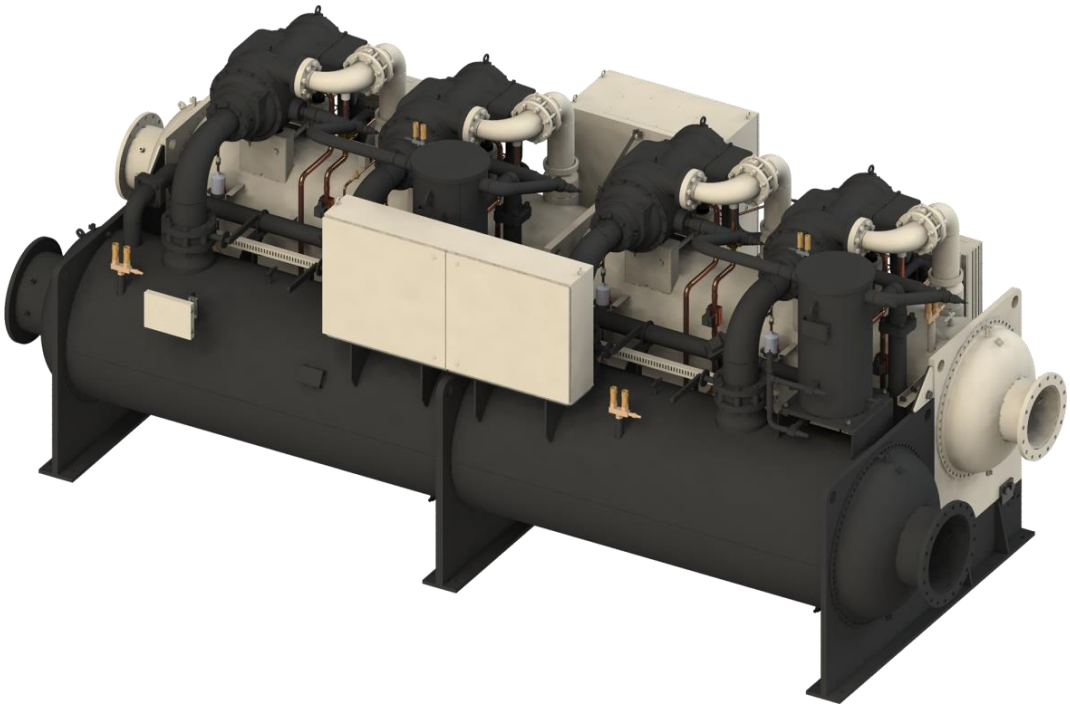
Operating and Maintenance Manual	OMM HXE
	Group: Chiller
	Date:2024.08
	New Part No.: Z8100453-00
	Old Part No.:

Magnitude™ Magnetic Bearing Chillers

Model HXE



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 V 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 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 pressure
  - EXV opening position
  - Condenser and economizer 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 R1234ze 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.

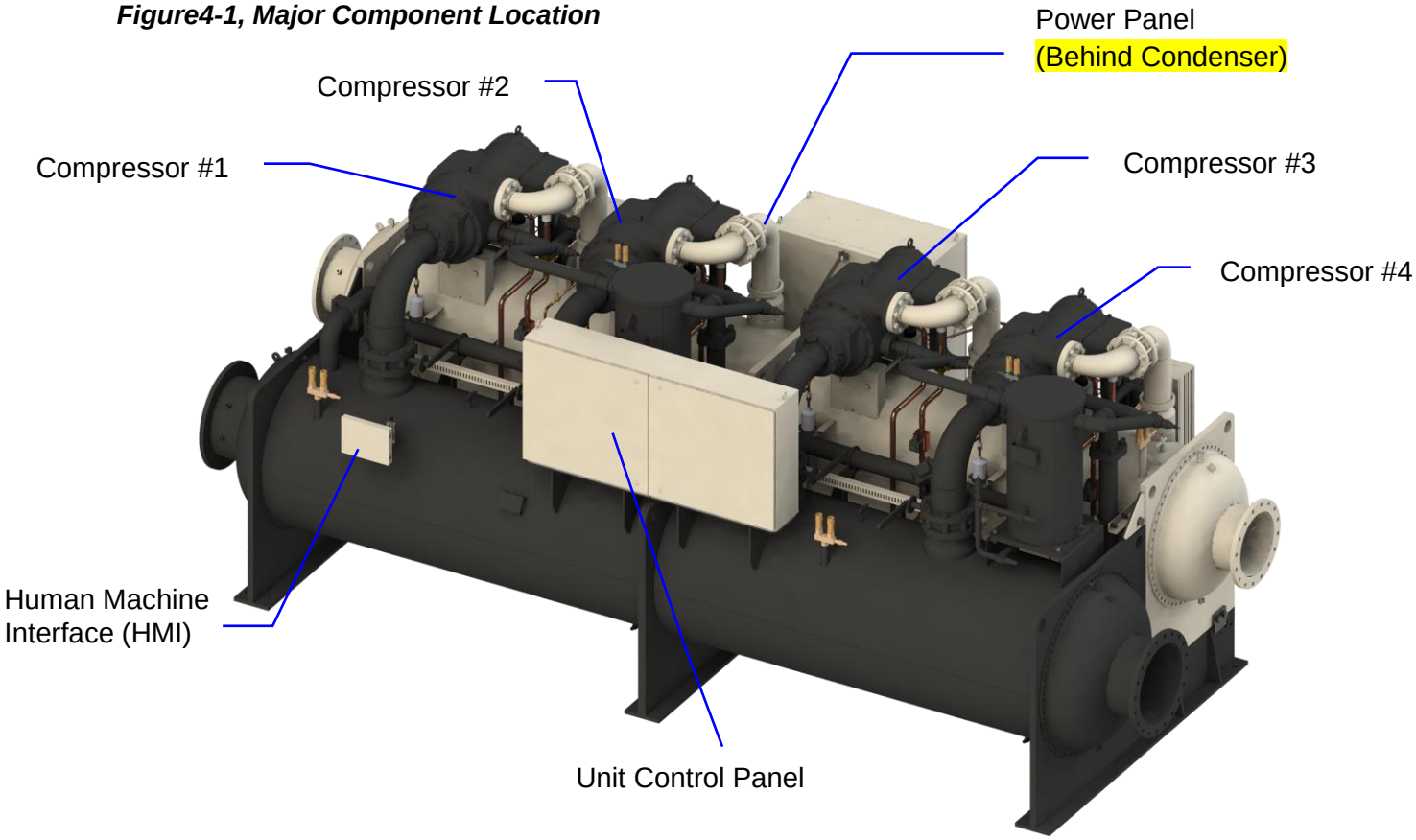
VFD

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 V 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 V 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.

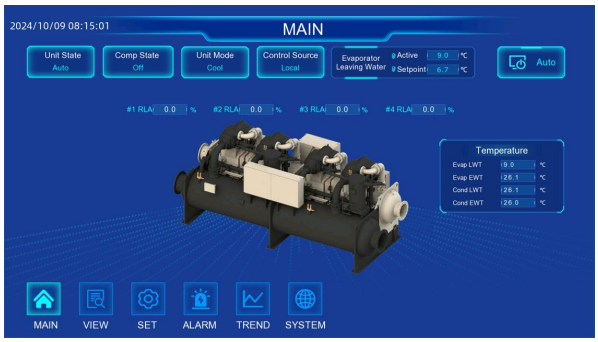
5.5 Chiller Operation without the Operator Interface Panel

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

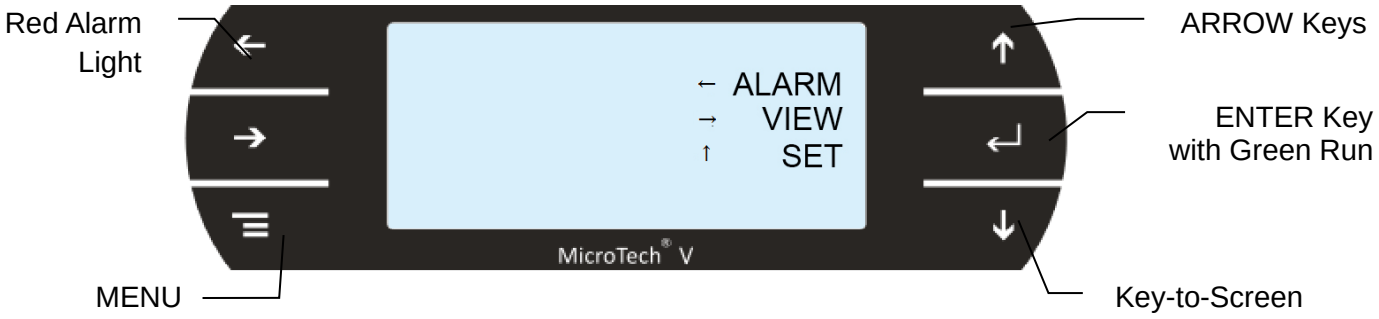
The controller is fitted with a microprocessor for running the control program. There are terminals for connection to the controlled devices (for example: solenoid valves, tower fans, pumps). The program and settings are saved permanently in FLASH memory, preventing data loss in the event of power failure 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 V 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

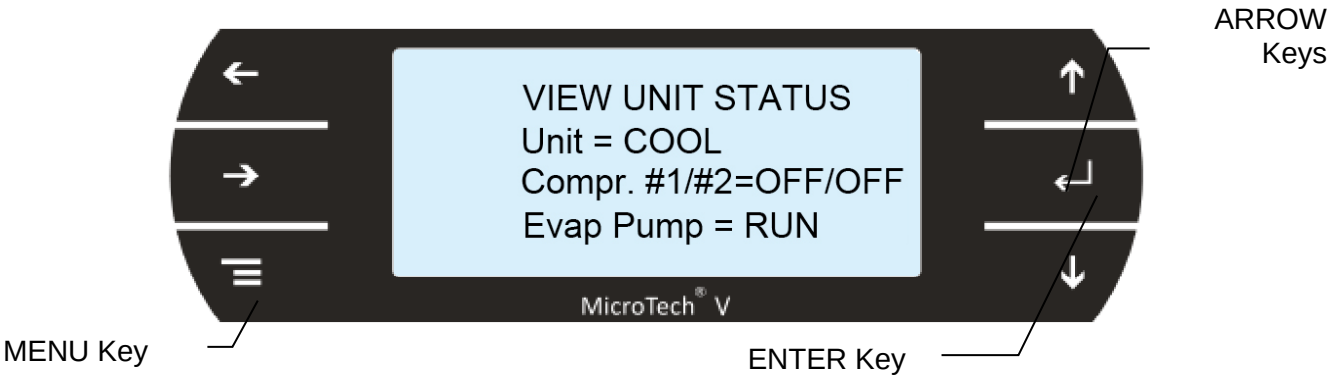
The menus are arranged in a matrix of screens across a top horizontal row. Some of these top-level screens have sub-screens located under them.

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:

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.

7 Unit Control System

Table7-1, Unit Control system, Analog Inputs

#	Description	Signal Source	Range
U1-UC	Entering Condenser Water Temperature	NTC Thermistor (10k@25°C)	-4 to 221°F
U2-UC	Leaving Condenser Water Temperature	NTC Thermistor (10k@25°C)	-4 to 221°F
U3-UC	Condenser Liquid Level 1	4-20 mA Current	0 to 100%
U4-UC	Economizer Pressure 1	0.5-4.5VDC	0 to 132psi
U5-UC	Economizer Pressure 2	0.5-4.5VDC	0 to 132psi
U6-UC	1# Air Inlet Pressure	0.5-4.5VDC	0 to 132psi
U7-UC	2# Air Inlet Pressure	0.5-4.5VDC	0 to 132psi
U8-UC	3# Air Inlet Pressure	0.5-4.5VDC	0 to 132psi
U9-UC	Entering Evaporator Water Temperature	NTC Thermistor (10k@25°C)	-58 to 212°F
U10-UC	Leaving Evaporator Water Temperature	NTC Thermistor (10k@25°C)	-58 to 212°F
U1-C.PCOE	Condenser Liquid Level 2	4-20 mA Current	0 to 100%
U2-C.PCOE	Economizer Liquid Level 1	4-20 mA Current	0 to 100%
U3-C.PCOE	Economizer Liquid Level 2	4-20 mA Current	0 to 100%
U4-C.PCOE	4# Air Inlet Pressure	0.5-4.5VDC	0 to 132psi
U5-C.PCOE	Evaporation Pressure 1	0.5-4.5VDC	0 to 132psi
U6-C.PCOE	Evaporation Pressure 2	0.5-4.5VDC	0 to 132psi
U7-C.PCOE	Condensation Pressure 1	0.5-4.5VDC	0 to 410psi
U8-C.PCOE	Condensation Pressure 2	0.5-4.5VDC	0 to 410psi

Table7-2, Unit Control system, Digital Inputs

#	Description	Signal	Signal
ID1-UC	Unit OFF Switch	0 VAC (Stop)	24 VAC (Auto)
ID2-UC	Remote Start/Stop	0 VAC (Stop)	24 VAC (Start)
ID3-UC	Spared		
ID4-UC	Comp 1 Switch	0 VAC (Stop)	24 VAC (Start)
ID5-UC	Comp 2 Switch	0 VAC (Stop)	24 VAC (Start)
ID6-UC	Comp 3 Switch	0 VAC (Stop)	24 VAC (Start)
ID7-UC	Comp 4 Switch	0 VAC (Stop)	24 VAC (Start)
ID8-UC	Emergency Stop	0 VAC (Stop)	24 VAC (Start)
ID9-UC	GFP Device1	0 VAC(No protect)	24 VAC(In Protect)
ID10-UC	GFP Device2	0 VAC(No protect)	24 VAC(In Protect)
ID11-UC	GFP Device3	0 VAC(No protect)	24 VAC(In Protect)
ID12-UC	GFP Device4	0 VAC(No protect)	24 VAC(In Protect)
ID17-UC	Evaporator Water Flow Switch	0 VAC (No Flow)	24 VAC (Flow)
ID18-UC	Condenser Water Flow Switch	0 VAC (No Flow)	24 VAC (Flow)

Table7-3, Unit Control system, Digital Outputs

#	Description	Load	Output OFF	Output ON
NO1-UC	Evaporator Water Pump #1	Pump Contactor	Pump OFF	Pump ON
NO2-UC	Evaporator Water Pump #2	Pump Contactor	Pump OFF	Pump ON
NO3-UC	Condenser Water Pump #1	Pump Contactor	Pump OFF	Pump ON
NO4-UC	Condenser Water Pump #2	Pump Contactor	Pump OFF	Pump ON
NO5-UC	Tower Fan #1	Fan Contactor	Fan OFF	Fan ON
NO6-UC	Tower Fan #2	Fan Contactor	Fan OFF	Fan ON
NO8-UC	Alarm	Alarm Indicator	Alarm OFF	Alarm ON
NO9-UC	Tower Fan #3	Fan Contactor	Fan OFF	Fan ON
NO10-UC	Tower Fan #4	Fan Contactor	Fan OFF	Fan ON
NO13-UC	1# Staging Solenoid Valve	Solenoid Valve	SV Close	SV Open
NO14-UC	2# Staging Solenoid Valve	Solenoid Valve	SV Close	SV Open
NO15-UC	3# Staging Solenoid Valve	Solenoid Valve	SV Close	SV Open
NO6--C.PCOE	4# Staging Solenoid Valve	Solenoid Valve	SV Close	SV Open
NO16-UC	1# Interlock out	Interlock switch	Interlock Disable	Interlock Enable
NO17-UC	2# Interlock out	Interlock switch	Interlock Disable	Interlock Enable
NO18-UC	3# Interlock out	Interlock switch	Interlock Disable	Interlock Enable
NO1--C.PCOE	4# Interlock out	Interlock switch	Interlock Disable	Interlock Enable

Table7-4, Unit Controller, Analog Outputs

#	Description	Output Signal	Range
Y1-UC	Condenser EBV 1	2 to 10 VDC	0 to 100%
Y2-UC	Condenser EBV 2	2 to 10 VDC	0 to 100%
Y3-UC	Economizer EBV 1	2 to 10 VDC	0 to 100%
Y4-UC	Economizer EBV 2	2 to 10 VDC	0 to 100%
Y5-UC	1# Air Inlet Valve signal to EVD	0 to 10 VDC	0 to 100%
Y6-UC	2# Air Inlet Valve signal to EVD	0 to 10 VDC	0 to 100%
U9-C.PCOE	3# Air Inlet Valve signal to EVD	0 to 10 VDC	0 to 100%
U10-C.PCOE	4# Air Inlet Valve signal to EVD	0 to 10 VDC	0 to 100%
U3-C.PCOE2	Cooling Tower Bypass Valve Position	0 to 10 VDC	0 to 100% Open
U4-C.PCOE2	Cooling Tower VFD Speed	0 to 10 VDC	0 to 100%

7.1 Unit Controller Setpoints

The following parameters are remembered during power off, are factory set to the **Default** value, and can be adjusted to any value in the **Range** column.
The PW (password) column indicates the password that must be active in order to change the setpoint. Codes are as follows:

O = Operator, **M** = Manager, **T** = Technician.

The following table groups setpoints that relate to the entire unit operation and are stored in the unit controller. All settings are made through the HMI

Table7-5, Controller Setpoints

Description	Default	Range	PW
MODE			
Unit Enable	OFF	OFF, Auto	O
UNIT Mode	Cool	NA, Ice, Cool, Heat	O
Control Source	Local	Local，Switches，BAS	O
Evaporator Pump	Only #1	Only #1, Only #2, Auto, #1 Primary, #2 Primary	M
Condenser Pump	Only #1	Only #1, Only #2, Auto, #1 Primary, #2 Primary	M
Available Modes	Cool Only	Test, Cool Only, Cool Glycol, Cool/Ice, Ice Only, Cool/Heat, Heat Only	M
MOTOR			
Demand Limit	OFF	OFF, ON	O
Minimum Amps	5%	1 to MIN { 50%, Maximum Amps }	M
Maximum Amps - Upstream	100%	MAX { 10%, Minimum Amps } to 100%	M
Maximum Amps - Downstream	100%	MAX { 10%, Minimum Amps } to 100%	M
Nameplate RLA	210Amps	0 to 330Amps	T
Maximum LWT Rate	2.7°F/min	0.1 to 5.0 °F/min	T
Minimum LWT Rate	1.8 °F/min	0.1 to 5.0 °F/min	T
Nominal Capacity	250Tons	0 to 999Tons	T
Maximum Compressor ON	4	1 to 4	T
WATER			
Leaving Water Temp - Cool	44. 0°F	37.4 to 77.0 °F	O
Leaving Water Temp – Ice	25. 0°F	17.4 to 37.4 °F	O
Leaving Water Temp – Heat	113. 0°F	86.0 to113.0 °F	O
Startup Delta T	3.0°F	0.0 to 10.0 °F	O
Stage Delta T	1.0°F	0.0 to 9.9 °F	M
Shutdown Delta T	3.0°F	0.0 to 3.0 °F	O
LWT Reset Type	NONE	NONE, RETURN, 4-20mA	M
Maximum Reset Delta T	0.0°F	0.0 to 20.0 °F	M
Start Reset Delta T	10. 0°F	0.0 to 20.0 °F	M
Cond Appr Temp	7.2°F	3.6 to 9.8 °F	M
Online Cond Tubes Cleaning Enable	Off	Off, Enable	M
Templifier Source No Start	68.0°F	44 to 99°F	M
Templifier Source Reset	54°F	50 to 99°F	M
TIMER			

Description	Default	Range	PW
Evap Recirculate Timer	0.5min	0.2 to 5min	M
Start to Start Timer	10min	2 to 60min	M
Stop to Start Timer	3min	1 to 20min	M
Interlock Timer	30s	10 to 240s	NA
TOWER			
Cooling Tower Control	None	None, Temperature, Lift	M
Twr bypass Valve/Fan VFD	None	None, Valve Setpoint, Valve Stage, VFD Stage, Valve SP/VFD Stage	M
Tower Stages	2	1 to 4	M
Stage Up Time	2 min	1 to 60 min	M
Stage Down Time	5min	1 to 60 min	M
Stage Differential (Temp)	3.0 °F	1.0 to 20.0 °F	M
Stage Differential (Lift)	6.0 psi	1.0 to 20.0 psi	M
Stage #1 On (Temp)	70 °F	40 to 120 °F	M
Stage #2 On (Temp)	75 °F	40 to 120 °F	M
Stage #3 On (Temp)	80 °F	40 to 120 °F	M
Stage #4 On (Temp)	85 °F	40 to 120 °F	M
Stage #1 On (Lift)	35 psi	10 to 130 psi	M
Stage #2 On (Lift)	45 psi	10 to 130 psi	M
Stage #3 On (Lift)	55 psi	10 to 130 psi	M
Stage #4 On (Lift)	65 psi	10 to 130 psi	M
VALVE			
Tower Valve Type	NC to Twr	NC to Twr,NO to Twr	M
Valve Target (Temp)	65 °F	40 to 120 °F	M
Valve Target (Lift)	30 psi	10 to 130 psi	M
Valve Deadband (Temp)	1.0 °F	0.0 to 10.0 °F	M
Valve Deadband (Lift)	1.0 psi	0.0 to 20.0 psi	M
Stage Up @	80%	0 to 100%	M
Stage Down @	20%	0 to 100%	M
Minimum Start Position	10%	0 to 100%	M
Temp- Min Start Position	60°F	0 to 100 °F	M
Maximum Start Position	100%	0 to 100%	M
Temp- Max Start Position	90°F	0 to 100 °F	M
Valve Control Range (Min)	10%	0 to 100%	M
Valve Control Range(Max)	100%	0 to 100%	M
Valve Control Error Gain	25	10 to 99	M
Valve Control Slope Gain	25	10 to 99	M
ALARMS			
Low Suction Pressure-Inhibit	19 psi	7 to 45 psi	T
Low Suction Pressure-Unload	18.1 psi	6 to 45 psi	T
Low Suction Pressure-Stop	17.4 psi	5 to 45 psi	T
High Discharge Pressure-Stop	121 psi	91 to 174 psi	M
High Discharge Temperature-Load	170 °F	120 to 240 °F	NA
High Discharge Temperature-Shutdown	190°F	120 to 240 °F	NA
Surge Temperature Limit	11 °F	2 to 25 °F	NA
Surge Slope Limit	20 °F	1 to 99 °F/min	NA
Motor Current Threshold	3%	3 to 99%	NA
Evaporator Freeze Protect	34.0 °F	-9.0 to 45.0 °F	NA
Condenser Freeze Protect	34.0 °F	-9.0 to 45.0 °F	NA

These setpoints are normally viewed or changed on the HMI.

8 Unit Controller

8.1 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).

Problems (Limit Alarms)

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

Table8-1, Controller 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.

Table8-2, Controller 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

8.2 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.

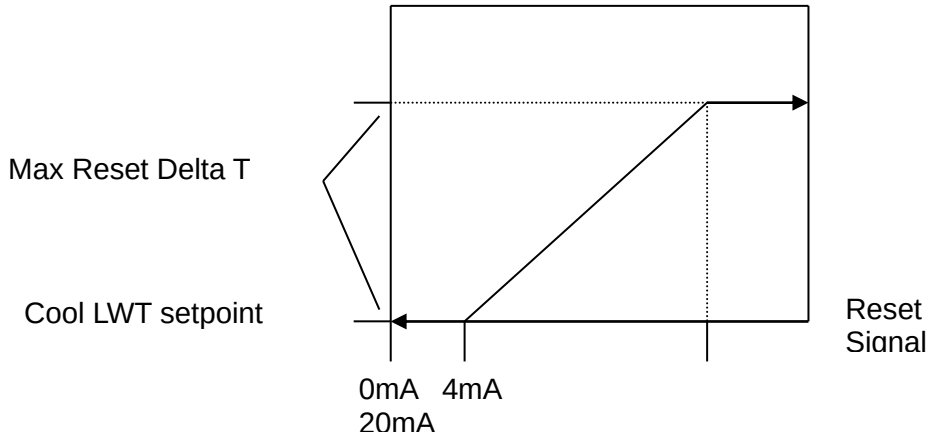
When the chiller mode = COOL, the Active Leaving Water variable is reset using the following parameters:

- 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.

Figure8-1



8.3 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

Table8-3, Compressor Faults (Equipment Protection Shutdowns)

Description	Occurs When:	Action Taken
Low Suction Pressure	Suction Pressure < Low Suction Pressure SP	Rapid Stop
High Discharge Pressure-Stop	Discharge Pressure > High Discharge Pressure SP	Rapid Stop
Low Motor Current	%RLA < Motor Current Threshold with Compressor ON for 300 sec	Rapid Stop
High Discharge Temperature	Discharge Temp > High Discharge Temperature SP	Rapid Stop
Mechanical High Pressure	Digital Input = High Pressure	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
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

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.

Table8-4, 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.

9 Human Machine Interface

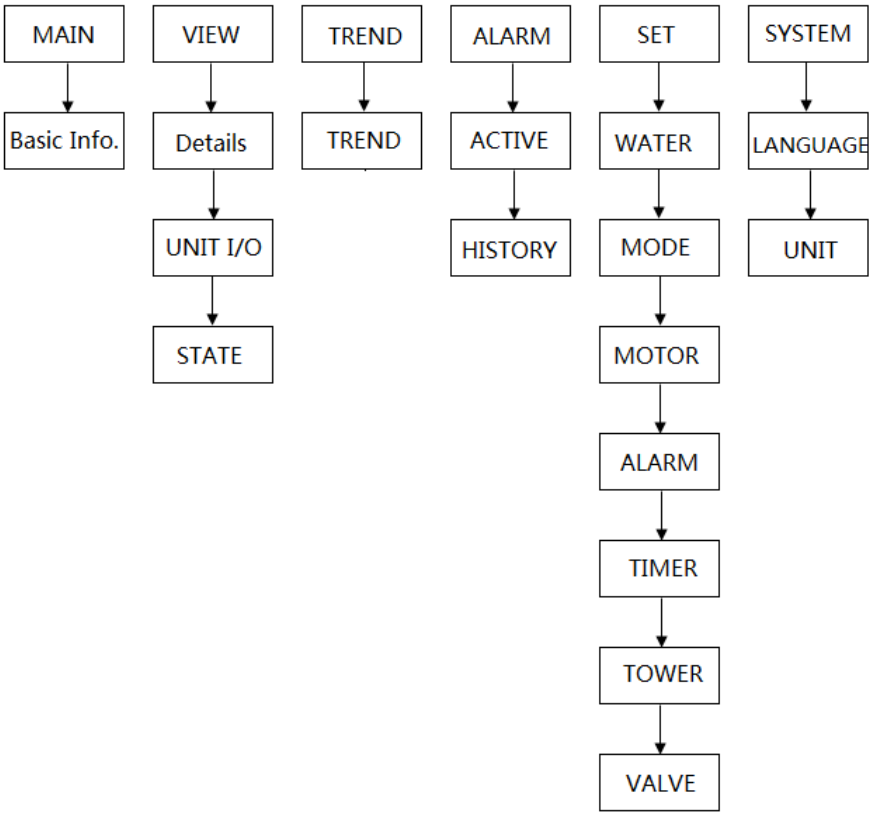
9.1 Navigation

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.

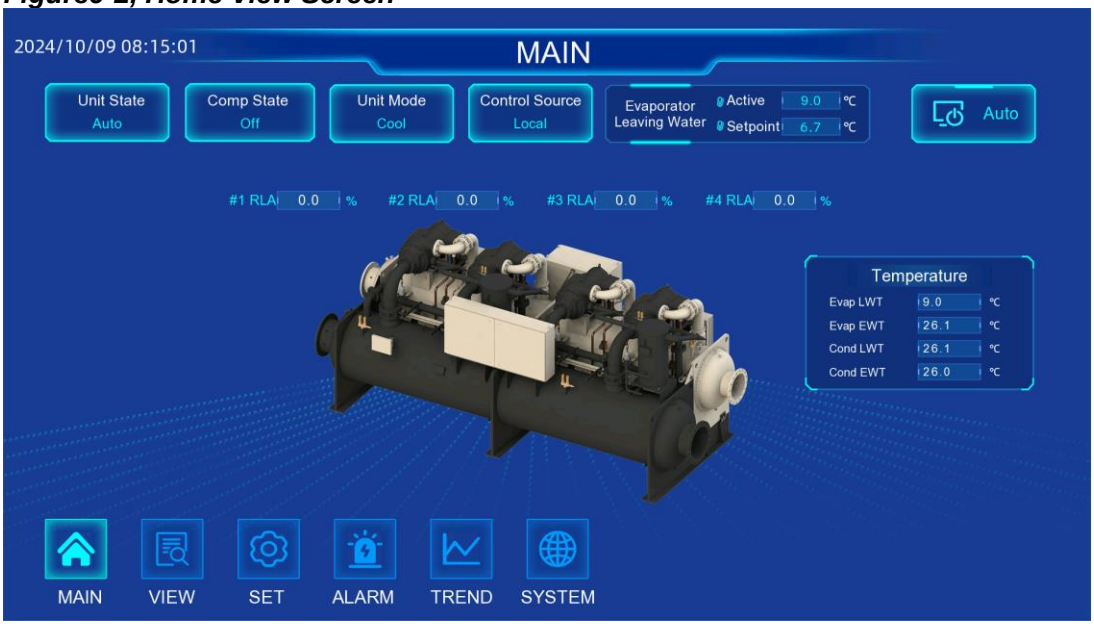
Figure9-1 illustrates the arrangement of the various screens available on the HMI. A few minutes practice on an actual HMI should provide an acceptable level of confidence in navigating through the screens.

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

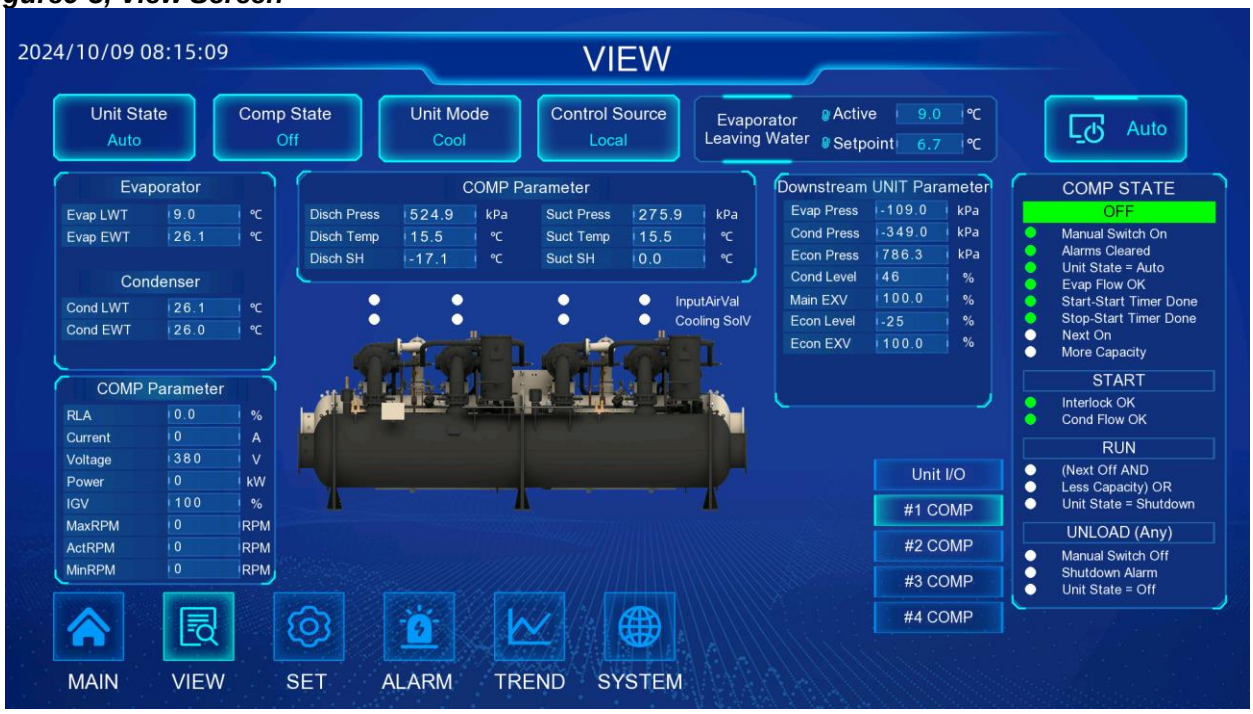
STATES	MODES	SOURCES
STOP	COOL	Local
AUTO	ICE	Remote Switch
Shutdown	HEAT	BAS Network

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

Figure9-3, View Screen



9.4 View Screens

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.

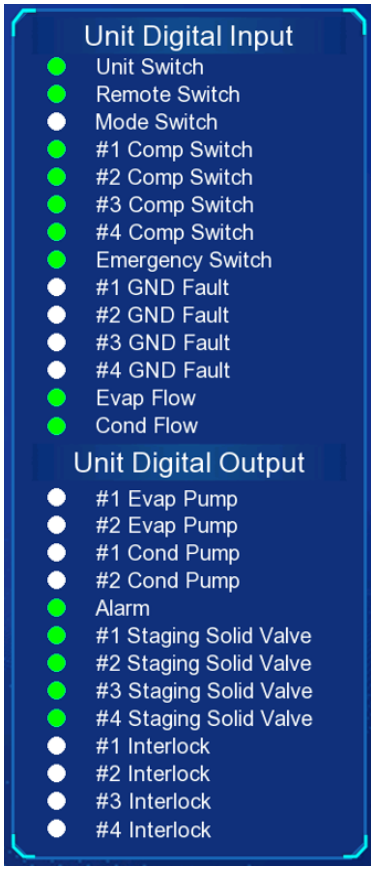


Figure9-5, View Compressor State Screen

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.

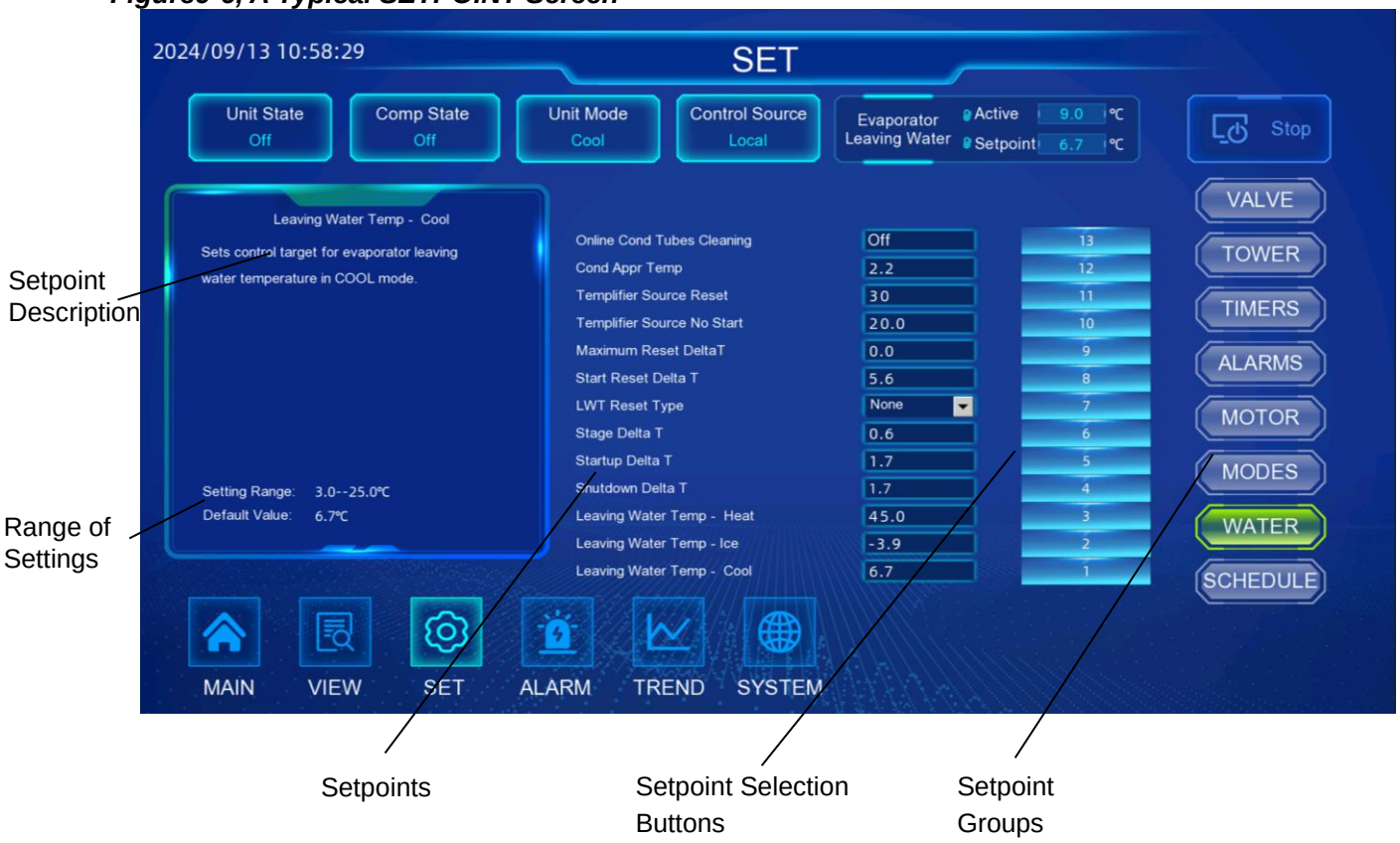
The bottom sections (from "RUN" down) are in effect during the shut down process. The sequence transitions back to OFF at this point and the OFF light will be illuminated.

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 Table9-5.

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.
8) SCHEDULE, set the time for start or stop the chiller in a week.

TIMERS Setpoint

Figure9-7, TIMERS Setpoint Screen

Table9-2, TIMER Setpoints

Description	No.	Default	Range	Pass-word	Comments
Interlock Timer	4	30 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	10 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	#	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	827 ~ 1200kpa	M	Max discharge pressure, stop compressor
Low Suction Pressure-Stop	3	131.0kPa	34 ~ 310 kPa	T	Min Suction pressure – stop compressor
Low Suction Pressure-Unload	2	124.8kPa	41 ~ 310 kPa	T	Min Suction pressure – unload compressor
Low Suction Pressure-Inhibit	1	120.0kPa	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
Fan Stage Down Time	5	5min	1 to 60 min	M	Time delay between stage up/down event and next stage down
Fan 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%.

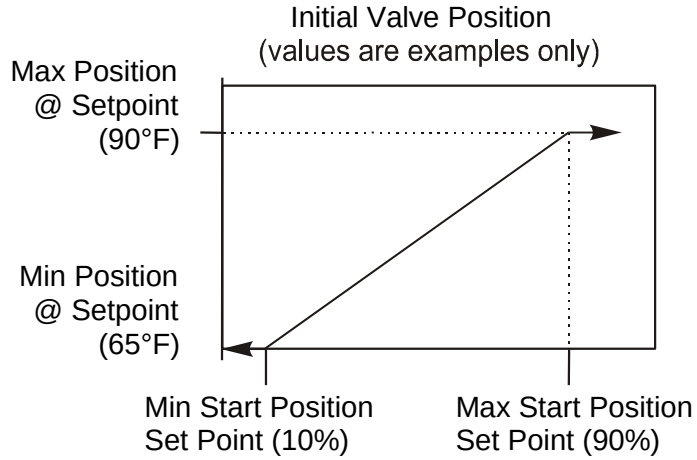
   iv) SP13, Set the maximum position to which the valve can go. Default is 100%.

   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	9	4	1 to 4	M	Set maximum compressor on the chiller
Nominal Capacity	8	--	0 to 999 Tons	M	Determines when to shut off a compressor
Minimum LWT Rate	7	1.0 ℃/min	0.1 ~ 2.8℃/min	M	Additional compressor can start if LWT change is below setpoint.
Maximum LWT Rate	6	1.5 ℃/min	0.1 ~ 2.8 ℃/min	M	Inhibits loading if LWT change exceeds the setpoint value.
Nameplate RLA	5	--	0 to 330 Amps	M	RLA value from compressor nameplate
Maximum Amps – Upstream	4	100%	MAX { 10%, Minimum Amps } to 100%	M	% RLA above which loading is inhibited (Load Limit) SP + 5% unloads compressor
Maximum Amps – Downstream	3	100%	MAX { 10%, Minimum Amps } to 100%	M	% RLA above which loading is inhibited (Load Limit) SP + 5% unloads compressor
Minimum Amps	2	5%	1 to MIN { 50%, Maximum Amps }	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
Available Modes	6	Cool Only	Test, Cool Only, Cool Glycol, Cool/Ice, Ice Only, Cool/Heat, Heat Only	M	Sets modes that can be selected in SP 2
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	13	Off	Off, Enable	M	Set the Online Cond Tubes Cleaning Enable
Cond Appr Temp	12	4.0℃	2.0~8.0℃	M	Cond Saturated Temp－Cond leaving water temp high delta means tube fouling
Templifier Source Reset	11	40℃	28~56℃	M	Resets the condenser leaving temperature downward if source leaving drops under the delta-T. Setting is a function of comp selection.
Templifier Source No Start	10	20.0℃	10~37℃	M	Entering source water temperature below which the unit cannot start.
Maximum Reset DeltaT	9	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	8	5.6℃	0.0 ~11.2℃	M	Sets the evap delta-T above which Return reset begins.
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
Stage Delta-T	6	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	5	1.7℃	0.0~5.6℃	O	Degrees above setpoint for compressor to start.
Shutdown Delta-T	4	1.7℃	0.0~1.7℃	O	Degrees below setpoint for compressor to stop.
Leaving Water Temp-Heat	3	45.0	30~45℃	O	Condenser LWT setpoint in HEAT (Templifier) mode
Leaving Water Temp-Ice	2	-3.9	-8~3℃	O	Evaporator LWT setpoint in the ICE mode
Leaving Water Temp-Cool	1	6.7℃	3~25℃	O	Evaporator LWT setpoint in COOL mode

SCHEDULE Setpoints

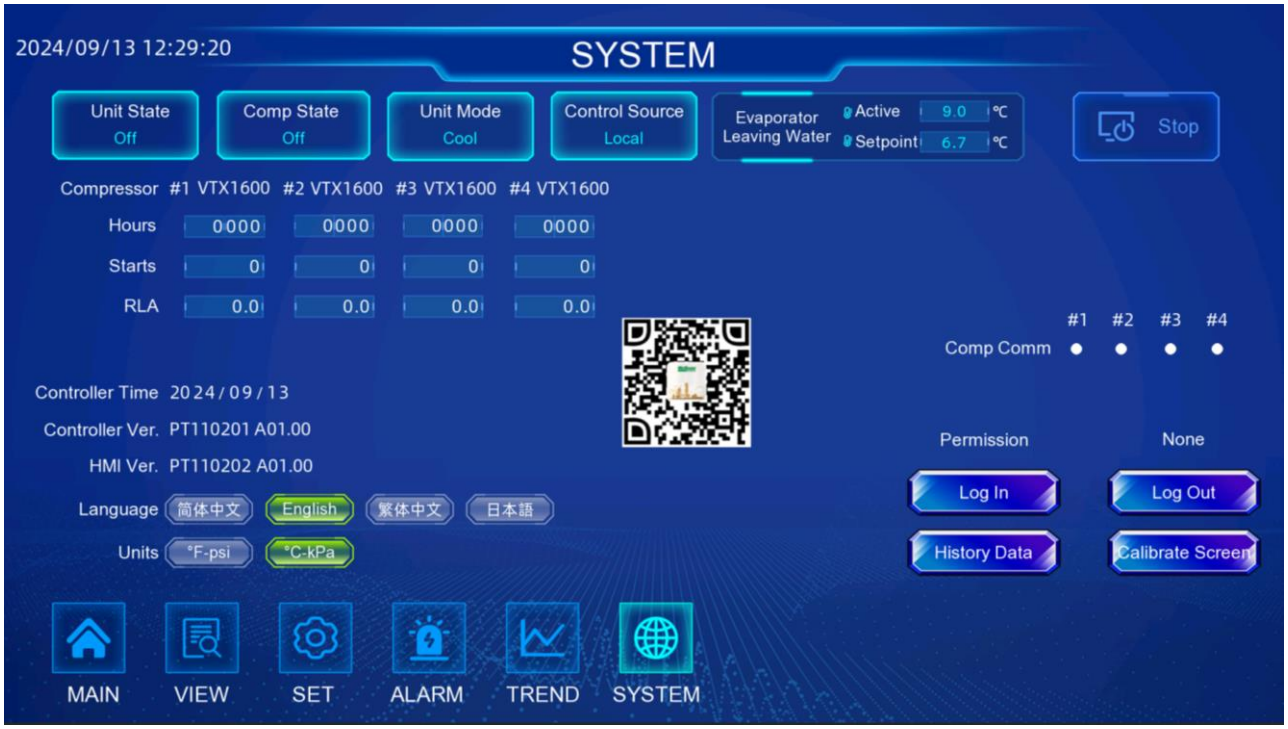
Figure 9-15，SCHEDULE Setpoint Screen

Table9-9，Schedule Setpoints

Description	N0.	Default	Range	Pass-word	Comments
Sunday Close Time	15	00:00	00:00~23:59	O	Set the time when chiller will Close on Sunday
Sunday Open Time	14	00:00	00:00~23:59	O	Set the time when chiller will Open on Sunday
Saturday Close Time	13	00:00	00:00~23:59	O	Set the time when chiller will Close on Saturday
Saturday Open Time	12	00:00	00:00~23:59	O	Set the time when chiller will Open on Saturday
Friday Close Time	11	00:00	00:00~23:59	O	Set the time when chiller will Close on Friday
Friday Open Time	10	00:00	00:00~23:59	O	Set the time when chiller will Open on Friday
Thursday Close Time	9	00:00	00:00~23:59	O	Set the time when chiller will Close on Thursday
Thursday Open Time	8	00:00	00:00~23:59	O	Set the time when chiller will Open on Thursday
Wednesday Close Time	7	00:00	00:00~23:59	O	Set the time when chiller will Close on Wednesday
Wednesday Open Time	6	00:00	00:00~23:59	O	Set the time when chiller will Open on Wednesday
Tuesday Close Time	5	00:00	00:00~23:59	O	Set the time when chiller will Close on Tuesday
Tuesday Open Time	4	00:00	00:00~23:59	O	Set the time when chiller will Open on Tuesday
Monday Close Time	3	00:00	00:00~23:59	O	Set the time when chiller will Close on Monday
Monday Open Time	2	00:00	00:00~23:59	O	Set the time when chiller will Open on Monday
Schedule Enable	1	Off	Off, Enable	O	Set the schedule function.

9.6 SYSTEM Screen

Figure9-16, System Screen

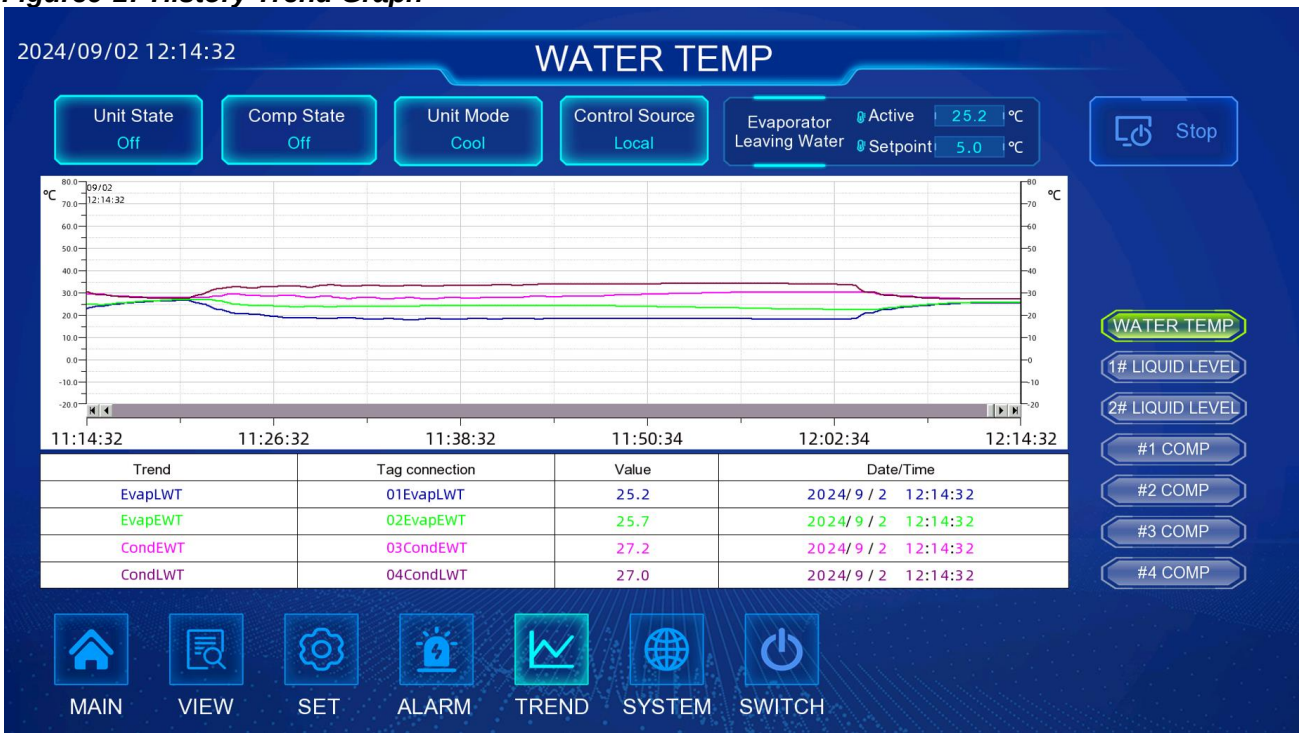


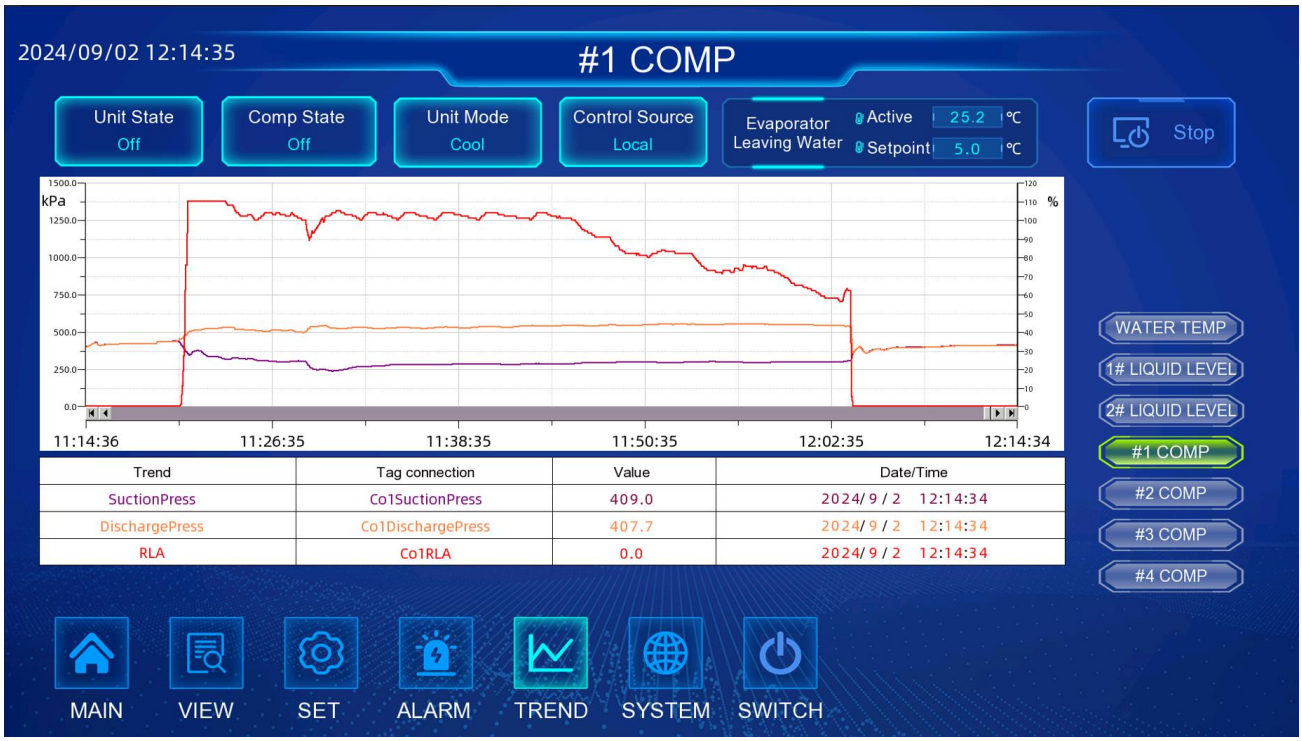
The SYSTEM screen is accessed by pressing SYSTEM from MAIN screen. While containing information and activity buttons for the service technician, it also has valuable information for the operator.

- 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

Figure9-17 History Trend Graph

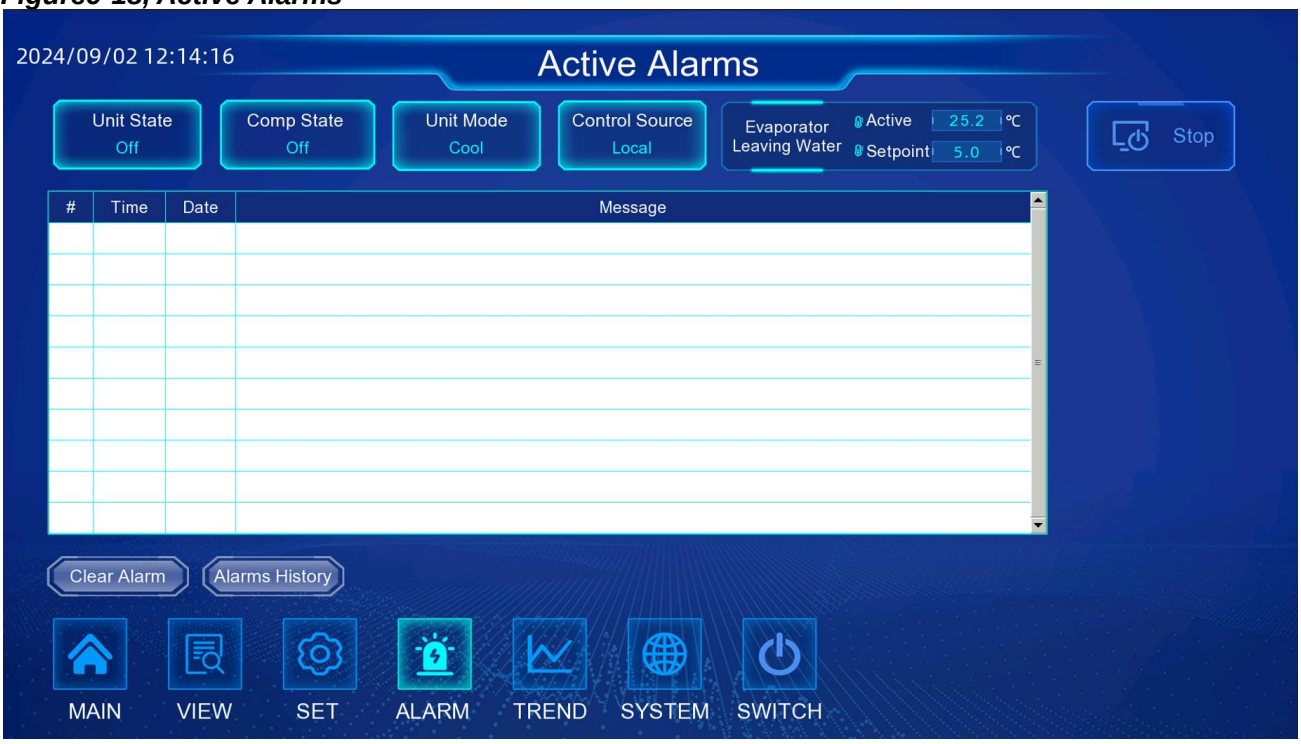




The Trend History Overview allows the user to view the various parameters listed on the right side of the screen. The temperature scale in ℃ . Pressure in kPa is on the left and % RLA is represented by the right-hand scale.

9.8 ALARM Screens

Figure9-18, 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 BAS Interface

The MicroTech V 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.

10.1 Modbus Protocol

Modbus Data Points

Network Control Property	Read/ Write	Data Type	Index	Description	Units
Cool Setpoint	R/W	Holding Register	40002	LocalLWTSp~25℃	℃*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 – Downstream	**W**	**Holding Register**	**40004**	**0~1000 (For 0~100%)**	**%*10**
Capacity Limit Setpoint – Upstream	**W**	**Holding Register**	**40341**	**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 – Upstream	**R**	**Holding Register**	**40300**	**0~100%**	**%**
Capacity Limit Output – Downstream	**R**	**Holding Register**	**40100**	**0~100%**	**%**
Evaporator Entering Water Temperature	R	Holding Register	40005	-25~100℃	℃*10
Evaporator Leaving	R	Holding Register	40007	-25~100℃	℃*10

Network Control Property	Read/ Write	Data Type	Index	Description	Units
Water Temperature					
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 Status	R	Coil	8	0=No Flow, 1=Flow	NA
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

Network Control Property	Read/ Write	Data Type	Index	Description	Units
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
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	R				
Compressor #1		Holding Register	40030	0~32767Volts	Volts
Compressor #2		Holding Register	40099	0~32767Volts	Volts
Compressor #3		Holding Register	40111	0~32767Vlots	Volts
Compressor #4		Holding Register	40268	0~32767Vlots	Volts
Compressor Power	R				
Compressor #1		Holding Register	40028	0~32767kiloWatts	kiloWatts
Compressor #2		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	R				
Compressor #1		Holding Register	40026	0~125%	%*10
Compressor #2		Holding Register	40095	0~125%	%*10
Compressor #3		Holding Register	40045	0~125%	%*10
Compressor #4		Holding Register	40280	0~125%	%*10
Discharge Temperature	R				
Compressor #1		Holding Register	40020	-25~100℃	℃*10
Compressor #2		Holding Register	40092	-25~100℃	℃*10
Compressor #3		Holding Register	40041	-25~100℃	℃*10
Compressor #4		Holding Register	40277	-25~100℃	℃*10
Suction Temperature	R				
Compressor #1		Holding Register	40016	-25~100℃	℃*10
Compressor #2		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	R				
Compressor #1		Holding Register	40208*1000＋40175	0~999999	Hour
Compressor #2		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	R				
Compressor #1		Holding Register	40174	0~32767	Starts

Network Control Property	Read/ Write	Data Type	Index	Description	Units
Compressor #2		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%	%
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
Evap_ApprDT – Upstream（option）	**R**	**Holding Register**	**40015**	**-25~100℃**	**℃*10**
Cond_ApprDT– Upstream（option）	**R**	**Holding Register**	**40035**	**-25~100℃**	**℃*10**
Evap_ApprDT – Downstream（option）	**R**	**Holding Register**	**40779**	**-25~100℃**	**℃*10**
Cond_ApprDT– Downstream（option）	**R**	**Holding Register**	**40780**	**-25~100℃**	**℃*10**
Online Cleaning Control Mode（option）	RW	Holding Register	40501	0=Manual， 1=Timing Switch， 2=AppTemp DT	NA
Online Cleaning Manual Switch（option）	RW	Coil	0x182	0=Off，1=Enable	NA
Cleaning Starts Each Circle （option）	RW	Holding Register	40503	1-5	Starts
Timer Mode: Cleaning Interval （option）	RW	Holding Register	40504	0-6hours	Hour
Online Cleaning State （option）	R	Holding Register	40509	0=Off，1=Run， 2=Alarm	Starts
Online Cleaning Total Starts（option）	R	Holding Register	40508	0-32767	NA

Network Control Property	Read/ Write	Data Type	Index	Description	Units
Valve Open Relay （option）	R	Coil	0x183	0=No Action， 1=Valve Open	NA
Valve Close Relay （option）	R	Coil	0x184	0=No Action， 1=Valve Close	NA
Valve Full Open Feedback （option）	R	Coil	0x185	0=Not Open， 1=Open Feedback	NA
Valve Full Close Feedback （option）	R	Coil	0x186	0=Not Close， 1=Close Feedback	NA
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 （option）	R	Holding Register	40283	0~1000V	V
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

Note：

The actual value of temperature, pressure, RLA is the read-out value divided by ten.

Chiller Alarm Variables

Network Control Property	Read/ Write	Data Type	Index	Description
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**	**40139~ 40140**	**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

10.2 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~25℃
Ice Setpoint	R/W	AO30	AV100050	LocalLWTSp~3.0℃
Heat Setpoint	R/W	AO31	AV100005	30℃~LocalLWTSp
Capacity Limit Setpoint – Downstream	**R/W**	**AO32**	**AV100003**	**0~100%**
Capacity Limit Setpoint – Upstream	**R/W**	**AO33**	**AV100340**	**0~100%**
Chiller Local/Remote	R	BI38	BV100005	0=Remote,1=Local
Run Enabled	R	BI33	BV100002	0=Off, 1=Run Allowed

Network Control Property	Read/ Write	Object Instance	Object ID	Description
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	-9.4~21℃
Actual Capacity	R	AI9	AV100010	0~125%
Capacity Limit Output – Upstream	**R**	**AI300**	**AV200299**	**0~100%**
Capacity Limit Output – Downstream	**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℃
Compressor Suction Temperature #1	R	AI15	AV100015	-25~100℃
Discharge Pressure #1	R	AI16	AV100021	0~2800kPa
Discharge Saturated	R	AI17	AV100020	-25~62℃

Network Control Property	Read/ Write	Object Instance	Object ID	Description
Temperature #1				
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
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℃

Network Control Property	Read/ Write	Object Instance	Object ID	Description
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%
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 - Upstream （option）	**R**	**AV314**	**AV100014**	**-25~100℃**

Network Control Property	Read/ Write	Object Instance	Object ID	Description
Cond_ApprDT - Upstream （option）	**R**	**AV334**	**AV100034**	**-25~100℃**
Evap_ApprDT - Downstream （option）	**R**	**AV779**	**AV100778**	**-25~100℃**
Cond_ApprDT - Downstream （option）	**R**	**AV780**	**AV100779**	**-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
3	Temperature Sensor Out of Range	AI809	AV200034	5
4	Pressure Sensor Out of Range	AI809	AV200034	6

#	Description	Object Instance	Object ID	Bit
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

11 How To Download Touch Screen Data Record

The operating data of the chiller is stored in the internal storage area of the touch screen. To download the operating data and history alarms, insert the USB disk into the USB port on the back of the touch screen. Press the "System" button at the bottom of the page to enter the system screen, as shown in Figure 11-1.

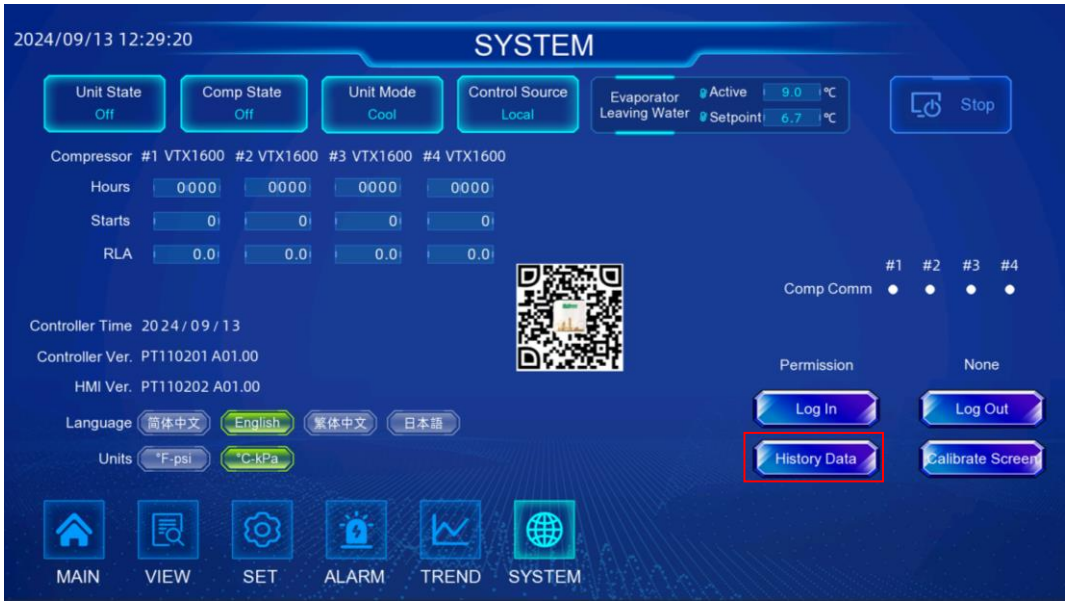


Figure 11-1

1) On the system screen, press “History Data” button to view history data. Press “Export Data” button to export all data, as shown in Figure 11-2

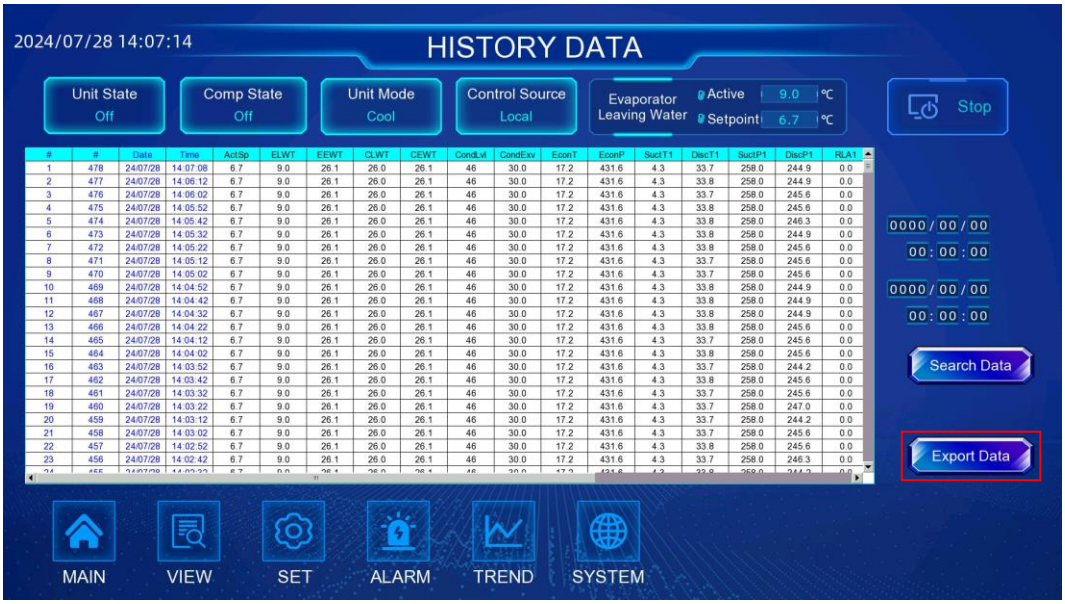


Figure 11-2

2) Enter the start and end time in the input box and press “Search Data” to query the data within this period. Press the “Export Data” button to export it, as shown in Figure 11-3. Please remember to press the “Start Record” button after data export.

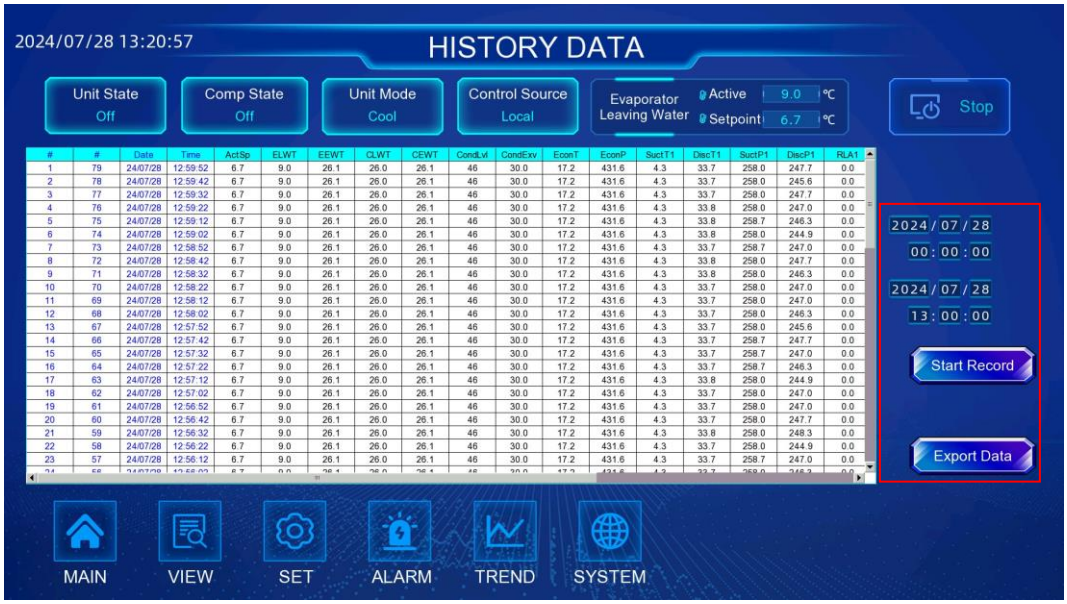


Figure 11-3

While exporting data, a window pops up indicating the progress bar, as shown in Figure 11-4. When the progress value reaches 100%, the dialog box is automatically closed. Then remove the USB disk.

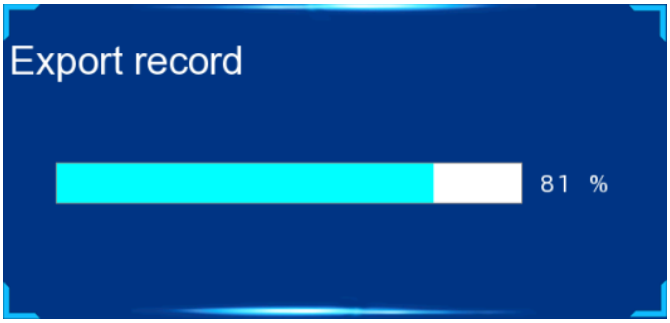


Figure 11-4

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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