Installation, Operation, and Maintenance Manual

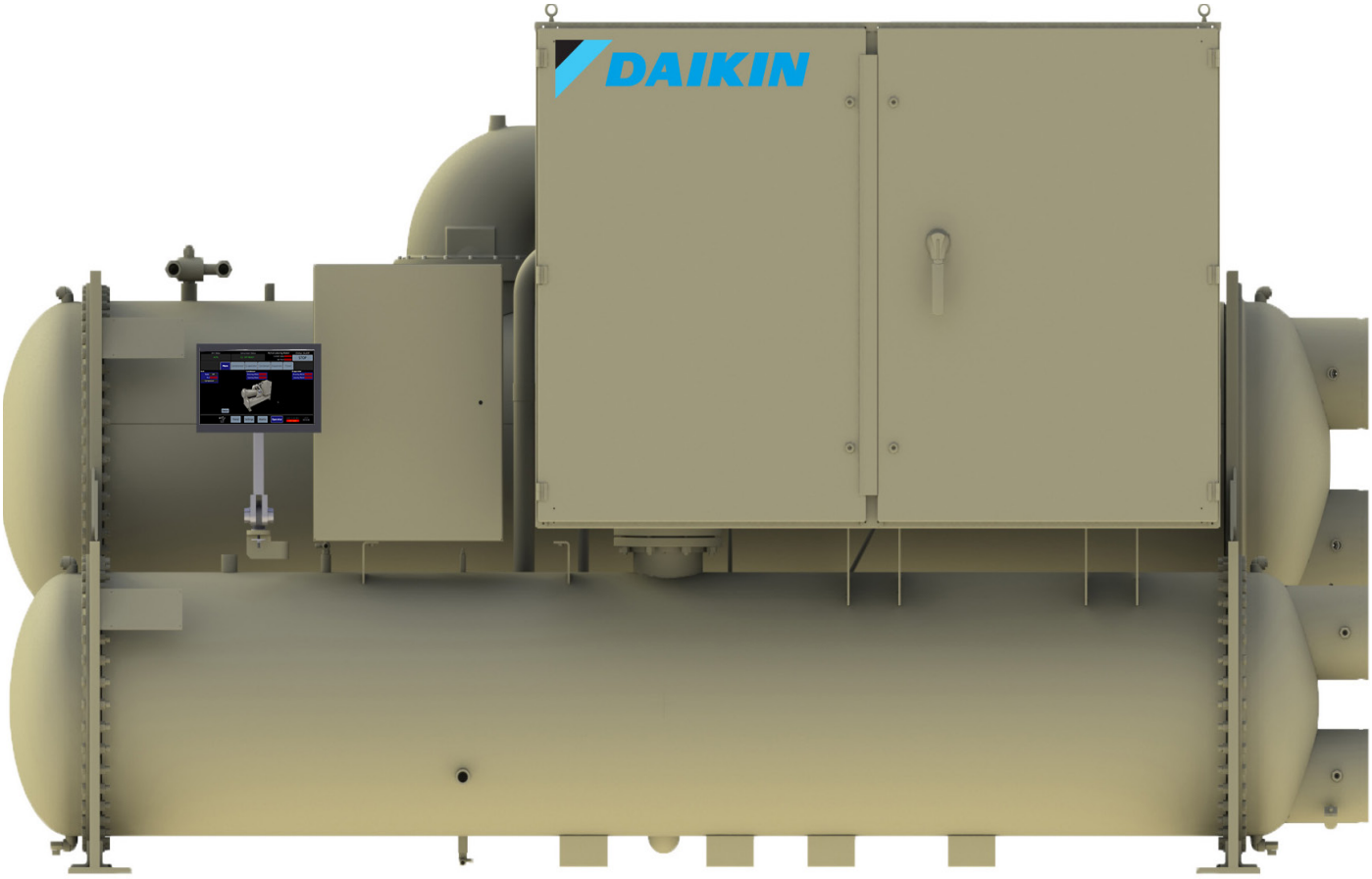
IOM 1033-6

Group: **Chiller**
Part Number: **IOM1033**
Date: **January 2017**
Supercedes: **August 2012**

Magnitude®
Magnetic Bearing Centrifugal Chillers

Model WME, B Vintage
400 to 700 Tons (1400 to 2461 kW)
HFC-134a Refrigerant

Control Software Version: G00078761_100_060



Manufactured in an ISO 9001 & ISO 14001 certified facility

Pre-Start Checklist – Centrifugal Chillers

Must be completed, signed and returned to Daikin Applied service dept. at least 2 weeks prior to requested start date.

Job Name	
Installation Location	
Customer Order Number	
Model Number(s)	
G.O. Number(s)	

Chilled Water	Yes	No	N/A	Initials
Piping Complete	☐	☐	☐	
Water System – flushed, filled, vented; Water treatment in place	☐	☐	☐	
Pumps installed and operational (rotation checked, strainers installed and cleaned)	☐	☐	☐	
Controls operational (3-way valves, face/bypass dampers, bypass valves, etc.)	☐	☐	☐	
Water system operated and tested; flow meets unit design requirements	☐	☐	☐	

Condenser Water	Yes	No	N/A	Initials
Cooling tower flushed, filled, vented; Water treatment in place	☐	☐	☐	
Pumps installed and operational (rotation checked, strainers installed and cleaned)	☐	☐	☐	
Controls (3-way valves, bypass valves, etc.) operable per IM/IOM	☐	☐	☐	
Water system operated and flow balance to meet unit design requirements	☐	☐	☐	

Electrical	Yes	No	N/A	Initials
115 volt service completed, but not connected to control panel (remote mounted starters)	☐	☐	☐	
Line Power Leads connected to starter; load leads(b) run from starter to compressor, ready for connection by Service (Do not connect load leads to starter or compressor terminals). (See Notes 1 & 4)	☐	☐	☐	
All interlock wiring complete and compliant with Daikin Applied specifications	☐	☐	☐	
Starter complies with Daikin Applied specifications	☐	☐	☐	
*Oil cooler solenoid wired to control panel as shown on wiring diagram (See Notes)	☐	☐	☐	
Pump starter and interlocks wired	☐	☐	☐	
Cooling tower fans and controls wired	☐	☐	☐	
Wiring complies with National Electrical Code and local codes (See Note 4)	☐	☐	☐	
Condenser pump starting relay (CP1,2) installed and wired (See Note 3)	☐	☐	☐	

Miscellaneous	Yes	No	N/A	Initials
*Oil cooled water piping complete. (Units with water-cooled oil coolers only)	☐	☐	☐	
Relief valve piping complete (per local codes)	☐	☐	☐	
Thermometers, wells, gauges, control, etc., installed	☐	☐	☐	
Minimum system load of 80% capacity available for testing/adjusting controls	☐	☐	☐	
Document Attached: Technical Breakdown from Daikin Tools	☐	☐	☐	
Document Attached: Final Order Acknowledgement	☐	☐	☐	

Notes: The most common problems delaying start-up and affecting unit reliability are:

1. Field installed compressor motor power supply leads too small. Questions: Contact the local Daikin Applied sales representative. State size, number and type of conductors and conduits installed:
   a. From Power supply to starter _____
   b. From starter to chiller unit (remote mounted)_____
2. Centrifugal chillers with water cooled oil coolers must have a 115 volt normally closed water solenoid valve installed in the oil cooler water supply line. Daikin Applied recommends ASCO Type 8210B27 solenoid valve or approved equal and strainer. Daikin Applied does not supply these components.
3. A 115-volt field-supplied relay (CP1,2) must be used to start/stop condenser water pump on most applications. Cold condenser water must not flow through condenser during compressor off cycle. Provisions have been made in control center for connecting CP relay, but must not have a rating in excess of 100 VA.
4. Refer to NEC Article 430-22 (a)

***Does Not Apply to Magnetic Bearing Chillers (WMC/WME)**

Cut Here ✂

Contractor Representative

Signed: _____
Name: _____
Company: _____
Date: _____
Phone/Email: _____

Daikin Applied Sales Representative

Signed: _____
Name: _____
Company: _____
Date: _____
Phone/Email: _____

This manual provides installation, operation, and maintenance information for Daikin WME Magnitude® centrifugal chillers with the MicroTech® III controller.

⚠ WARNING

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

⚠ CAUTION

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. Never unplug any cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

⚠ CAUTION

When moving refrigerant to/from the chiller from an auxiliary tank, a grounding strap must be used. An electrical charge builds when halo-carbon refrigerant travels in a rubber hose. A grounding strap must be used between the auxiliary refrigerant tank and the chiller's end sheet (earth ground), which will safely take the charge to the ground. Damage to sensitive electronic components could occur if this procedure is not followed.

NOTICE

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with this instruction manual, it may cause interference with radio communications. 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.

Daikin Applied disclaims any liability resulting from any interference or for the correction thereof.

HAZARD IDENTIFICATION INFORMATION

⚠ DANGER

Dangers indicate a hazardous situation, which will result in death or serious injury if not avoided.

⚠ WARNING

Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

⚠ CAUTION

Cautions indicate potentially hazardous situations, which can result in personal injury or equipment damage if not avoided.

General Description

Daikin Magnitude® Centrifugal Chillers are complete, self-contained, automatically controlled, liquid-chilling units featuring oil-free, magnetic bearing compressors. All Magnitude® chillers are equipped with a single evaporator and a single condenser along with either one or two compressors depending on the model.

Magnitude® chillers are designed for indoor, non-freezing installation only. The chillers use refrigerant HFC-134a that operates at a positive pressure over the entire operation range, so no purge system is required.

Only normal field connections such as water piping, relief valve piping, electric power, and control interlocks are required, thereby simplifying installation and increasing reliability. Necessary equipment protection and operating controls are included.

All Daikin Applied centrifugal chillers must be commissioned by a factory-trained Daikin Applied service technician. Failure to follow this startup procedure can affect the equipment warranty.

The standard limited warranty on this equipment covers parts that prove defective in material or workmanship. Specific details of this warranty can be found in the warranty statement furnished with the equipment.

NOMENCLATURE

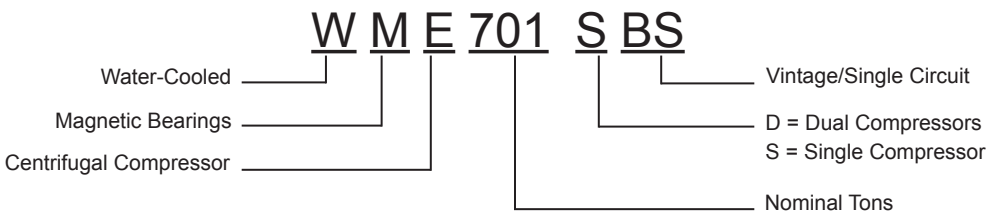
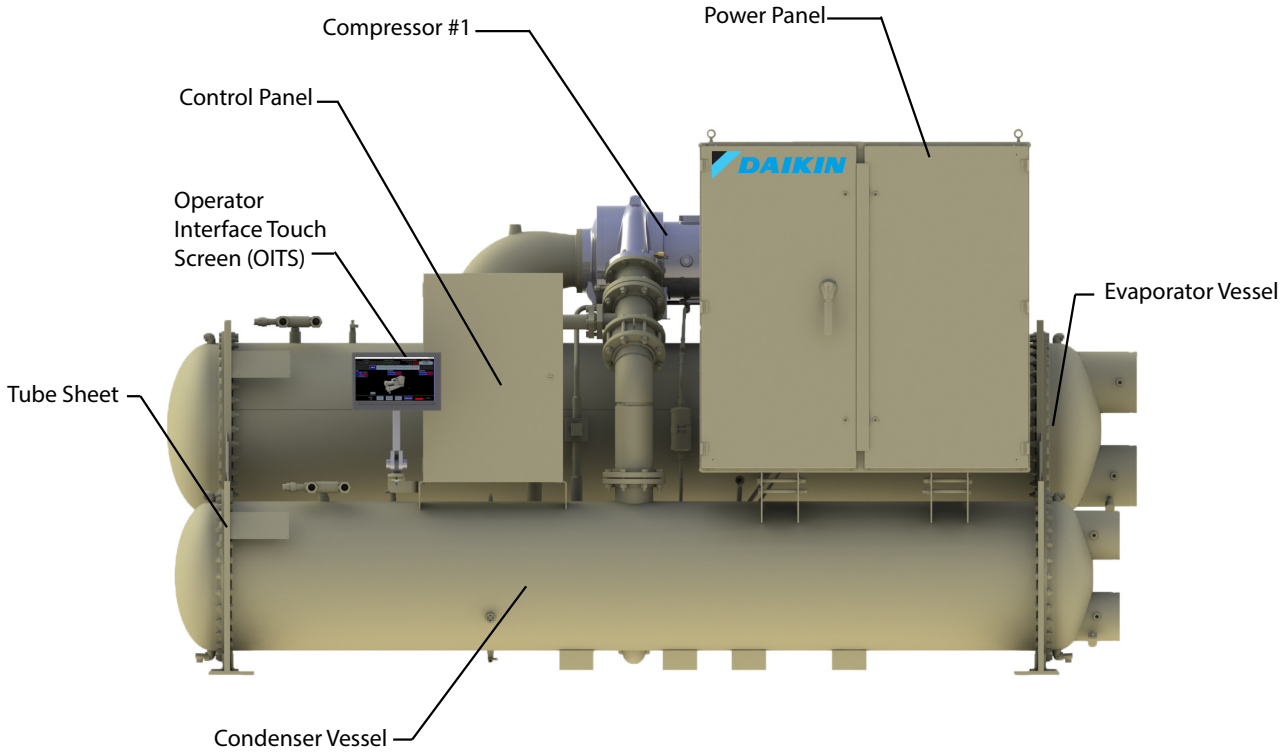


Figure 1: WME Major Component Locations



NOTE: Unit shown with left-hand condenser water connections and right-hand evaporator water connections. Water connection orientation is based on facing the unit power panel.

The Control System

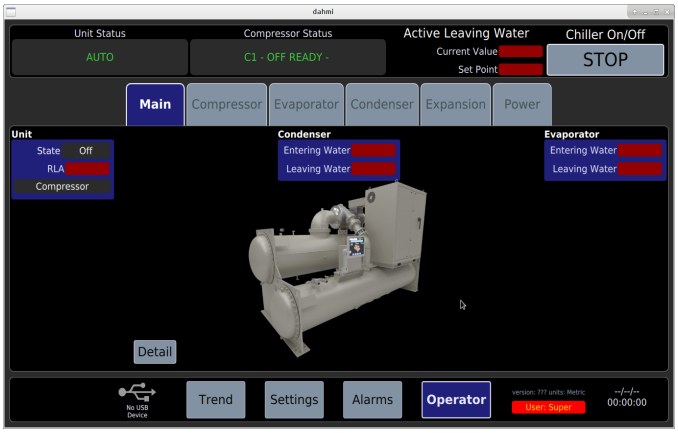
The centrifugal MicroTech® III control system consists of an operator interface touch screen (OITS), a microprocessor-based unit controller, and compressor on-board controllers, providing monitoring and control functions required for the efficient operation of the chiller.

Operator Interface Touch Screen

The operator interface touch screen (OITS), see Figure 2 for an example of a screen display, is the device used for viewing unit operation information and entering commands and entries into the control system. Select information from the OITS panel can be downloaded via a USB port located in the unit control panel.

A single OITS is used per unit. The OITS panel, see Figure 1, is mounted on a moveable arm to allow placement in a convenient position for the operator. The Unit Control Processor, which is used to control the chiller as well as the OITS is located in the Control Panel, as shown in Figure 3. For more information on the OITS, see the "Operator Interface Touch Screen (OITS)" section starting on page 23. Note: All units are referenced in IP units.

Figure 2: Operator Interface Touch Screen

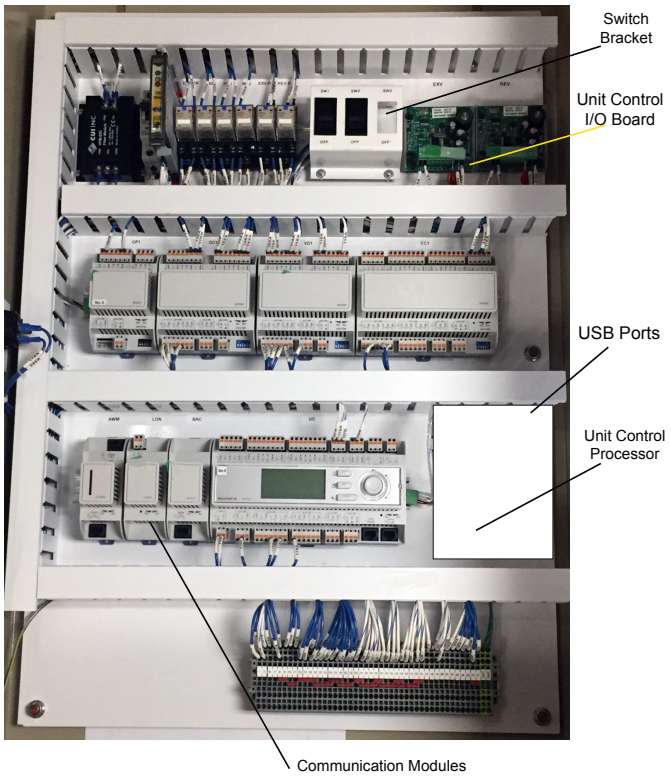


NOTE: Check daikinapplied.com for the latest updated version.

Unit Controller

The purpose of the MicroTech® III unit controller is to acquire and process data relating to chiller operation, issue instructions to various components of the chiller, and maintain controlled operation of the chiller. As a part of operating the chiller successfully, the unit controller offers necessary condenser water control. See "Condenser Water Temperature Control" on page 15 for more information. The unit controller also sends information to the operator interface touch screen (OITS) for graphic display.

Figure 3: Control Panel



Nameplates

There are several identification nameplates on the chiller:

- The unit nameplate is located on the exterior of the Unit Power Panel. Both the Model No. and Serial No. are located on the unit nameplate; the Serial No. is unique to the unit. These numbers should be used to identify the unit for service, parts, or warranty questions. This plate also has the unit refrigerant charge and electrical ratings.
- Vessel nameplates are located on the evaporator and condenser. They have a National Board Number (NB) and a serial number, either of which identify the vessel (but not the entire unit).

Receiving and Handling

The unit should be inspected immediately after receipt for possible damage. All Daikin Applied centrifugal water chillers are shipped FOB factory and all claims for handling and shipping damage are the responsibility of the consignee.

On units with factory-installed insulation, the insulation is removed from the vessel lifting hole (also used for transportation tie-downs) locations and is shipped loose. It should be secured in place after the unit is finally placed. Neoprene vibration isolation pads are shipped loose in the power panel. If the unit is equipped with a shipping skid, leave the skid in place until the unit is in its final position. This will aid in handling the equipment.

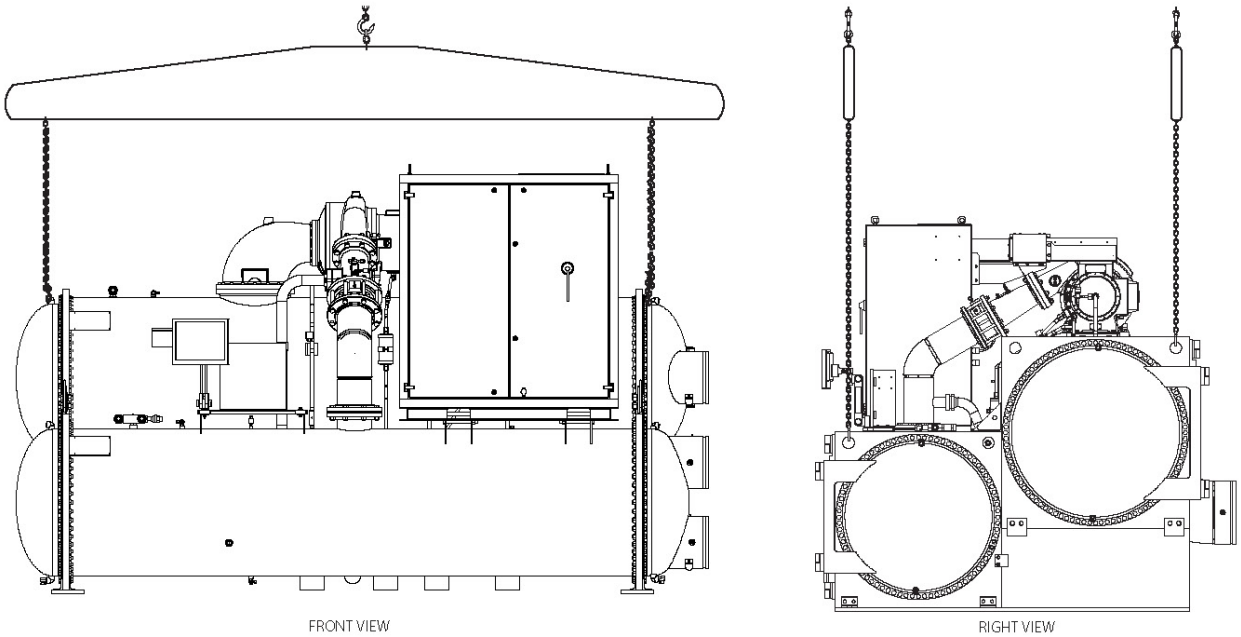
⚠ CAUTION

Extreme care must be used when rigging the unit to prevent damage to the control panels and refrigerant piping. See the certified dimension drawings included in the job submittal for the weights and center of gravity of the unit. If the drawings are not available, consult the local Daikin Applied sales office for assistance.

The unit can be lifted by fastening the rigging hooks to the four corners of the unit where the rigging eyes are located — see Figure 4. A spreader bar must be used between the rigging lines to prevent damage to the control panels, piping, and electrical panels. The spreader-bar length should be equal to, or no more than 1-foot shorter than, the distance between the lifting holes located at opposite ends of the chiller. The unit will require a single spreader-bar of this length capable of supporting 1.5 times the shipping weight of the unit. Separately, all cables and hooks by themselves must also be capable of supporting 1.5 times the shipping weight of the unit.

If a knockdown option was ordered on the unit, reference the "Retrofit Knockdown" section starting on page 8 for more information.

Figure 4: WME Unit Rigging



NOTE: The spreader bars in Figure 4 are a representation only and may not reflect the appearance of the actual spreader bars needed.

Unit Dimensions and Shipping Weight

Figure 5: WME0501/502-0701/702S (2-pass, right-hand configuration, with grooved connections)

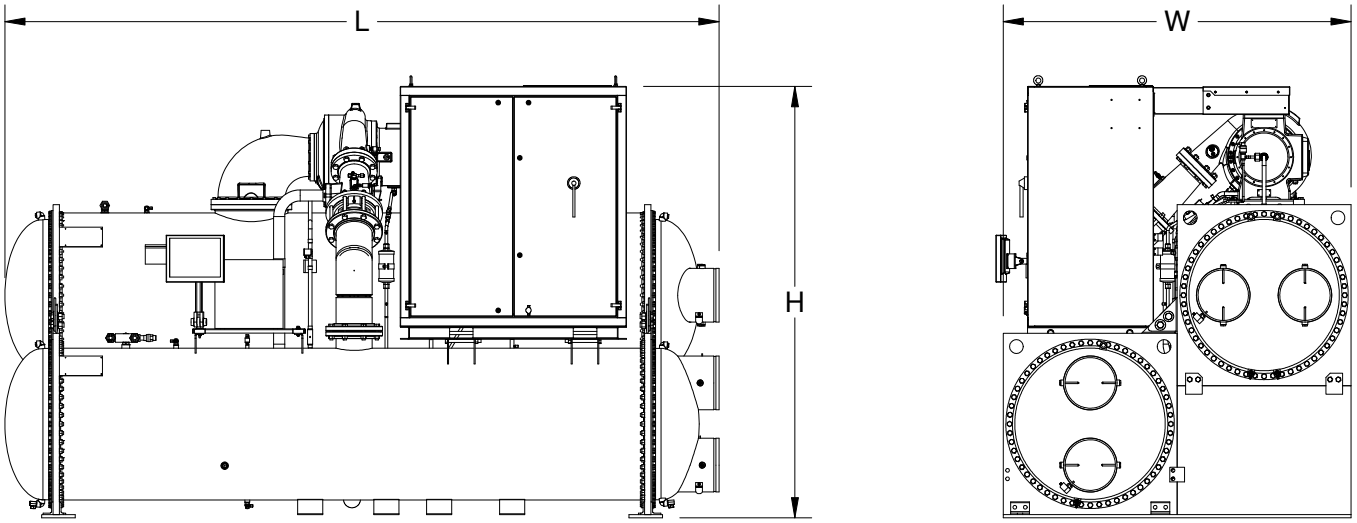


Table 1: WME0501-702S Dimensions and Shipping Weights

Model	Heat Exchanger	Length in (mm)	Width in (mm)	Height ** in (mm)	Shipping Weight * lb (kg)
WME0501/502S	**E3012 / C2612**	168.5 (4280)	68.4 (1737) ***	92.8 (2357)	12864 (5835)
			70.7 (1796) ****		
	E3012 / C3012	168.5 (4280)	71.3 (1811)	96.8 (2459)	14163 (6424)
	E3612 / C3012	170.0 (4318)	77.3 (1963)	96.8 (2459)	16329 (7407)
WME0701/702S	**E3612 / C3012**	170.0 (4318)	77.3 (1963)	96.3 (2446)	17726 (8040)
	E3612 / C3612	170.0 (4318)	83.0 (2108)	102.3 (2598)	20094 (9115)

* Shipping weight is based on unit with standard tube configuration.

** Unit height does not include height of removable eye bolt.

*** Dimension for unit with M6 standard motor (380/440V).

**** Dimension for unit with M7 standard motor (460/480V)

Chiller	Component	Dry Weight	
		LBS	KG
WME 501/502S	E3012 Evaporator	5075	2299
	E3612 Evaporator	6890	3125
	C2612 Condenser	3900	1767
	C3012 Condenser	6491	2944
	Power Box	788	357
WME 701/702S	E3612 Evaporator	6890	3125
	C3012 Condenser	6491	2944
	C3612 Condenser	9261	4200
	Power Box	1103	500

* Component weights based on unit with largest tube configuration

Retrofit Knockdown

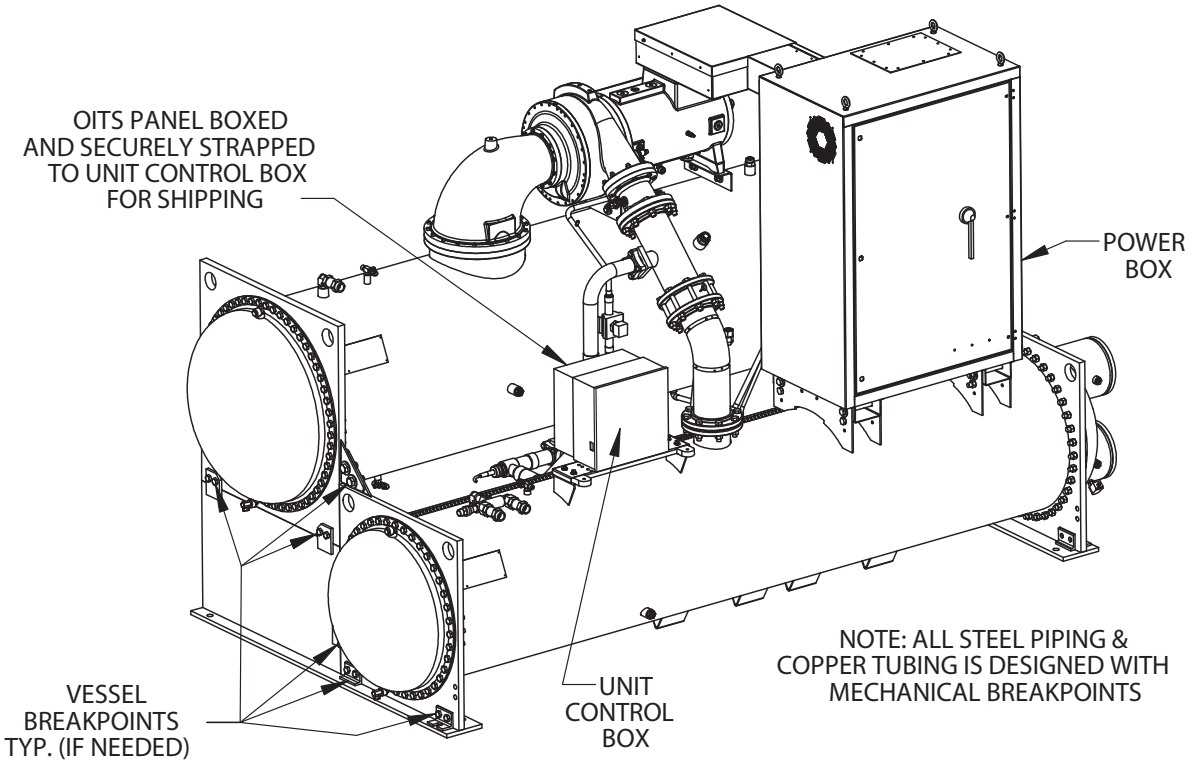
It is estimated that fifty percent of retrofit applications require partial or complete disassembly of the chiller. Magnitude® WME chillers are relatively easy to disassemble due to the small compressor size, simplified refrigerant piping, and the absence of a lubrication system with its attendant components and piping. Various knockdown arrangements are available as options.

"Bolt-Together Construction"

Chillers are built and shipped completely assembled with bolt-together construction on major components for field disassembly and reassembly on the job site. "Bolt-Together Construction" applies to the following:

- Type A Knockdown for models WME 501/502 and 701/702S

Figure 6: "Bolt-Together Construction"



Scope:

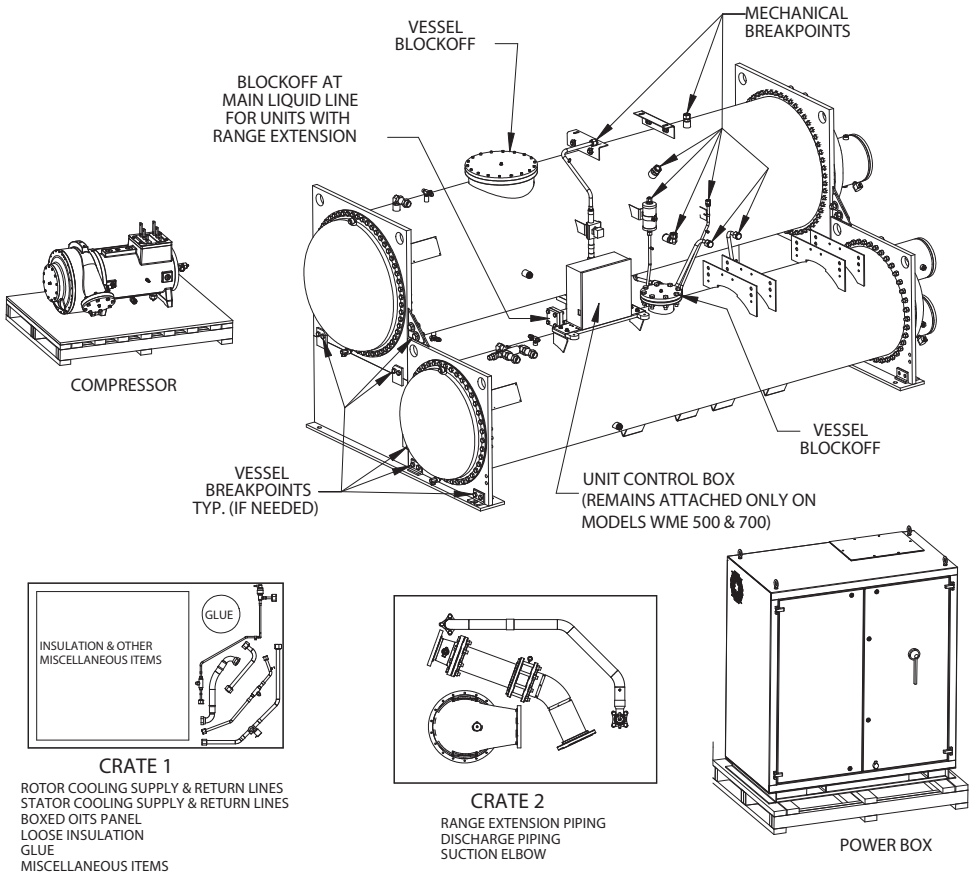
- Chiller components are manufactured with bolt-together construction designed for field disassembly and reassembly on-site.
- Unit ships completely assembled to the jobsite.
- Suction and discharge lines have bolt-on flanges.
- Motor cooling line is brazed at mechanical connections.
- Unit ships with vessel and/or head insulation, if ordered.
- Unit ships with full factory refrigerant charge in the chiller.
- Unit ships with replacement refrigerant gaskets and O-rings, stick-on wire ties, and touch-up paint.
- Unit is fully tested at the factory prior to shipment.
- Site disassembly and reassembly must be supervised or completed by Daikin Applied service personnel.
- Blockoff plates are required to cover any refrigerant connection left open for extended periods of time. Contact Daikin Applied service to obtain these parts.
- Ideal for retrofit applications where site disassembly is needed due to installation clearances.

"Partial Disassembly"

Compressor(s), power box(es), and control box are removed and shipped on separate skids; combined vessel stack is shipped together as a sub-assembly. "Partial Disassembly" applies to the following:

- Type B Knockdown for models 501/502 and 701/702S

Figure 7: "Partial Disassembly"

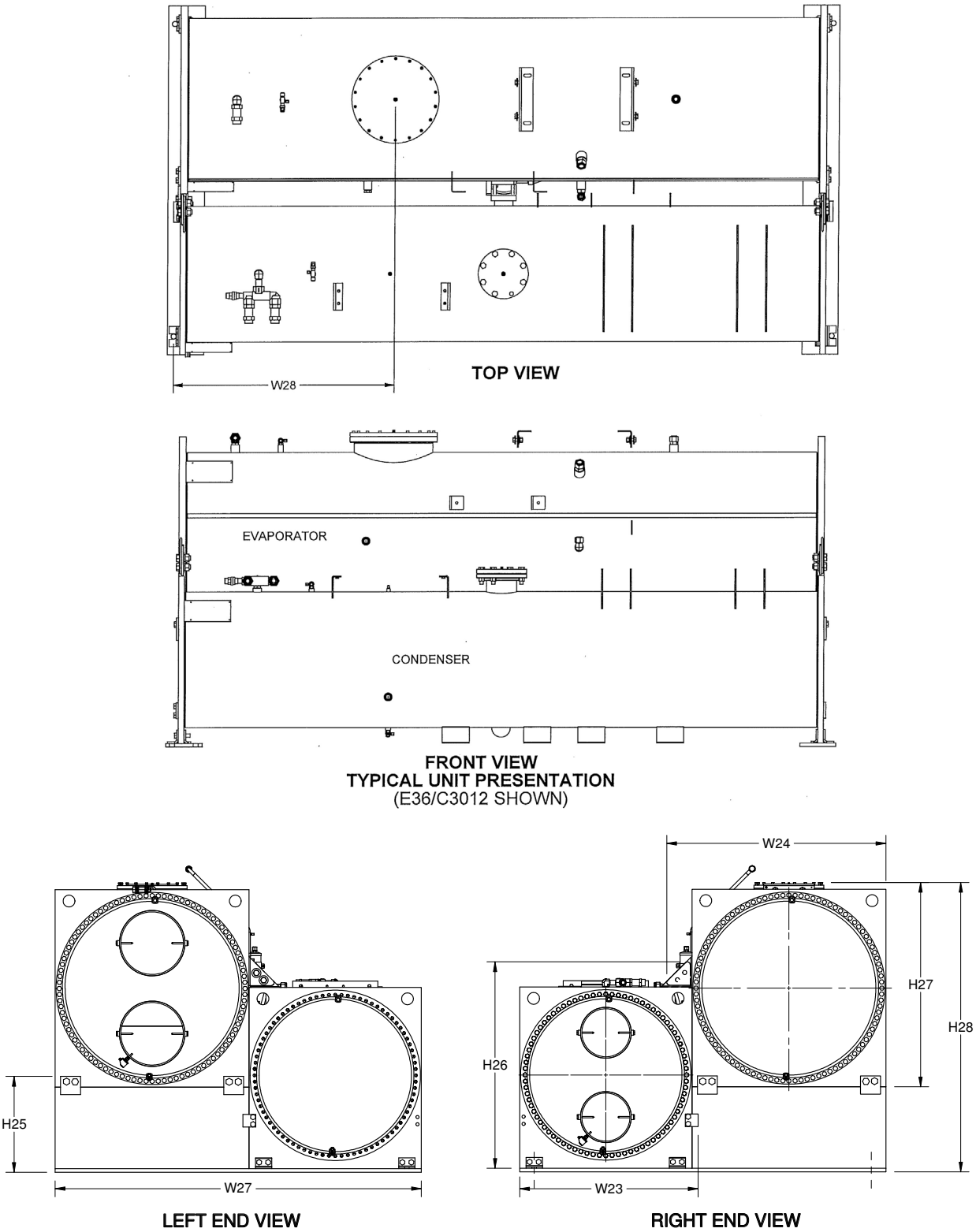


Scope:

- Compressor and power box is removed (at the factory) and shipped on separate skids; vessel stack is shipped as a complete sub-assembly.
- The control box for models WME 501/502 and 701/702 (Type B Knockdown) is shipped attached to the unit, as shown in Figure 7.
- All associated piping and wiring remain attached, if possible.
- Suction and discharge lines have bolt-on flanges and, if possible, remain attached.
- All free piping ends are capped.
- Unit ships with vessel and/or head insulation, if ordered.
- Refrigerant will not be shipped with the chiller and must be procured by others.
- Compressor(s) and vessels receive an inert gas holding charge.
- Unit ships with replacement refrigerant gaskets and O-rings, stick-on wire ties, and touch-up paint.
- Unit is fully tested at the factory prior to shipment.
- Site reassembly must be supervised or completed by Daikin Applied service personnel. Cost for unit reassembly and supervision by Daikin Applied service is not included in the purchase price of the equipment. Contact Daikin Applied service for pricing.
- Ideal for retrofit applications where it is desired that the compressor(s), power box(es), and control box be removed at the factory, prior to shipment, and where refrigerant may be secured by others.

Unit Knockdown Dimensions

Figure 8: Unit Dimensional Diagram for Typical WME Knockdown



NOTE: See page 7 for overall unit length, width, and height dimensions for WME models.

Table 2: Label Descriptions for Unit Dimensional Diagram

Label	Description
W23	Width (Condenser Tubesheet with Mounting Brackets)
W24	Width (Evaporator Tubesheet with Mounting Brackets)
W27	Width (Mounting Foot with Mounting Brackets)
W28	Width (Center of Outside Foot Mounting Hole to Center of Suction #1)
W29	Width (Center of Outside Foot Mounting Hole to Center of Suction #2)
H25	Height (Mounting Foot with Mounting Brackets)
H26	Height (Condenser Tubesheet with Mounting Brackets)
H27	Height (Evaporator Tubesheet with Mounting Brackets)
H28	Height (Unit Height from Bottom of Foot to Top of Suction)

Table 3: WME Knockdown Dimensions (in)

Label	Dimensions (in)				
	WME0501/502S			WME0701/702S	
	E3012/C2612	E3012/C3012	E3612/C3012	E3612/C3012	E3612/C3612
W23	32.3	37.3	37.3		43.3
W24	42.4	42.4	48.4		48.4
W27	66.0	71.0	77.0		83.0
W28	48.7	48.7	48.7		48.7
W29	N/A	N/A	N/A		N/A
H25	27.8	28.5	28.5		34.3
H26	39.9	44.7	44.7		49.9
H27	37.8	37.7	44.3	44.6	44.6
H28	62.5	63.2	69.8	70.2	75.9

Table 4: WME Knockdown Dimensions (mm)

Label	Dimensions (mm)				
	WME0501/502S			WME0701/702S	
	E3012/C2612	E3012/C3012	E3612/C3012	E3612/C3012	E3612/C3612
W23	819	946	946		1099
W24	1078	1078	1230		1230
W27	1676	1803	1956		2108
W28	1237	1237	1237		1237
W29	N/A	N/A	N/A		N/A
H25	705	725	725		871
H26	1014	1135	1135		1268
H27	960	957	1124	1134	1134
H28	1588	1605	1773	1782	1929

Compressor Dimensions

The compressor dimensions on WME models vary. All dimensions are listed in Table 5.

Figure 9: Dimension Representation for Compressors Used on WME Models

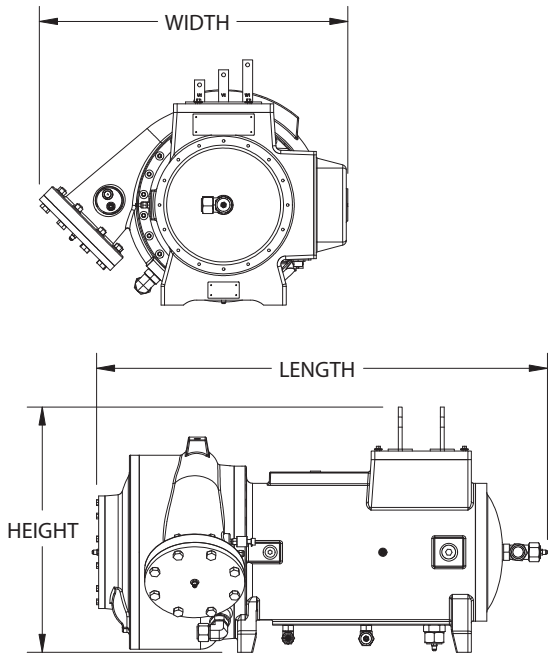


Table 5: Compressor Dimensions for WME Models

Model	Length in (mm)	Width in (mm)	Height in (mm)
WME0501/ 502S	45.03 (1144)	30.81 (783)	24.50 (622)
WME0701/ 702S	44.99 (1143)	31.97 (812)	25.19 (640)

NOTE: Approximate weight of compressors:

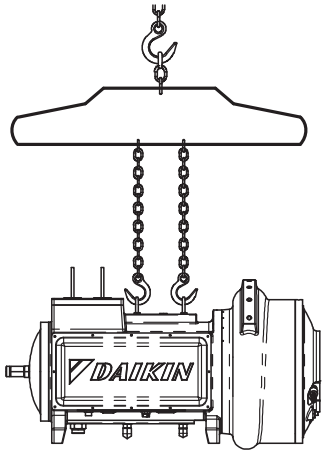
WME 501/502 Compressor: 893 lbs.

WME 701/702 Compressor: 1050 lbs.

Compressor Rigging Requirements

To properly rig the compressor, install eye-bolts in the 2 holes on the top of the compressor. Use a spreader bar between the two chain hoists, as shown in Figure 10, to safely lift the compressor.

Figure 10: WME Compressor Rigging Setup



NOTE: The spreader bar in Figure 10 is a representation only and may not reflect the appearance of the actual spreader bar needed.

Compressor Removal and Re-Attachment Instructions

Follow the steps listed to remove and re-attach the compressor.

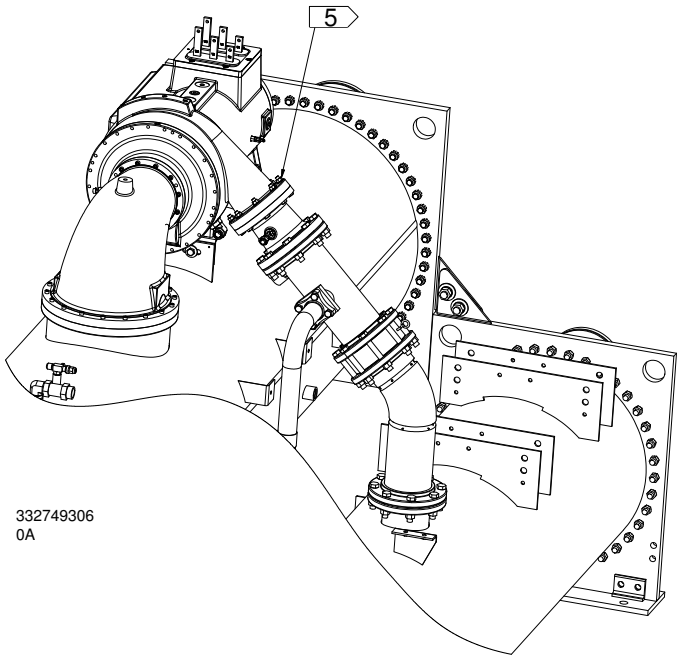
Compressor Removal Preparation

1. Close the king valve at condenser liquid line outlet.
2. Close all other related shut-off valves.
3. Pump the refrigerant charge down into the condenser.
4. Ensure that the charge has been removed from the compressor and evaporator and that the discharge check valve is holding the charge in the condenser.
5. Loosen and remove bolts on the compressor discharge nozzle (see Figure 11, flag #5).
6. Disconnect motor cooling lines.
7. Cover openings to prevent foreign objects entering.

⚠ CAUTION

Improper rigging, lifting, or moving of a unit can result in property damage, severe personal injury or death. Follow rigging and moving instructions carefully.

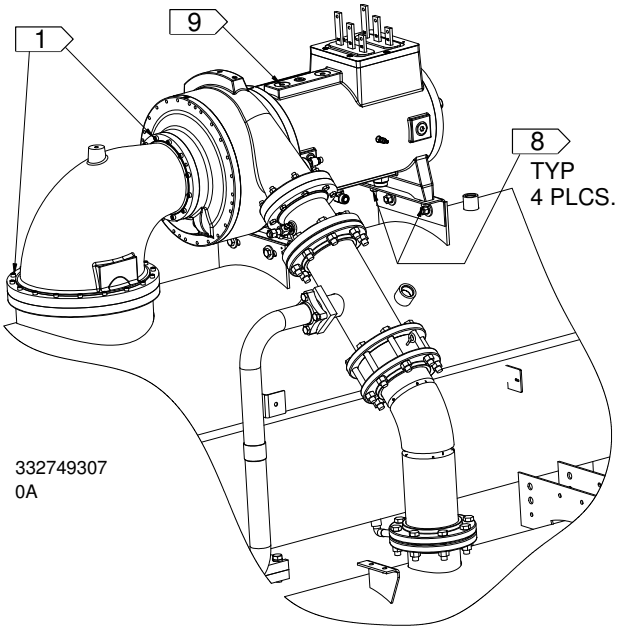
Figure 11: Compressor Removal Preparation



Compressor Removal

1. Loosen and remove bolts on either side of the cast suction elbow (see Figure 12, flag #1 below).

Figure 12: Compressor Removal / Re-Attachment



2. Remove rotor cooling return line on the underside of the compressor motor housing along with both rotor cooling supply lines.
3. Remove (2) DIN connectors from the solenoid coils along refrigerant piping.
4. Remove rotor stepping valve control wire. The wire ties will have to be cut away during this process.
5. Remove the following wires coming from the VFD:
   - 300V DC power supply (yellow cable)
   - 25 pin “D” shell connector
   - power leads on the top of the motor housing
6. Remove the Ethernet cable coming from the unit control box.
7. Remove the wireway box assembly from the compressor to the back of the VFD.
8. Loosen the (4) bolts from the compressor’s bottom mounting feet (see Figure 12, flag #8).

   NOTE: Do not loosen or remove bolts securing the compressor brackets as height is pre-set from the factory.
9. Rig compressor for removal as shown in Figure 11.

Compressor Re-Attachment

1. Set the suction elbow back on top of the evaporator and install the screws loosely at the evaporator flange. Use new O rings provided.
2. Set compressor on mounting brackets and install the (4) mounting bolts loosely. Reconnect the discharge nozzle with new gasket provided.
3. Install (12) bolts at suction elbow to compressor and torque to 25 ft-lbs; do not over-tighten.
4. Install (18) bolts at evaporator flange to the suction line and torque to 62 ft-lbs; do not over-tighten.
5. Torque the (8) bolts at the discharge nozzle to 205 ft-lbs.
6. Re-install the wireway between the compressor and the VFD.
7. Re-attach all associated power wiring & Ethernet cable.
8. Re-attach rotor cooling return line on the underside of the compressor motor housing along with both liquid injection lines.
9. Evacuate the evaporator and VFD cooling lines to 500 microns and perform a standing hold to verify no moisture or leaks.
10. After verifying that pumps are running and water flow has been established on both evaporator and condenser, add vapor refrigerant to bring the saturated temperature above freezing. Open all valves.
11. Perform refrigerant leak check to ensure all connections and fittings are securely fastened.

Unit Knockdown Diassembly and Reassembly Notes

Type A

Type A units are designed for a wide range of disassembly and the degree of knockdown varies. Observe the following recommendations.

1. The chiller is shipped with the full refrigerant charge,

which must be recovered before breaking any refrigerant connection. Before attempting any disassembly, assume the condenser isolation valves may have leaked and that any component of the chiller may be pressurized with refrigerant. Exert the proper precautions with this caveat in mind.

2. Check that power has been removed from the unit. Before disconnecting any wire, it is prudent to label its function and connection point to facilitate reconnection.
3. The refrigerant charge must be removed from the unit if the vessels are to be separated.
4. Some insulation repair and touch-up painting may be required..

Type B

Type B Knockdown units are shipped disassembled except for the vessel stack and are shipped less refrigerant. If the stack size or weight dictates further disassembly, the vessels can be separated by disconnecting any interconnecting wiring and tubing and then unbolting them. The vessels and compressors have an inert gas holding charge that must be released prior to attempting to open any connection.

⚠ CAUTION

Standard torque specs must be followed when re-installing bolts. Contact Daikin Applied service for this information.

⚠ WARNING

Remove compressor, piping or vessel holding charge through the Schrader valve in the block off plates before attempting to loosen any fittings on them. Failure to do so can cause severe bodily injury.

Location

WME 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 40°F to 104°F (4.4°C to 40°C).

NOTE: Excessive humidity in the mechanical room should be avoided. Excessive humidity in the mechanical room can potentially lead to premature component wear on/near all cool surfaces which can condense water. If possible the mechanical room should be conditioned which can extend the useful lifetime for all mechanical room equipment.

Clearance

The unit must be placed in an area that allows for adequate clearance around the unit. See Figure 13 for clearance requirements around the sides of the chiller. Doors and removable wall sections can be utilized to meet these clearance requirements. There must be a minimum 3-feet clearance above the top of the chiller. The U.S. National Electric Code (NEC) or local codes can require more clearance in and around electrical components and must be checked for compliance.

Mounting

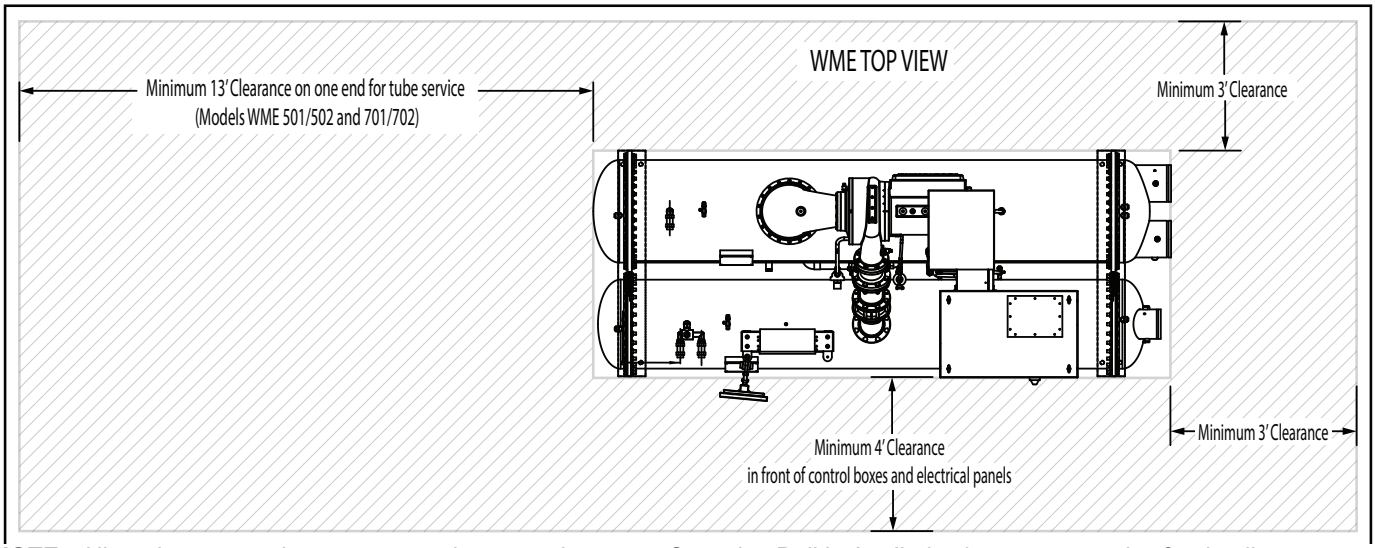
The unit must be mounted on a concrete or steel base. Make sure that the floor or structural support is adequate to support the full operating weight of the complete unit.

The neoprene vibration pads (shipped loose in the power panel) should be placed under the corners of the unit (unless the job specifications state otherwise). They must be installed so that they are flush with the edges of the unit feet.

It is not necessary to bolt the unit to the mounting slab or framework. Should this be required by local codes, 1-1/8 inch (28.5 mm) mounting holes are provided in the unit supports at the four corners.

When mounted, the base pad of the unit must be level to within ± 1/2 inch (12.7 mm) across the length and width of the unit.

Figure 13: Minimum Clearances Based on Standard Waterboxes



NOTE: Hinged type waterboxes may require more clearance. Consult a Daikin Applied sales representative for details.

Water Piping

All vessels come standard with groove-type nozzles (also suitable for welding) or optional flange connections. The installing contractor must provide matching mechanical connections of the size and type required. Grooved connections are AWWA C-606. Be sure that water inlet and outlet connections match certified drawings and nozzle markings.

NOTE: The contractor must supply the appropriate transition connectors if the field piping uses AGS® (Advanced Groove System) manufactured by Victaulic.

⚠ CAUTION

If welding is to be performed on the mechanical or flange connections:

1. Remove the solid-state temperature sensor, thermostat bulbs, and nozzle mounted flow switches from the wells to prevent damage to those components.
2. Properly ground the unit or severe damage to the MicroTech® III unit controller can occur.

NOTE: ASME certification will be revoked if welding is performed on a vessel shell or tube sheet.

The water heads can be interchanged (end for end) so that the water connections can be made at either end of the unit. If this is done, use new head gaskets and relocate the control sensors.

Field installed water piping to the chiller must include:

- air vents at the high points.
- a cleanable water strainer with 0.125” perforations in water inlet lines.
- a flow proving device for both the evaporator and condenser to prevent freeze up. Flow switches, thermal dispersion switches, or Delta-P switches can be used. Note that flow switches are factory installed. Additional flow switches can be used only if they are connected in series with the ones already provided. Connect additional flow switches in series between CF1 and CF2, shown in “Figure 18: WME0501/502-0701/702S Schematic” .
- sufficient shutoff valves to allow vessel isolation. The chiller must be capable of draining the water from the evaporator or condenser without draining the complete system.

It is recommended that field installed water piping to the chiller include:

- thermometers at the inlet and outlet connections of both vessels.
- water pressure gauge connection taps and gauges at the inlet and outlet connections of both vessels for measuring water pressure drop.

⚠ CAUTION

When common piping is used for both building heating and cooling modes, care must be taken to provide that water flowing through the evaporator cannot exceed 110°F. Water this hot can damage controls or cause the relief valve to discharge refrigerant.

The piping must be supported to eliminate weight and strain on the fittings and connections. Piping must also be adequately insulated. A cleanable perforated basket strainer with 0.125-in perforations and 40 % open area must be installed in the evaporator and condenser water inlet line. Sufficient shutoff valves must be installed to permit draining the water from the evaporator or condenser without draining the complete system.

Vessel Drains at Startup

The unit is drained of water at the factory and shipped with open drain valves in each head of the evaporator and condenser. Be sure to close the valves prior to filling the vessel with fluid.

Condenser Water Temperature Control

Condenser water control is an important consideration in chiller plant design since condenser water temperature will directly impact chiller operation and efficiency. When the ambient wet bulb temperature is lower than peak design, the entering condenser water temperature from the cooling tower can be allowed to fall, improving chiller performance. However, operational issues may occur when the condenser water temperatures are either too high or too low. The WME chiller provides several options to assist the chiller plant designer in providing the optimum control of condenser water temperature.

Cooling Tower Control

Control of the cooling tower is required to maintain stability and avoid operational issues. This can be achieved through a BAS or by using the MicroTech® III controller. For systems utilizing a common condenser water loop for multiple purposes, the BAS contractor must provide the control but use of the MicroTech® III output signal is still recommended.

The preferred cooling tower control utilizes a variable speed fan. MicroTech® III will provide a control signal to determine the proper fan speed. It can also control up to three stages of fan cycling. Note that fan cycling can cause cooling tower water temperature to fluctuate as fans stage on/off, potentially adding instability to the system.

Special consideration must be given to starting the chiller when cold condenser water is present, such as with inverted starts or changeover from free (tower) cooling to mechanical cooling. It is required that some method be used to control the condenser water to maintain proper head pressure as indicated by the MicroTech® III controller.

Acceptable methods include the following **(Each of these options can be controlled by the MicroTech® III or through a BAS utilizing the MicroTech® III output signals.)**:

1. Three-Way Bypass Valve Operation

   A traditional method for building condenser pressure at startup with colder condenser water is with the use of a three-way bypass valve. The device blends warmer water leaving the condenser with cooler water from the cooling tower at the condenser inlet. The bypass valve position will change until full flow from the tower to the condenser is obtained. The MicroTech® III provides only the valve position control signal. Main power to drive the valve's actuator must be provided by the installer. The three-way valve should be located close to the chiller within the equipment room to minimize the volume of water.

2. Two-Way Valve Operation

   Another condenser control method is to use a modulating two-way control valve located on the outlet connection of the condenser. The valve will be nearly closed at startup to restrict water flow, which keeps generated heat in the condenser until an acceptable minimum condenser pressure is reached. As heat builds, the valve will open slowly until a full flow condition from the cooling tower is established. A separate power source is required to provide power to the valve actuator.

   NOTE: To ensure proper operation, caution should be used when utilizing the two-way valve option.

3. VFD Operating with a Condenser Water Pump

   A third method of condenser control for startup is utilizing a variable frequency drive with the condenser water pump. The speed will change as directed by the MicroTech® III output signal until design flow is reached. Speed adjustments may be required during the initial chiller startup as determined by the service technician.

NOTE: Not using the MicroTech® III logic to control valves and variable frequency drives may result in system instability, capacity reduction, and issues starting the chiller with cold condenser water temperature.

Condenser Pump Sequencing

It is recommended to utilize the logic built into the MicroTech® III controller to start the condenser pump. MicroTech® III has the capability to operate a primary pump and a secondary standby pump. The condenser water flow should be stopped when the chiller shuts off. This will conserve energy and prevent refrigerant from migrating to the condenser.

Lenient Flow Operation

For chiller startup, the condenser control systems can reduce the flow to low rates, which can make operation of a flow sensing device unreliable. The MicroTech® III controller has a "lenient flow" feature that acts as an override of the flow sensor while protecting the chiller by monitoring a condenser pressure setting that is below the high pressure cutout.

Water Side Economizer Cycle Operation

Water side economizers are commonly used for ASHRAE 90.1 compliance and energy savings. This system utilizes a heat exchanger external to the chiller when cold cooling tower water is available to provide cooling. The most common system has a heat exchanger used in conjunction with the chiller's evaporator.

The BAS contractor will need to provide controls for the heat exchanger including isolation valves and temperature control. The BAS contractor will also need to control the isolation valves for the chiller. It is important to use slow-acting type valves to prevent rapid changes in system flows. Changeover from economizer cooling to mechanical cooling requires one of the methods previously mentioned to maintain suitable condenser head pressure.

Contact your local Daikin Applied representative for more information on this application.

Relief Valves

As a safety precaution and to meet code requirements, each chiller is equipped with pressure relief valves located on the condenser and evaporator for the purpose of relieving excessive refrigerant pressure (caused by equipment malfunction, fire, etc.) to the atmosphere.

- Condensers have two 200 psi, 1.0-inch female NPT relief valves as a set with a three-way valve separating the two valves. (See Figure 14.) One valve remains active at all times and the second valve acts as a standby.
- Evaporators have a single 200 psi valve. Each valve has a 1.0-inch female NPT connection.
- Vessel valve capacity is 75 lb/min air.

⚠ CAUTION

Units are shipped with refrigerant valves closed to isolate the refrigerant in the unit condenser. Valves must remain closed until startup by the factory service technician.

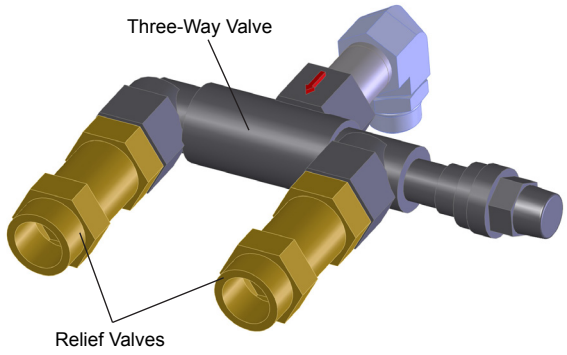
Most codes require that relief valves be vented to the outside of a building. Relief piping connections to the relief valves must have flexible connectors.

Remove plastic shipping plugs (if installed) from the inside of the valves prior to making pipe connections. Whenever vent piping is installed, the lines must be in accordance with local code requirements; where local codes do not apply, the latest issue of ANSI/ASHRAE Standard 15 code recommendations must be followed.

Condenser Relief Valves

As stated previously and as shown in Figure 14, condensers have two 200 psi, 1.0-inch female NPT relief valves separated by a three-way valve.

Figure 14: Condenser Three-Way Relief Valve



In order to ensure proper installation, it is important to know how the three-way relief valve functions. When the stem of the three-way valve is pushed into the valve completely, the valve is in “Front Seated Position” and all refrigerant will flow through the back outlet port, as shown in Figure 15. When the stem of the three-way valve is pulled back completely, the valve is in “Back Seated Position” and all refrigerant will flow through the front outlet port, as shown in Figure 16.

Figure 15: Three-Way Valve, Front Seated Position

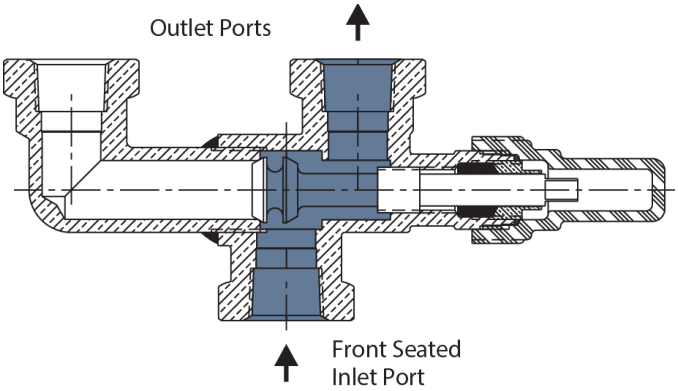
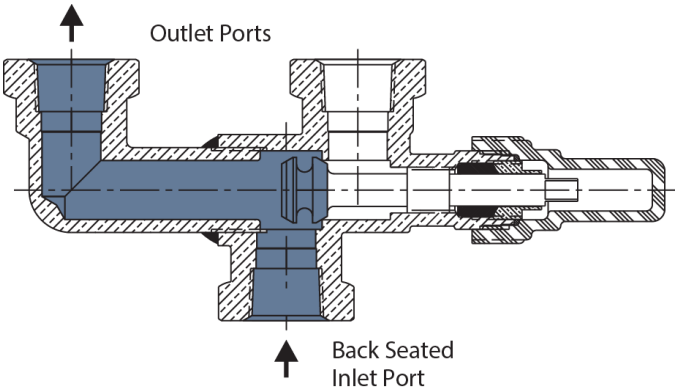


Figure 16: Three-Way Valve, Back Seated Position

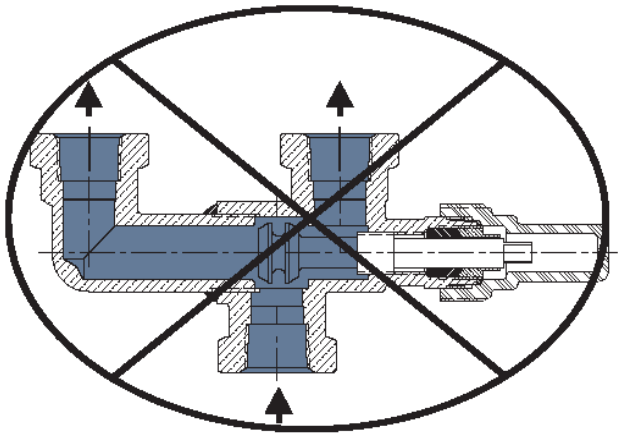


When the valve stem is not pushed forward or pulled back completely, the valve is in “Mid Position,” as shown in Figure 17.

⚠ CAUTION

Do not operate the system with the three-way valve stem in the Mid Position.

Figure 17: Three-Way Valve, Mid Position



Field Insulation

If the optional factory-installation of thermal insulation is not ordered, insulation should be field installed to reduce heat loss and prevent condensation from forming. Insulation should cover:

- the evaporator barrel, tube sheet, and waterboxes.
- the suction line from the top of the evaporator to the compressor inlet flange.
- the compressor support brackets welded to the evaporator.
- the liquid line from the expansion valve to the evaporator inlet, including the expansion valve.
- the part load balance valve to the evaporator.

Approximate total square footage of insulation surface required for individual packaged chillers is tabulated by evaporator code and can be found in Table 6.

Table 6: Insulation Area Required for WME Models

WME Model	Evaporator Code	Insulation Area sq. ft. (m^2)
0501/502S	E3012	141 (13.1)
	E3612	168 (15.6)
0701/702S	E3612	168 (15.6)

Field Power Wiring

The standard power wiring connection to Magnitude® chillers is single point for models WME 501/502 and 701/702. Refer to the unit nameplate and the Daikin Tools selection report for the correct electrical ratings.

⚠ DANGER

Qualified and licensed electricians must perform wiring. An electrical shock hazard exists that can cause severe injury or death.

The field control wiring required varies depending on unit model. See "Figure 18: WME0501/502-0701/702S Schematic" on page 20 for wiring information. These wiring diagrams are also provided with the chiller.

Factory-mounted DC reactors are standard.

NOTE: Wiring, fuse, and wire size must be in accordance with the National Electric Code (NEC). The voltage to these units must be within ±10% of nameplate voltage and the voltage unbalance between phases must not exceed 2%. Since a 2% voltage unbalance will cause a current unbalance of 6 to 10 times the voltage unbalance per the NEMA MG-1 Standard, it is most important that the unbalance between phases be kept at a minimum.

NOTE:

⚠ CAUTION

Do not use power factor correction capacitors with WME chillers. Doing so can cause harmful electrical resonance in the system. Correction capacitors are not necessary since VFDs inherently maintain high power factors.

Chiller Control Power

In all cases of power operation except when with RapidRestore®, the chiller control power must remain as factory-wired from a unit-mounted transformer.

Models WME 501/502 and 701/702 are available with the RapidRestore® option. This option requires an Uninterruptible Power Supply (UPS) to the WME control panel in order for RapidRestore® to function properly.

Long Term Storage

This information applies to new units being stored waiting for startup or to existing units that may be inoperative for an extended period of time.

The chiller must be stored in a dry location indoors and protected from any damage or sources of corrosion. A Daikin Applied service representative must perform an inspection and leak test of the unit on minimum quarterly schedule, to be paid by the owner or contractor. Daikin Applied will not be responsible for any refrigerant loss during the storage time or for repairs to the unit during the period of storage, or while moving the unit from the original location to a storage facility and back to any new installation location. If there is concern about the possibilities of damage and loss of charge during storage, the customer can have the charge removed and stored in recovery cylinders.

⚠ CAUTION

If the temperature of where the chiller is located is expected to exceed 122°F (50°C), then the refrigerant must be removed.

For additional tasks required, contact Daikin Applied service.

DAIKIN

Pre-Start Checklist – Centrifugal Chillers

Must be completed, signed and returned to Daikin Applied service dept. at least 2 weeks prior to requested start date.

Job Name	
Installation Location	
Customer Order Number	
Model Number(s)	
G.O. Number(s)	

Chilled Water	Yes	No	N/A	Initials
Piping Complete	☐	☐	☐	
Water System – flushed, filled, vented; Water treatment in place	☐	☐	☐	
Pumps installed and operational (rotation checked, strainers installed and cleaned)	☐	☐	☐	
Controls operational (3-way valves, face/bypass dampers, bypass valves, etc.)	☐	☐	☐	
Water system operated and tested; flow meets unit design requirements	☐	☐	☐	
Condenser Water	**Yes**	**No**	**N/A**	**Initials**
Cooling tower flushed, filled, vented; Water treatment in place	☐	☐	☐	
Pumps installed and operational (rotation checked, strainers installed and cleaned)	☐	☐	☐	
Controls (3-way valves, bypass valves, etc.) operable per IM/IOM	☐	☐	☐	
Water system operated and flow balance to meet unit design requirements	☐	☐	☐	
Electrical	**Yes**	**No**	**N/A**	**Initials**
115 volt service completed, but not connected to control panel (remote mounted starters)	☐	☐	☐	
Line Power Leads connected to starter; load leads(b) run from starter to compressor, ready for connection by Service (Do not connect load leads to starter or compressor terminals). (See Notes 1 & 4)	☐	☐	☐	
All interlock wiring complete and compliant with Daikin Applied specifications	☐	☐	☐	
Starter complies with Daikin Applied specifications	☐	☐	☐	
*Oil cooler solenoid wired to control panel as shown on wiring diagram (See Notes)	☐	☐	☐	
Pump starter and interlocks wired	☐	☐	☐	
Cooling tower fans and controls wired	☐	☐	☐	
Wiring complies with National Electrical Code and local codes (See Note 4)	☐	☐	☐	
Condenser pump starting relay (CP1,2) installed and wired (See Note 3)	☐	☐	☐	
Miscellaneous	**Yes**	**No**	**N/A**	**Initials**
*Oil cooled water piping complete. (Units with water-cooled oil coolers only)	☐	☐	☐	
Relief valve piping complete (per local codes)	☐	☐	☐	
Thermometers, wells, gauges, control, etc., installed	☐	☐	☐	
Minimum system load of 80% capacity available for testing/adjusting controls	☐	☐	☐	
Document Attached: Technical Breakdown from Daikin Tools	☐	☐	☐	
Document Attached: Final Order Acknowledgement	☐	☐	☐	

Notes: The most common problems delaying start-up and affecting unit reliability are:

1. Field installed compressor motor power supply leads too small. Questions: Contact the local Daikin Applied sales representative. State size, number and type of conductors and conduits installed:
   a. From Power supply to starter _____
   b. From starter to chiller unit (remote mounted)_____
2. Centrifugal chillers with water cooled oil coolers must have a 115 volt normally closed water solenoid valve installed in the oil cooler water supply line. Daikin recommends ASCO Type 8210B27 solenoid valve or approved equal and strainer with 0.125-in perforations. Daikin Applied does not supply these components.
3. A 115-volt field-supplied relay (CP1,2) must be used to start/stop condenser water pump on most applications. Cold condenser water must not flow through condenser during compressor off cycle. Provisions have been made in control center for connecting CP relay, but must not have a rating in excess of 100 VA.
4. Refer to NEC Article 430-22 (a)

***Does Not Apply to Magnetic Bearing Chillers (WMC/WME)**

Contractor Representative

Signed: _____
Name: _____
Company: _____
Date: _____
Phone/Email: _____

Daikin Applied Sales Representative

Signed: _____
Name: _____
Company: _____
Date: _____
Phone/Email: _____

Form SF01017

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Figure 18: WME0501/502-0701/702S Schematic

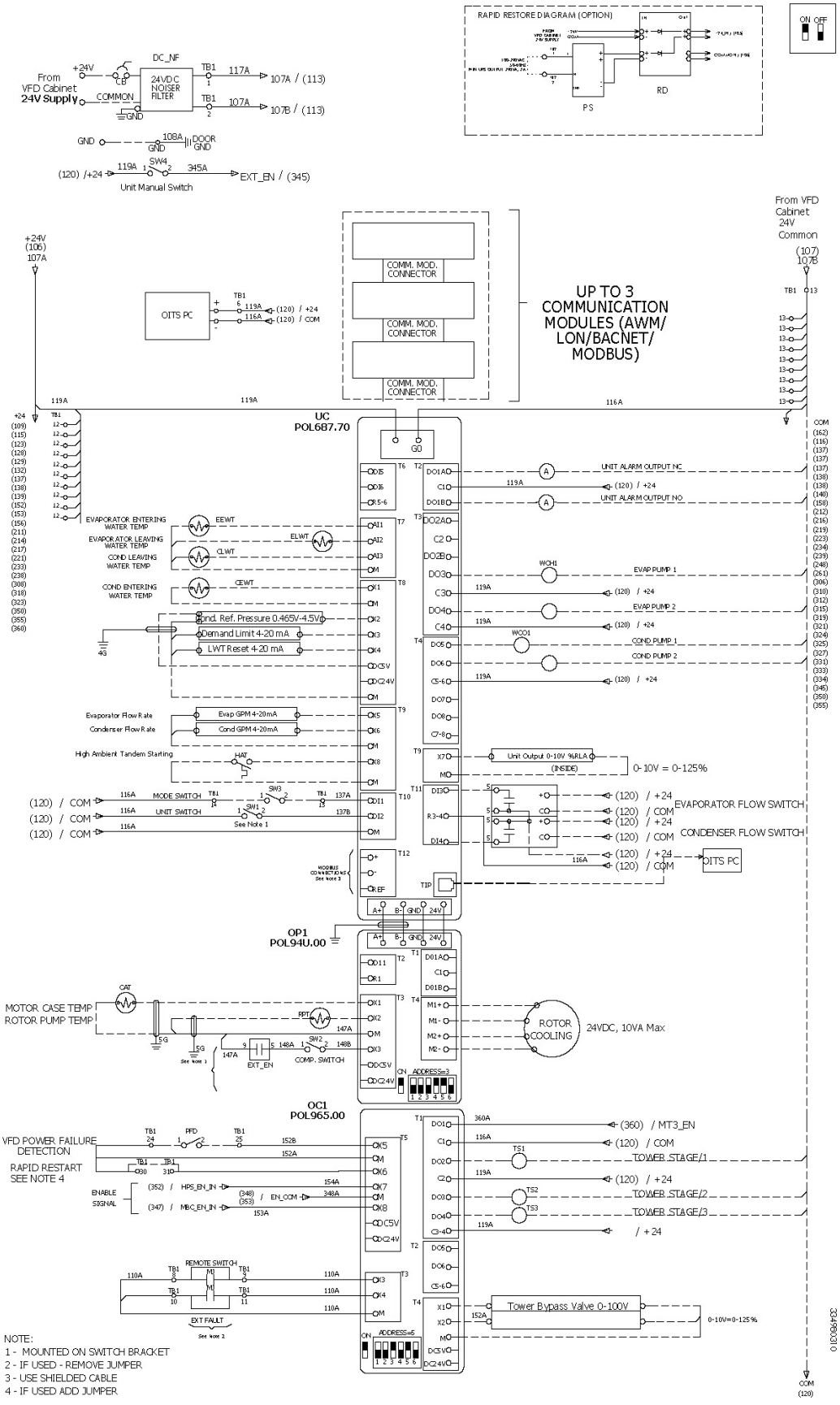


Figure 18: WME0501/502-0701/702S Schematic continued

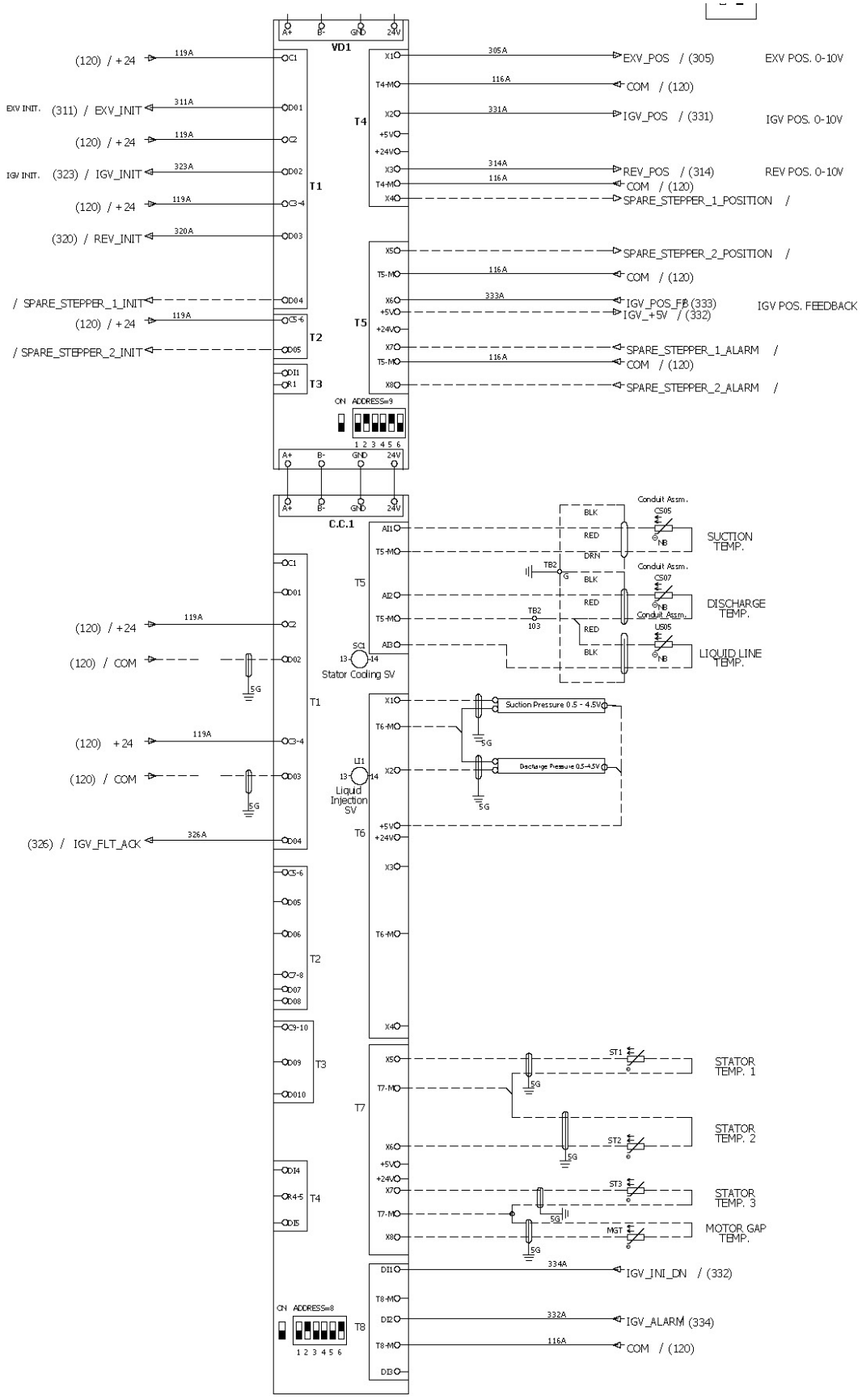
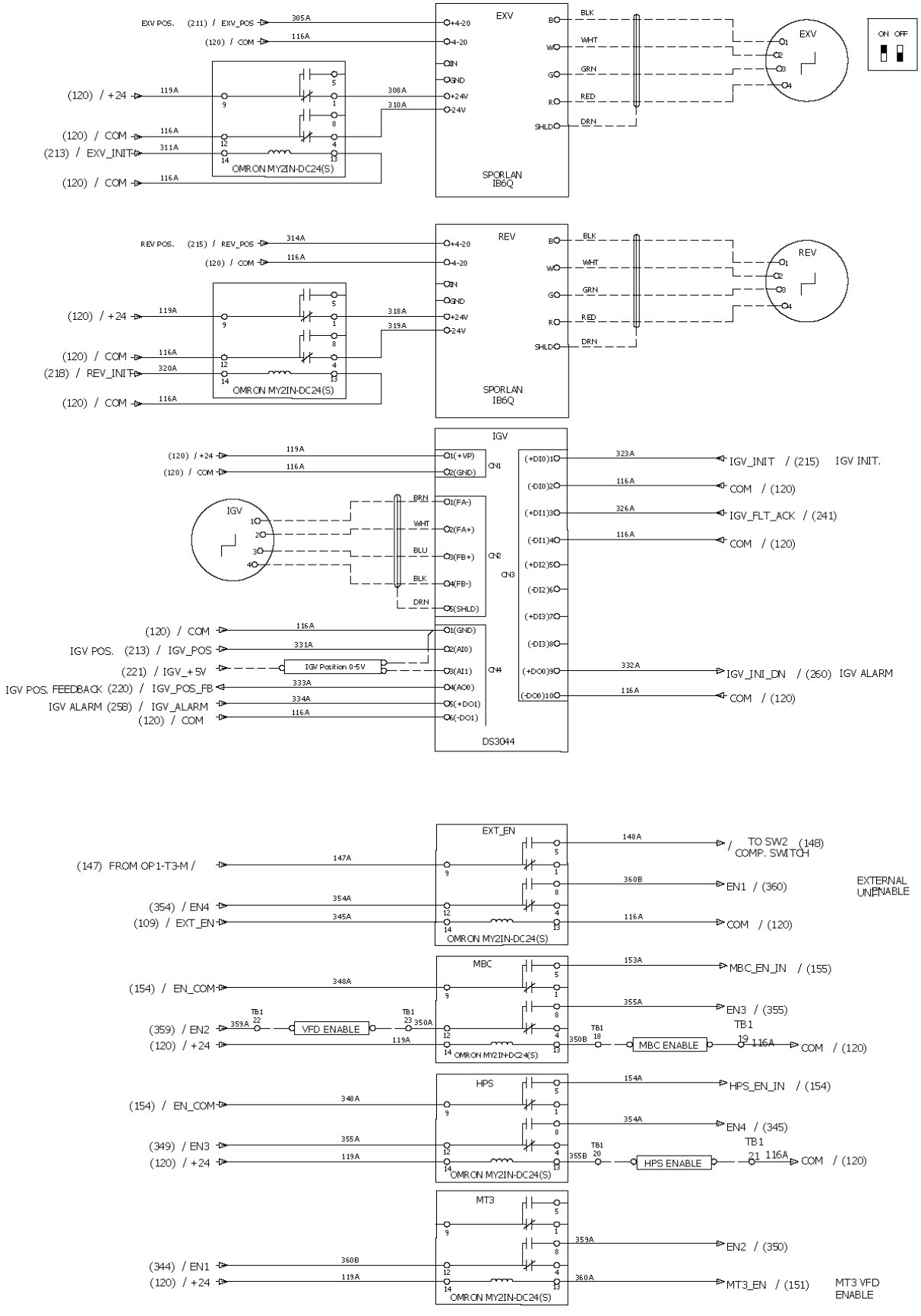


Figure 18: WME0501/502-0701/702S Schematic continued



Operator Responsibilities

It is important that the operator become familiar with the equipment and the system before attempting operation. During the initial startup of the chiller, the Daikin Applied technician will be available to answer any questions and instruct the proper operating procedures. It is recommended that the operator maintain an operating log for each individual chiller unit. In addition, a separate maintenance log should be kept of the periodic maintenance and servicing activities.

Operator Schools

Training courses for Magnitude® Centrifugal Maintenance and Operation are held through the year at the Daikin Learning Institute in Verona, Virginia. The school duration is three and one-half days and includes instruction on basic refrigeration, MicroTech® III controllers, enhancing chiller efficiency and reliability, MicroTech® III troubleshooting, system components, and other related subjects. For more information, visit us at www.DaikinApplied.com and click on Training or call the Training Department. Refer to the back cover of this document for contact information.

Sequence of Unit Operation

A general chiller sequence of operation is outlined below for Magnitude® Model WME chillers. A separate sequence is provided for single and dual compressor units. Certain conditions and chiller alarms may alter the sequence, but the chiller's objective is to achieve the target temperature of the leaving water.

Single Compressor Units

The following sequence of operation applies to Magnitude® Model WME chillers with a single compressor.

1. **Chiller enabled**

   With the chiller enabled via its onboard interlocks and selected external control source, it will start the evaporator pump and check for flow and chiller load.

2. **Water flow and load proven**

   Once evaporator flow has been confirmed and the chiller load proven, the sequence for starting the compressor will begin.

3. **Compressor shaft levitation**

   The magnetic bearings are activated and correct shaft position is verified.

4. **Condenser pump start**

   The condenser pump is commanded to start and water flow is confirmed.

5. **Compressor start**

   The compressor is started and comes up to the calculated Start RPM and IGV. From this point the vanes are opened and then speed is increased to match the cooling load.

6. **Compressor loading**

   As building load increases, the compressor will load up maximizing the Inlet Guide Vane (IGV) position and impeller speed. Maximum capacity at a given operating condition can be found when the compressor reaches its Maximum RPM, maximum allowed %RLA or power limitation.

7. **Compressor unloading**

   As load decreases, the compressor will unload to sustain the water temperature set point by reducing speed until the minimum speed limit has been reached. If further unloading is required, the IGV assemblies will close as required to satisfy the load. If the High Lift Part Load Balance mode is enabled, further capacity reduction is accomplished by opening the Part Load Balance valve.

8. **Chiller shutdown**

   The compressor will adjust capacity to manage the chiller load and will shut off when the load reduces below the compressor's minimum capacity and the leaving water temperature goes below set point and reaches the stop delta temperature. Anytime the chiller is disabled, it will perform an orderly unload and shutdown of the compressor.

Unit Enabling/Disabling

There are multiple switches that will enable and disable the chiller and its compressors (see Figure 3 on page 5 for location of the switch bracket):

1. Unit Switch - The left-most switch on the switch bracket that is mounted inside the control panel.
2. Compressor 1 Switch - Located to the right of the Unit Switch on the switch bracket.
3. Compressor 2 Switch - Located to the right of the Compressor 1 Switch on the switch bracket. On dual compressor units only.
4. External Switch - Located on the outer, left side of the control box.
5. Remote Switch - Optional. Replaces a jumper located on terminal connection J25 (see Figure 18).

The switches listed above work in conjunction with the "Control Source" that is selected in the OITS via the UNIT Setpoint Screen using Setpoint button #3. (See Figure 45 and Table 14 on page 40.) The three options for "Control Source" are:

1. User - This is the default mode. When this mode is set, a STOP button and an AUTO button will appear at the top of the OITS screens, as shown in Figure 21 on page 26. **This mode will ignore all functionality of a connected Remote Switch**. It will also ignore BAS commands.
2. Digital Input - This mode will ignore BAS commands.
3. BAS - This mode adds BAS capability to the Digital Input

functionality.

Enabling and disabling the unit and its compressors using the switches in conjunction with the selected “Control Source” are discussed next.

Enabling

To enable the chiller and its compressor when the “Control Source” is “Digital Input” or “BAS,” all rocker switches (three rocker switches for single compressor units, four rocker switches for dual compressor units) and the Remote Switch, if included, need to be closed (in the ON position).

If the “Control Source” is set to “User” and a Remote Switch is being used, the position of the Remote Switch will be ignored. In that case, only the rocker switches need to be closed. Once these rocker switches are closed, press the AUTO button on the OITS to enable the chiller in “User” mode.

Disabling

Each of the four switches located on the unit have a different functionality in terms of disabling. The descriptions below apply if the “Control Source” on the OITS MODES Setpoint Screen is set to “Digital Input” or “BAS.”

1. Unit Switch- When placed in the OFF position while the chiller is running, the Unit Switch will shutdown the chiller in a normal controlled sequence and will stop each compressor that is running. This switch will leave the entire chiller disabled until it is set in the ON position.
2. Compressor 1 Switch - When placed in the OFF position, this switch prevents Compressor 1 from being used in the normal auto-sequencing of the compressors. If Compressor 1 is running when this switch is placed in the OFF position, the compressor will perform a “rapid stop” different from the stop caused from placing the Unit Switch in the OFF position.
3. External Switch - This switch will disable the chiller in a similar manner as the Unit Switch.
4. Remote Switch - This switch will disable the chiller in a similar manner as the Unit Switch.

If the “Control Source” on the OITS MODES Setpoint Screen is set to “User,” press the STOP button on the OITS to disable the chiller. This method of disabling will cause the chiller to act in a similar manner as when it is disabled using the Unit Switch in the “Digital Input” or “BAS” mode.

Operator Interface Touch Screen (OITS)

The following sections outline the operation of the OITS panel.

OITS On/Off

The OITS is turned on/off with a switch located at the upper right-hand edge of the display panel. Screen control buttons are located to either side of it and elicit on-screen prompts when pressed. The OITS is equipped with a screen saver (a blank, black screen). If the screen is black, touch it first to be sure it is on before using the ON/OFF button.

Chiller Operation Without the OITS

The Operator Interface Touch Screen (OITS) communicates with the Unit Control Processor, displaying data and transmitting touch screen inputs to the controllers. It does no actual controlling and the chiller can operate without it. Should the Touch Screen become inoperable, no commands are necessary for continuing unit operation. All normal inputs and outputs will remain functional. Use MicroTech III controller if OITS screen fails to operate. See "Controller Inputs and Outputs" section starting on page 48 for more information.

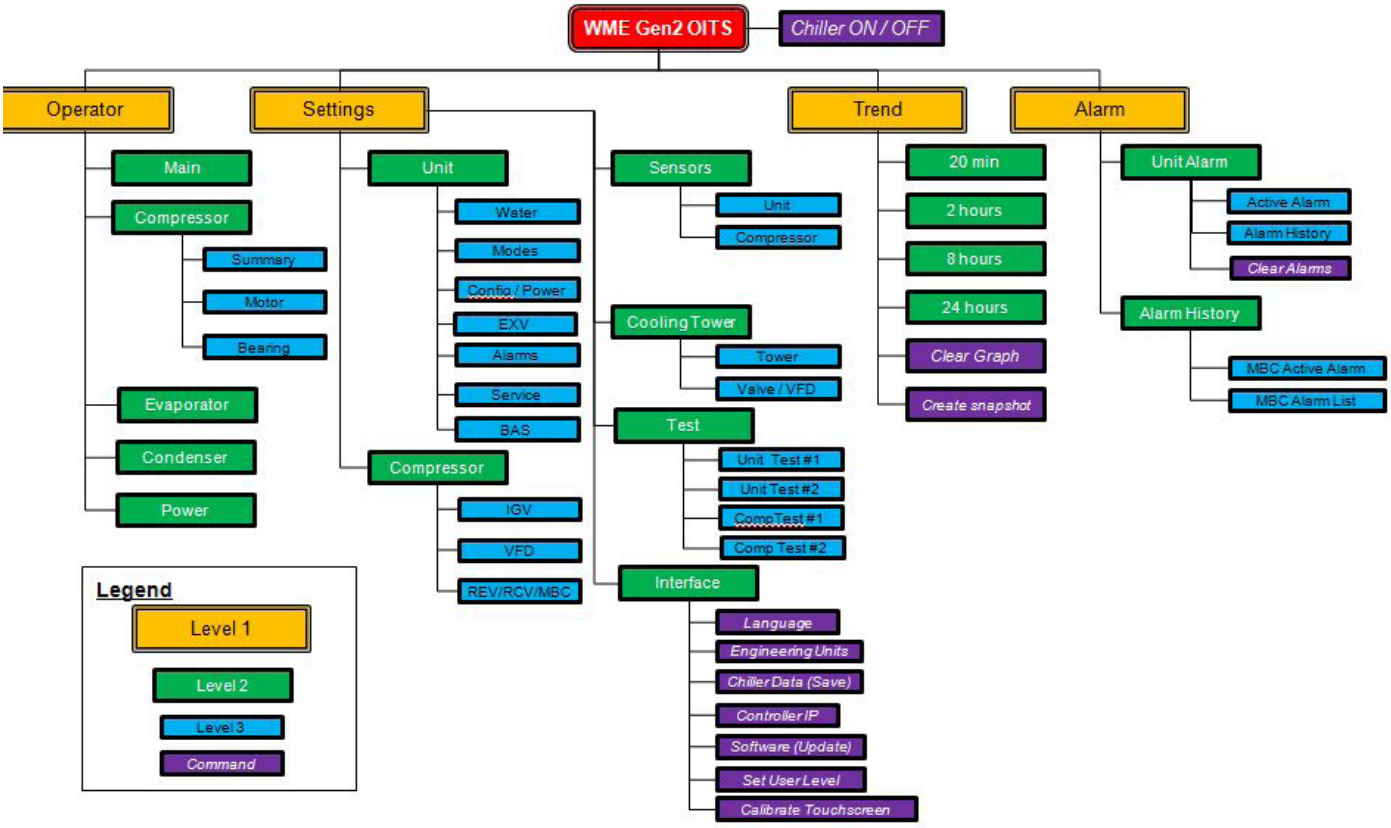
Navigation Summary

The Home View Screen, see Figure 20 on page 24, is usually left on. This screen contains the AUTO and STOP buttons used to start and stop the unit when in “User” control mode. Other groups of screens can be accessed from the Home View Screen by pressing one of four buttons on the bottom of the screen: TREND, VIEW, SET, or ALARM.

- TREND: See the "HISTORY Screens" section starting on page 43 for more information.
- VIEW: See the "VIEW Screens" section starting on page 25 for more information.
- SET: See the "SET Screens" section starting on page 28 for more information.

Figure 19 on page 25 illustrates the arrangement of the various screens available on the OITS. A few minutes practice on an actual OITS should provide an acceptable level of confidence in navigating through the screens.

Figure 19: OITS Screen Layout



VIEW Screens

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

Detail View Screen

The Detail View Screen, shown below, is the default view screen and can be accessed by pressing the DETAIL button from any other screen that contains this button.

Figure 20: Detail View Screen

Data for one compressor is shown at a time on the Detail View Screen. If the unit is a dual compressor unit, pressing the COMP button in the lower-left hand corner of the screen will toggle between compressor #1 and compressor #2.

When first booted up, the Detail View Screen will be blank on the right side. Various information will appear on the right side of the Detail View Screen by pressing available buttons. For example, pressing the STATE button will bring up a display of the Compressor State Information (Figure 21) on the right side of the Detail View Screen. Use the COMP button to toggle between the two compressors' data.

Superimposed on the Detail View Screen is:

(I) Alarms

- The ALARM button at the bottom of the screen will turn red should an alarm occur. This red ALARM button will appear on all screens in the case of an alarm. See Figure 45 for an example of an active alarm alert. For display purposes, the rest of the screen images presented in this manual will not show the red ALARM button.
- Any type of alarm will cause the ALARM button to turn red. Pressing the ALARM button will bring up the Alarm History Screen (Figure 51 on page 43) to view the alarm details. For more information on alarms, see page 43 through page 47.

(II) Status

- Chilled water setpoint (ACTIVE LWT SETPOINT)
- Entering and leaving evaporator water temperatures
- Entering and leaving condenser water temperatures
- Percent unit RLA
- UNIT STATUS, which is MODE followed by STATE followed by the SOURCE that is the device or signal that created the STATE. The possible combinations are shown in Table 7.

Table 7: UNIT STATUS Possibilities

MODE	STATE	SOURCE
COOL	OFF	Manual Switch
	SHUTDOWN	Remote Switch
	AUTO	Local
		BAS Network

- COMPRESSOR STATUS, shown for each unit compressor (#1 only for single compressor units, both #1 and #2 for dual compressor units), is MODE followed by STATE followed by the SOURCE that is the device or signal that created the STATE. The possible combinations are shown in Table 8.

Table 8: COMPRESSOR STATUS Possibilities

Complete STATUS Text (in priority sequence)	Notes
OFF Manual Switch	Reason for the compressor being off
OFF Compressor Alarm	
OFF Unit State	
OFF Evaporator Flow	
OFF Stop to Start Timer = xxx	
OFF Staging (Next ON)	
OFF Awaiting Load	
FLOAT Levitation	Confirming levitation
START Condenser Flow	Waiting for condenser flow
RUN Load [method]	Normal operation
RUN Hold [method]	
RUN Unload [method]	
RUN [capacity] [method] RLA Limit	Overrides water temperature control
RUN [capacity] [method] Lag Start	
RUN [capacity] [method] Evaporator Pressure	
RUN [capacity] [method] Pull Down Rate	
RUN [capacity] [method] Demand Limit	
UNLOAD	Unloading during the shutdown sequence
SHUTDOWN Awaiting Zero Current	Motor coasting to a stop
SHUTDOWN Coasting	

NOTE: Timer countdown values will be shown where “xxx” is shown in Table 8. [capacity] can be Load, Hold, or Unload. [method] can be IGV, VFD, or REV.

(III) Action Buttons

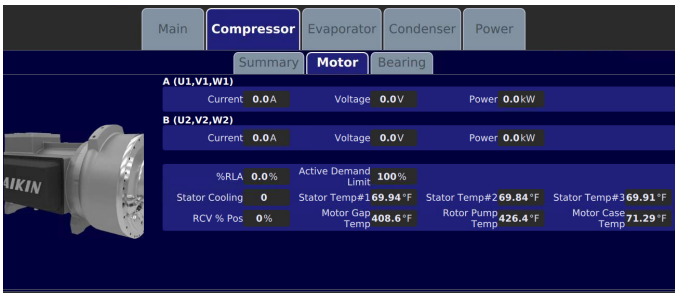
- Chiller Control: AUTO button (normal start) and STOP button (normal shutdown). **These buttons are only visible and active when the control is in the “User” mode.** For display purposes, the rest of the screen images presented in this manual will not show the AUTO and STOP buttons.
- TREND button: Shows the Trend History Screen (Figure 50 on page 43).
- DETAIL button: Shows details about the unit status and conditions. Pressing this button will toggle between the Home View Screen (Figure 20) and the Detail View Screen (Figure 22).
- SETTINGS button: Toggles between the Setpoint Screens (descriptions start on page 28) that are used for changing setpoints and the Service Screen (Figure 48 on page 42).
- ALARM button: Shows the Alarm History Screen (Figure 51 on page 43).

Figure 21: Compressor State Information

The Compressor State Information is basically a compilation of the events that the chiller sequences through at startup. A green light indicates that a particular sequence requirement has been satisfied. It is recommended that this information be viewed during the startup sequence. One can see the requirements light up as they are met and quickly see why a non-start may have occurred. The bottom sections (from “Run” down) of the Compressor State Information are in effect during the shut down process. The sequence transitions back to "Off" at this point and the "Off" light will be illuminated.

Pressing the I/O button on the Detail View Screen displays the status of the compressor inputs and outputs, as shown in Figure 22, on the right side of the Detail View Screen. For dual compressor units, use the COMP button to toggle between the two compressors’ data.

Figure 22: Compressor Inputs/Outputs Information



The compressor inputs and outputs are to and from the compressor controller. A green light to the left of the condition indicates that it is active. The “Liquid Injection Solenoid” digital output is controlled by Setpoint 12 on the Unit Setpoint Screen (see Figure 45 on page 40). The “Range Ext Target” (Part Load Balance Valve Target) stepper output is the percent opening of the Part Load Balance valve. The valve locks to zero if the feature is not configured.

Pressing the POWER button on the Detail View Screen will display the current, voltage, and power of the chiller, as shown in Figure 23.

Figure 23: Power Information

Pressing the EVAP or COND buttons on the Detail View Screen will display pertinent vessel temperatures and pressures. The Evaporator Information and Condenser Information are shown in Figure 24 and Figure 25, respectively. Flow rate can be displayed only if the unit has flow meters. Flow meters must be provided by a third party supplier.

Figure 24: Evaporator Information

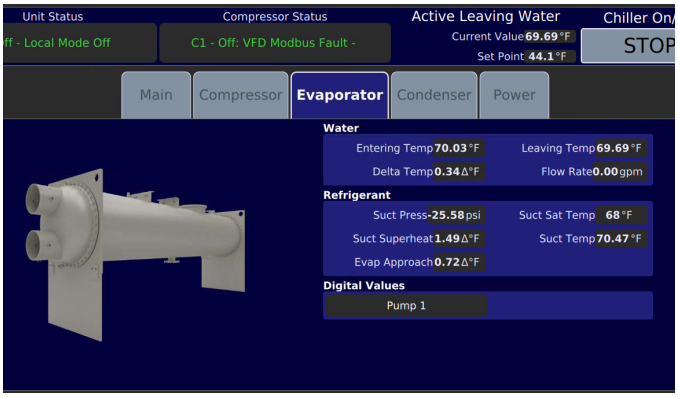
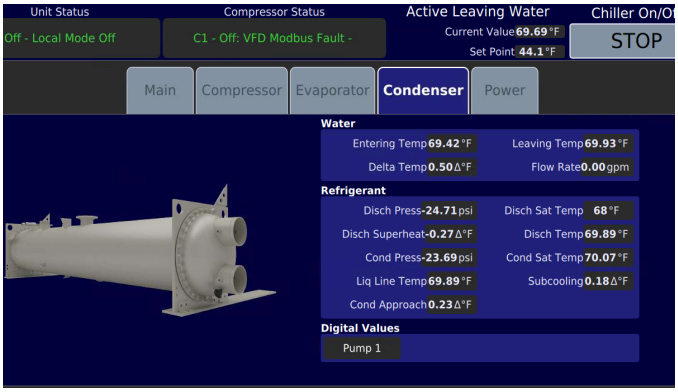
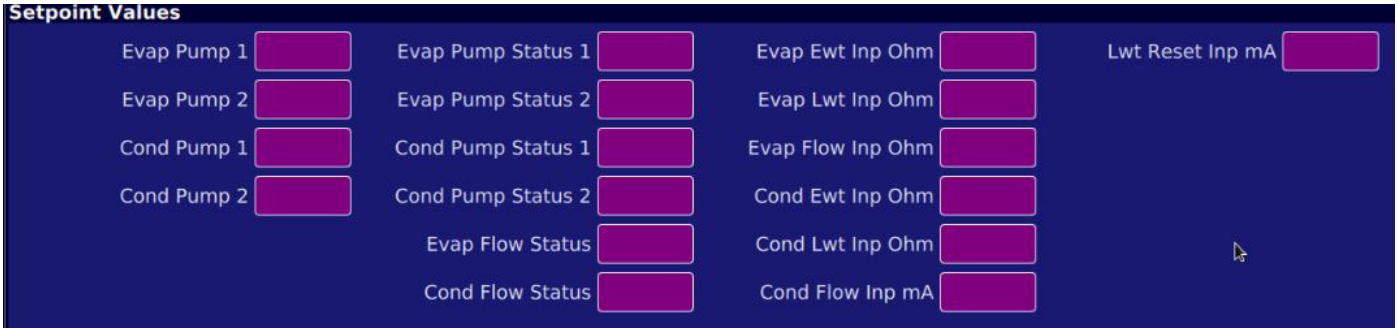


Figure 25: Condenser Information



Pressing the TEST button on the Settings screen displays the unit inputs and outputs, as shown in Figure 26. The unit inputs and outputs are to and from the unit controller. An illuminated block indicates that either an input or output signal exists.

Figure 26: Unit Inputs/Outputs Information



SET Screens

The Setpoint Screens on the Operator Interface Touch Screen (OITS) are used to input the many setpoints associated with equipment of this type. MicroTech® III provides a simple method for accomplishing this. Appropriate setpoints are factory set and checked by a Daikin Applied service representative 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 last Setpoint Screen used. When in any Setpoint Screen, pressing the SET button again will toggle to the Service Screen, shown in Figure 48 on page 42. Certain setpoints may be greyed out depending on password level (1= General, 2= Site Manager, 3=Daikin Field Technician). A "W" indicates Write access and "R" is Read (determined by controller). The password levels displayed in the following setpoint tables indicate the minimum password level needed to change the setpoint it is assigned to. A typical Setpoint Screen is displayed in Figure 27 below.

Figure 27: A Typical Setpoint Screen

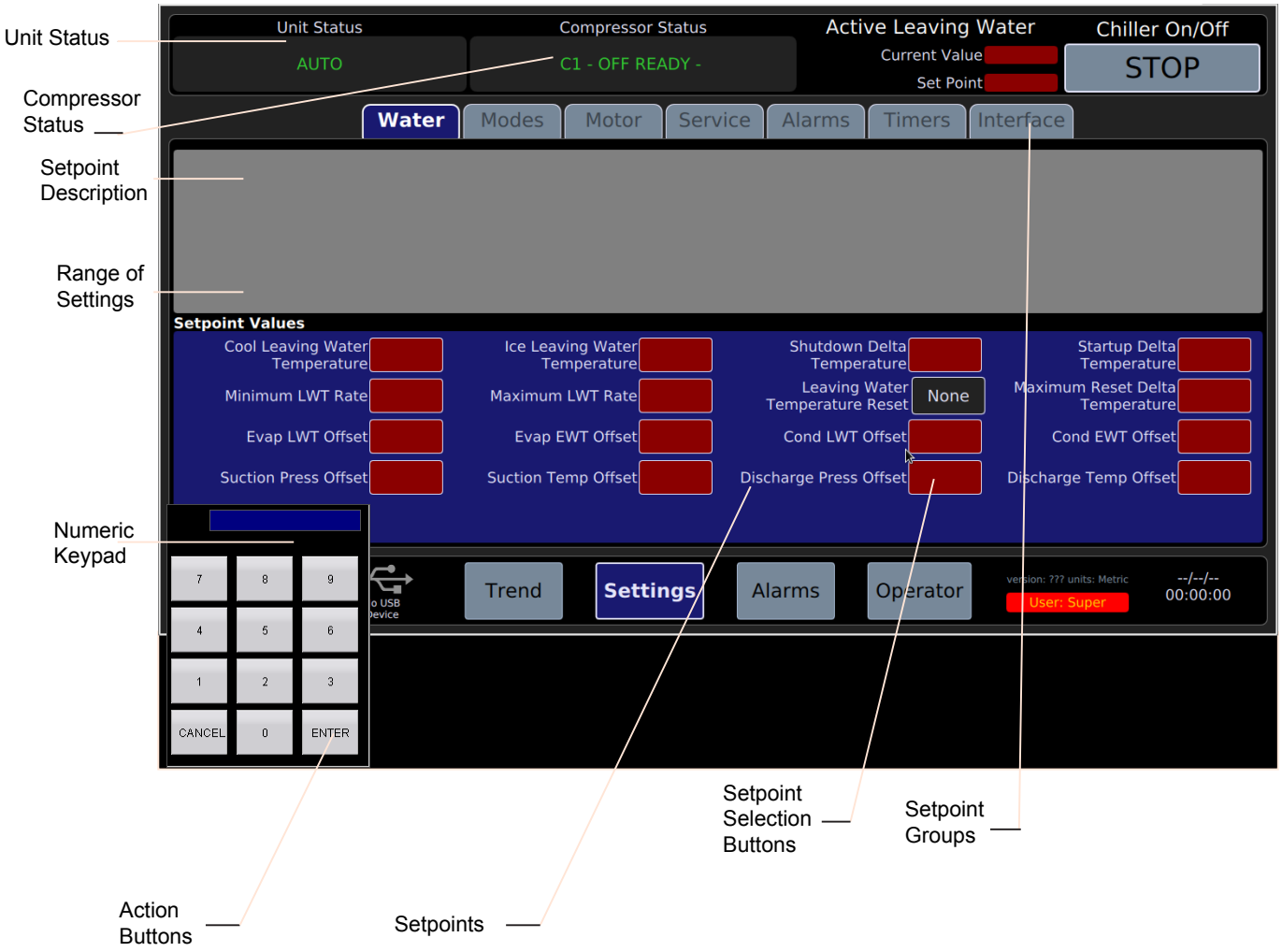


Figure 27 shows the WATER Setpoint Screen. The various setpoint groups are in a column on the right side of the screen. Each button contains a number of setpoints grouped together by similar content. The WATER button, for example, contains various setpoints relating to water temperature setpoints. The numbered Setpoint Selection buttons are pressed to select a particular setpoint. The selected setpoint will appear in purple on the screen and a description of it (with the range of available settings) will appear in the upper left-hand box.

Procedure for Changing a Setpoint

A list of setpoints along with their default value, available setting range, and password authority can be found in the tables after each Setpoint Screen, starting on page 29. Follow the steps listed below in order to change a setpoint.

⚠ CAUTION

Many setpoints are interactive. Changes may have an adverse effect on chiller operation. Only trained operators should be allowed to change chiller setpoints.

1. Press the applicable Setpoint Group. (A complete explanation of setpoint content of each group follows this section.)
2. Select the desired setpoint by pressing the numbered Setpoint Selection button.
3. Press the CHANGE button to change a setpoint value. The Password Prompt, as shown in Figure 27, will be turned on automatically to facilitate entering the password.
4. Input the appropriate password number. (Use 100 for operator level. The technician level password number is only provided to Daikin Applied technicians.) 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.
5. After inputting the password on the Password Prompt, 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 during this period.
6. Press CHANGE again on the Setpoint Screen. The Numeric Keypad and/or Action buttons in the lower left-hand corner of the screen will become active.
7. Setpoints with numeric values can be changed in two ways:
   - Select the desired value by pressing the numbered buttons on the Numeric Keypad.
   - Press the UP or DOWN button to increase or decrease the value displayed.

   Some setpoints are selectable text rather than numeric values. For example, Control Source (Setpoint 3) on the UNIT Setpoint Screen (Figure 45 on page 40) is either "USER," "BAS," or "DIGITAL INPUT." The selection can be made using two methods:
   - Select the desired option using the dropdown menu that appears on that particular setpoint.
   - Toggle between choices using the UP or DOWN button. If dashed lines appear in the setpoint window it means that toggling in that direction can go no further, so reverse direction.

   Other setpoints require a text entry rather than selecting the text or value. An example of this is the BACnet IP - Network Address (Setpoint 10) on the BAS1 Setpoint Screen (Figure 29 on page 29). When attempting to change a setpoint such as this, use the Keyboard Prompt (Figure 28) that appears on the screen to enter the desired value.

Figure 28: Keyboard Prompt

   For all of the methods listed above, press ENTER on the Setpoint Screen to enter the value or CANCEL to cancel the transaction. The CANCEL or ENTER buttons must be pressed before another setpoint can be selected.
8. Additional setpoints can be changed by selecting another setpoint on the screen using the Setpoint Selection buttons or by selecting an entirely new group of setpoints using the Setpoint Group buttons.

Explanation of Setpoints

There are eight setpoint groups shown on the Setpoint Screens:

1. BAS, sets the network protocol and associated options.
2. ALARMS, sets 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. POWER, selects power related setpoints such as amp limits.
6. STAGING, sets parameters for staging multiple compressors.
7. UNIT, selects various unit parameters such as liquid injection, timers, pump staging, control source, unit mode, etc.
8. WATER, sets leaving water temperature setpoint, start and stop delta-T, resets, etc.

Each of the eight setpoint groups are detailed in the following pages.

ALARMS Setpoints

Figure 29: ALARMS Setpoint Screen

Table 9: ALARMS Setpoint Settings

Description	Default	Range	PW	Comments
Motor RLA Thrshld	3%	1 to 20 %	3	When %RLA is below this SP, motor is considered OFF. When above, motor is considered ON.
Hi Disch Press	140	120 to 240 psi	3	Sets the discharge pressure above which the compressor is shut down.
Hi Disch Temp	150	120 to 180 °F	3	Sets the discharge temperature above which the compressor is shut down.
Low Lift Press	7.25	0 to 43.5 psi	3	Sets the lift pressure below which the compressor is shut down.
Surge Temp Limit	6	2 to 25 °F	3	At start, Surge Temp (ST) is compared to this SP (ST = Suction Temp-Evap LWT). If less, alarm occurs when ST > 2X this SP. If greater, slope alarm is active until ST < this SP. Then alarm at 2X this SP.
Surge Slope Limit	20	1 to 99 °F/min	3	Sets the Surge Temp (ST) slope value above which alarm occurs. Active only if ST > Surge Temp Limit SP at start. Deactivated when ST drops below Surge Temp Limit.
Evap Water Frz	34.0 °F	-9.0 to 45.0 °F	3	Sets the value of evaporator saturated temperature below which the evaporator pump is forced ON.
Evap Flow Loss	2 sec	0 to 15 sec	3	Sets the delay before the evaporator flow loss alarm is triggered.
Cond Water Frz	34.0 °F	-9.0 to 45.0 °F	3	Sets the value of condenser saturated temperature below which the condenser pump is forced ON.
Cond Flow Loss	20 sec	2 to 30 sec	3	Sets the delay before the condenser flow loss alarm is triggered.
Low Suct Press Stop	26 psi	10 to 45 psi	3	Sets the evaporator pressure value below which the compressor is shut down.
Low Suct Press Delta	3 psi	1 to 10 psi	3	Low evaporator pressure is limited to SP2 plus this delta.
Low Rotor Pump SH	1.8 Δ°F	0.9 to 2.2 Δ°F	4	Low Rotor Pump Superheat value

NOTE: Setpoints that have a technician level password (3) should only be changed by a Daikin Applied technician. Contact a Daikin Applied service representative for more information.

Cooling Tower Bypass VALVE Setpoints

Figure 30: Tower Bypass VALVE Setpoint Screen

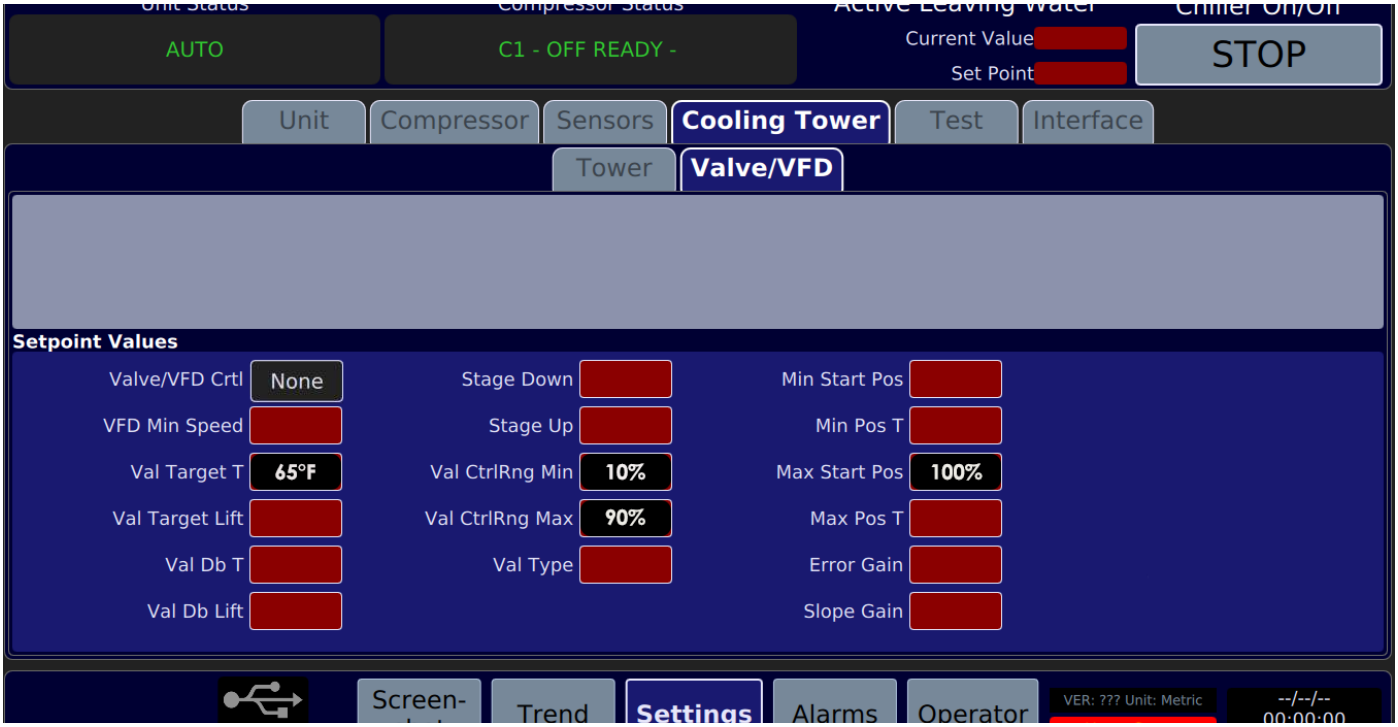


Table 10: Tower Bypass VALVE Setpoint Settings (See page 39 for complete explanation.)

Description	Default	Range	PW	Comments
Valve/VFD Ctrl		None, Valve Setpoint, Valve Stage, VFD Stage,Valve SP/ VFD Stage	2	None: No tower valve or VFD Valve Setpoint: Valve controls to "Valve Target (Temp or Lift)" SP or "Valve Deadband (Temp or Lift)" SP Valve Stage: Valve controls between fan stages VFD Stage: 1st fan is VFD controlled, no valve Valve SP/VFD Stage: Both valve and VFD
VFD Min Speed	0%	0 to 70%	2	Sets Min. Fan VFD Speed.
Val Target T	65 °F	40 to 120 °F	2	Target for condenser EWT ("Cooling Tower Control" SP = Temp), Works with "Valve Deadband (Temp)" SP
Val Target Lift	30 psi	10 to 130 psi	2	Target for lift pressure ("Cooling Tower Control" SP= Lift), Works with "Valve Deadband (Lift)" SP
Val Db T	2.0 D°F	1.0 to 10.0 Δ°F	2	Sets control deadband, "Cooling Tower Control" SP=Temp
Val Db Lift	4.0 psi	1.0 to 20.0 psi	2	Sets control deadband, "Cooling Tower Control" SP=Lift
Stage Down	20%	0 to 100%	2	Valve position below which the fans can stage down ("Bypass Valve/VFD Control" SP = Valve Stage) VFD speed below which the fans can stage down ("Bypass Valve/VFD Control" SP = VFD stage or valve SP/VFD stage)
Stage Up	80%	0 to 100%	2	Valve position above which the fans can stage up ("Bypass Valve/VFD Control" SP = Valve Stage) VFD speed above which the fans can stage up ("Bypass Valve/VFD Control" SP = VFD or valve SP/VFD stage)
Val CtrlRng Min	10%	0 to 100%	2	Minimum valve position, overrides all other settings
Val CtrlRng Max	90%	0 to 100%	2	Maximum valve position, overrides all other settings
Val Type	NC (To Tower)	NC, NO	2	Normally closed or normally open to tower
Min Start Pos	0%	0 to 100%	2	Minimum position of valve when condenser EWT is at or below "Minimum Start Position Temp" SP
MIn Pos T	60 °F	0 to 100 °F	2	Condenser EWT at which initial valve position is set to "Minimum Start Position" SP
Max Start Pos	100%	0 to 100%	2	Initial valve position when condenser EWT is at or above "Max Start Position Temp" SP
Max Pos T	90 °F	0 to 100 °F	2	Condenser EWT at which initial valve position is set to "Maximum Start Position" SP
Error Gain	25	10 to 99	2	Control gain for temperature (or lift) error
Slope Gain	25	10 to 99	2	Control gain for temperature (or lift) slope

NOTE: Table 10 relies on Setpoints 1 and 2 in Table 11 on page 32.

Cooling TOWER Fan Setpoints

Figure 31: Cooling TOWER Fan Setpoint Screen

Table 11: TOWER Fan Setpoint Settings (See page 39 and Figure 46 for complete explanation.)

Description	Default	Range	PW	Comments
Tower Ctrl	None	None, Temperature, Lift	2	None: No tower fan control Temperature: Fan and valve controlled by Condenser EWT Lift: Fan and valve controlled by lift pressure
Tower Stages	2	1 to 3	2	Number of fan stages used
Twr Loop Time	60 sec	10 to 999 sec	2	Cooling Tower Loop Time
Stage Up Time	2 min	1 to 60 min	2	Time delay between stage up/down event and next stage up
Stage Down Time	5 min	1 to 60 min	2	Time delay between stage up/down event and next stage down
Stage Delta T	3.0 Δ°F	1.0 to 10.0 D°F	2	Fan staging deadband with Cooling Tower Control =Temp
Stage Delta Lift	6.0 psi	1.0 to 20.0 psi	2	Fan staging deadband with Cooling Tower Control = Lift
Stage#1 On T	70 °F	40 to 120 °F	2	Temperature for fan stage #1 on
Stage#2 On T	75 °F	40 to 120 °F	2	Temperature for fan stage #2 on
Stage#3 On T	80 °F	40 to 120 °F	2	Temperature for fan stage #3 on
Stage#1 On Lift	35 psi	10 to 130 psi	2	Lift pressure for fan stage #1 on
Stage#2 On Lift	45 psi	10 to 130 psi	2	Lift pressure for fan stage #2 on
Stage#3 On Lift	55 psi	10 to 130 psi	2	Lift pressure for fan stage #3 on

Tower Control Settings

There are five possible tower control strategies: (I) **VFD STAGE**, (II) **VALVE SP**, (III) **VALVE STAGE**, (IV) **NONE**, and (V) **VALVE SP / VFD STAGE**. These control strategies are selected from the TOWER Setpoint Screen (see Figure 31 on page 32) using Setpoint 2. (In the following pages, "SP" means "Setpoint.") An explanation of each control strategy follows this paragraph. Along with each explanation is a diagram and graph to help illustrate the control strategy. Note that these graphs illustrate the default conditions for each strategy.

Setting Tower Control Using the OITS Panel

MicroTech® III may assist in the head control either directly or through inputs to a BAS to optimize performance and efficiency. Using the MicroTech® III, up to three Digital Outputs of Tower Staging along with two Analog Outputs (0-10 VDC) are available. The two Analog Outputs are as follows:

1. Bypass Valve signal
2. Tower Fan VFD signal

Setup for any tower control will be accomplished on the OITS using the TOWER Setpoint Screen (see Figure 31 on page 32) and the VALVE Setpoint Screen (see Figure 30 on page 31).

Setpoint 1 (Cooling Tower Control) on the TOWER Setpoint Screen sets the type of control. NONE is selected as default. Choose TEMPERATURE for entering condenser water control or LIFT to define the lift pressure between the Evaporator Pressure and the Condenser Pressure.

Setpoint 2 (Tower Bypass Valve / Fan VFD) on the TOWER Setpoint Screen defines if and how the two MicroTech® III Analog Outputs (Bypass Valve signal and Tower Fan VFD signal) will be used with the Staging selected for the tower. A BAS or other control may monitor these outputs to understand when or how much the MicroTech® III would recommend for proper head control on the WME unit. Setup instructions for each of the five tower control strategies are provided next.

Setpoint 3 (Cooling Tower Stages) on the TOWER Setpoint Screen sets the number of tower stages that the tower has.

(I) VFD STAGE (Default): In this mode, a VFD controls the first fan. Up to two more fans are staged on and off and there is no bypass valve. See Figure 32 and Figure 33.

To set up in OITS,

A. TOWER Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section I.A [the TOWER Setpoint Screen section for control strategy (I) NONE] except for SP2. For SP2, select VFD STAGE for control of the VFD speed based on temperature or lift.

Figure 32: TOWER Setpoint - SP2 - (I) VFD STAGE

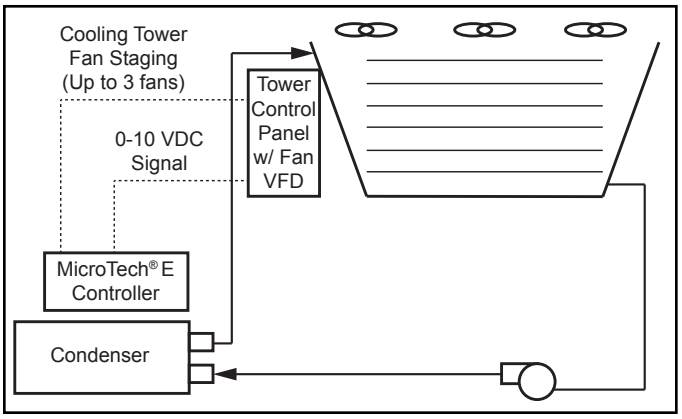
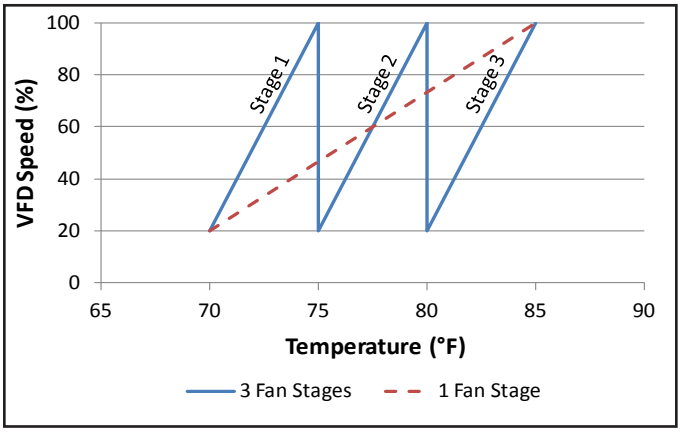


Figure 33: (I) VFD STAGE - VFD Speed vs. Temperature



As shown in Figure 33, the default minimum and maximum VFD speeds are 20% and 100%, respectively. These minimum and maximum values are adjustable anywhere between 0% and 100%. Additional fans stage on when the VFD speed reaches the maximum value that was set.

(II) VALVE SP: This control strategy is tower staging (up to three stages) with a low-limit controlled bypass valve. The tower fans are controlled as in (I), 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. See Figure 34 and Figure 35.

To set up in OITS,

A. TOWER Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section I.A [the TOWER Setpoint Screen section for control strategy (I) NONE] except for SP2. For SP2, select VALVE SP for control of the bypass valve based on temperature or lift.

B. VALVE Setpoint Screen

1. SP1. Select NC or NO depending if valve is *normally closed* to the tower with no control power or *normally open* to the tower with no control power.
2. If TEMP was selected for SP1 on the TOWER Setpoint Screen, use the following on the VALVE Setpoint Screen:
   a. SP2. Set the VALVE TARGET. This setpoint is usually 5°F below the minimum fan stage setpoint established in SP8 of the TOWER Setpoint Screen. This keeps full flow through the tower until the last fan is staged off. The default for SP2 is 65°F.
   b. SP4. Set VALVE DEADBAND. The default of 2.0°F is a good place to start.
   c. SP12. Set the minimum position to which the valve can go. The default is 10%.
   d. SP13. Set the maximum position to which the valve can go. The default is 90%.
   e. SP14. Set the control gain for error. The default is 25.
   f. SP15. Set the control gain for slope. The default is 25.

⚠ CAUTION

Setpoints 14 and 15 on the VALVE Setpoint Screen are site specific, dealing with system fluid mass, component size, and other factors affecting the reaction of the system to control inputs. To avoid possible equipment damage, these setpoints should be set by personnel experienced with setting up this type of control.

3. If LIFT was selected for fan control, use:
   a. SP3. Set the VALVE TARGET. This setpoint is usually 5 psi below the minimum fan stage setpoint established in SP11 of the TOWER Setpoint Screen. This keeps full flow through the tower until the last fan is staged off. The default for SP3 is 30 psi.
   b. SP5. Set VALVE DEADBAND. The default of 4.0 psi is a recommended initial setting.
   c. SP12. Set the minimum position to which the valve can go. The default is 10%.
   d. SP13. Set the maximum position to which the valve can go. The default is 90%.
   e. SP14. Set the control gain for error. The default is 25.
   f. SP15. Set the control gain for slope. The default is 25.

⚠ CAUTION

Setpoints 14 and 15 on the VALVE Setpoint Screen are site specific, dealing with system fluid mass, component size, and other factors affecting the reaction of the system to control inputs. To avoid possible equipment damage, these setpoints should be set by personnel experienced with setting up this type of control.

Figure 34: TOWER Setpoint - SP2 - (II) VALVE SP

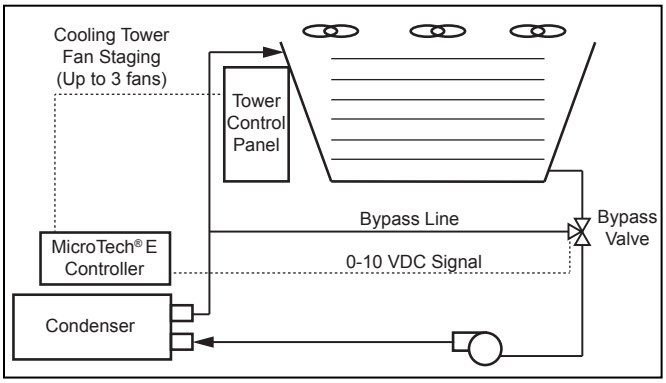
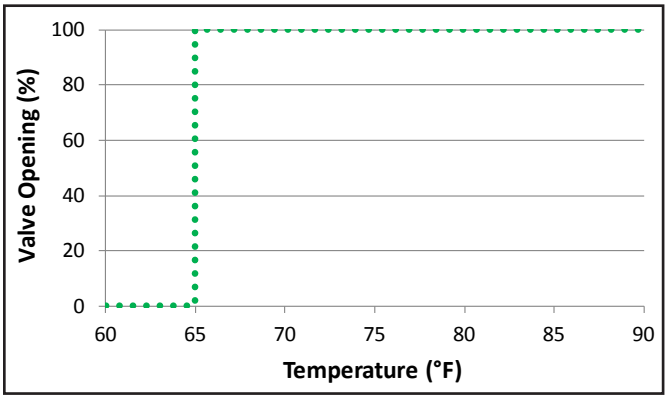


Figure 35: (II) VALVE SP - Valve Opening vs. Temperature



As shown in Figure 35, the default temperature at which the valve opens completely is 65°F. This temperature is the Valve SP (also called Valve Target) and is adjustable.

(III) VALVE STAGE: This control strategy is tower staging (up to three stages) with a stage-controlled bypass valve. In this mode, the bypass valve controls between fan stages to smooth the control and reduce fan cycling. See Figure 36 and Figure 37.

To set up in OITS,

A. TOWER Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section I.A [the TOWER Setpoint Screen section for control strategy (I) NONE] except for SP2. For SP2, select VALVE STAGE. .

B. VALVE Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section II.B [the VALVE Setpoint Screen section for control strategy (II) VALVE SP]. In addition, set the following:
   a. SP6. Set STAGE UP (valve position % open) above which the first fan can stage on. Fan STAGE#X ON temperature from SP8-10 on the TOWER Setpoint Screen and FAN STAGE UP TIME from SP4 on the TOWER Setpoint Screen must also be satisfied. The default for SP6 is 80%.
   b. SP7. Set STAGE DOWN (valve position % closed) below which the first fan can stage off. Fan STAGE#X ON temperature from SP8-10 on the TOWER Setpoint Screen and FAN STAGE DOWN TIME from SP5 on the TOWER Setpoint Screen must also be satisfied. The default for SP7 is 20%.

Figure 36: TOWER Setpoint - SP2 - (III) VALVE STAGE

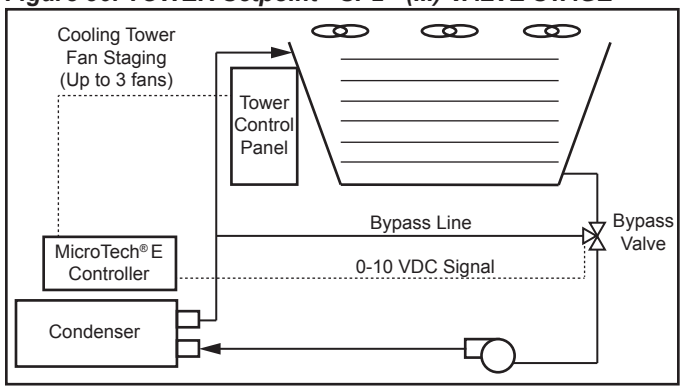
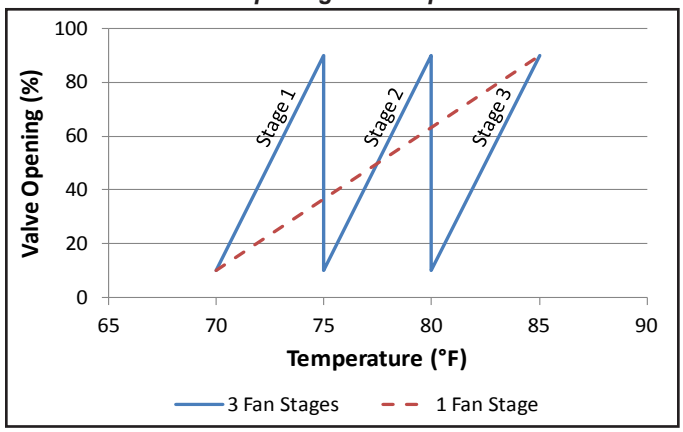


Figure 37: (III) VALVE STAGE - Valve Opening vs. Temperature



As shown in Figure 37, the default minimum and maximum valve opening positions are 10% and 90%, respectively. These minimum and maximum positions are adjustable anywhere between 0% and 100%. Additional fans stage on when the valve opening position reaches the maximum value that was set.

(IV) NONE: This control strategy is tower fan staging only. ***This is not a recommended strategy.*** In this mode the tower fan staging (up to three stages) is controlled by either the condenser Entering Water Temperature (EWT) or LIFT pressure (difference between the condenser and evaporator pressure). Tower bypass or fan speed are not controlled. See Figure 38 and Figure 39.

To set up in OITS,

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

A. TOWER Setpoint Screen

1. SP1. Select TEMP if control is based on condenser EWT or LIFT if based on compressor lift expressed in pressure.
2. SP2. Select NONE for no bypass valve or fan VFD control.
3. SP3. Select one to three 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.
4. SP4. Select FAN STAGE UP 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.
5. SP5. Select FAN STAGE DOWN 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.
6. If TEMP is selected in SP1, use
   a. SP6. Select STAGE DIFFERENTIAL in degrees F. Start with default of 3°F.
   b. SP8-10. 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, and 80°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.
7. If LIFT is selected in SP1, use
   a. SP7. Select STAGE DIFFERENTIAL in PSI. Start with default of 6.0 PSI.
   b. SP11-13. Start with default setpoints. The number of STAGE ON setpoints used must be the same as SP3.

Figure 38: TOWER Setpoint - SP2 - (IV) NONE

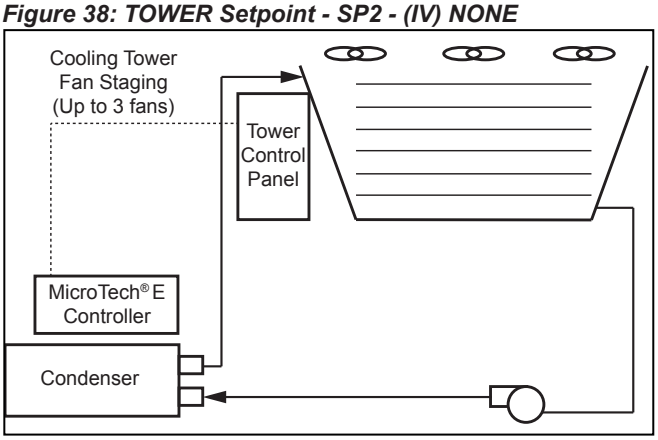
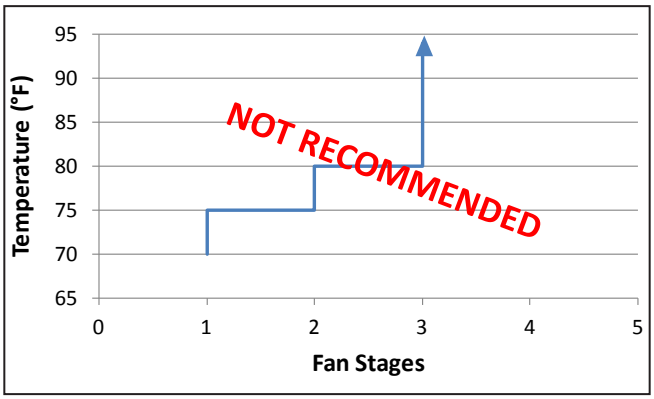


Figure 39: (IV) NONE - Temperature vs. Fan Stages



(V) VALVE SP /VFD STAGE: This control strategy is tower fan control with a VFD and bypass valve control. See Figure 40 and Figure 41.

To set up in OITS,

A. TOWER Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section I.A [the TOWER Setpoint Screen section for control strategy (I) NONE] except for SP2. For SP2, select VALVE SP/VFD STAGE.

B. VALVE Setpoint Screen

1. Use all of the same setpoint settings as those outlined in section II.B [the VALVE Setpoint Screen section for control strategy (II) VALVE SP].

Figure 40: TOWER Setpoint - SP2 - (V) VALVE SP/ VFD STAGE

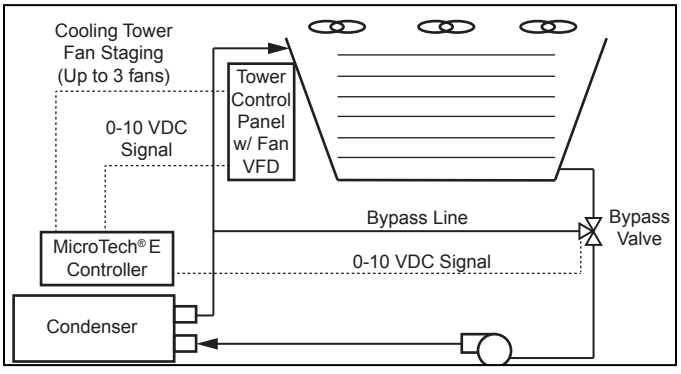
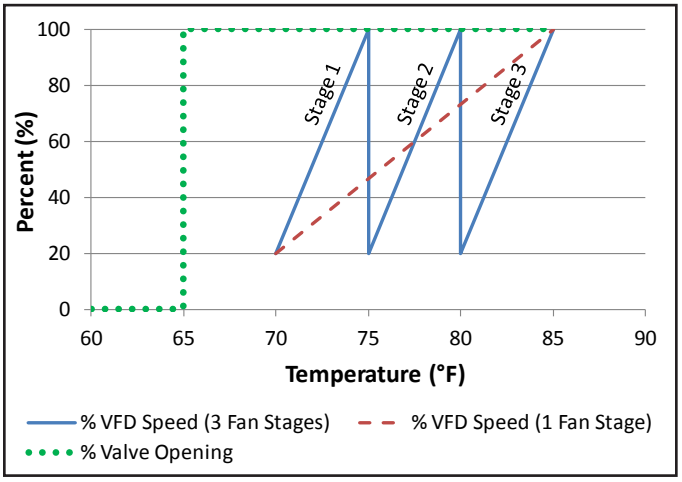


Figure 41: (V) VALVE SP / VFD STAGE - Percent vs. Temperature

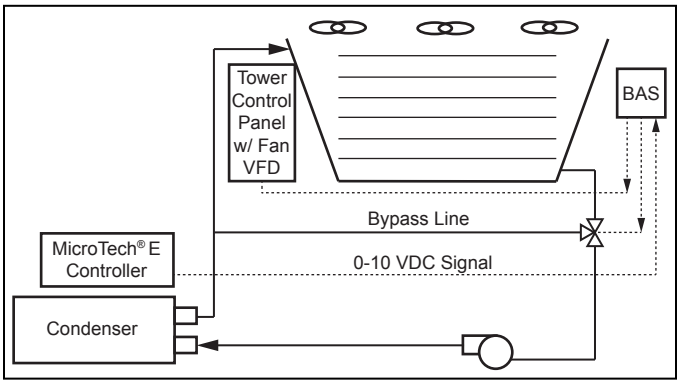


As shown in Figure 41, the default minimum and maximum VFD speeds are 20% and 100%, respectively. These minimum and maximum values are adjustable anywhere between 0% and 100%. Additional fans stage on when the VFD speed reaches the maximum value that was set. In addition, Figure 41 shows that the default temperature at which the valve opens completely is 65°F. This temperature is the Valve SP (also called Valve Target) and is adjustable.

BAS Alternate

In control strategies (I) through (V), the chiller MicroTech® III is directly controlling the cooling tower fan staging, variable frequency drives, and bypass valves. As an alternative, a BAS can control these components based on a signal from the MicroTech® III controller. See Figure 42.

Figure 42: BAS Alternate



POWER Setpoint Screen

Figure 43: POWER Setpoint Screen

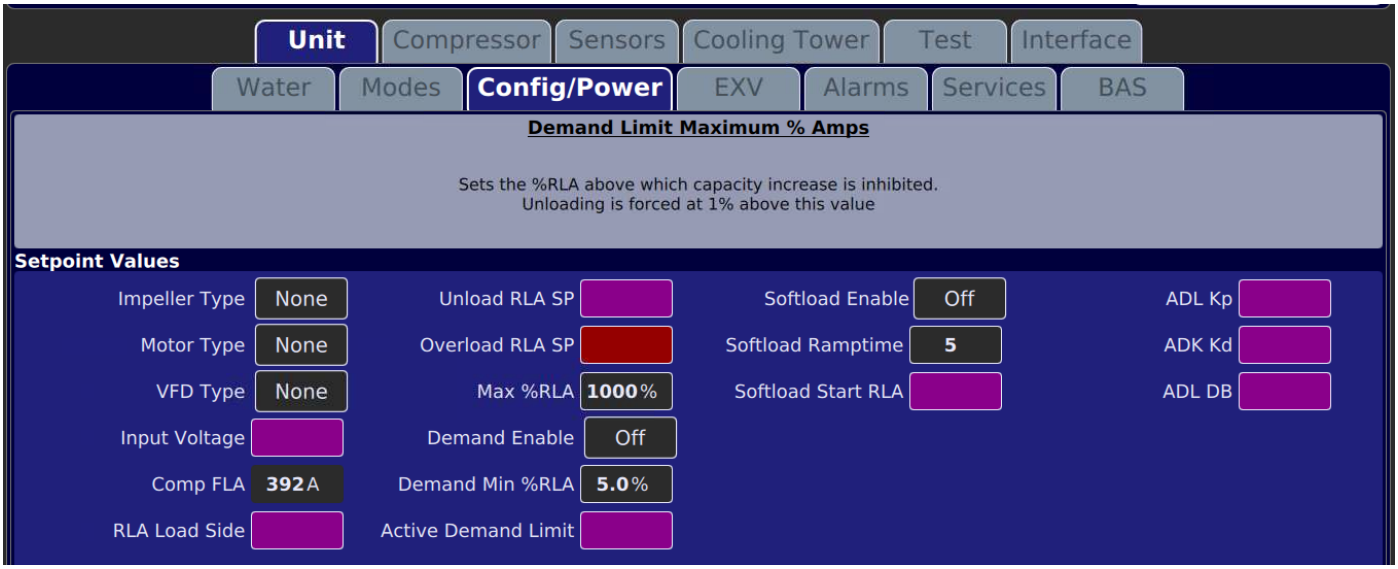


Table 12: POWER Setpoint Settings

Description	Default	Range	PW	Comments
Impeller Type	0501	0501, 0502, 0701, 0702	3	Sets compressor Impeller Type
Motor Type	M6	M6, M7, M8, M9	3	Sets compressor Motor Type
VFD Type	0590E2S	0520E2S, 0590E2S 0650G1S, 0650E2S 0740G1S, 160VG1S 200VG1S, 220VG1S 280VG1S	3	Sets VFD Model
Input Power	380	380V, 400V, 415V, 440V, 460V, 480V	3	Sets input power voltage of compressor.
Comp FLA	543		R	Full Load Amps of Compressor determined internally.
RLA Load Side	250	0 to 720A	3	Sets the Rated Load Amps (RLA) per compressor phase as given in the chiller nameplate - Load Side Phase Data.
Unload RLA SP	1.020	1.000 to 1.020	3	Sets %RLA unload factor to establish the maximum amps limit that compressor must unload.
Overload RLA SP	1.100	1.000 to 1.249	3	Sets %RLA overload factor to establish the maximum amps limit that compressor must shut down.
Max %RLA	100.0	20.0 to 100.0%	2	Inhibits capacity increase above the %RLA. Unloading is forced at 2% above this value.
Demand Enable	OFF	ON, OFF	2	ON: Limits %RLA to a value set by the Demand Limit analog input, where: 4mA = 0 %RLA 20mA = 100 %RLA OFF: The Demand Limit input is ignored.
Demand Min %RLA	5.0	5.0 to 80.0%	2	Sets the lowest limit of "Active Demand Limit" SP, which can be adjusted by Demand Limit analog input such as 4-20mA if the "Demand Enable" SP is ON.
Active Demand Limit			R	Setting to be same as "Max %RLA" SP or determined by the Demand Limit analog input if the "Demand Enable" SP is ON.
SoftLoad Enable	OFF	ON, OFF	2	ON: Soft loading is ON using "Soft Load Ramp Time" SP & "Softload Start RLA" SP. OFF: Soft Loading is disabled.
Softload Ramptime	5	1 to 60 min	2	Sets the time period over which the %RLA limit is increased from the "Softload Start RLA" SP value to 100%. Used with "Soft Load Enable" SP and "Soft Load Start RLA" SP
Softload Start RLA	40.0%	20.0 to 100.0%	2	Sets the initial %RLA limit for the soft load ramp. Used with "Soft Load Enable" SP and "Soft Load Ramp Time" SP
ADL Kp	8.0	0.0 to 16.0	3	Proportional Gain for Max Amp Limitation Control
ADK Kd	0.0	0.0 to 16.0	3	Derivative Gain for Max Amp Limitation Control
ADL DB	1.0	0.0 to 3.0%	3	Deadband for Max Amp Limitation Control

NOTE: Setpoints that have a technician level password (3) should only be changed by a Daikin Applied technician. Contact a Daikin Applied service representative for more information.

⚠ CAUTION

* Chiller Nameplate RLA **MUST** match chiller dataplate per compressor.

EXV Setpoint Screen

Figure 44: EXV Setpoint Screen

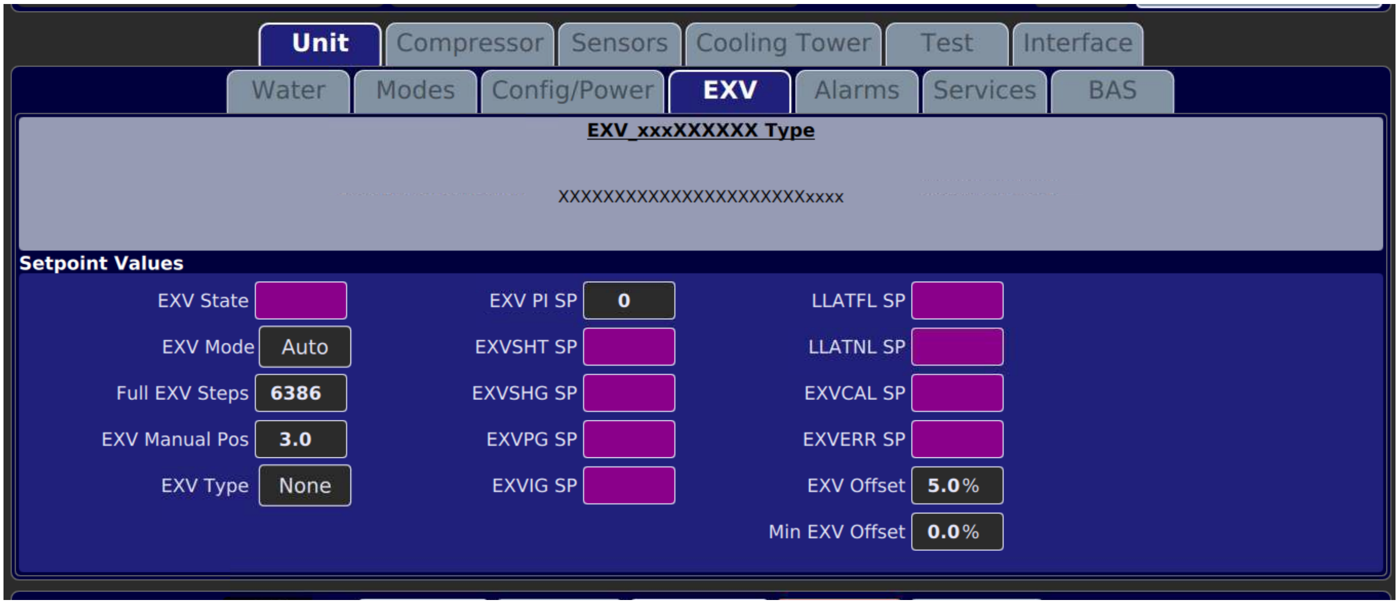


Table 13: EXV Setpoint Settings

Description	Default	Range	PW	Comments
EXV State	CLOSE	CLOSE, START, RUN	R	Status of Expansion Valve CLOSE: EXV is off. START: EXV is staring. RUN: EXV is running and being controlled by controller.
EXV Mode	AUTO	AUTO, MANUAL	3	AUTO: EXV Mode is ON and controlled automatically by controller. MANUAL: EXV position is controlled manually.
Full EXV Steps	6386	6386 for Single WME 2508 for Dual WME	R	Number of full travel steps of stepper motor to change EXV position 100%.
EXV Manual Pos	0	0 to 100 %	3	Set EXV position manually when "EXV Mode" is set to MANUAL.
EXV Type	Single	Single 1000T Dual 1500 Dual	3	Determine appropriate expansioin valve from list of applicable types.
EXV PI SP	OFF	ON, OFF	3	Activate PI Control logic. ON: PI control logic is On. OFF: PI control logic is Off.
EXVSHT SP	5.0	0.0 to 9.0 ∆°F	3	Set Suction Superheat target. Setpoint is effective only when EXV PI SP is ON.
EXVSHG SP	1.0	0.0 to 2.0	3	Set Superheat Gain setpoint for EXV PI Control. SP is effective only when EXV PI SP is ON.
EXVPG SP	2.0	0.0 to 5.0	3	Set Proportional Gain setpoint for EXV PI Control. SP is effective only when EXV PI SP is ON.
EXVIG SP	0.004	0.0 to 0.02	3	Set Integral Gain setpoint for EXV PI Control. SP is effective only when EXV PI SP is ON.
LLATFL SP	1.3	0.0 to 3.0 ∆°F	3	Set Liquid Line Approach Target for Full Load setpoint. SP is effective only when EXV PI SP is ON.
LLATNL SP	0.5	0.0 to 3.0 ∆°F	3	Set Liquid Line Approach Target for No Load setpoint. SP is effective only when EXV PI SP is ON.
EXVCAL SP	100%	50 to 200%	3	Set EXV Calibration setpoint. SP is effective only when EXV PI SP is ON.
EXVERR SP	0.78	0.00 to 1.00	3	EXV Efficiency Reduction Ratio
EXV Offset	0.0	-20.0 to 20.0%	3	EXV Position Offset
Min EXV Offset	0.0	0.0 to 20.0%	3	Min EXV Position Offset

Compressor Capacity Control

Compressor capacity is determined by the status of the leaving chilled water temperature (LWT), which is a direct indicator of whether the chiller is producing enough cooling to satisfy the cooling load. The LWT is compared to the active chilled water setpoint, and compressor loading or unloading ensues, considering any capacity overrides that may be in effect.

Capacity Overrides

The conditions described in the following subparagraphs override normal capacity control. Of the following limits, the one creating the lowest capacity limit is in effect.

Low Evaporator Pressure

If the evaporator pressure drops below the Low Evaporator Pressure – Inhibit setpoint, the unit will inhibit capacity increases. If the evaporator pressure drops below the Low Evaporator Pressure - Unload setpoint, the unit will begin capacity decreases.

High Motor Temperature

If the highest motor stator temperature is above the limit, the unit will adjust capacity to keep the temperature within the limits.

Soft Load

Soft Loading is a configurable function used at compressor startup to limit the maximum current draw on the compressor in a ramp-up type manner. It is only active on the first compressor to start. The setpoints that control this function are:

- Soft Load Enable– (ON/OFF)
- Initial Soft Load Limit – (%RLA)
- Maximum Amps – (%RLA)
- Soft Load Ramp Time – (seconds)

The active soft load limit value (in % RLA) increases linearly from the Initial Soft Load Limit setpoint to the Maximum Amps setpoint over the amount of time specified by the Soft Load Ramp Time setpoint. While this override is in effect, chiller capacity is continuously adjusted to keep the % RLA near the active soft load limit.

Maximum LWT Rate

The maximum rate at which the leaving water temperature can drop is limited at all times by the Maximum Rate setpoint. If the rate exceeds this setpoint, capacity increases are inhibited.

Demand Limit

The maximum amp draw of the compressor(s) can be limited by a 4 to 20 mA signal on the Demand Limit analog input. This function is only enabled if the Demand Limit Enable setpoint is set to ON. The amp limit decreases linearly from the Maximum Amp Limit setpoint (at 4 mA) to the Minimum Amp Limit setpoint (at 20mA). While this override is in effect, chiller capacity is continuously adjusted to keep the % RLA near the requested demand limit.

Network Limit

The maximum amp draw of the compressor (s) can be limited by a value sent through a BAS network connection and stored in the Network Limit variable. While this override is in effect, chiller capacity is continuously adjusted to keep the % RLA near the requested demand limit.

Maximum Amp Limit

The maximum amp draw of the compressor(s) is always limited by the Maximum Amps setpoint. This limit has priority over all other functions including manual capacity control. While this override is in effect, chiller capacity is continuously adjusted to keep the % RLA near the limit value.

UNIT Setpoints

Figure 45: UNIT Setpoint Screen

Table 14: UNIT Setpoint Settings

Description	Default	Range	PW	Comments
Unit Enable	STOP	STOP, OFF	1	OFF: Compressors, pumps & fans are OFF, AUTO: Evap pump is ON, Compressors, condenser pump & fans will operate as needed to maintain water temperature.
Unit Mode	COOL	COOL, TEST	2	COOL: Maintains evaporator LWT - Cool
Ctrl Source	LOCAL	LOCAL NETWORK REMOTE SW	2	Sets control source for Unit Enable, Mode, & LWT SPs. LOCAL: Control is from touchscreen or remote user NETWORK: Control is from the BAS network. REMOTE SW: As LOCAL except Unit Mode is controlled by the Mode Switch digital input.
Evap Recirc Timer	0.5	0.0 to 5.0 min	2	Sets the amount of time the evaporator pump must run before a compressor can start.
No start timer	60	10 to 300 sec	2	Sets the amount of time the compressor may be held in the START state before faulting.
Unload Timer	30	10 to 240 sec	2	Sets the maximum amount of time a compressor will unload before it turns OFF (goes to shutdown).
Start Relief Timer	15	5 to 60 sec	3	Set the amount of time for IGV to maintain at its starting position per "IGV Start Pos" SP after compressor start to keep load to motor within designed motor torque to prevent startup failure
Liq Inj Mode	OFF	OFF, AUTO	2	Used to reduce chiller sound level when set to AUTO.
High Lift Mode	IGV	NONE, IGV, RANGE EXT	3	Sets mininum chiller capacity to be handled with IGV or Range Extension (same as hot gas bypass)
REV Mode	AUTO	AUTO, MANUAL	3	AUTO: REV Mode is ON by setting "High Lift Mode" SP to RANGE EXT. MANUAL: REV position is set manually.
Rapid Restore	OFF	ON, OFF	R	Internal datapoint to enable Rapid Restore Mode to restore compressor rapidly after main power failure and restore. Rapid Restore hardware is rquired to enable the mode automatically.
Startup VFD Factor	0.70	0.00 to 1.00	3	Sets high compressor startup speed to prevent startup failure due to high lift condition.
Idle Speed Mode Rls	1.50	1.2 to 3.5	3	Set the pressure ratio that compressor can accelerate from idle speed to the calculated minimum speed.
Start to Start Timer	3	0 to 60 min	3	Sets the amount of time that must occur after a compressor starts until it can restart.
Stop to Start Timer	3	0 to 20 min	3	Sets the amount of time that must occur after a compressor stops until it can restart.
Cycle Timer	3	0 to 20 min	R	Internal timer to keep track of the remaining time of Stop-Start Timer after compressor shut down.
Clr Cycle Timer	NO	YES, NO	3	Clear Cycle timer (Stop-Start Timer) manually to shorten time for compressor to restart.

NOTE: Setpoints that have a technician level password (3) should only be changed by a Daikin Applied technician. Contact a Daikin Applied service representative for more information.

WATER Setpoints

Figure 46: WATER Setpoint Screen

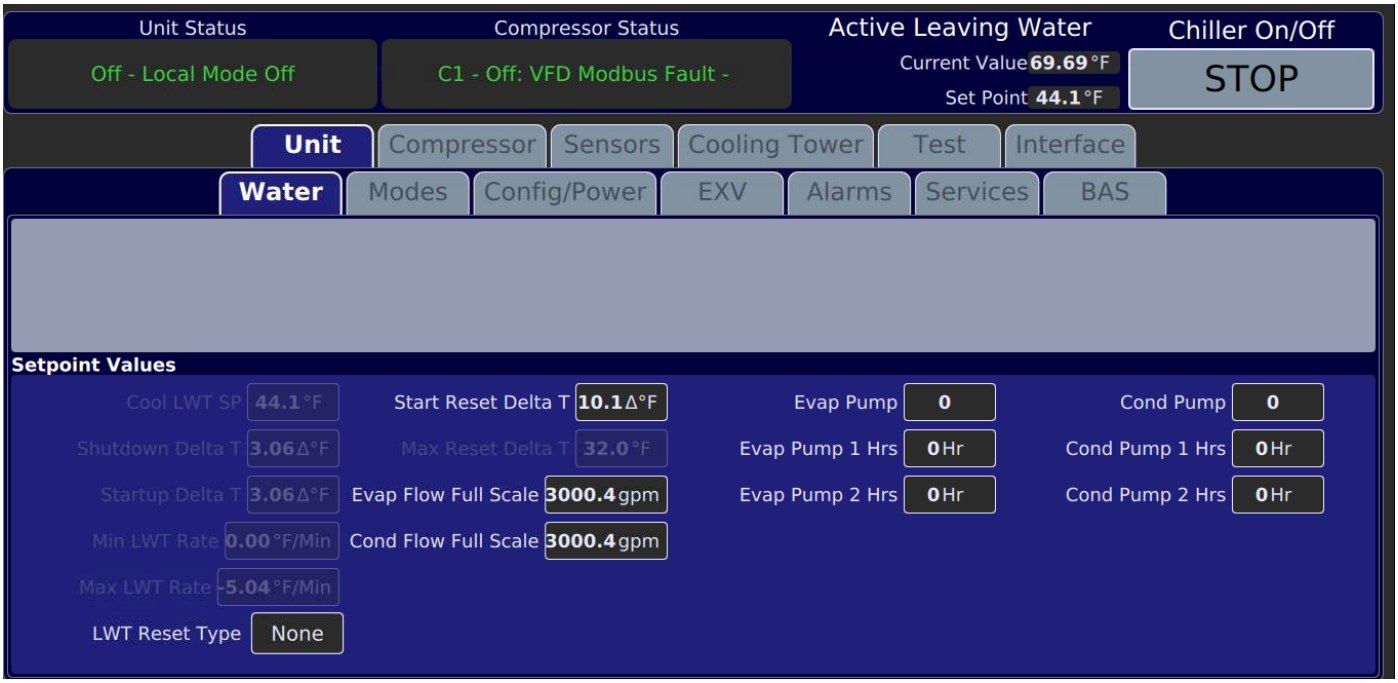


Table 15: WATER Setpoint Settings

Description	Default	Range	PW	Comments
Cool LWT SP	44.0	35.0 to 80.0 °F	2	Sets control target for evaporator leaving water temperature in COOL mode.
Shutdown Delta T	3.0	0.5 to 6 Δ°F	2	Sets amount leaving water must drop below setpoint for last compressor to stop.
Startup Delta T	3.0	0.2 to 10 Δ°F	2	Sets amount leaving water must go above for first compressor to start.
Min LWT Rate	0.1	0 to 5 °F/min	2	Sets the value below which an additional compressor can stage on.
Max LWT Rate	-5.0	-10 to 0 °F/min	2	If the LWT rate is above this value, capacity increase is inhibited.
LWT Reset Type	None	None Return 4-20mA	2	Reset raises LWT setpoint Return (uses "Start Reset Delta Temp" SP and "Max Reset Delta Temp" SP) 4-20mA (4mA=None,20mA=Max asset by "Max Reset Delta Temp" SP
Start Reset Delta T	10.0	5 to 20 Δ°F	2	Sets evaporator delta-T above which Return reset begins.
Max Reset Delta T	0.0	0 to 20 Δ°F	2	"LWT Reset Type" SP = Return: Sets the maximum LWT reset that can occur. "LWT Reset Type" SP = 4-20mA: Sets amount of reset at 20mA input.
Evap Flow Full Scale	3000	200 to 10000 GPM	2	Sets the full scale (20mA) value for the evaporator flow rate analog input
Cond Flow Full Scale	3000	200 to 10000 GPM	2	Sets the full scale (20mA) value for the condenser flow rate analog input
Evap Pump	Pump1 Only	Pump1 Only Pump2 Only Auto Pmp1 Priority Pmp2 Priority	2	Pump 1 ONLY: Use only Pump #1 Pump 2 ONLY: Use only Pump #2 AUTO: Balance hours between Pump 1 and Pump 2. Pmp 1 Priority: Use Pump 1. If it fails, then use Pump 2. Pmp 2 Priority: Use Pump 2. If it fails, then use Pump 1.
Evap Pump 1 Hrs	0	0 to 999999 Hrs	2	Number of hours of operation
Evap Pump 2 Hrs	0	0 to 999999 Hrs	2	Number of hours of operation
Cond Pump	Pump1 Only	Pump1 Only Pump2 Only Auto Pmp1 Priority Pmp2 Priority	2	Pump 1 ONLY: Use only Pump #1 Pump 2 ONLY: Use only Pump #2 AUTO: Balance hours between Pump 1 and Pump 2. Pmp 1 Priority: Use Pump 1. If it fails, then use Pump 2. Pmp 2 Priority: Use Pump 2. If it fails, then use Pump 1.
Cond Pump 1 Hrs	0	0 to 999999 Hrs	2	Number of hours of operation
Cond Pump 2 Hrs	0	0 to 999999 Hrs	2	Number of hours of operation

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 (Setpoint 6 of the WATER Setpoint Screen).

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:

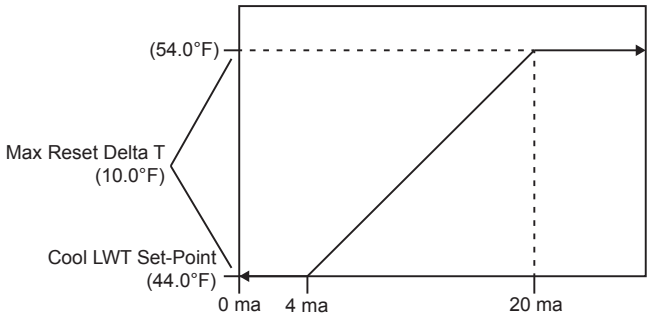
1. Cool LWT setpoint
2. Max Reset Delta T setpoint
3. Start Reset Delta T setpoint

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.

Reset Type – 4-20mA

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 in Figure 47.

Figure 47: LWT Reset (Cool Mode)

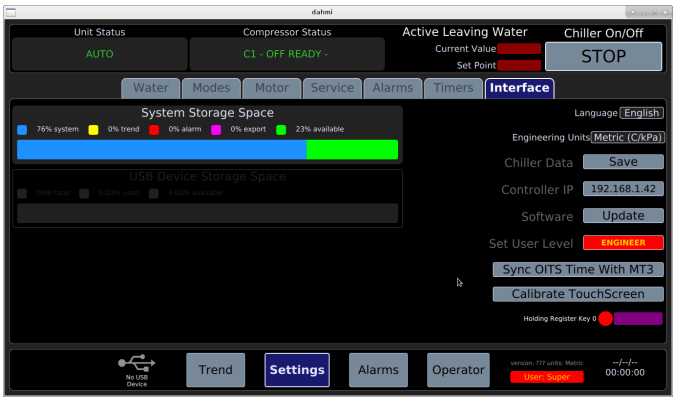


NOTE: Temperatures in Figure 47 are examples only.

Service Screen

The Service Screen (Figure 48) is accessed by pressing the SET button from any SET screen. In other words, it is the second “SET” screen. While containing information and activity buttons for the service technician, it also has valuable information for the operator.

Figure 48: Service Screen



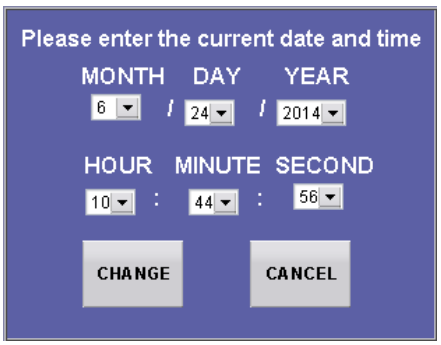
The upper left corner of the Service Screen contains compressor information such as operating hours and number of starts for each compressor. “Spare Capacity” is used to set the compressor stopping increments.

A matrix in the middle of the screen shows the chillers and compressors attached to the network. A green box indicates that a given controller is present and communicating. This is an effective means for verifying communication between units and compressors on the same network.

Pressing the Date/Time button on the right side of the Service Screen opens the Date and Time Prompt, shown in Figure 49. Use the drop down menus to select the appropriate date and time, then press CHANGE.

NOTE: It is likely that the chiller will contain the factory settings for date and time; therefore, it is important to verify or change these settings when the chiller is first used on the job-site. Failure to do so will result in incorrectly labeled History files.

Figure 49: Date and Time Prompt



The CHANGE button on the Service Screen allows selection of Inch-Pounds or Metric units of measure on the OITS.

The Authorize button is used to access the Password Prompt (see Figure 30 on page 28) to enter a password. When a password is active, the button will show “Unauthorize.”

The version numbers shown towards the bottom left of the screen are the controllers’ software identification. These numbers may be required by Daikin Applied to answer questions about unit operation or to assist in possible future upgrades of software.

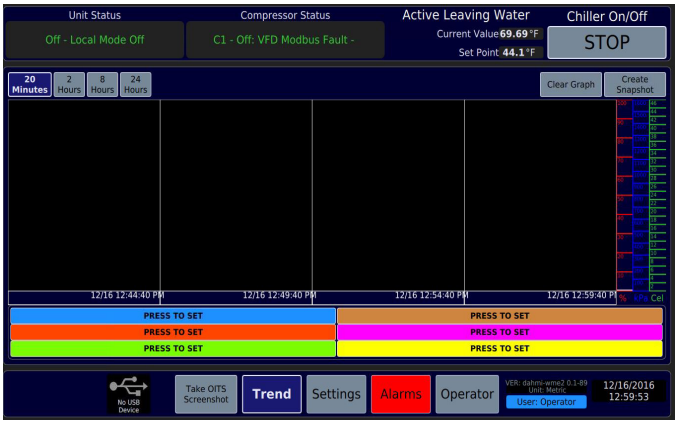
HISTORY Screens

The OITS is capable of storing two types of history: trend history and alarm history. These two types are described in the following sections.

Trend History Screen

The Trend History Screen (Figure 50) is accessed by clicking the TREND button at the bottom of any screen that contains this button.

Figure 50: Trend History Screen



The Trend History Screen allows the user to view the various parameters listed on the right side of the screen. The temperature scale in °F is on the left. Pressure in psi and % RLA are represented by the right-hand scale. The COMP button toggles between compressor #1 and compressor #2.

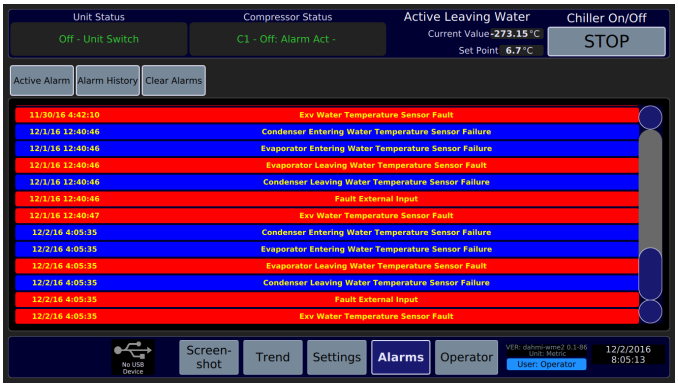
The Trend History Screen can display history for 8-hour, 2-hour, or 20-minute periods by pressing 8, 2, or 1/3, respectively. Pressing the NOW button for any time period will start the display for the current time beginning on the right of the screen with history flowing to the left. The arrow buttons scroll the time period forward or backward.

When the Unit Control Processor is powered on after being off, the Trend History Screen will only display the history starting from the time the Unit Control Processor was powered on. Previous trend history can be downloaded but there will be a gap in the data from when the Unit Control Processor was off. Trend history is not affected if only the OITS screen (not the Unit Control Processor) is off or in sleep mode. For details on how to download the trend history, reference the "Alarm History Screen" section starting on page 43.

Alarm History Screen

The Alarm History Screen (Figure 51) is accessed by clicking the ALARM button at the bottom of any screen that contains this button. An active alarm is shown in Figure 52.

Figure 51: Alarm History Screen



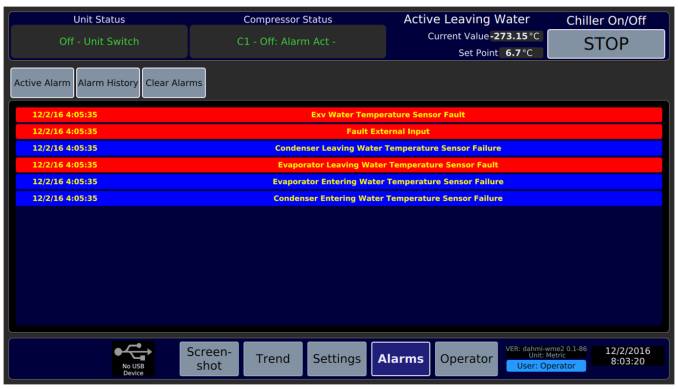
There are two types of alarms:

1. **Shutdown Alarm (Red)**- This is an equipment protection alarm that shuts a unit or compressor off.
2. **Limit Alarm (Yellow)**- This alarm limits compressor loading in response to an out-of-normal condition or may only be a notification to indicate that the condition requires attention. This alarm will not cause a shutdown. If the condition that caused a limit alarm is corrected, the alarm light will often be cleared automatically.

The Alarm History Screen displays a maximum of eight alarms with the most current alarm listed on top. Each alarm displays the date stamp, action taken, and the cause of the alarm. See the "Possible Alarms" section starting on page 45 for specifics on alarms that may occur.

If there is an active alarm, the ALARM button used to access the Alarm History Screen will be red. (In this manual, the red ALARM button is displayed as an example in Figure 20 on page 24.) On the Alarm History Screen, the active alarms can be recognized by a red box to the left of the alarm description. An inactive, cleared alarm will have a black box to the left of the alarm description.

Figure 52: Active Alarm Screen



After eliminating the cause of an active alarm, clear it by pressing the CLEAR button. This will change the box to the left of the alarm description from red (indicating active) to black (indicating inactive/cleared). If there are no remaining active alarms, the unit will restart after going through the start sequence. If the cause of an alarm is not remedied, the box to the left of the alarm description will remain red and the unit will not begin its starting sequence.

Although the Alarm History Screen only displays the eight most current alarms, a record of ALL alarms is stored in the Unit Control Processor. Note that this record may include alarms that occurred when the chiller was in the factory. This record is maintained even if the Unit Control Processor is powered off. When the OITS is powered back on, the last eight alarms will show back up on the Alarm History Screen and all alarm history will still be available for download. (The download process is described next.)

Downloading Trend History and Alarm History

The download button on the Alarm History Screen (Figure 51) can be used to download the trend history and the alarm history via USB. In order to download the trend and alarm history:

1. Insert a USB drive into the side of the OITS monitor.

NOTE: One of the USB ports will have a USB cable going to J13. Do NOT unplug this cable.

Do not remove the main USB drive located behind the metal bracket.

Thirty MB per day should be available on the USB drive that is inserted for the download of the trend and alarm history. There is no warning of insufficient space.

2. If an error message that states “Error mounting the USB drive” appears on the OITS, remove and re-install the USB drive. If the problem persists, try a different USB drive. Name brand USB drives are recommended.

NOTE: Often times, this error message is due to not allowing sufficient time between inserting the USB drive and pressing the DOWNLOAD button (see Step 4 below).

3. Using the calendar on the Alarm History Screen, choose the desired date.
4. Press the DOWNLOAD button. This will download the trend and alarm history for the selected day. (The Unit Control Processor will store 30 days of history at a maximum. The Unit Control Processor will automatically delete old trend history files as needed to make room for new trend history files. Old alarm history files are not deleted.) The OITS will display "download complete" once the history files have been successfully transferred to the USB drive.
5. Repeat this process for each desired day of history. Each day must be downloaded individually. It is not possible to download multiple days of history at once.

Viewing/Using Trend History Files:

Trend history files can be recognized by “trend.log” at the end of the file name. The front of the file name will contain the date and hour. For example, if there is a file called “2014-06-23-08-UTC_trnd.log,” it indicates that the file contains trend history from 6/23/2014. The “08” in the example represents the eighth hour of the day (8:00 am) and “UTC” represents the time zone. When the history is downloaded, there will be one trend history file per hour of the day. Therefore, if the history is downloaded for any previous day, there will be twenty-four trend history files. If the history is downloaded for the current day, there will only be trend history files for each hour up until the current hour. For example, if the history was downloaded at 8:00 am, there will be eight trend history files.

NOTE: This assumes that the chiller was powered on for at least some portion of every hour. No hourly trend history file is created when the chiller is powered off.

Trend history files can only be opened by a Daikin Applied technician. Contact a Daikin Applied service representative for more information.

Viewing/Using Alarm History Files:

Alarm history files can be recognized by “alarms.csv” at the end of the file name. The front of the file name will contain the date. For example, if there is a file called “2014-06-23_alarms.csv,” it indicates that the file contains alarm history from 6/23/2014. When the history is downloaded, there will only be one alarm history file per day (unlike the trend history where there is one file per hour of the day). This one alarm history file will contain all of the alarms from the selected day. If there were no alarms that day, no alarm history file will appear when the history is downloaded.

All alarm history files are saved from the Unit Control Processor as .csv files. These files can be opened on a normal PC and manipulated using Microsoft Excel for personal use.

Requesting Tech Support:

When the trend and alarm history is downloaded for a desired day, there will be two additional file types that are downloaded as well: **events.log** and **gblCom.csv**.

If tech support is requested, ALL of the original (un-manipulated) files (trnd.log, alarms.csv, events.log, and gblCom.csv) must be sent together to Daikin Applied. Any other file formats are NOT accepted.

Possible Alarms

There are two types of alarms: shutdowns and limits. Shutdown alarms are equipment protection alarms that shut a unit or compressor off. Limit alarms limit compressor loading in response to an out-of-normal condition or may only be a notification to indicate that the condition requires attention. A limit alarm will not cause a shutdown. See the following tables for examples of shutdowns and limits that can occur.

NOTE: In the "Clear" column of the following tables, "Auto" indicates that the alarm will auto-clear after the condition is resolved and the normal condition returns.

Table 16: Shutdown Alarms

Screen Text	Occurs When	Troubleshooting	Clear
Evaporator Pressure Low	Evaporator Press < Low Evap Pressure-Stop SP for 60 sec. Delay reduces linearly to 10 sec at 10 psi below SP, then drops to 0 below 10 psi below SP	Causes: Low or No Evaporator Water Flow. Low refrigerant level in evaporator. Incorrect setpoint value for leaving water temperature.	Manual
Discharge Pressure High	Discharge pressure > High Discharge Temperature SP	Causes: Low or No Condenser Water Flow	Manual
Timer Expired No Start	Compressor state = START for > No Start Timer SP. Time is extended indefinitely if motor is spinning	Causes: Low or No Condenser Water Flow	Manual
Motor Current Low	%RLA < Motor Current Threshold SP with Compressor ON for 60 sec	Causes: Incorrect setting for Motor Current Threshold SP. No VFD enable signal at VFD (wiring or bearing controller fault)	Manual
Discharge Temperature High	Temperature > High Discharge Temp-Stop SP	Causes: Low or No Condenser Water Flow	Manual
Mechanical High Pressure	Digital Input on VFD = High Pressure (switch open) (this switch connects directly to the VFD)	Causes: Low or No condenser water flow, HPS failure	Manual
Motor Stator Temperature High	Analog Motor Temp (any sensor) > 300°F	Rotor and/or stator cooling circuit fault Causes: Motor stator cooling solenoid not open, rotor cooling stepper motor not functioning correctly, motor rotor superheat or gain setpoints incorrect (contact factory)	Manual
Motor Gap Temperature High	Motor Gap Temperature > 130°F	Rotor and/or stator cooling circuit fault. Causes: Motor stator cooling solenoid not open, motor rotor cooling stepper motor not opening, motor rotor superheat or gain setpoints incorrect (contact factory)	Manual
Rotor Pump Superheat Low	Rotor Pump Superheat (Rotor Pump Temp – Saturated Suction Temp) < 5°F for 5 minutes with compressor running	Rotor cooling circuit fault. Causes: rotor cooling valve stuck open, motor rotor superheat or gain setpoints incorrect (contact factory)	Manual
Surge Temperature	FOR Surge Temp (ST) = Sctn Temp – Evap LWT: IF (ST < Surge Temp Limit SP at compressor start) THEN (alarm if ST > 2 X Surge Temp Limit SP) ELSE (alarm if ST slope > Surge Slope Limit SP until ST < Surge Temp Limit SP , then alarm if ST > 2 X Surge Temp Limit SP).	Compressor Surge detected. Causes: Compressor Surge/Stall line not set properly (see setpoint section), loss of condenser or evaporator GPM, low evaporator or condenser GPM, condenser fouling	Manual
Motor Start Failure	(Motor speed not = speed command (+/- 30%) AND Compressor ON) for > 3 minutes	Motor did not start. Causes: VFD control failure Check VFD enable signal wiring, Check VFD breaker	Manual
No Compressor Stop	%RLA > Motor Current Threshold SP with Compressor OFF for 120	Motor running while it should be off. Causes: VFD enable relay failure, VFD CTs failure, VFD loss of communications.	Manual
VFD Fault	VFD Fault AND Compressor State = FLOAT, START, RUN, or UNLOAD	General VFD fault. Normally accompanied by another fault.	Manual
VFD Reference Fault	Failure to calculate speed pulse reference position at 900 rpm (1000 rpm on 700RT compressor)	Speed pulse feedback not present: Causes: Speed sensor fault, speed sensor wiring fault, VFD controller fault	Manual
VFD Loss of Motor Sync	Loss of VFD phase lock loop synchronization	Speed pulse loss while running Causes: Speed sensor fault, speed sensor wiring fault, VFD controller fault	Manual
VFD Motor Stall	No speed pulse detected when motor should be running	Speed pulse feedback not present: Causes: Speed sensor fault, speed sensor wiring fault, VFD controller fault	Manual
VFD Speed Command Fault	Commanded speed fault	Motor speed outside of expected range. Causes: Speed sensor fault, speed sensor wiring fault, VFD controller fault	Manual
VFD Cooling Fan Fault	Fan current not detected	Fan is stopped - Causes: Fan failure, fan breaker open. All fans running - Causes: Check fan CT wiring, check VFD controller	Manual
VFD Maintenance Mode	Maintenance mode switch activated	Jumper missing. See VFD schematic. Jumper required for normal chiller operation	Manual

Table 16 continued: Shutdown Alarms

Screen Text	Occurs When	Troubleshooting	Clear
Suction Pressure Sensor Fault	Sensor shorted or open (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Manual
Discharge Pressure Sensor Fault	Sensor shorted or open (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Manual
Condenser Rfr Ckt #1 Pressure Sensor Fault	Sensor shorted or open (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Manual
Suction Temperature Sensor Fault	Sensor shorted or open (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Manual
Discharge Temperature Sensor Fault	Sensor shorted or open (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Manual
Motor Gap Temperature Sensor Fault	Sensor shorted or open (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Manual
Rotor Pump Temperature Sensor Fault	Sensor shorted or open (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Manual
Compressor Surge/ Bearing Orbit	Mag bearings exceed allowable orbit or sensor fault	Causes: Compressor dynamic load change, compressor surge, improperly set stall/surge line setpoints, bearing controller fault or bearing amplifier fault Contact factory if persistent.	Manual
Communications Fault	Loss of communications between compressor and chiller controller or VFD	Check wiring and verify correct software versions	Manual
Evaporator Leaving Water Temperature Sensor Fault	Sensor shorted or open (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Manual
Software Fault	Controller internal check failure	Causes: Compressor controller fault. If persistent, contact factory.	Manual
Evaporator Water Flow Loss	Evaporator Flow DI = No Flow for > Evap Flow Loss Delay SP **OR** (No Flow **AND** shutdown due to low evap pressure **OR** bearing fault) with compressor running. (Alarm is masked during power fail — timer restarts after power returns)	Causes: Loss of evaporator flow, evaporator pump off, evap head gasket leaking or missing, sensor wiring fault, evaporator flow sensor failure	Manual
Condenser Water Flow Loss	Condenser Flow DI = No Flow for > Cond Flow Loss Delay SP **OR** (No Flow **AND** shutdown due to high Cond pressure **OR** bearing fault) with compressor running. (Alarm is masked during power fail — timer restarts after power returns)	Causes: Loss of condenser flow, condenser pump off, condenser head gasket leaking or missing, sensor wiring fault, condenser flow sensor failure	Manual

Table 17: Limit Alarms

Screen Text	Occurs When	Troubleshooting	Clear
Low Evaporator Pressure – Inhibit Loading	Suction Pressure < (Low Evap Press - Stop SP) + (Low Evap Pressure Delta SP)	Causes: Low evaporator water flow rate, low refrigerant in chiller, setpoints incorrect for operating conditions	Auto
Evaporator Pressure Low (Freeze)	Saturated Suction Temp < Evaporator Freeze Protect SP	Causes: Low evaporator water flow rate, low refrigerant in chiller, setpoints incorrect for operating conditions	Auto
Condenser pressure Low (Freeze)	Saturated Cond Temp < Condenser Freeze Protect SP	Causes: Low evaporator water flow rate, low refrigerant in chiller, setpoints incorrect for operating conditions	Auto
Discharge Temperature High	Temperature > High Discharge Temperature-Load SP	Causes: Low or No Condenser Water Flow	Auto
Software Problem (Compressor)	Controller internal check failure	Causes: Compressor control fault. Contact factory if persistent.	None
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]	Evaporator flow not detected. Causes: improper pump wiring	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]	Evaporator flow not detected. Causes: improper pump wiring	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]	Condenser flow not detected. Causes: improper pump wiring	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]	Condenser flow not detected. Causes: improper pump wiring	Manual
Evaporator Entering Water Temperature Sensor Fault	Sensor fault (Input voltage < 0.2 OR > 4.6 volts) AND the LWT Reset Type SP is set to RETURN	Causes: Sensor wiring fault, sensor fault	Manual
Evaporator Entering Temperature Sensor Fault	Sensor is open or shorted (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Auto
Condenser Entering Temperature Sensor Fault	Sensor is open or shorted (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Auto
Condenser Leaving Temperature Sensor Fault	Sensor is open or shorted (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Auto
Liquid Line #1 Refrigerant Temperature Sensor Fault	Sensor is open or shorted (Input voltage < 0.2 OR > 4.6 volts)	Causes: Sensor wiring fault, sensor fault	Auto
System Fault	Controller internal fault	Causes: controller fault. If persistent contact factory.	None

Controller Inputs and Outputs

As outlined below, inputs and outputs vary between the unit controller and the compressor controller.

Unit Controller Inputs and Outputs

The following tables list the unit controller inputs and outputs, both analog and digital, as well as the stepper motor outputs.

Table 18: Unit Controller, Analog Inputs

#	Description	Wiring	Source	Signal	Sensor Range
1	Evaporator Water Flow Rate	Field	Water Flow Sensor	4 to 20 mA Current	0 to 10,000 gpm
2	Condenser Water Flow Rate	Field	Water Flow Sensor	4 to 20 mA Current	0 to 10,000 gpm
3	Reset of Leaving Water Temperature	Field	BAS	4 to 20 mA Current	0 to 100%
4	Demand Limit	Field	BAS	4 to 20 mA Current	0 to 100%

Table 19: Unit Controller, Digital Inputs

#	Description	Wiring	Signal Source	States (Open / Closed)
1	Front Panel “Stop/Auto” Switch	Chiller	Isolated Switch Contacts	Stop / Auto
2	Remote Start/Stop	Field	Isolated Switch or Relay Contacts	Stop / Auto
3	Mode Switch (not used)	Field	Isolated Switch or Relay Contacts	Normal / Alternate Mode
4	Evaporator Water Flow Switch	Chiller & Field (in series)	Isolated Flow Switch Contacts	No Flow / Flow
5	Condenser Water Flow Switch	Chiller & Field (in series)	Isolated Flow Switch Contacts	No Flow / Flow
6	Compressor Manual OFF Switch	Chiller	Isolated Switch Contact	Stop/Auto

Table 20: Unit Controller, Analog Outputs

#	Description	Output Signal	Sensor Range
1	Cooling Tower Bypass Valve Position	0 to 10 VDC	0 to 100% Open
2	Cooling Tower VFD Speed	0 to 10 VDC	0 to 100%

NOTE: “Sensor Range” indicates the range of the output, NOT the operating range of the chiller.

Table 21: Unit Controller, Digital Outputs

#	Description	Load	Rating
1	Alarm	Indicator Light	240 VAC
2	Evaporator Water Pump #1	Pump Contactor	240 VAC
3	Evaporator Water Pump #2	Pump Contactor	240 VAC
4	Condenser Water Pump #1	Pump Contactor	240 VAC
5	Condenser Water Pump #2	Pump Contactor	240 VAC
6	Cooling Tower Fan #1	Fan Contactor	240 VAC
7	Cooling Tower Fan #2	Fan Contactor	240 VAC
8	Cooling Tower Fan #3	Fan Contactor	240 VAC

Table 22: Unit Controller, Stepper Motor Outputs

#	Description	Motor Type
1	Electronic Expansion Valve	2 Phase Bipolar
2	Part Load Balancing Valve	2 Phase Bipolar

Compressor Controller Inputs and Outputs

The following tables list the compressor controller analog inputs and digital outputs as well as the stepper motor outputs.

Table 23: Compressor Controller, Analog Inputs

#	Description	Source	Signal	Sensor Range
1	Compressor Suction Temperature	NTC Thermistor	10k @ 25°C	-40 to 125°C
2	Compressor Discharge Temperature	NTC Thermistor	10k @ 25°C	-40 to 125°C
3	Suction Refrigerant Pressure	Sealed Gage Transducer	0.5 to 4.5 VDC nominal	0 to 132 psi
4	Discharge Refrigerant Pressure	Sealed Gage Transducer	0.5 to 4.5 VDC nominal	0 to 410 psi
5	Rotor Pump Temperature	NTC Thermistor	10k @ 25°C	-40 to 125°C
6	Inlet Guide Vane Position	Rotary Transducer	1.5 to 2.6 VDC nominal	Closed to Open
7	Motor Winding Temperature 1	NTC Thermistor	10k @ 25°C	-40 to 150°C
8	Motor Winding Temperature 2	NTC Thermistor	10k @ 25°C	-40 to 150°C
9	Motor Winding Temperature 3	NTC Thermistor	10k @ 25°C	-40 to 150°C
10	Motor Case Temperature	NTC Thermistor	10k @ 25°C	-40 to 125°C
11	Motor Gap Temperature	NTC Thermistor	10k @ 25°C	-40 to 125°C

Table 24: Compressor Controller, Digital Outputs

#	Description	Load	Output OFF	Output ON
1	VFD Enable	VFD	Compressor OFF	Compressor ON
2	Liquid Injection	Solenoid (24 VDC, 20 VA max)	No Injection	Injection
3	Stator Cooling	Solenoid (24 VDC, 20 VA max)	Cooling OFF	Cooling ON

Table 25: Compressor Controller, Stepper Motor Outputs

#	Description	Load
1	Inlet Guide Vane Position	2 Phase Bipolar
2	Rotor Cooling	2 Phase Bipolar

Building Automation Systems (BAS)

All MicroTech® III controllers with Open Choices™ are capable of BAS communications, providing easy integration and comprehensive monitoring, control, and two-way data exchange with open standard protocols such as LonTalk®, Modbus® or BACnet®.

Daikin Applied unit controllers strictly conform to the interoperability guidelines of the LonMark® Interoperability Association and BACnet® International. They have received LonMark® certification with optional LONWORKS® communication module.

Protocol Options

The following protocol options are available:

- BACnet® MS/TP
- BACnet® IP
- BACnet® Ethernet
- LONWORKS®
- Modbus® RTU

The BAS communication module can be ordered with the chiller and factory-mounted or can be field-mounted at any time after the chiller unit is installed. Connection to the chiller for all BAS protocols will be at the unit controller. An interface card, depending on the protocol being used, will have been factory installed in the unit controller if so ordered, or it can be field installed.

If an interface module was ordered, the appropriate BAS interface installation manual was shipped with the unit. If necessary, contact your local Daikin Applied sales office for a replacement manual or obtain one from www.DaikinApplied.com. These documents can be easily found on the website using the “Search Literature” feature.

Use with On-Site Generators

All Magnitude® Model WME chillers have their compressors operated with variable frequency drives and, if the unit has two compressors, the compressors start sequentially in the normal start/load sequence. These features make Magnitude® chillers especially appropriate for use in applications where they may be required to run with on-site electrical generators. This is particularly true when the generators are used for temporary power when the utility power is lost.

Generator Sizing

Natural gas and diesel generators are sensitive to the peak current loads of the chiller. Although the normal VFD start sequence does not require these peak values of current, certain dynamic conditions such as changes in water flow and temperature or momentary power interruptions can cause high peak electrical currents. Use the electrical data either on the VFD data plate or supplied with the chiller performance rating sheet – obtained from the Daikin Applied sales office – for generator sizing purposes. The referenced data will show the RLA and LRA, which is for each compressor. It is important to size the generator to handle the LRA value.

⚠ WARNING

Generator must be sized by an electrical engineer familiar with generator applications.

Transfer Back to Grid Power

Due to the special VFD incorporated in all WME chillers and the system’s inherent ride-through capabilities, transfer from grid power to stand-by generator power and back to grid power can be done at any time. The duration of power interruption during the transfer process will determine how the chiller will respond. While the compressor rotor is still spinning at adequate speed, power is generated internally to keep the bearings and all control electronics operating. Power interruptions of various durations will cause different restart scenarios as described below.

1. **Short:** Interruptions of only a few seconds will allow a running compressor to return to operating speed almost immediately. (NOTE: If the operating pressure ratio is high at the time of interruption, there may be a short delay in return to operating speed.)
2. **Medium:** For interruptions that cause the compressor to coast down below about 3500 rpm (but still generating control power), the compressor will continue coasting to a stop, and then restart.
3. **Long:** Once the compressor coasts nearly to a stop, control power is lost and the controllers must reboot normally when either grid power or emergency generator power is reinstated. (NOTE: If the RapidRestore® option is installed, the time required to restart is reduced to only a few seconds.)

Service Programs

It is important that an air conditioning system receive adequate maintenance if the full equipment life and full system benefits are to be realized. Maintenance should be an ongoing program from the time the system is initially started. A full inspection should be made after 3 to 4 weeks of normal operation on a new installation and on a regular basis thereafter.

Daikin Applied offers a variety of maintenance services through the local Daikin Applied service office and can tailor these services to suit the needs of the building owner. Most popular among these services is the Daikin Applied Comprehensive Maintenance Contract. For further information concerning the many services available, contact your local Daikin Applied service office.

Chiller Maintenance

⚠ DANGER

Use approved Lock Out / Tag Out procedures to disconnect power from the unit. Wait 20 minutes after disconnecting power from the unit before opening any compressor access covers. The DC link capacitors store enough energy to cause electrocution.

Electrical System

Maintenance of the electrical system involves the general requirement of keeping connections clean and tight. Pump interlocks and flow switches should be checked to be sure they interrupt the control circuit when tripped.

Cleaning and Preserving

A common cause of service calls and equipment malfunction is dirt. This can be prevented with normal maintenance. The system components most subject to dirt are:

1. Strainers: Remove and clean strainers in the chilled water system and condenser water system at every inspection.
2. Condenser Tubes: Inspect the condenser tubes annually for fouling and clean if required. The standard waterboxes should be removed with care due to their weight. One method for handling standard waterboxes follows (only qualified service personnel should perform these tasks):
    - After draining water, remove all but two head bolts at roughly 10 and 2 o'clock.
    - Loosen the remaining two bolts to enable the head to be separated from the tube sheet sufficiently for a clevis pin or hook to be inserted into an open bolt hole at the top of the head.
    - Attach a hoist to the pin or hook, lift the head to remove weight from the two remaining bolts, remove the bolts, and carefully remove the head.
    - Do not try to install a machine thread eyebolt into the head vent fitting, which has pipe threads.
    - Reverse this procedure to mount the head, using a new gasket.
3. Condenser Flow Sensor: The condenser sensor should be cleaned anytime the condenser is opened. This should typically be performed at the annual inspection; however, more frequent cleaning may be required depending on the conditions of the jobsite. Recommended maintenance includes the following:
    - Check the sensor tip for buildup.
    - Clean the tip using a soft cloth. Stubborn buildup — such as lime — can be removed using a common vinegar cleaning agent.

Water Treatment

Special care must be taken when utilizing open system water that is usually not treated (such as lakes, rivers, and ponds). The use of untreated water will result in corrosion, erosion, slime buildup, scaling, or algae formation. Water treatment service must be used. Special tube and water head material may be required to reduce damage from corrosion. Daikin Applied is not responsible for damage or faulty operation from untreated or improperly treated water.

Seasonal Shutdown

⚠ CAUTION

The condenser and evaporator are not self-draining. Where the chiller can be subject to freezing temperatures, the condenser and evaporator must be drained of all water. Water permitted to remain in the piping and vessels can rupture these parts if subjected to freezing temperatures. Dry air blown through the vessels will aid in forcing all water out.

Except for freezing conditions, it is desirable to leave water in the vessels to avoid long term exposure to air.

Continuous forced circulation of antifreeze through the vessels is one method of avoiding freeze up.

Seasonal Startup

Seasonal startup procedures are as follows:

1. Leak test the unit.
2. Check and tighten all electrical connections.
3. Replace the drain plugs (including cooling tower pump and tower drain) if they were removed at shutdown the previous season.

Maintenance Schedule

Table 26 provides an overview of recommended maintenance procedures along with how frequently these procedures should be performed.

Table 26: Recommended Maintenance Schedule

	Monthly	Quarterly	Semi-Annually	Annually	As Required By Performance	During Seasonal Shutdown	During Seasonal Startup
I. Compressor							
A. Analyze Compressor Fault Log		X					
B. Check IGV operation		X					
C. Check and tighten compressor electrical connections				X			
II. MicroTech® E Controls							
A. Check for proper settings		X					
B. Verify transducers and sensors for accuracy		X					
C. Retrieve and archive OITS Trend Logs	O						
D. Perform MicroTech® III check, log, and last fault analysis		X					
III. Condenser							
A. Confirm correct water flow and pressure drop	O	X					
B. Confirm appropriate water treatment	O						
C. Clean and Leak Test condenser tubes				X	X	X	
D. Eddy Current Test - tube wall thickness					X		
E. Seasonal Protection					X		
F. Clean Flow Sensor				X	X		
IV. Evaporator							
A. Confirm correct water flow and pressure drop	O	X					
B. Confirm appropriate water treatment	O						
C. Clean and Leak Test evaporator tubes					X		
D. Eddy Current Test - tube wall thickness					X		
E. Seasonal Protection					X		
F. Clean Flow Sensor				X			
V. Chiller Unit							
A. Run Test / Performance Evaluation		X					
B. Leak Test entire unit		X				X	X
C. General Appearance:							
1. Paint / Corrosion					X		
2. Insulation					X		
VII. Electrical							
A. Check and record line voltage		X					
B. Inspect power components for signs of overheating		X					
C. Check and tighten unit electrical components				X			X

Key: O = Performed by owner personnel X = Performed by qualified service personnel

Definitions

Active Amp Limit

Active amp limit is the actual amp limit in effect at any given time. It is the lowest value of any active external inputs and internal setpoints.

Active LWT Setpoint

The active LWT (leaving water temperature) setpoint is the actual target value for leaving water temperature in effect at any given time. It is the Leaving Water Temp - Cool setpoint as modified by any active LWT reset input.

Dead Band

The dead band is a range of values for a controlled variable over which no action is taken by the controller.

Demand Limit

A signal from the User Interface or the BAS that limits the compressor loading to a designated percent of full load. This function limits the %RLA value.

Discharge Superheat

Discharge superheat is calculated using the following equation:

Discharge Superheat = Discharge Temperature – Discharge Saturated Temperature

ELWT

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

ELWT Error

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

ELWT Slope

The ELWT slope is an indication of the trend of the chilled water temperature. It shows whether the temperature is increasing or decreasing and how quickly.

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/Condenser Approach

The evaporator/condenser approach is calculated as follows:

Evap Approach = LWT – Saturated Temperature

Cond Approach = Saturated Temperature – LWT

Evap Recirc (Evaporator Recirculation) Timer

A timing function, with a 30-second default, that holds off starting the chiller until the building/evaporator loop has had time to settle to a good indication of the actual temperature. This delay helps prevent false decisions by the start logic regarding the need for cooling.

EXV

Electronic expansion valve, used to control the flow of refrigerant from condenser to evaporator.

Lenient Flow Logic

This logic allows the chiller to continue to run with loss of flow indication as long as no other fault occurs and the associated Flow Loss Delay timer is not exceeded.

Load Balance

Load balance is a technique that equally distributes the total unit load between two or more running compressors. On the WME, this function uses compressor power.

Low Pressure Delta Setpoint

Chiller logic attempts to prevent low pressure shutdowns by keeping evaporator pressure above the shutdown limit. The target low pressure limit is the Low Evap Pressure Stop setpoint plus the Low Evap Pressure Delta setpoint.

LRA

Locked rotor amps.

Maximum Compressor Speed

The maximum compressor speed is a fixed value based on the impeller size.

Minimum Compressor Speed

The minimum compressor speed is a dynamically calculated value based on operating conditions that is further limited on the low side by the VFD Minimum Speed setpoint.

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.

OITS

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

RapidRestore® Function

This capability uses an optional power supply running from a facilities uninterruptable power source that keeps the unit and compressor controllers powered during a power interruption. This option allows the chiller to restart quickly when power returns.

Refrigerant Saturated Temperature

Refrigerant saturated temperature is calculated from the pressure sensor readings. The pressure is fitted to an HFC-134a temperature/pressure curve to determine the saturated temperature. The WME uses sealed gage transducers so that barometric pressure compensation is not required.

RLA

Rated load amps.

Soft Load

Soft Load is a control sub-routine that allows the chiller to load up gradually.

SP

Setpoint

Stage Delay

The time delay from the start of the first compressor to the start of the second or from the start of the second until the time it can shut down.

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.

Suction Superheat

Suction superheat is calculated using the following equation:

Suction Superheat = Suction Temperature – Suction Saturated Temperature

VDC

Volts, Direct Current; sometimes noted as vdc.

VFD

Variable Frequency Drive, a power conversion device used to vary the compressor speed.

Temperature / Pressure Chart

Table 27: R-134a Temperature / Pressure Chart

R-134a Temperature / Pressure Chart							
°F	PSIG	°F	PSIG	°F	PSIG	°F	PSIG
6	9.7	46	41.1	86	97.0	126	187.3
8	10.8	48	43.2	88	100.6	128	192.9
10	12.0	50	45.4	90	104.3	130	198.7
12	13.2	52	47.7	92	108.1	132	204.5
14	14.4	54	50.0	94	112.0	134	210.5
16	15.7	56	52.4	96	115.9	136	216.6
18	17.1	58	54.9	98	120.0	138	222.8
20	18.4	60	57.4	100	124.1	140	229.2
22	19.9	62	60.0	102	128.4	142	235.6
24	21.3	64	62.7	104	132.7	144	242.2
26	22.9	66	65.4	106	137.2	146	249.0
28	24.5	68	68.2	108	141.7	148	255.8
30	26.1	70	71.1	110	146.3	150	262.8
32	27.8	72	74.0	112	151.1	152	270.0
34	29.5	74	77.1	114	155.9	154	277.3
36	31.3	76	80.2	116	160.9	156	284.7
38	33.1	78	83.4	118	166.0	158	292.2
40	35.0	80	86.7	120	171.1	160	299.9
42	37.0	82	90.0	122	176.4	162	307.8
44	39.0	84	93.5	124	181.8	164	315.8

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