1 Only is selected, only pump #1 will be started even in event of a failure.
- If #2 Only is selected, only pump #2 will be started.
- If Auto is desired, the unit will try to balance operating hours on each pump by starting the pump with the least amount of operating hours first. In case of pump failure, the unit will start the backup pump.
- In standby mode, the primary pump will always be started first. The standby pump will only be started if there is a failure indicated on the primary pump.

An Evaporator Water Pump output will be ON if the Evap State is set to START or RUN. Both outputs will be OFF if the Evap State is set to OFF.

SET UNIT SPs (9)
Run Mode=Normal Mode
OfsEP=X.X CP=X.X
EcoTOfs=X.X °F

SET UNIT SPs (10)
Remote Sw Valid ELWT
Changed by BAS= No
AlmOut = AllComp Alarm

SET UNIT SPs (11)
Evap WF = 02400 GPM
Cond WF = 03000 GPM
Language = Chinese

'Language = Chinese means the HMI is displayed by Chinese.It can be English and Traditional.

SET UNIT SPs (12)
STD/Day Light Time
dd/mmm/yyyy
hh:mm:ss Day of week

SET UNIT SPs (13)
Units = °F/psi (IP) WXETT
Econ Offset=00.0psi
SS=Auto 1# 2# 3# 4#

Econ Offset-Used to calibrate Econ pressure.
SS=Auto 1# 2# 3# 4# -Used to set Econ solenoid valve control mode- Auto /Man.

SET UNIT SPs (14)
Protocol = Modbus
Id#= 001 Units=IP
Baud Rate = 19200

SET UNIT EX-Val(15)
Release @LR＞X.X0
LiqLVXXX--LVSetXX
EP Control X.X0 Keep XXs

These settings are used to set parameters for Liquid Level control.

SET UNIT SPs (16)
Sonser Offset
ELWT=X.X CLWT=X.X
EEWT=X.X CEWT=X.X

SET UNIT SPs (17)
AirInPOft
1#=X.Xpsi 2#=X.Xpsi
3#=X.Xpsi 4#=X.Xpsi

Set Compressor Setpoints
NOTE: In the following SET COMP screens, the #N field indicates which compressor (#1 or #2) is being set. There is basically a column of menu screens for each compressor.

SET COMP#N SPs (1)
Demand Limit = OFF
Minimum Amps = XXX%
Maximum Amps = XXX%

Demand Limit settings can be OFF or ON as determined from the Demand Limit setpoint.

SET COMP#N SPs (2)
StageMode = NORMAL
StageSequence# =01
Max Comprs ON =02

SET COMP#N SPs (3)
StageDeltaT =X.X°F
Stop-Start =XXmin
Start-Start =XXmin

SET COMP#1 SPs (4)
UL Surge Ofs=XXXRPM
Name Plate RLA XXX
Avg_Current=xxxA

SET COMP# SP1 (5)
Lead Staging=XXX%
Nom Capacity=XXXXT
InvtTH=XXX.X°F - XX.X°F

Ignore hot gas bypass setting. Magnitude chillers are not so equipped.

SET COMP#N SPs (6)
IntrLokTmr=XXXsec
Max Str LWT = XXX°F
MECH_HPEn=Disable

InterLok Timer = 10 Sec - Time allotted for the compressor to detect the Interlock switch is closed and report status to controller.

Max Start LWT = 10.0F - If ELWT is higher than setpoint above Evap Target Temp, then Comp will be commanded to start with the Max Starting Demand value of 80%. (800).

SET COMP#1 (7)
Vane COntrol
Lead Start=XXX%
Lag Start=XXX%

SET COMP#N (8)
Start Speed
Lead Str Spd=XXX%
Lag Str Spd=XXX%

SET COMP#N (9)
Protocol =M-BUS MSTR
Ident Number= 001
Baud Rate = 19200

SET COMP#N (10)
Pressure Offset psi
Ep#1=XX.X #2=XX.X
Cp#1=XX.X #2=XX.X

SET COMP#N (11)
Orbit Limit = C
Onlyfor TT350/400/500
Not for TT700!

Set Alarm Limits

SET ALARM LMTS (1)
LowEvPrHold=XXpsi
LowEvPrUnld=XXpsi
LowEvPrStop=XXpsi

SET ALARM LMTS (2)
HighCondPr = XXXpsi
HiDschT-Load=XXX°F
HiDschT-Stop=XXX°F

SET ALARM LMTS (3)
WMC Compressor
Oilless Design
(blank mask page)

SET ALARM LMTS (4)
Surge Slp Str=XX°F
Surge Tmp Run=XX°F
MtrCurThrshld=XX

⚠ CAUTION

Only trained compressor technicians should set these setpoints.

SET ALARM LMTS (5)
Evap Freeze=XX.X°F
Cond Freeze=XX.X°F
CAppT=X.X°F En=No

Set Tower Setpoints

SET TOWER SPs (1)
TowerControl = None
Tower Stages = X
StageUP/DN=XXX/XXX%

Tower fan control settings can be None, Temp, or Lift.

Tower Fan Control=Temp/None Tower Control = Lift

SET TOWER SPs (2)	SET TOWER SPs (2)
Stage ON (Temp)°F	Stage ON (Lift)psi
#1 #2 #3 #4	#1 #2 #3 #4
XXX XXX XXX XXX	XXX XXX XXX XXX

Tower Fan Control=Temp/None Tower Control = Lift(psi)

SET TOWER SPs (3)	SET TOWER SPs (3)
VFD Min Spd=XX.X%	VFD Min Spd=XX.X%
StageDiff=typepsi/°F	StageDiff=typepsi/°F
Stg Up=XX Dn=XX min	Stg Up=XX Dn=XX min

VFD Min Spd - Tower Fan Minimum VFD Speed (%)
StageDiff - Fan staging deadband (type? psi/°F)
StageUp - Time between a fan stage event and the next fan stage up event.
StageDown - Time between a fan stage event and the next fan stage down event.

SET TOWER SPs (4)
Valve/VFD Control=
None
Valve Type = NC

Tower Configuration
Bypass Valve/ Fan VFD combination
Bypass Valve Type - Nornally Open / Closed

Tower Control = Temp/None

SET TOWER SPs (5)
Reset = XX°F
Sensor=ECWT-B3

Tower Control = Lift

SET TOWER SPs (5)
Valve SP = XX.X psi
Sensor=ECWT-B9

Valve Sp - Bypass Valve Non-staging Control Target

Reset - sets the amount of Tower reset (Lift/Temp) to coax more capacity from the compressor if needed.

Sensor - Tower water return sensor (Ain-B3 or B9)

SET TOWER SPs (6)
ValveStartPosition
Min = XXX% @ XXX°F
Max = XXX% @ XXX°F

Sets tower bypass valve

SET TOWER SPs (7)
Valve Control Range
Min=XXX% Max=XXX%
Tower Loop=X.Xmin

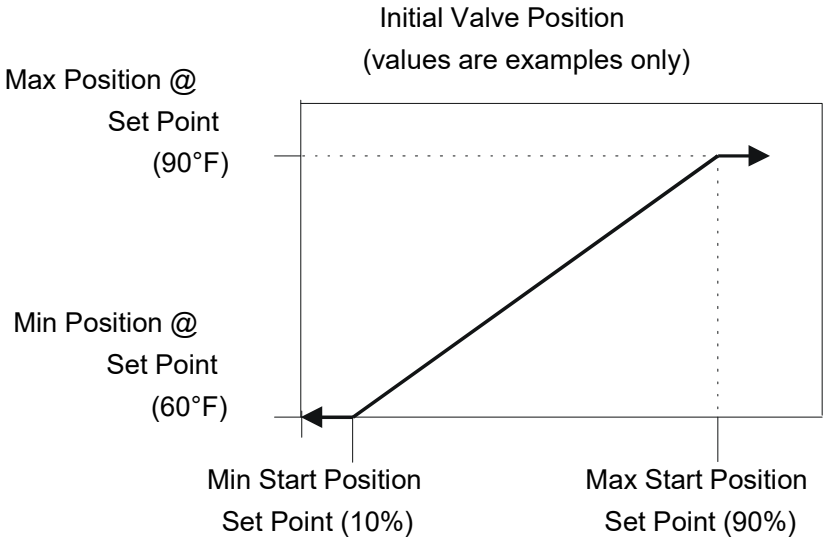
SET TOWER ByP (8)
FB XXX.X Intg Derv
Trg XXX.X XXXs XXXs
KXXXX DbXX Tc XXXXmS

FB - Feedback of control parameter. Trg - Control Target (Selected type Lift/Temp)
Intg - Integral time period (seconds) Derv - Derivative time period (seconds)
K - Proportional constant Db - Dead band of the control target
Tc - Time constant of the output correction.

SET TOWER VFD (9)
FB XXX.X Intg Derv
Trg XXX.X XXXs XXXs
KXXXX DbXX Tc XXXXmS

Db Tower RXX.X FXXX
CAF*XXX XXX UTXXX
Spd XXX XXX% SXXXX
RLAXXX CsPXXX mXXXX

Figure10-1, Bypass Valve Position



Normal Operation

When the condenser pump is in the RUN state, the valve output is controlled in one of two modes as specified by the Valve/VFD Control setpoint. The controlled parameter (CP) is either ECWT or Lift as specified by the Tower Control setpoint. When the desired output signal varies from 0 to 100%, the output voltage will vary as follows.

- 0 to 10 VDC (Valve Type = NC to tower)
- 10 to 0 VDC (Valve Type = NO to tower)

Valve Setpoint Mode

This mode is operational when the Valve/VFD Control setpoint is set to Valve Setpoint OR Valve SP/VFD Stage. In this mode the valve output is varied with a proportional-derivative (PD) algorithm (with deadband) in order to maintain the controlled parameter (CP) at the desired value. The output is always limited between the Valve Control Range (Min) setpoint and the Valve Control Range (Max) setpoint. A valve increment is computed once every 5 seconds according to the following equation.

- Increment = [(Error) * (Error Gain setpoint)] + [(Slope) * (Slope Gain setpoint)]
- Where: Error = ECWT – Valve Setpoint (Temp), (only if Tower Control setpoint = Temperature)
- Error = Lift – Valve Setpoint (Lift), (only if Tower Control setpoint = Lift)
- Slope = (Present CP) – (Previous CP)

When the Error is > the Valve Deadband (Temp OR Lift as appropriate) setpoint, the valve position analog output (% of full scale) is updated according to the following equation.

- New %Position = Old %Position + Increment/10.

Valve Stage Mode

This mode is only operational when the Valve/VFD Control setpoint is set to Valve Stage. In this mode the valve output is controlled as for Valve Setpoint mode (above), except that the active setpoint for the controlled parameter is selected according to the following table.

Table 10-2, Valve Staging

# Of Fans ON	Active Setpoint
0	Valve Setpoint (Temp OR Lift as appropriate)
1	Stage #1 ON (Temp OR Lift as appropriate)
2	Stage #2 ON (Temp OR Lift as appropriate)
3	Stage #3 ON (Temp OR Lift as appropriate)
4	Stage #4 ON (Temp OR Lift as appropriate)

Cooling Tower Fan VFD

Normal Operation

When the Valve/VFD Control setpoint is set to None, Valve Setpoint, OR Valve Stage, this output is set to 0. Otherwise, it shall be controlled in a manner identical to Valve Stage Mode (above) except that (1) it is kept at zero until the first fan stage is ON and (2) the following setpoints do not apply.

- Valve Control Range (Min)
- Valve Control Range (Max)
- Valve Type

Editing

Editing is accomplished by pressing the ENTER (lower-right key) key until the desired field is selected. This field is indicated by a blinking cursor under it. The arrow keys then operate as follows:

CANCEL (⇒ Key)	Reset the current field to the value it had when editing began.
DEFAULT (⇐ Key)	Set value to original factory setting.
INCREMENT (⇑ Key)	Increase the value or select the next item in a list.
DECREMENT (⇓ Key)	Decrease the value or select the previous item in a list.

During edit mode, the display shows a two-character wide menu pane on the right as shown below.

SET UNIT SPs (X)	**<D**
(data)	**<C**
(data)	**<+**
(data)	**<-**

Additional fields can be edited by pressing the ENTER key until the desired field is selected. When the last field is selected, pressing the ENTER key switches the display out of “edit” mode and returns the arrow keys to “scroll” mode.

Alarms

When an alarm occurs, the alarm type, date, and time are stored in the active alarm buffer corresponding to that alarm (viewed on the Alarm Active screens) and also in the alarm log buffer (viewed on the Alarm Log screens). The active alarm buffers hold a record of the last occurrence of each alarm and whether or not it has been cleared. The alarm can be cleared by pressing the Edit key. A separate buffer is available for each alarm (High Discharge Pressure, Evaporator Freeze Protect, etc.) The alarm history buffer holds a chronological account of the last 25 alarms of any type.

Security

Two four-digit passwords provide OPERATOR and MANAGER levels of access to changeable parameters. Either password can be entered using the ENTER PASSWORD screen which can be accessed in one of three ways:

1. The SET UNIT SPs menu
2. Scrolling to it (last screen in the SET UNIT SPs column)
3. By simply pressing the UP ARROW, DOWN ARROW, or DEFAULT keys while on the desired field on one of the SET screens. The password can then be entered by pressing the ENTER key, scrolling to the correct value with the UP and DOWN arrow keys, and pressing ENTER

again. The length of the password shall not be indicated. Once the correct password has been entered (cases 1 and 2 above), the PASSWORD screen shall show the active password level. For case 3 above, the previously selected screen shall reappear (still in edit mode) with the cursor on the previously selected field. Once a password has been entered, it shall remain valid for 15 minutes after the last key-press.

11 BAS Interface

The MicroTech controller is available with the optional Open Choices™ feature, an exclusive Daikin feature that provides easy integration with a building automation system (BAS). If the unit will be tied into a BAS, the controller should have been purchased with the correct factory-installed communication module. The modules can also be added in the field during or after installation.

If an interface module was ordered, one of the following BAS interface installation manuals was shipped with the unit. Contact your local Daikin sales office for a replacement, if necessary.

Connection to Chiller

Connection to the chiller for all BAS protocols will be at the unit controller. An interface card will have to be installed in the unit controller depending on the protocol being used.

11.1 Modbus Protocol

Modbus Data Points

Network Control Property	Read/ Write	Data Type	Index	Description	Units
Cool Setpoint	**R/W**	**Holding Register**	**40002**	**LocalLWTSp~18℃**	**℃*10**
Ice Setpoint	**R/W**	**Holding Register**	**40051**	**LocalLWTSp~3.0℃**	**℃*10**
Heat Setpoint	**R/W**	**Holding Register**	**40006**	**30℃~LocalLWTSp**	**℃*10**
Capacity Limit Setpoint	**W**	**Holding Register**	**40004**	**0~1000 (For 0~100%)**	**%*10**
Chiller Mode (Setpoint)	**W**	**Holding Register**	**40146**	**1=Ice,2=Cool,3=Heat**	NA
Chiller Enable Input	**R/W**	**Coil**	**2**	**0=Off,1=On**	NA
Run Enabled	R	Coil	3	0=Off, 1=Run Allowed	NA
Chiller Local/Remote	R	Coil	6	0=Remote,1=Local	NA
Chiller Control Source Output	R	Holding Register	40182	0=Local, 1=BAS Network 2=Remote Switch	NA
Chiller Limited	R	Coil	7	0=Not Limited, 1=Limited	NA
Chiller Mode Output	R	Holding Register	40148	1=Ice,2=Cool,3=Heat	NA
Unit Status	**R**	**Holding Register**	**40147**	**0=Off,1=Start,2=Run, 3=Pre-Shutdown, 4=Service**	NA
Active Setpoint	R	Holding Register	40003	-9.4~55℃	**℃*10**
Actual Capacity	**R**	**Holding Register**	**40011**	**0~125%**	**%*10**
Capacity Limit Output	R	Holding Register	40100	0~100%	%
Evaporator Entering Water Temperature	**R**	**Holding Register**	**40005**	**-25~100℃**	**℃*10**
Evaporator Leaving Water Temperature	**R**	**Holding Register**	**40007**	**-25~100℃**	**℃*10**
Condenser Entering Water Temperature	**R**	**Holding Register**	**40008**	**-25~100℃**	**℃*10**
Condenser Leaving Water Temperature	**R**	**Holding Register**	**40009**	**-25~100℃**	**℃*10**
Evaporator Flow Switch	**R**	**Coil**	**8**	**0=No Flow,**	NA

Network Control Property	Read/ Write	Data Type	Index	Description	Units
Status				**1=Flow**	
Condenser Flow Switch Status	**R**	**Coil**	**9**	**0=No Flow, 1=Flow**	NA
Evaporator Pump Status #1	**R**	**Coil**	**30**	**0=Pump Off, 1=Pump On**	NA
Evaporator Pump Status #2	**R**	**Coil**	**31**	**0=Pump Off, 1=Pump On**	NA
Condenser Pump Status #1	R	Coil	32	0=Pump Off,1=Pump On	NA
Condenser Pump Status #2	R	Coil	33	0=Pump Off,1=Pump On	NA
Evaporator Pump Run Hours #1	R	Holding Register	40176	0~32767	Hour/10
Evaporator Pump Run Hours #2	R	Holding Register	40232	0~32767	Hour/10
Condenser Pump Run Hours #1	R	Holding Register	40177	0~32767	Hour/10
Condenser Pump Run Hours #2	R	Holding Register	40233	0~32767	Hour/10
Discharge Pressure	R				
Compressor #1		Holding Register	40022	0~2800kPa	kPa*10
Compressor #2		Holding Register	40094	0~2800kPa	kPa*10
Compressor #3		Holding Register	40044	0~2800kPa	kPa*10
Compressor #4		Holding Register	40279	0~2800kPa	kPa*10
Condenser Saturated Temperature	R				
Compressor #1		Holding Register	40021	-25~62℃	℃*10
Compressor #2		Holding Register	40093	-25~62℃	℃*10
Compressor #3		Holding Register	40042	-25~80℃	℃*10
Compressor #4		Holding Register	40278	-25~80℃	℃*10
Suction Pressure	R				
Compressor #1		Holding Register	40018	0~910kPa	kPa*10
Compressor #2		Holding Register	40091	0~910kPa	kPa*10
Compressor #3		Holding Register	40040	0~910kPa	kPa*10
Compressor #4		Holding Register	40276	0~910kPa	kPa*10
Evaporator Saturated Temperature	R				
Compressor #1		Holding Register	40017	-25~40℃	℃*10
Compressor #2		Holding Register	40090	-25~40℃	℃*10
Compressor #3		Holding Register	40039	-25~40℃	℃*10
Compressor #4		Holding Register	40275	-25~40℃	℃*10
Compressor Current	R				
Compressor #1		Holding Register	40027	0~32767Amps	Amps

Network Control Property	Read/ Write	Data Type	Index	Description	Units
Compressor #2		Holding Register	40096	0~32767Amps	Amps
Compressor #3		Holding Register	40046	0~32767Amps	Amps
Compressor #4		Holding Register	40281	0~32767Amps	Amps
Compressor Voltage					
Compressor #1		Holding Register	40030	0~32767Volts	Volts
Compressor #2	R	Holding Register	40099	0~32767Volts	Volts
Compressor #3		Holding Register	40111	0~32767Vlots	Volts
Compressor #4		Holding Register	40268	0~32767Vlots	Volts
Compressor Power					
Compressor #1		Holding Register	40028	0~32767kiloWatts	kiloWatts
Compressor #2	R	Holding Register	40097	0~32767kiloWatts	kiloWatts
Compressor #3		Holding Register	40047	0~32767kiloWatts	kiloWatts
Compressor #4		Holding Register	40282	0~32767 kiloWatts	kiloWatts
Compressor Percent RLA					
Compressor #1		Holding Register	40026	0~125%	%*10
Compressor #2	R	Holding Register	40095	0~125%	%*10
Compressor #3		Holding Register	40045	0~125%	%*10
Compressor #4		Holding Register	40280	0~125%	%*10
Discharge Temperature					
Compressor #1		Holding Register	40020	-25~100℃	℃*10
Compressor #2	R	Holding Register	40092	-25~100℃	℃*10
Compressor #3		Holding Register	40041	-25~100℃	℃*10
Compressor #4		Holding Register	40277	-25~100℃	℃*10
Suction Temperature					
Compressor #1		Holding Register	40016	-25~100℃	℃*10
Compressor #2	R	Holding Register	40089	-25~100℃	℃*10
Compressor #3		Holding Register	40038	-25~100℃	℃*10
Compressor #4		Holding Register	40274	-25~100℃	℃*10
Compressor Run Hours					
Compressor #1		Holding Register	40208*1000＋40175	0~999999	Hour
Compressor #2	R	Holding Register	40209*1000＋40236	0~999999	Hour
Compressor #3		Holding Register	40210*1000＋40241	0~999999	Hour
Compressor #4		Holding Register	40211*1000＋40265	0~999999	Hour
Compressor Starts					
Compressor #1		Holding Register	40174	0~32767	Starts
Compressor #2	R	Holding Register	40235	0~32767	Starts
Compressor #3		Holding Register	40240	0~32767	Starts
Compressor #4		Holding Register	40264	0~32767	Starts
IGV					
Compressor #1		Holding Register	40249	0-110%	%
Compressor #2	R	Holding Register	40253	0-110%	%
Compressor #3		Holding Register	40155	0-110%	%

Network Control Property	Read/ Write	Data Type	Index	Description	Units
Compressor #4		Holding Register	40262	0-110%	%
Max RPM	R				
Compressor #1		Holding Register	40246	32767 RPM	RPM
Compressor #2		Holding Register	40250	32767 RPM	RPM
Compressor #3		Holding Register	40152	32767 RPM	RPM
Compressor #4		Holding Register	40259	32767 RPM	RPM
Actual RPM	R				
Compressor #1		Holding Register	40247	32767 RPM	RPM
Compressor #2		Holding Register	40251	32767 RPM	RPM
Compressor #3		Holding Register	40153	32767 RPM	RPM
Compressor #4		Holding Register	40260	32767 RPM	RPM
Min RPM	R				
Compressor #1		Holding Register	40248	32767 RPM	RPM
Compressor #2		Holding Register	40252	32767 RPM	RPM
Compressor #3		Holding Register	40154	32767 RPM	RPM
Compressor #4		Holding Register	40261	32767 RPM	RPM
Online Cleaning Control Mode	RW	Holding Register	40500	0=Manual， 1=Timing Switch， 2=AppTemp DT	NA
Online Cleaning Manual Switch	RW	Coil	0x182	0=Off，1=Enable	NA
Cleaning Starts Each Circle	RW	Holding Register	40503	0-5	Starts
Timer Mode: Cleaning Interval	RW	Holding Register	40504	0-6hours	Hour
Online Cleaning State	R	Holding Register	40509	0=Off，1=Run， 2=Alarm	NA
Online Cleaning Total Starts	R	Holding Register	40508	0-32767	Starts
Valve Open Relay	R	Coil	0x183	0=No Action， 1=Valve Open	NA
Valve Close Relay	R	Coil	0x184	0=No Action， 1=Valve Close	NA
Valve Full Open Feedback	R	Coil	0x185	0=Not Open， 1=Open Feedback	NA
Valve Full Close Feedback	R	Coil	0x186	0=Not Close， 1=Close Feedback	NA
Evap_ApprDT（option）	R	Holding Register	40015	-25~100℃	℃*10
Cond_ApprDT（option）	R	Holding Register	40035	-25~100℃	℃*10
Chiller Total KW （option）	R	Holding Register	40245	0~1000kW	kW
Chiller Total Amp （option）	R	Holding Register	40244	0~1000A	A
Chiller Total Voltage	R	Holding Register	40283	0~1000V	V

Network Control Property	Read/ Write	Data Type	Index	Description	Units
（option）					
Chiller Total RLA （option）	R	Holding Register	40299	0~120%	%*10
COP（option）	R	Holding Register	40392	0~32767	*1000
Refrigerating Capaticy （option）	R	Holding Register	40393	0~32767kW	kW
Evaporator Flow （option）	R	Holding Register	40394	0~32767L/sec	L/sec
Condenser Flow （option）	R	Holding Register	40395	0~32767L/sec	L/sec
Evaporator Differential Pressure（option）	R	Holding Register	40396	0~200kPa	kPa*10
Condenser Differential Pressure（option）	R	Holding Register	40397	0~200kPa	kPa*10
ABB M4M Multimeter（option）					
Average line voltage	R	Holding Register	40750	0~32767	V*10
Average three-Phase voltage	R	Holding Register	40751	0~32767	V*10
Average three-Phase current	R	Holding Register	40752	0~32767	A
A-Phase voltage THD	R	Holding Register	40754	0~32767	%*10
B-Phase voltage THD	R	Holding Register	40755	0~32767	%*10
C-Phase voltage THD	R	Holding Register	40756	0~32767	%*10
A-B Line Voltage THD	R	Holding Register	40770	0~32767	%*10
A-C Line Voltage THD	R	Holding Register	40772	0~32767	%*10
B-C Line Voltage THD	R	Holding Register	40774	0~32767	%*10
Current Ia THD	R	Holding Register	40757	0~32767	%*10
Current Ib THD	R	Holding Register	40758	0~32767	%*10
Current Ic THD	R	Holding Register	40759	0~32767	%*10
Total Active Power	R	Holding Register	40760	-32768~32767	kW*10
Total Power Factor	R	Holding Register	40762	-32768~32767	*1000
A-B Line Voltage	R	Holding Register	40763	0~32767	V*10
A-Phase Voltage	R	Holding Register	40764	0~32767	V*10
A-C Line Voltage	R	Holding Register	40765	0~32767	V*10
B-Phase Voltage	R	Holding Register	40766	0~32767	V*10
B-C Line Voltage	R	Holding Register	40767	0~32767	V*10
C-Phase Voltage	R	Holding Register	40768	0~32767	V*10
A-Phase Current	R	Holding Register	40769	0~32767	A
B-Phase Current	R	Holding Register	40771	0~32767	A
C-Phase Current	R	Holding Register	40773	0~32767	A

Chiller Alarm Variables

Network Control	Read/	Data Type	Index	Description

Property	Write			
Alarm Digital Output	**R**	**Coil**	**4**	**0=No Alarm,1=Alarm**
Clear Alarm	**R/W**	**Coil**	**25**	**0=Normal,1=Clear Alarm**
Active Alarms	**R**	**Holding Register**	**40130~ 40145**	**16Holding Registers: Each bit representing an alarm condition**

Modbus Alarms List

#	Description	Holding Rigester	Bit
1	EVAP PUMP ON - Suction Pressure Low (Freeze)	40139	3
2	COND PUMP ON - Discharge Pressure Low (Freeze)	40139	4
3	Temperature Sensor Out of Range	40139	5
4	Pressure Sensor Out of Range	40139	6
5	Liquid Level Sensor Out of Range	40139	7
6	Condenser Water Flow Loss	40139	8
7	Evaporator Water Flow Loss	40139	9
8	External Input Alarm	40139	10
9	Ground Alarm #1	40139	11
10	Ground Alarm #2	40139	12
11	Ground Alarm #3	40139	13
12	Ground Alarm #4	40139	14
13	Compressor Alarm #1	40140	0
14	Compressor Alarm #2	40140	1
15	Compressor Alarm #3	40140	2
16	Compressor Alarm #4	40140	3
17	Compressor Comm Alarm #1	40140	4
18	Compressor Comm Alarm #2	40140	5
19	Compressor Comm Alarm #3	40140	6
20	Compressor Comm Alarm #4	40140	7
21	Check Valve Alarm #1	40140	8
22	Check Valve Alarm #2	40140	9
23	Check Valve Alarm #3	40140	10
24	Check Valve Alarm #4	40140	11
25	Load Balance Valve Alarm #1	40140	12
26	Load Balance Valve Alarm #2	40140	13
27	Load Balance Valve Alarm #3	40140	14
28	Load Balance Valve Alarm #4	40140	15

11.2 BACnet Protocol

BACnet Data Points

Network Control Property	Read/ Write	Object Instance	Object ID	Description
Chiller Enable(Input)	R/W	BV41	BV100001	0=Disable,1=Enable
Cool Setpoint	R/W	AO29	AV100001	**LocalLWTSp~18℃**

Network Control Property	Read/ Write	Object Instance	Object ID	Description
Ice Setpoint	R/W	AO30	AV100050	**LocalLWTSp~3.0℃**
Heat Setpoint	R/W	AO31	AV100005	**30℃~LocalLWTSp**
Capacity Limit Setpoint	R/W	AO32	AV100003	0~100.0%
Chiller Local/Remote	R	BI38	BV100005	0=Remote,1=Local
Chiller Control Source(Output)	R	MSI40	AV200040	1=Local,2=BAS network, 3=Remote Switch
Run Enabled	R	BI33	BV100002	0=Off, 1=Run Allowed
Chiller Limited	R	BI39	BV100006	0=Not Limited, 1=Limited
Chiller Mode (Setpoint)	W	MSO45	AV200045	1=Ice,2=Cool,3=Heat
Chiller Mode (Output)	R	MSI44	AV200033	1=Ice,2=Cool,3=Heat
Active Setpoint	R	AI7	AV100002	-9.4~55℃
Actual Capacity	R	AI9	AV100010	0~125%
Capacity Limit Output	R	AI8	AV200003	0~100%
Chiller Status	R	MSI43	AV200002	1=Off,2=Start,3=Run, 4=Pre-Shutdown, 5=Service
Evaporator Entering Water Temperature	R	AI1	AV100004	-25~100℃
Evaporator Leaving Water Temperature	R	AI2	AV100006	-25~100℃
Condenser Entering Water Temperature	R	AI3	AV100007	-25~100℃
Condenser Leaving Water Temperature	R	AI4	AV100008	-25~100℃
Evaporator Flow Switch Status	R	BI34	BV100007	0=No Flow, 1=Flow
Condenser Flow Switch Status	R	BI35	BV100008	0=No Flow, 1=Flow
Evaporator Pump Run Hours1	R	AI27	AV200004	0~32767
Evaporator Pump Run Hours2	R	AI89	AV200005	0~32767
Evaporator Pump Status	R	BI36	BV100135	0=Pump Off, 1=Pump On
Condenser Pump Run Hours1	R	AI28	AV200006	0~32767
Condenser Pump Run Hours2	R	AI90	AV200007	0~32767
Condenser Pump Status	R	BI37	BV100136	0=Pump Off, 1=Pump On
Suction Pressure #1	R	AI13	AV100017	0~910kPa
Suction Saturated Temperature #1	R	AI14	AV100016	-25~40℃

Network Control Property	Read/ Write	Object Instance	Object ID	Description
Compressor Suction Temperature #1	R	AI15	AV100015	-25~100℃
Discharge Pressure #1	R	AI16	AV100021	0~2800kPa
Discharge Saturated Temperature #1	R	AI17	AV100020	-25~62℃
Compressor Discharge Temperature #1	R	AI18	AV100019	-25~100℃
Compressor Percent RLA #1	R	AI24	AV100025	0~125%
Compressor Current #1	R	AI51	AV200008	0~32767A
Compressor Power #1	R	AI54	AV200009	0~32767kW
Compressor Voltage #1	R	AI52	AV200010	0~32767V
Compressor Run HoursHigh #1	R	AI208	AV200011	0~999
Compressor Run HoursLow#1	R	AI26	AV200012	0~999
Compressor Starts #1	R	AI25	AV200013	0~32767
Compressor IGV #1	R	AV249	AV200248	0~110%
Compressor Max RPM #1	R	AV246	AV200245	0~32767 RPM
Compressor Actual RPM #1	R	AV247	AV200246	0~32767 RPM
Compressor Min RPM #1	R	AV248	AV200247	0~32767 RPM
Suction Pressure #2	R	AI71	AV100090	0~910kPa
Suction Saturated Temperature #2	R	AI70	AV100089	-25~40℃
Compressor Suction Temperature #2	R	AI69	AV100088	-25~100℃
Discharge Pressure #2	R	AI74	AV100093	0~2800kPa
Discharge Saturated Temperature #2	R	AI73	AV100092	-25~62℃
Compressor Discharge Temperature #2	R	AI72	AV100091	-25~100℃
Compressor Percent RLA #2	R	AI75	AV100094	0~125%
Compressor Current #2	R	AI76	AV200014	0~32767A
Compressor Power #2	R	AI77	AV200015	0~32767kW
Compressor Voltage #2	R	AI79	AV200016	0~32767V
Compressor Run HoursHigh #2	R	AI209	AV200017	0~999
Compressor Run HoursLow #2	R	AI93	AV200018	0~999
Compressor Starts #2	R	AI92	AV200019	0~32767
Compressor IGV #2	R	AV253	AV200252	0~110%
Compressor Max RPM #2	R	AV250	AV200249	0~32767 RPM
Compressor Actual RPM #2	R	AV251	AV200250	0~32767 RPM

Network Control Property	Read/ Write	Object Instance	Object ID	Description
Compressor Min RPM #2	R	AV252	AV200251	0~32767 RPM
Suction Pressure #3	R	AI132	AV100039	0~910kPa
Suction Saturated Temperature #3	R	AI133	AV100038	-25~40℃
Compressor Suction Temperature #3	R	AI135	AV100037	-25~100℃
Discharge Pressure #3	R	AI130	AV100043	0~2800kPa
Discharge Saturated Temperature #3	R	AI131	AV100041	-25~62℃
Compressor Discharge Temperature #3	R	AI134	AV100040	-25~100℃
Compressor Percent RLA #3	R	AI94	AV100044	0~125%
Compressor Current #3	R	AI95	AV200020	0~32767A
Compressor Power #3	R	AI96	AV200021	0~32767kW
Compressor Voltage #3	R	AI98	AV200022	0~32767V
Compressor Run HoursHigh #3	R	AI210	AV200023	0~999
Compressor Run HoursLow #3	R	AI101	AV200024	0~999
Compressor Starts #3	R	AI100	AV200025	0~32767
Compressor IGV #3	R	AV155	AV200154	0~110%
Compressor Max RPM #3	R	AV152	AV200151	0~32767 RPM
Compressor Actual RPM #3	R	AV153	AV200152	0~32767 RPM
Compressor Min RPM #3	R	AV154	AV200153	0~32767 RPM
Suction Pressure #4	R	AI142	AV100275	0~910kPa
Suction Saturated Temperature #4	R	AI143	AV100274	-25~40℃
Compressor Suction Temperature #4	R	AI145	AV100273	-25~100℃
Discharge Pressure #4	R	AI140	AV100278	0~2800kPa
Discharge Saturated Temperature #4	R	AI141	AV100277	-25~62℃
Compressor Discharge Temperature #4	R	AI144	AV100276	-25~100℃
Compressor Percent RLA #4	R	AI102	AV100279	0~125%
Compressor Current #4	R	AI103	AV200026	0~32767A
Compressor Power #4	R	AI104	AV200027	0~32767kW
Compressor Voltage #4	R	AI106	AV200028	0~32767V
Compressor Run HoursHigh #4	R	AI211	AV200029	0~999
Compressor Run HoursLow #4	R	AI109	AV200030	0~999
Compressor Starts #4	R	AI108	AV200031	0~32767
Compressor IGV #4	R	AV262	AV200261	0~110%

Network Control Property	Read/ Write	Object Instance	Object ID	Description
Compressor Max RPM #4	R	AV259	AV200258	0~32767 RPM
Compressor Actual RPM #4	R	AV260	AV200259	0~32767 RPM
Compressor Min RPM #4	R	AV261	AV200260	0~32767 RPM
Evap_ApprDT（option）	R	AV314	AV100014	-25~100℃
Cond_ApprDT（option）	R	AV334	AV100034	-25~100℃
Chiller Total KW（option）	R	AV332	AV200032	0~1000kW
Chiller Total Amp（option）	R	AV337	AV200037	0~1000A
Chiller Total Voltage（option）	R	AV338	AV200038	0~1000V
Chiller Total RLA（option）	R	AV339	AV200039	0~120%
COP（option）	**R**	**AI392**	**AV100391**	**0~32.767**
Refrigerating Capaticy（option）	**R**	**AI393**	**AV200392**	**0~32767kW**
Evaporator Flow（option）	**R**	**AI394**	**AV200393**	**0~32767L/sec**
Condenser Flow（option）	**R**	**AI395**	**AV200394**	**0~32767L/sec**
Evaporator Differential Pressure（option）	**R**	**AI396**	**AV100395**	**0~200.0kPa**
Condenser Differential Pressure（option）	**R**	**AI397**	**AV100396**	**0~200.0kPa**
ABB M4M Multimeter（option）				
Average line voltage	**R**	**AI750**	**AV200749**	**0~32767**
AVerage three-Phase voltage	**R**	**AI751**	**AV200750**	**0~32767**
AVerage three-Phase current	**R**	**AI752**	**AV200751**	**0~32767**
A-Phase voltage THD	**R**	**AI754**	**AV200753**	**0~32767**
B-Phase voltage THD	**R**	**AI755**	**AV200754**	**0~32767**
C-Phase voltage THD	**R**	**AI756**	**AV200755**	**0~32767**
A-B Line Voltage THD	**R**	**AI770**	**AV200769**	**0~32767**
A-C Line Voltage THD	**R**	**AI772**	**AV200771**	**0~32767**
B-C Line Voltage THD	**R**	**AI774**	**AV200773**	**0~32767**
Current Ia THD	**R**	**AI757**	**AV200756**	**0~32767**
Current Ib THD	**R**	**AI758**	**AV200757**	**0~32767**
Current Ic THD	**R**	**AI759**	**AV200758**	**0~32767**
Total Active Power	**R**	**AI760**	**AV200759**	**-32768~32767**
Total Power Factor	**R**	**AI762**	**AV200761**	**-32768~32767**
Line Voltage A-B	**R**	**AI763**	**AV200762**	**0~32767**
A-Phase Voltage	**R**	**AI764**	**AV200763**	**0~32767**
Line Voltage A-C	**R**	**AI765**	**AV200764**	**0~32767**
B-Phase Voltage	**R**	**AI766**	**AV200765**	**0~32767**
Line Voltage B-C	**R**	**AI767**	**AV200766**	**0~32767**
C-Phase Voltage	**R**	**AI768**	**AV200767**	**0~32767**
A-Phase Current	**R**	**AI769**	**AV200768**	**0~32767**
B-Phase Current	**R**	**AI771**	**AV200770**	**0~32767**
C-Phase Current	**R**	**AI773**	**AV200772**	**0~32767**

Note:Compressor Run Hours＝Compressor Run HoursHigh×1000＋Compressor Run HoursLow

Alarms

Alarm Classes

Alarms in a MicroTechV unit controller are divided into three classes: Faults, Problems, and Warnings. Fault alarms have the highest severity level. Problem alarms have medium severity level. Warning alarms have the lowest severity level.

Fault Alarms

Fault alarms require an acknowledgment from the operator. These alarms indicate that the compressor is shutdown.

Problem Alarms

Problem alarms do not cause compressor shutdown but limit operation of the chiller in some way.

Warning Alarms

A warning is enunciated whenever an abnormal condition exists which does not affect chiller operation.

Alarm Handling

One Network variable indicates an alarm condition and one network variable clears alarms. To determine the particular alarm condition, you must read the status of the 16 Active Alarms Holding Registers.

Alarm Digital Output

This network variable indicates whether an alarm condition has occurred. This variable must be polled for alarm notification.

Object Instance	Object ID	Object Name	Measurement	Data Type	Valid Range
BI40	BV100003	AlarmDigital Output	Alarm State	Enumerated	0=No Alarm 1=Alarm

Clear Alarms

This input network variable clear active alarms.

Object TInstance	Object ID	Object Name	Measurement	Data Type	Valid Range
BI42	BV100024	ClearAlarm	NA	Enumerated	0=Normal 1=Clear Alarm

Active Alarms

The Active Alarms Obeject Name register contain a single bit for each alarm condition. You must read the status of these registers to determine the particular alarm condition indicated by the Alarm Digital Output. The table shown below defines the bit location for each alarm condition.

Object Instance	Object ID	Object Name	Measurement	Data Type	Valid Range
AI809	AV200034	UnitAlarmBits	Alarm Condition	Signed Integer	-32768~32767
AI810	AV200035	CompAlarmBits	Alarm Condition	Signed Integer	-32768~32767

BACnet Alarms List

#	Description	Object Instance	Object ID	Bit
1	EVAP PUMP ON - Suction Pressure Low (Freeze)	AI809	AV200034	3
2	COND PUMP ON - Discharge Pressure Low (Freeze)	AI809	AV200034	4

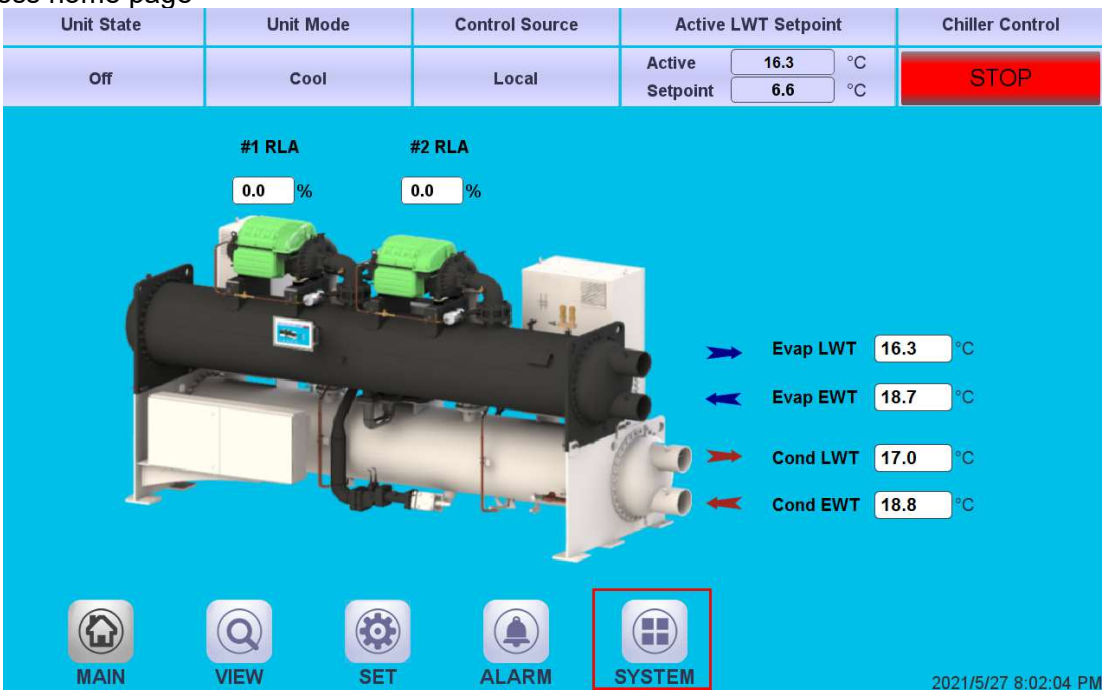
#	Description	Object Instance	Object ID	Bit
3	Temperature Sensor Out of Range	AI809	AV200034	5
4	Pressure Sensor Out of Range	AI809	AV200034	6
5	Liquid Level Sensor Out of Range	AI809	AV200034	7
6	Condenser Water Flow Loss	AI809	AV200034	8
7	Evaporator Water Flow Loss	AI809	AV200034	9
8	External Input Alarm	AI809	AV200034	10
9	Ground Alarm #1	AI809	AV200034	11
10	Ground Alarm #2	AI809	AV200034	12
11	Ground Alarm #3	AI809	AV200034	13
12	Ground Alarm #4	AI809	AV200034	14
13	Compressor Alarm #1	AI810	AV200035	0
14	Compressor Alarm #2	AI810	AV200035	1
15	Compressor Alarm #3	AI810	AV200035	2
16	Compressor Alarm #4	AI810	AV200035	3
17	Compressor Comm Alarm #1	AI810	AV200035	4
18	Compressor Comm Alarm #2	AI810	AV200035	5
19	Compressor Comm Alarm #3	AI810	AV200035	6
20	Compressor Comm Alarm #4	AI810	AV200035	7
21	Check Valve Alarm #1	AI810	AV200035	8
22	Check Valve Alarm #2	AI810	AV200035	9
23	Check Valve Alarm #3	AI810	AV200035	10
24	Check Valve Alarm #4	AI810	AV200035	11
25	Load Balance Valve Alarm #1	AI810	AV200035	12
26	Load Balance Valve Alarm #2	AI810	AV200035	13
27	Load Balance Valve Alarm #3	AI810	AV200035	14
28	Load Balance Valve Alarm #4	AI810	AV200035	15

12 How To Download KTP1200 Touch Screen Data Record

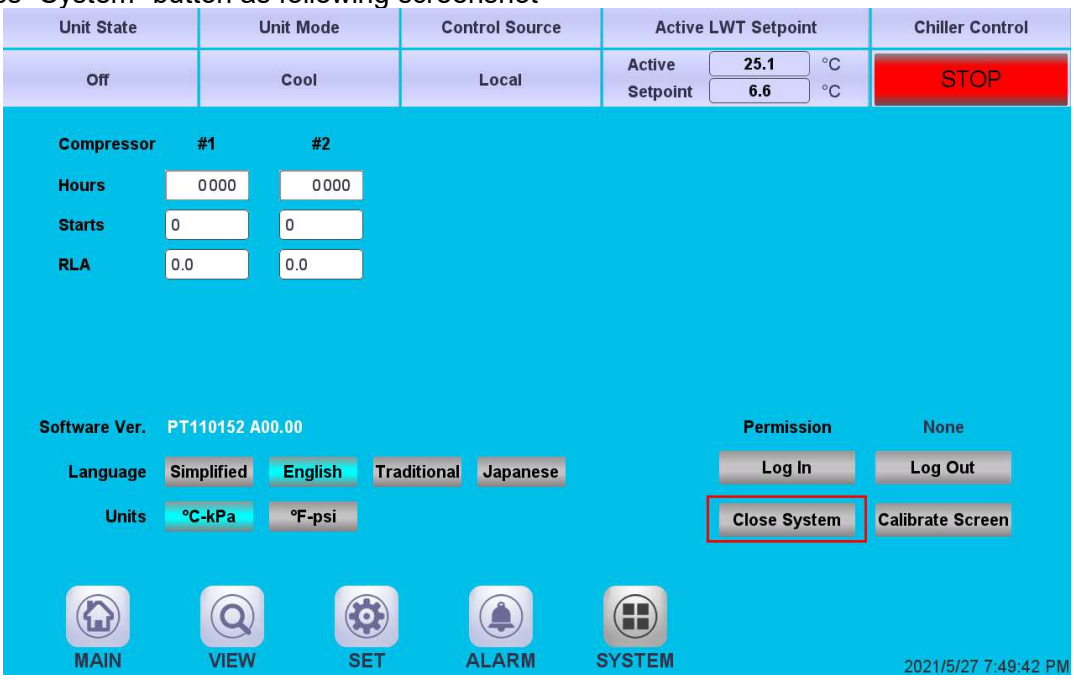
12.1 How to download KTP1200 touch screen data record

KTP1200 touch screen comes with USB disk, please do not lose it. Chiller data and alarm record is stored the mentioned USB disk. Before unplugging the date recording USB disk from KTP1200 touch screen, the following procedure is required:

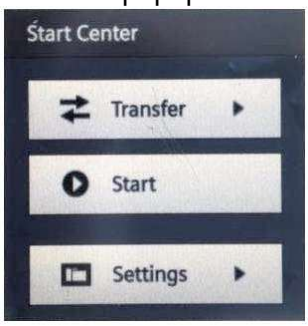
Access home page



Press “System” button as following screenshot



Press “Close System” and “Start Center” window popup as following photo.



1) The USB disk can be unplug until the “Start Center” window popup and power cut safely.
2) After the copy of USB disk is completed, restore the USB disk to KTP1200 touch screen, then reapply the power, press “Start” button and back to chiller operation system.

12.2 How to operate when touch screen normal power cut

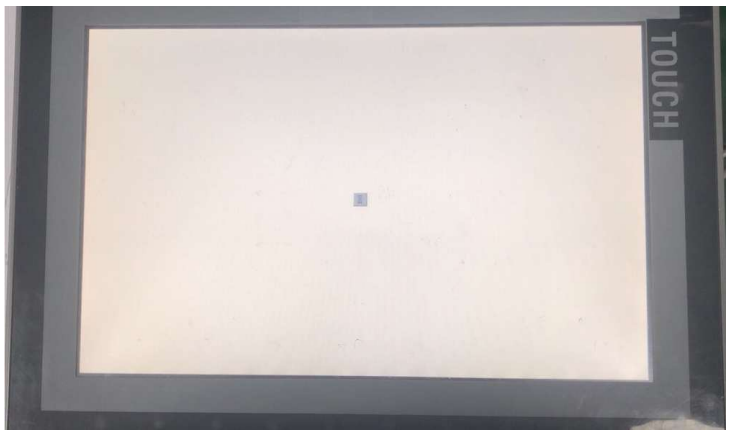
Due to KTP1200 touch screen comes with Linux OS, the safety power cut operation is required to store the data record with lossless. It generates a large number of data record archive when a long term chiller operation, it is most probably existing date record be overwritten due to the archive “RT_COUNT flag” loss when the safety power cut operation has not been taken.

Hence, it suggests carry out as per “Close System” procedure before chiller is required to be power cut.

12.3 How to operate when touch screen abnormal power cut

If KTP1200 touch screen is power cut with irresistible conditions, after power reapplied, it suggests carry out as per “Close System” procedure immediately to prevent existing data record be overwritten and lost from happening.

12.4 Attentions during touchscreen booting



During touchscreen booting, when a sand glass icon appears on the screen (as shown above), please wait for 3 to 5 mins for completing the boot sequence. It is normal phenomenon, please be patient.

Service Procedure

The proper maintenance prolongs service life and enhances performance of the AC system.

The maintenance starts basically as the chiller starts. 3 to 4 weeks after the first start-up, it must be overall inspected, followed by periodical maintenance.

DAIKIN provides diversified maintenance service according to different customer needs.

Contact Methods

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