Installation Manual	IM 1002
	Group: **Chillers**
	Part Number: 10000199902
	Date: June 11, **2009**

Pathfinder™ Air Cooled Chillers

Models AWS 280ADS to AWS 300ADS (Standard Efficiency)
Models AWS 300ADH to AWS 360ADH (High Efficiency)
280 to 350 Tons, 985 to 1230 kW
R-134a
50 Hz

DAIKIN McQUAY

Contents

Hazard Identification

⚠ 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.

Modbus

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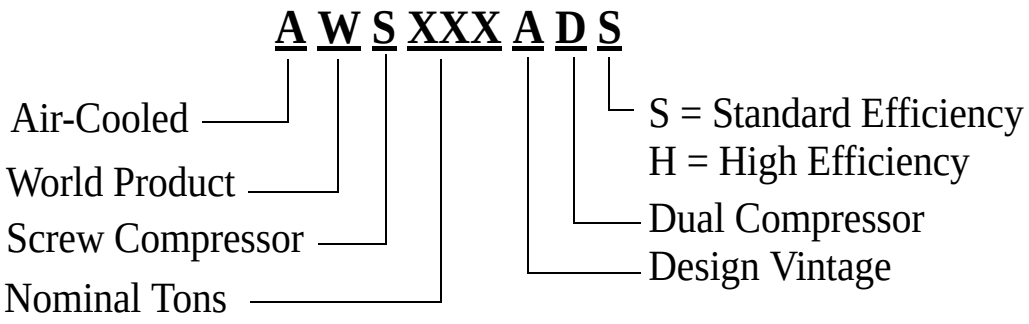
Figure 1: Model Nomenclature



General Description

Daikin McQuay Pathfinder™ air-cooled chillers are complete, self-contained chillers that include the latest in engineered components arranged to provide a compact and efficient unit. Each unit is completely assembled, factory wired, evacuated, charged, tested and comes complete and ready for installation. Each of two circuits consists of an air-cooled condenser section with an integral subcooler section, a semi-hermetic, single-screw compressor with starter, a multi-circuit, shell-and-tube, direct expansion evaporator, an economizer and complete refrigerant piping. Each compressor has an independent refrigeration circuit. Liquid line components included are a manual liquid line shutoff valve, charging port, filter-drier, sight-glass/moisture indicator, and electronic expansion valve. A combination discharge check and shutoff valve is included and a compressor suction shutoff valve is optional. Other features include compressor heaters, evaporator heaters for freeze protection, automatic, one-time pumpdown of each refrigerant circuit upon circuit shutdown, and an advanced fully integrated microprocessor control system.

Pathfinder units are available as standard efficiency (ADS) or high efficiency (ADH)

A high ambient option is required for operation in ambient temperatures above 105°F (40.6°C) and up to 125°F (51.7°C) and when the VFD low ambient option is selected.

Information on the operation of the unit MicroTech®III controller is in the OM 998 manual.

Inspection

When the equipment is received, carefully check all items against the bill of lading to verify for a complete shipment. Check all units for damage upon arrival. All shipping damage must be reported to the carrier and a claim must be filed with the carrier. Check the unit's serial plate before unloading the unit to be sure that it agrees with the power supply available. Physical damage to a unit after shipment is not McQuay International's responsibility.

Note: Unit shipping and operating weights are shown in the Physical Data Tables beginning on page 13.

Table 1: Operating Limits

Maximum standby ambient temperature	130°F (55°C)
Maximum operating ambient temperature	105°F (40.6°C)
with optional high ambient package (see detailed information on page 3	125°F (52°C)
Minimum operating ambient temperature (standard control)	35°F (2°C)
Minimum operating ambient temperature (with optional low-ambient control)	0°F (-18°C)
Leaving chilled water temperature	40°F to 60°F (4.4°C to 15.6°C)
Leaving chilled fluid temperatures (with anti-freeze) - Unloading is not permitted with fluid leaving temperatures below 30°F (-1°C).	20°F to 60°F (-7°C to 16°C)
Operating chilled water delta-T range	6 to 18°F (-14 to -8°C)
Maximum evaporator operating inlet fluid temperature	76°F (24°C)
Maximum evaporator non-operating inlet fluid temperature	100°F (38°C)

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment.

⚠ WARNING

Sharp edges and coil surfaces are a potential injury hazard. Avoid contact with them.

Start-up by McQuay Factory Service is included on all Pathfinder units sold for installation within the U.S. and Canada and must be performed by them to initiate the standard Limited Product Warranty. Start-up by any party other than McQuay Factory Service or a McQuay Authorized Service Representative will void the Limited Product Warranty. Two-week prior notification of start-up is required. The contractor should obtain a copy of the Start-up Scheduled Request Form from the sales representative or from the nearest McQuay Factory Service office.

⚠ WARNING

Escaping refrigerant can displace air and cause suffocation. Immediately evacuate and ventilate the equipment area. If the unit is damaged, follow Environmental Protection Agency (EPA) requirements. Do not expose sparks, arcing equipment, open flame or other ignition source to the refrigerant.

Handling

⚠ DANGER

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

Avoid rough handling shock due to impact or dropping the unit. Do not push or pull the unit. Never allow any part of the unit to fall during unloading or moving, as this can result in serious damage.

To lift the unit, lifting tabs with 3" (76 mm) diameter holes are provided on the base of the unit. All lifting holes must be used when lifting the unit. Spreader bars and cables should be arranged to prevent damage to the condenser coils or unit cabinet (see Figure 2).

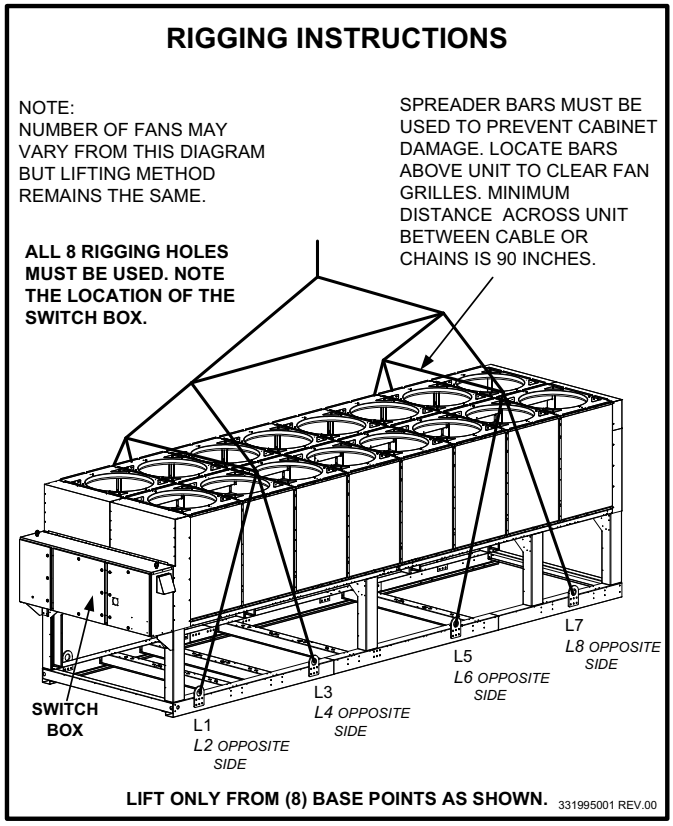
Location

Locate the unit carefully to provide proper airflow to the condenser. (SeeFigure 4, page 5 for required clearances.)Using less clearance than shown in Figure 4can cause discharge air recirculation to the condenser and could have a significant detrimental effect on unit performance.

Due to the shape of the condenser coils on the Pathfinder chillers, it is recommended that the unit be oriented so that prevailing winds blow parallel to the unit length, thus minimizing the wind effect on condensing pressure and performance. If low ambient temperature operation is expected, optional louvers should be installed if the unit has no protection against prevailing winds.

For pad-mounted units, it is recommended that the unit be raised a few inches with suitable supports such as neoprene waffle vibration pads, located at least under the mounting locations. This will allow water to drain from under the unit and facilitate cleaning under it.

Figure 2: Required Lifting Method



NOTES:

1. Unit with 8 lifting points illustrated above; the number of condenser sections, fans, and lifting points can vary from this diagram.see lifting/mounting drawings beginning on page page 41 to identfy the number of lifting points for a specific unit.
2. All rigging points must be used. See weights at lifting points beginning on page 39 for each specific size unit.
3. Crosswise and lengthwise spreader bars must be used to avoid damage to unit.

Service Access

Compressors, filter-driers, and manual liquid line shutoff valves are accessible on each side or end of the unit. The evaporator heater is located on the barrel.

The control panels are located on the end of the chiller. The left-hand control box contains the unit and circuit microprocessors as well as transformers, fuses and terminal. The right-hand panel contains a circuit breaker. A minimum of four feet of clearance is required in front of the panels. The side clearance required for airflow provides sufficient service clearance.

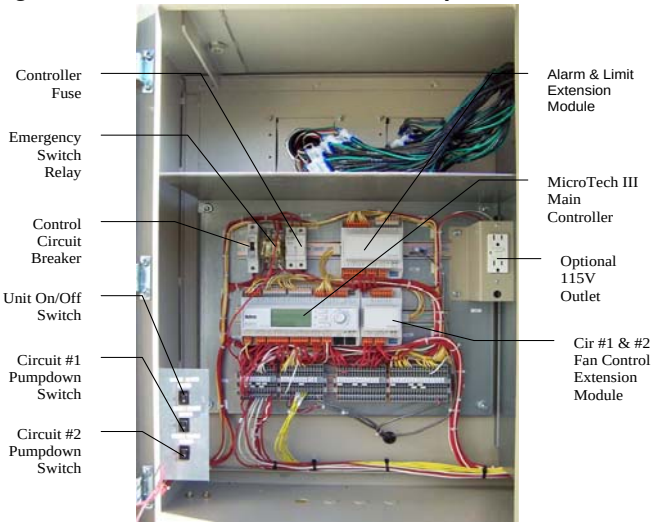
On all Pathfinder units, the condenser fans and motors can be removed from the top of the unit. The complete fan/motor assembly can be removed for service. The fan blade must be removed for access to wiring terminals at the top of the motor.

⚠ DANGER

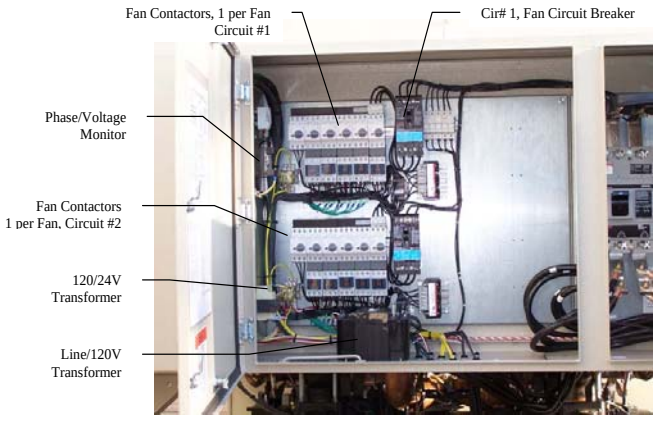
Disconnect, lockout and tag all power to the unit before servicing condenser fan motors or compressors. Failure to do so can cause bodily injury or death.

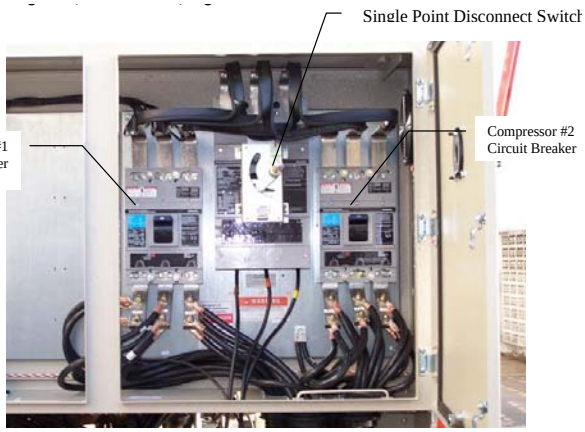
Do not block access to the sides or ends of the unit with piping or conduit. These areas must be open for service access. Do not block access to the control panels with field-mounted disconnect switches.

Figure 3: Control and Power Panel Component Location



NOTES:
1. The Emergency Switch Relay de-energizes circuit #1 and #2 control power when activated, causing an immediate compressor and fan shutdown. The red emergency button switch is located on the bottom front of the control panel door.
2. The control power transformer is located in the power panel adjacent to the control panel.
3. Additional extension (aka extension) modules are located elsewhere on the chiller.



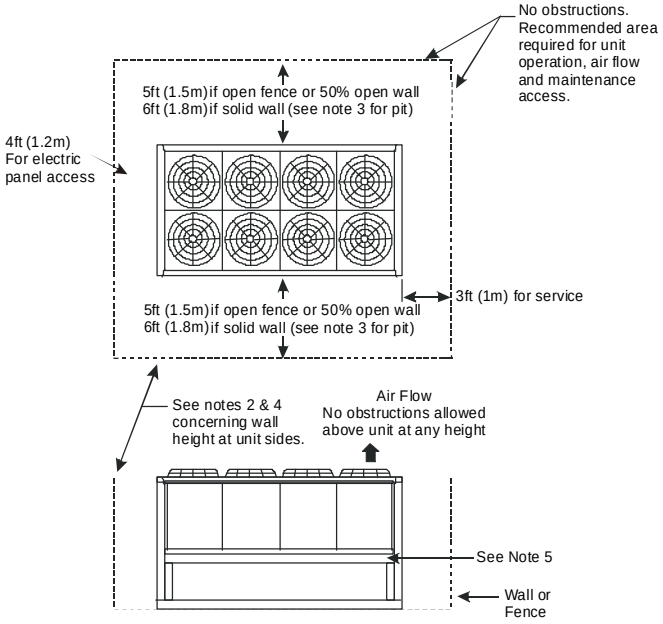


Clearance Requirements

Notes:

1. Minimum side clearance between two units is 12 feet (3.7 meters).
2. Unit must not be installed in a pit or enclosure that is deeper or taller than the height of the unit unless extra clearance is provided per note 4.
3. Minimum clearance on each side is 8 feet (2.4 meters) when installed in a pit no deeper than the unit height.
4. Minimum side clearance to a side wall or building taller than the unit height is 6 feet (1.8 meters), provided no solid wall above 6 feet (1.8 meters) is closer than 12 feet (3.7 meters) to the opposite side of the unit.
5. Do not mount electrical conduits where they can block service access to compressor controls, refrigerant driers or valves.
6. There must be no obstruction of the fan discharge.
7. Field installed switches must not interfere with service access or airflow.

Figure 4: Clearance Requirements



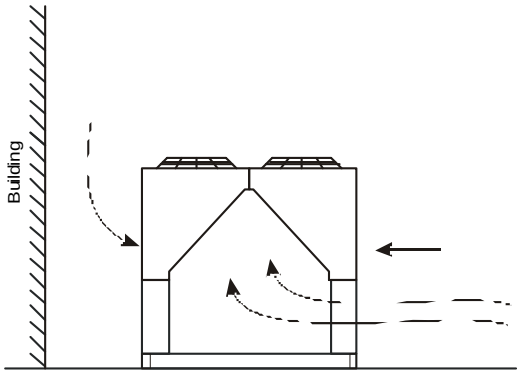
Restricted Air Flow

General

The clearances required for design operation of Pathfinder air-cooled chillers are described in the previous section. Occasionally, these clearances cannot be maintained due to site restrictions such as units being too close together or a fence or wall restricting airflow, or both. Pathfinder chillers have several features that may help mitigate the penalties attributable to restricted airflow.

"The condenser section is "W" shaped, as shown below. This allows inlet air for these coils to come in from both sides and the bottom. All the coils in one "V" section serve one compressor. Each compressor has its own independent refrigerant circuit.

"The MicroTech III control is proactive in response to "off-design conditions". In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the unit running (at reduced capacity), rather than allowing a shut-off on high discharge pressure.

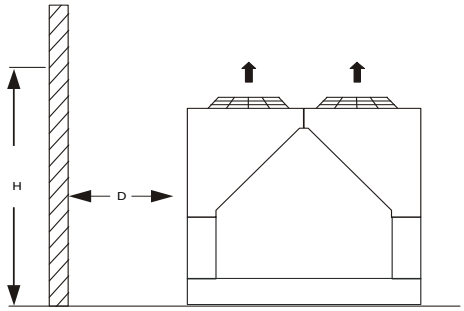


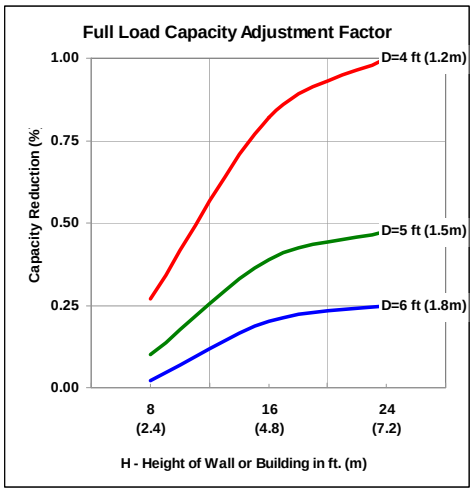
Case 1: Building or Wall on One Side of One Unit

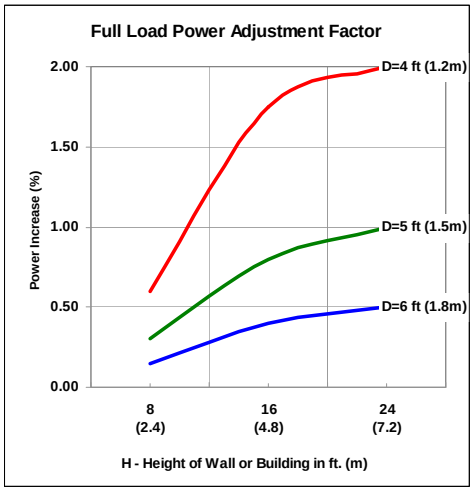
The existence of a screening wall or the wall of a building in close proximity to an air-cooled chiller is common in both rooftop and ground level applications. Hot air recirculation on the coils adjoining the wall will increase compressor discharge pressure, decreasing capacity and increasing power consumption.

When close to a wall, it is desirable to place chillers on the north or east side of them. It is also desirable to have prevailing winds blowing parallel to the unit's long axis. The worst case is to have wind blowing hot discharge air into the wall.

Figure 5: Unit Adjacent to Wall - Adjustment Factors







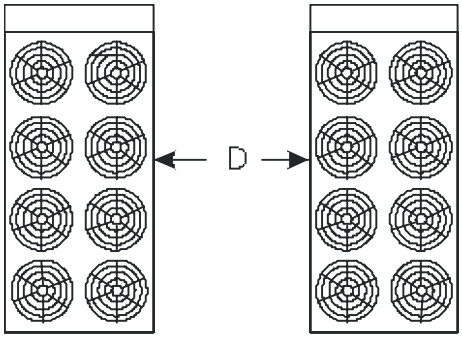
Case 2: Two Units Side By Side

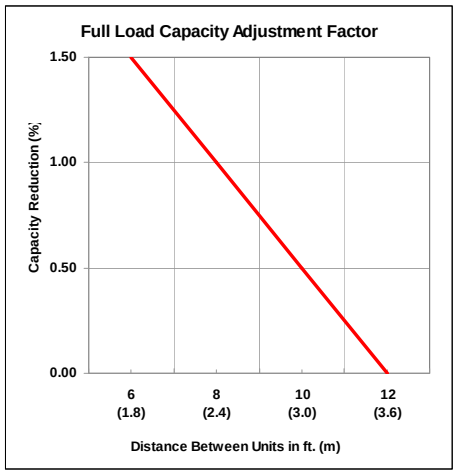
Two or more units sited side by side are common. If spaced closer than 12 feet (3.7 meters) it is necessary to adjust the performance of each unit; circuits adjoining each other are affected. If one of the two units also has a wall adjoining it, see Case 1. Add the two adjustment factors together and apply to the unit located between the wall and the other unit.

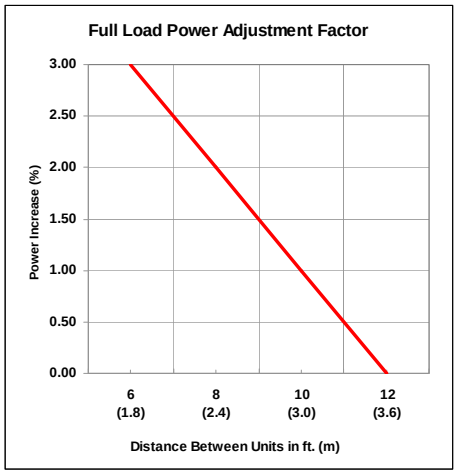
Mounting units end to end will not necessitate adjusting performance.

Do not use pit or solid wall surrounds where the ambient air temperature exceeds 105°F (40°C).

Figure 6: Two Units Side by Side - Adjustment Factors



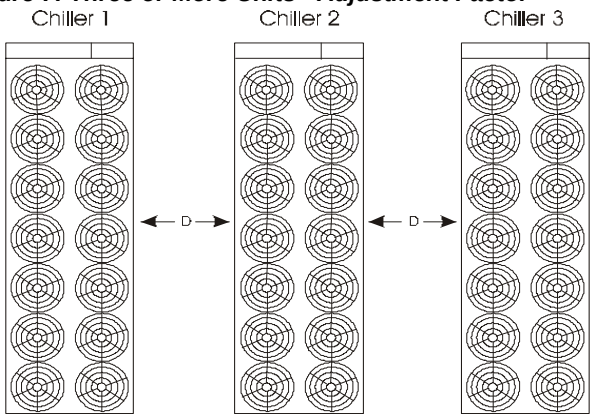


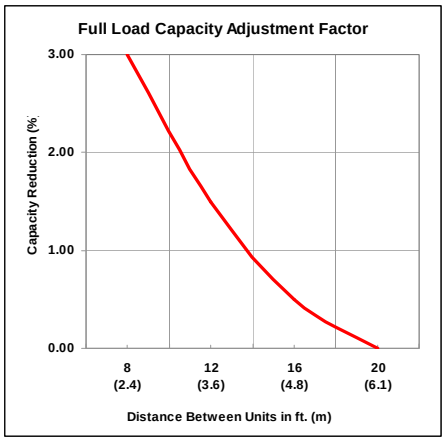


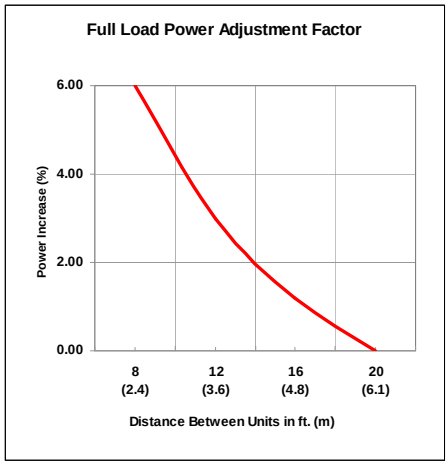
Case 3: Three or More Units Side By Side

When three or more units are side by side, the outside chillers (1 and 3 in this case) are influenced by the middle unit only on their inside circuits. Their adjustment factors will be the same as Case 2. All inside units (only number 2 in this case) are influenced on both sides and must be adjusted by the factors shown below.

Figure 7: Three or More Units - Adjustment Factor







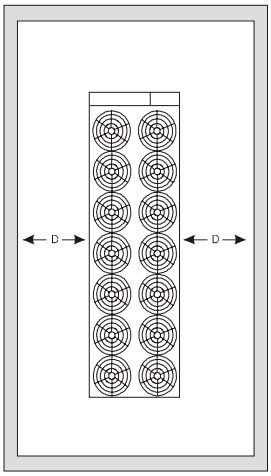
Case 4: Open Screening Walls

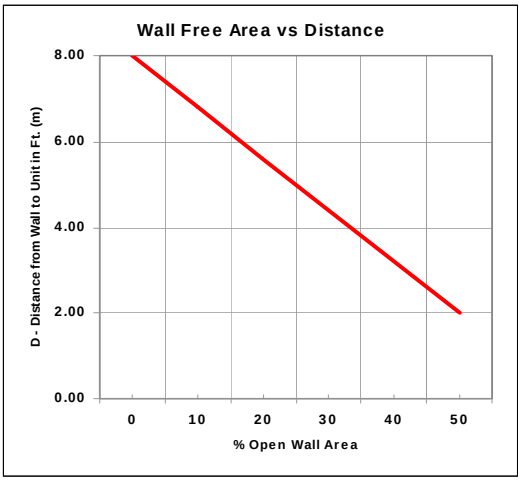
Decorative screening walls are often used to help conceal a unit either on grade or on a rooftop. Design these walls such that the combination of their open area and distance from the unit do not require performance adjustment. It is assumed that the wall height is equal to or less than the unit height when mounted on its base support. This is usually satisfactory for concealment. If the wall height is greater than the unit height, see Case 5, Pit Installation.

The distance from the sides of the unit to the side walls must be sufficient for service, such as opening control panel doors.

If each side wall is a different distance from the unit, the distances can be averaged providing either wall is not less than 8 feet (2.4 meters) from the unit. For example, do not average 4 feet and 20 feet to equal 12 feet (1 meter and 5 meters to equal 3 meters).

Figure 8: Open Screening Walls - Adjustment Factors



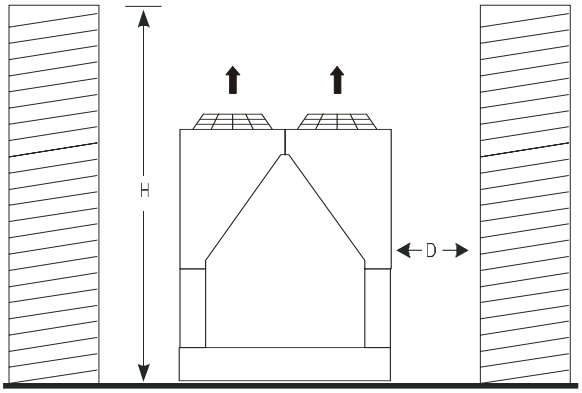


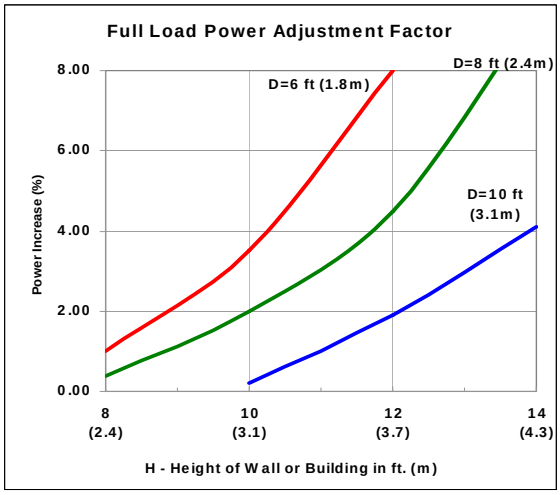
Case 5, Pit/Solid Wall Installation

Pit installations can cause operating problems. Use care if they are to be used on an installation. Recirculation and restriction can both occur. A solid wall surrounding a unit is substantially the same as a pit and the data presented here should be used.

Steel grating is sometimes used to cover a pit to prevent accidental falls or trips into the pit. The grating material and installation design must be strong enough to prevent such accidents, yet provide abundant open area or serious recirculation problems will occur. Have any pit installation reviewed by the McQuay sales representative prior to installation to make sure it has sufficient air-flow characteristics. The installation design engineer must approve the work to avoid an unreasonable risk of accident.

Figure 9: Pit Installation - Adjustment Factors





Chilled Water

It is recommended that the chilled water pumps' starters be wired to, and controlled by, the chiller's microprocessor. The controller will energize the pump whenever at least one circuit on the chiller is enabled to run, whether there is a call for cooling or not. The control will also start the pump when freezing temperatures are approached. Wiring connection points are shown in Figure 23, page 30.

Water Piping

Due to the variety of piping practices, follow the recommendations of local authorities. They can supply the installer with the proper building and safety codes required for a proper installation.

Design the piping with a minimum number of bends and changes in elevation to keep system cost down and performance up. It should contain:

1. Vibration eliminators to reduce vibration and noise transmission to the building.
2. Shutoff valves to isolate the unit from the piping system during unit servicing.
3. Manual or automatic air-vent valves at the high points of the system and drains at the low parts in the system. The evaporator should not be the highest point in the piping system.
4. Some means of maintaining adequate system water pressure (i.e., expansion tank or regulating valve).
5. Water temperature and pressure indicators located at the evaporator inlet and outlet to aid in unit servicing. Any connections should be made prior to filling the system with water.
6. A strainer to remove foreign matter from the water before it enters the pump. Place the strainer far enough upstream to prevent cavitation at the pump inlet (consult pump manufacturer for recommendations). The use of a strainer will prolong pump life and help maintain high system performance levels. **Note:** A 20-mesh strainer must also be placed in the supply water line just prior to the inlet of the evaporator. This will aid in preventing foreign material from entering the evaporator and causing damage or decreasing its performance. Care must also be exercised if welding pipe or flanges to the evaporator connections to prevent any weld slag from entering the vessel.
7. Any water piping to the unit must be protected to prevent freeze-up if below freezing temperatures are expected.
8. If the unit is used as a replacement chiller on a previously existing piping system, flush the system thoroughly prior to unit installation. Perform regular chilled water analysis and chemical water treatment immediately at equipment start-up.
9. In the event glycol is added to the water system as a late addition for freeze protection, recognize that the refrigerant suction pressure will be lower, cooling performance less, and water side pressure drop greater. If the percentage of glycol is large, or if propylene is employed in lieu of ethylene glycol, the added pressure drop and loss of performance could be substantial.
10. For ice making or low temperature glycol operation, a different freezestat pressure value is usually required. The freezestat setting can be manually changed through the MicroTech III controller.

Make a preliminary leak check prior to insulating the water piping and filling the system.

Include a vapor barrier with the piping insulation to prevent moisture condensation and possible damage to the building structure. It is important to have the vapor barrier on the outside of the insulation to prevent condensation within the insulation on the cold surface of the pipe.

System Water Volume

All chilled water systems need adequate time to recognize a load change, respond to that load change and stabilize, without undesirable short cycling of the compressors or loss of control. In air conditioning systems, the potential for short cycling usually exists when the building load falls below the minimum chiller plant capacity or on close-coupled systems with very small water volumes.

Some of the things the designer should consider when looking at water volume are the minimum cooling load, the minimum chiller plant capacity during the low load period and the desired cycle time for the compressors.

Assuming that there are no sudden load changes and that the chiller plant has reasonable turndown, a rule of thumb of "gallons of water volume equal to two to three times the chilled water gpm flow rate" is often used.

A properly designed storage tank should be added if the system components do not provide sufficient water volume.

Variable Speed Pumping

Variable water flow involves reducing the water flow through the evaporator as the load decreases. McQuay chillers are designed for this duty, provided that the rate of change in water flow is slow, and the minimum and maximum flow rates for the vessel are not exceeded.

The recommended maximum change in water flow is 10 percent of the change per minute. For example, if the maximum (design) flow is 200 gpm and the flow is reduced to a minimum of 140 gpm, the change in flow is 60 gpm, so the maximum change per minute would be 10% of 60, or 6 gpm per minute. It would take ten minutes to change the flow through the entire range.

The water flow through the vessel must remain between the minimum and maximum values listed on page 19. If flow drops below the minimum allowable, large reductions in heat

transfer can occur. If the flow exceeds the maximum rate, excessive pressure drop and tube erosion can occur.

Evaporator Freeze Protection

Pathfinder chillers are equipped with thermostatically controlled evaporator heaters that help protect against freeze-up down to -20°F (-28°C). For additional protection, at least one of the followingprocedures should be used during periods of sub-freezing temperatures:

1. Adding of a concentration of a glycol anti-freeze with a freeze point 10°F. below the lowest expected temperature. This will result in decreased capacity and increased pressure drop.

Note: Do not use automotive grade antifreezes as they contain inhibitors harmful to chilled water systems. Use only glycols specifically designated for use in building cooling systems.

2. Draining the water from outdoor equipment and piping and blowing the chiller tubes dry from the chiller. Do not energize the chiller heater when water is drained from the vessel.

3. Providing operation of the chilled water pump, circulating water through the chilled water system and through the evaporator

Note: The heaters come from the factory connected to the control power circuit. The control power can be rewired in the field to a separate 115V supply (do not wire directly to the heater). See the field wiring diagram on page 30. If this is done, it should power the entire control circuit. Mark the disconnect switch clearly to avoid accidental deactivation of the heater during freezing temperatures. Exposed chilled water piping also requires protection. If the evaporator is drained for winter freeze protection, the heaters must be de-energized to prevent heater burnout..

Table 2: Freeze Protection

Temp. °F (°C)	% Volume Glycol Concentration Required			
	For Freeze Protection		For Burst Protection	
	Ethylene Glycol	Propylene Glycol	Ethylene Glycol	Propylene Glycol
20 (6.7)	16	18	11	12
10 (-12.2)	25	29	17	20
0 (-17.8)	33	36	22	24
-10 (-23.3)	39	42	26	28
-20 (-28.9)	44	46	30	30
-30 (-34.4)	48	50	30	33
-40 (-40.0)	52	54	30	35
-50 (-45.6)	56	57	30	35
-60 (-51.1)	60	60	30	35

Note: "Freeze protection" maintains the solution ina pumpable, usable liquid state. "Burst protection" prevents pipes from rupturing, but solution may be in a gel state and not pumpable. In most applications, "burst" protection is sufficient; concentrations over 30% Ethylene Glycol or 35% Propylene Glycol will result in efficiency and capacity losses with negligible protection increases

Note: These figures are examples only and cannot be appropriate to every situation. Generally, for an extended margin of protection, select a temperature at least 15°F lower than the expected lowest ambient temperature. Inhibitor levels should be adjusted for solutions less than 25% glycol.

Note: Glycol of less than 25% concentration is not recommended because of the potential for bacterial growth and loss of efficiency.

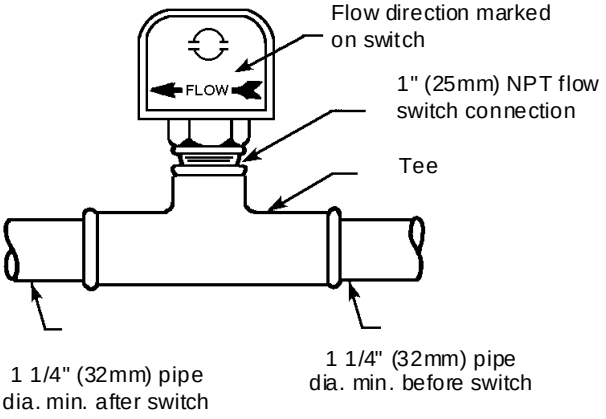
Flow Switch

A flow switch must be included in the chilled water system to prove that there is adequate water flow before the unit can start. It also serves to shut down the unit in the event that water flow is interrupted in order to guard against evaporator freeze-up.

A factory-mounted, solid state, thermal dispersion flow switch is available as an option. A field-installed version is also available as a kit (Accessory part number 332688401).

A paddle-type flow switch for field mounting and wiring is also available as a kit (Accessory part number 017503300). It is adaptable to pipe sizes from 1" (25mm) to 8" (203mm).

Certain minimum flow rates are required to close the switch and are listed in Table 3. Installation should be as shown in Figure 10.

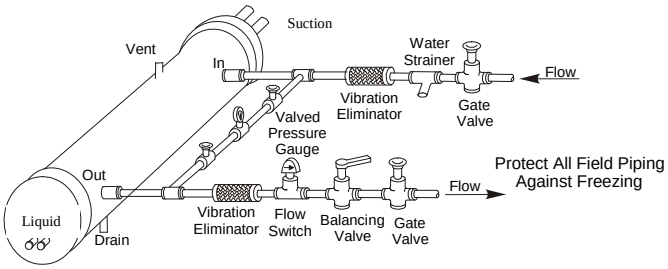


Electrical connections in the unit control center should be made at terminals 60 and 67 from switch terminals Y and R. The normally open contacts of the flow switch should be wired between these two terminals. Flow switch contact quality must be suitable for 24 VAC, low current (16ma). Flow switch wire must be in separate conduit from any high voltage conductors (115 VAC and higher) and have an insulation rating of 600 volts.

Table 3: Paddle Type Flow Switch Flow Rates

Pipe Size		inch	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8
		mm	32	38	51	63	76	102	127	153	204
(NOTE)		-	(2)	(2)		(3)		(4)	(4)	(4)	(5)
Min. Adjst.	Flow	gpm	5.8	7.5	13.7	18.0	27.5	65.0	125.0	190.0	205.0
		Lpm	1.3	1.7	3.1	4.1	6.2	14.8	28.4	43.2	46.6
	No Flow	gpm	3.7	5.0	9.5	12.5	19.0	50.0	101.0	158.0	170.0
		Lpm	0.8	1.1	2.2	2.8	4.3	11.4	22.9	35.9	38.6
Max. Adjst.	Flow	gpm	13.3	19.2	29.0	34.5	53.0	128.0	245.0	375.0	415.0
		Lpm	3.0	4.4	6.6	7.8	12.0	29.1	55.6	85.2	94.3
	No Flow	gpm	12.5	18.0	27.0	32.0	50.0	122.0	235.0	360.0	400.0
		Lpm	2.8	4.1	6.1	7.3	11.4	27.7	53.4	81.8	90.8
Note: [1]A segmented 3-inch paddle (1, 2, and 3 inches) is furnished mounted, plus a 6-inch paddle loose.											
Note: [2]Flow rates for a 2-inch paddle trimmed to fit the pipe.											
Note: [3]Flow rates for a 3-inch paddle trimmed to fit the pipe.											
Note: [4]Flow rates for a 3-inch paddle.											
Note: [5]Flow rates for a 6-inch paddle.											

Figure 10: Typical Field Water Piping



Note: Connections for vent and drain fittings are located on the top and bottom of the evaporator.

Note: Piping must be supported to avoid putting strain on the evaporator nozzles.

Refrigerant Charge

All packaged units are designed for use with R-134a and are shipped with a full operating charge. The operating charge for each unit is shown in the Physical Data Tables beginning on page 13.

Glycol Solutions

When using glycol anti-freeze solutions, the chiller's capacity, glycol solution flow rate, and pressure drop through the evaporator can be calculated using the following formulas and tables.

Note: The procedure below does not specify the type of glycol. Use the derate factors found in Table 4 or Table 5 forcorrections when using glycol.

1 **Capacity** - Cooling capacity is reduced from that with plain water. To find the reduced value, multiply the chiller's water system tonnage by the capacity correction factor to find the chiller's capacity when using glycol.

2 **Flow** - To determine flow (or Delta-T) knowing Delta-T (or flow) and capacity:

$$GPM = \frac{(24)(tons)(flow\ \ factor)}{Delta - T}$$

3 **Pressure drop** - To determine pressure drop through the evaporator when using glycol, enter the water pressure drop curve at the water flow rate. Multiply the water pressure drop found there by the "PD" factor to obtain corrected glycol pressure drop.

4 **Power** - To determine glycol system kW, multiply the water system kW by the factor designated "Power".

Test coolant with a clean, accurate glycol solution hydrometer (similar to that found in service stations) to determine the freezing point. Obtain percent glycol from the freezing point table below. On glycol applications, the supplier normally recommends that a minimum of 25% solution by weight be used for protection against corrosion or that additional inhibitors should be employed.

Note: Do not use automotive grade antifreeze. Industrial grade glycols must be used. Automotive antifreeze contains inhibitors that will cause plating on the copper tubes within the chiller evaporator. The type and handling of glycol used must be consistent with local codes.

Performance Adjustment Factors

Ethylene and Propylene Glycol Factors

Pathfinder chiller units are designed to operate with leaving chilled fluid temperatures of 20.0°F to 60.0°F (-6.7°C to 15.6°C). Consult the local McQuay sales office for performance outside these temperatures. Leaving chilled fluid temperatures below 40°F (4.4°C) result in evaporating temperatures at or below the freezing point of water and a glycol solution is required. MicroTech III control inhibits compressor unloading at leaving fluid temperatures below 30°F (-1°C)

.

Table 4: Ethylene Glycol Correction Factors

% E.G	Freeze Point		Capacity	Power	Flow	PD
	°F	°C				
10	26	-3.3	0.991	0.996	1.013	1.070
20	18	-7.8	0.982	0.992	1.040	1.129
30	7	-13.9	0.972	0.986	1.074	1.181
40	-7	-21.7	0.961	0.976	1.121	1.263
50	-28	-33.3	0.946	0.966	1.178	1.308

Table 5: Propylene Glycol Correction Factors

% P.G	Freeze Point		Capacity	Power	Flow	PD
	°F	°C				
10	26	-3.3	0.985	0.993	1.017	1.120
20	19	-7.2	0.964	0.983	1.032	1.272
30	9	-12.8	0.932	0.969	1.056	1.496
40	-5	-20.6	0.889	0.948	1.092	1.792
50	-27	-32.8	0.846	0.929	1.139	2.128

Table 6: Ambient Freeze Protection

	Percent Volume Glycol Concentration Required			
	For Freeze Protection		For Burst Protection	
Temperature °F (°C)	Ethylene Glycol	Propylene Glycol	Ethylene Glycol	Propylene Glycol
20 (6.7)	16	18	11	12
10 (-12.2)	25	29	17	20
0 (-17.8)	33	36	22	24
-10 (-23.3)	39	42	26	28
-20 (-28.9)	44	46	30	30
-30 (-34.4)	48	50	30	33
-40 (-40.0)	52	54	30	35
-50 (-45.6)	56	57	30	35
-60 (-51.1)	60	60	30	35

Note: In most applications, "burst" protection is sufficient; concentrations over 30% Ethylene Glycol or 35% Propylene Glycol will result in efficiency and capacity losses with negligible protection increases.

Note: These figures are examples only and may not be appropriate to every situation. Generally, for an extended margin of protection, select a temperature at least 10°F (-12°C) lower than the expected lowest ambient temperature. Adjust inhibitor levels for solutions less than 25% glycol

Note: Glycol of less than 25% concentration is not recommended because of the potential for bacterial growth and subsequent loss of heat transfer efficiency. Additional inhibitors may be required.

Electrical Connections

All wiring must be done in accordance with applicable local and national codes. Pathfinder units can be ordered with either standard multi-point power or optional single point power connections and with various disconnect and circuit breaker options. Wiring within the unit is sized in accordance with the U.S.A. National Electrical Code. Field-supplied disconnect switches are required if not factory-supplied with the unit.

Table 7: Electric Power Connection Option

Multi-Point Power Connection	Single-Point Power Connection
Standard: Disconnect switch per circuit, no compressor isolation circuit breakers	Optional: one power block, compressor isolation circuit breakers
Optional: High interrupt rated disconnect switches, no compressor isolation circuit breakers	Optional: One disconnect switch replacing the power block, compressor isolation circuit breakers
Optional: High short circuit current rated panel, high interrupt disconnect switches, no compressor isolation circuit breakers	Optional: One high interrupt rated disconnect switch, compressor isolation circuit breakers
	Optional: High short circuit current rated panel, one high interrupt disconnect switch, compressor isolation circuit breakers

Note: Disconnect switches are molded case construction with lockable through-the-door handles. They can be used to remove the unit/ circuit from the power system.

Note: The individual compressor isolation circuit breakers for each circuit isolate the compressor and do not have through-the-door handles. They are operable only after the panel doors are opened.

Note: The high short circuit rated panel means that a short circuit current up to the ratings shown in Table 8, Interrupt Ratings (kAmps)will be contained in the panel. There is a short period of time when the circuit breaker will short circuit before opening a circuit that can damage downstream components. In other words, the enclosure is stronger than a standard enclosure. It has a high interrupt rated disconnect switch.

Note: The factory-mounted control power transformer is protected by fuses.

Note: Condenser fans are protected and isolated by circuit breakers.

Table 8: Interrupt Ratings (kAmps)

VOLTAGE	STANDARD SHORT CIRCUIT PANEL RATING	HIGH INTERRUPT DISCONNECT SWITCH	HIGH SHORT CIRCUIT RATED PANEL
460	35 kA	35 kA	65 kA

Disconnecting means are addressed by Article 440 of the U.S.A. National Electrical Code (NEC), which requires "disconnecting means capable of disconnecting air conditioning and refrigerating equipment including motor-compressors, and controllers from the circuit feeder." Select and locate the disconnect switch per the NEC guidelines. Maximum recommended fuse sizes are given in the electrical data tables of this catalog for help in sizing the disconnect.

Terminals are provided in a unit control panel for optional field hookup of the control circuit to a separate fused 115-volt power supply in lieu of the standard factory installed control transformer.

Table 9: Physical Data, Standard Efficiency 50 Hz

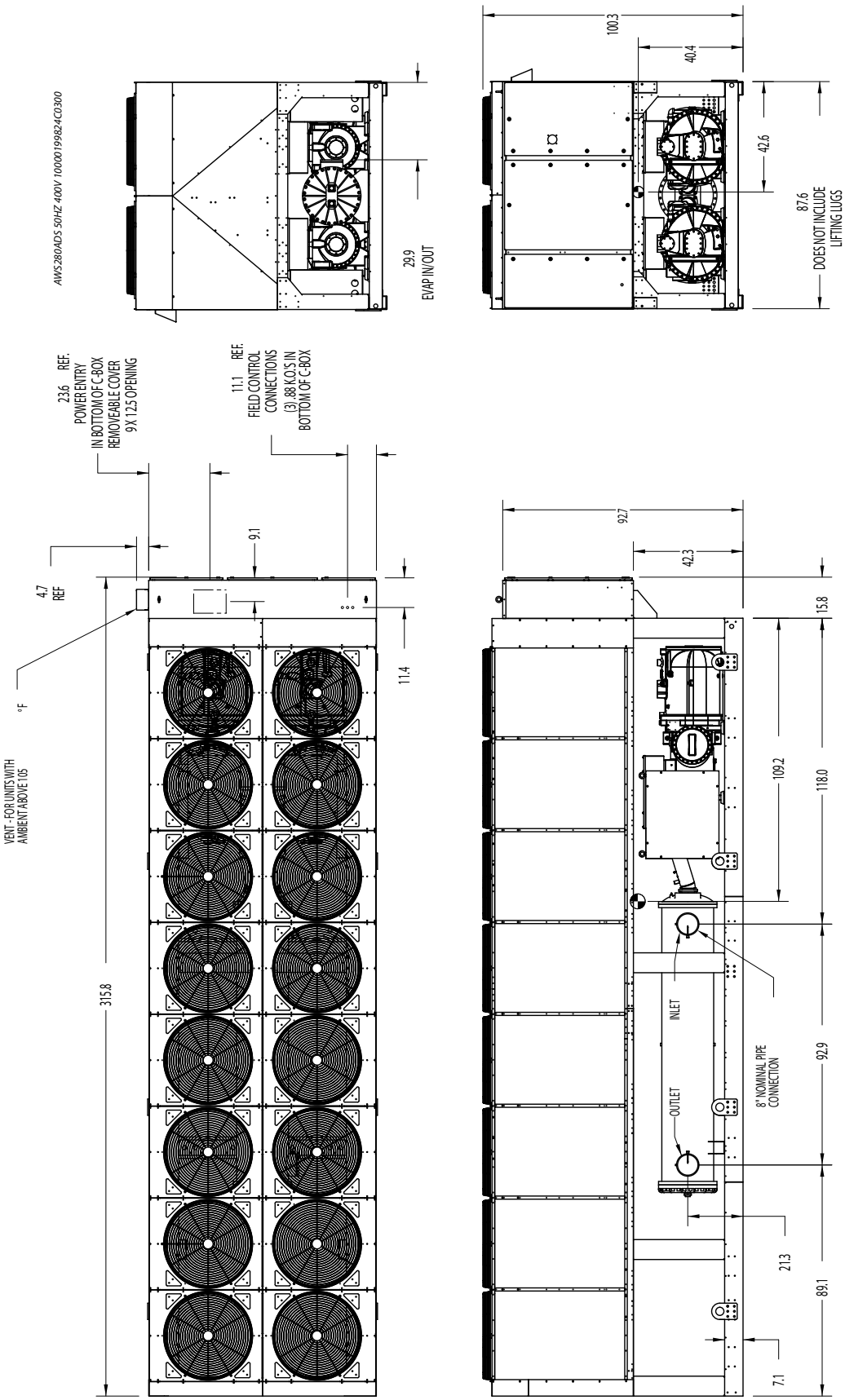
DATA	Pathfinder Chiller Model Numbers			
	AWS280ADS Std Eff		AWS300ADS Std Eff	
	CIRCUIT 1	CIRCUIT 2	CIRCUIT 1	CIRCUIT 2
BASIC DATA				
Unit Cap. @ AHRI tons (kW)	273.4 (961.6)		294.1 (1034.4)	
Unit Operating Charge lbs (kg)	185 (84)	185 (84)	185 (84)	185 (84)
Unit Dimensions L x W x H, in. (mm)	316 x 88 x 101 (8027 x 2235 x 2565)		316 x 88 x 101 (8027 x 2235 x 2565)	
Unit Operating Weight, lbs. (kg)	17434 (7908)		17434 (7908)	
Unit Shipping Weight, lbs (kg)	16567 (7515)		16567 (7515)	
Weight-Add for Copper Fins	2372		2372	
Weight-Add for Louvered Panels	1034		1034	
Weight-Add for Sound Enclosures	477		477	
COMPRESSORS, SCREW, SEMI-HERMETIC				
Nominal Capacity, tons (kW)	150 (528)	125 (140)	150 (528)	150 (528)
Minimum Capacity (% of Full Load)	15		15	
Oil charge per circuit , gallons (liters)	6.6 (25)	6.6 (25)	6.6 (25)	6.6 (25)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER				
Pumpdown Capacity, lbs (kg)	370 (168)	370 (168)	370 (168)	370 (168)
Coil Inlet Face Area, sq. ft. (sq m.)	196.9 (18.3)	196.9 (18.3)	196.9 (18.3)	196.9 (18.3)
Rows Deep/Fins Per Inch	3 / 16	3 / 16	3 / 16	3 / 16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE				
Number of Fans per Circuit Fan Diameter: 31.5 in. (800 mm)	8	8	8	8
Fan Motor hp (kW)	1.4 (1.05)		1.4 (1.05)	
Fan & Motor RPM, 50Hz	850		850	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE				
Shell Dia.-Tube Length, in.(mm)	20 x 108 / (508 x 2750)		20 x 108 / (508 x 2750)	
Water Volume, gallons (liters)	103.9 (393.3)		103.9 (393.3)	
Victaulic inlet/outlet conn. in. (mm)	8 (203)		8 (203)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	325 (2241)		325 (2241)	

Physical Data

Table 10: Physical Data, High Efficiency 50 Hz

DATA	Pathfinder Chiller Model Numbers					
	AWS300ADH High Eff		AWS320ADH High Eff		AWS350ADH High Eff	
	CIRCUIT 1	CIRCUIT 2	CIRCUIT 1	CIRCUIT 2	CIRCUIT 1	CIRCUIT 2
BASIC DATA						
Unit Cap. @ AHRI tons (kW)	287.4 (1010.8)		314.8 (1107.2)		341.6 (1201.4)	
Unit Operating Charge lbs (kg)	200 (91)	200 (91)	237 (107)	237 (107)	237 (107)	237 (107)
Unit Dimensions L x W x H, in. (mm)	316 x 88 x 101 (8027 x 2235 x 2565)		387 x 88 x 101 (9830 x 2235 x 2565)		387 x 88 x 101 (9830 x 2235 x 2565)	
Unit Operating Weight, lbs. (kg)	17724 (8040)		19656 (8916)		19656 (8916)	
Unit Shipping Weight, lbs (kg)	16857 (7646)		18789 (8523)		18789 (8523)	
Weight-Add for Copper Fins	2372		2968		2968	
Weight-Add for Louvered Panels	1034		1262		1262	
Weight-Add for Sound Enclosures	477		477		477	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	150 (528)	150 (528)	175 (615)	150 (528)	175 (615)	175 (615)
Minimum Capacity (% of Full Load)	15		15		15	
Oil charge per circuit , gallons (liters)	6.6 (25)	6.6 (25)	6.6 (25)	6.6 (25)	6.6 (25)	6.6 (25)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	370 (168)	370 (168)	462 (210)	462 (210)	462 (210)	462 (210)
Coil Inlet Face Area, sq. ft. (sq m.)	196.9 (18.3)	196.9 (18.3)	246.1 (22.8)	246.1 (22.8)	246.1 (22.8)	246.1 (22.8)
Rows Deep/Fins Per Inch	3 / 16	3 / 16	3 / 16	3 / 16	3 / 16	3 / 16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
Number of Fans per Circuit Fan Diameter: 31.5 in. (800 mm)	8	8	10	10	10	10
Fan Motor hp (kW)	1.4 (1.05)		1.4 (1.05)		1.4 (1.05)	
Fan & Motor RPM, 50Hz	850		850		850	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length, in.(mm)	20 x 108 / (508 x 2750)		20 x 108 / (508 x 2750)		20 x 108 / (508 x 2750)	
Water Volume, gallons (liters)	103.9 (393.3)		103.9 (393.3)		103.9 (393.3)	
Victaulic inlet/outlet conn. in. (mm)	8 (203)		8 (203)		8 (203)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	325 (2241)		325 (2241)		325 (2241)	

Figure 11: Physical Dimensions - AWS280 Standard Efficiency, 50 Hz
Note: All dimensions in decimal inches. Allow 1-inch manufacturing tolerance on all dimensions



Dimensions

Figure 12: Physical Dimensions - AWS300 Standard Efficiency, 50 Hz
Note: All dimensions in decimal inches. Allow 1-inch manufacturing tolerance on all dimensions

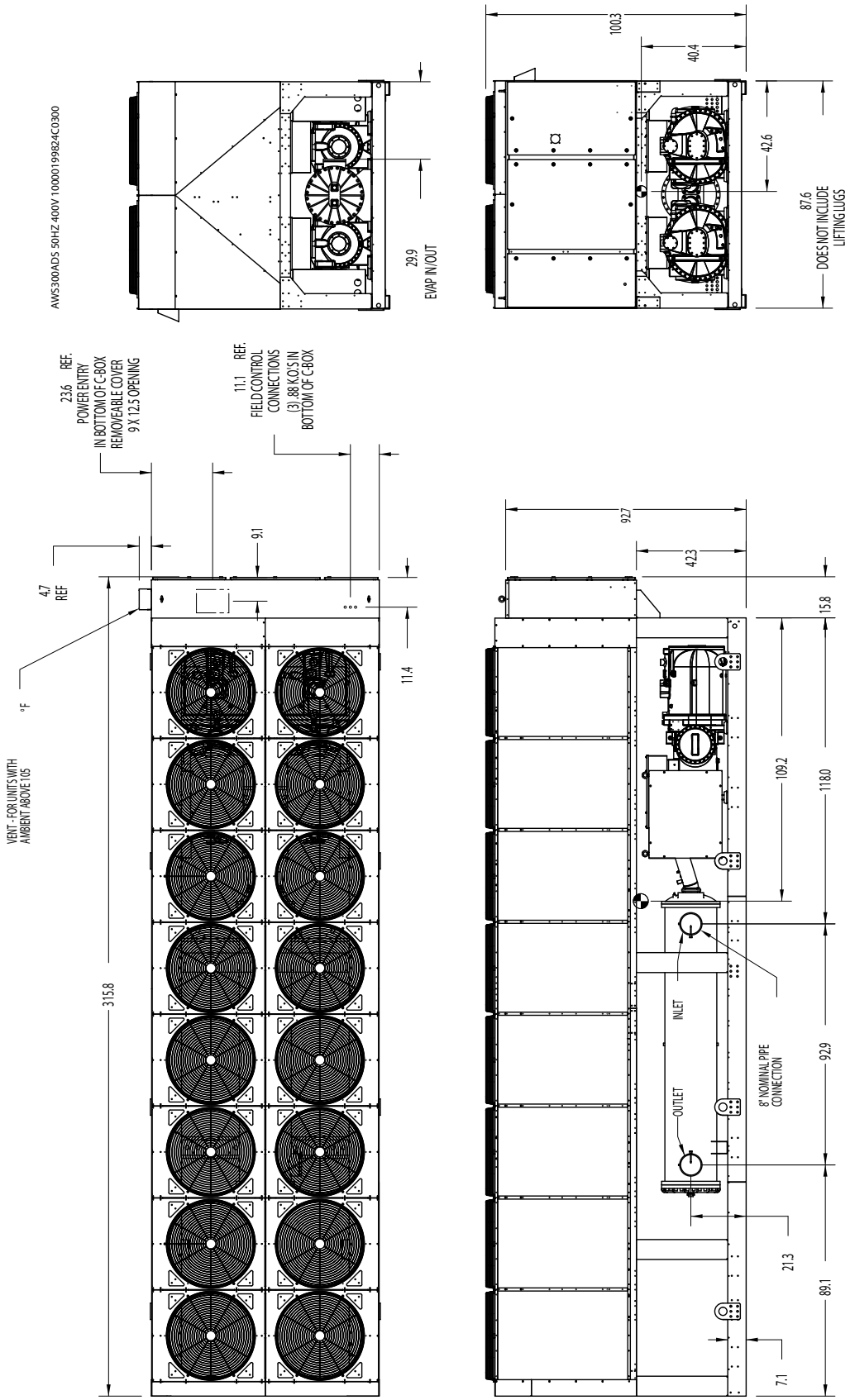
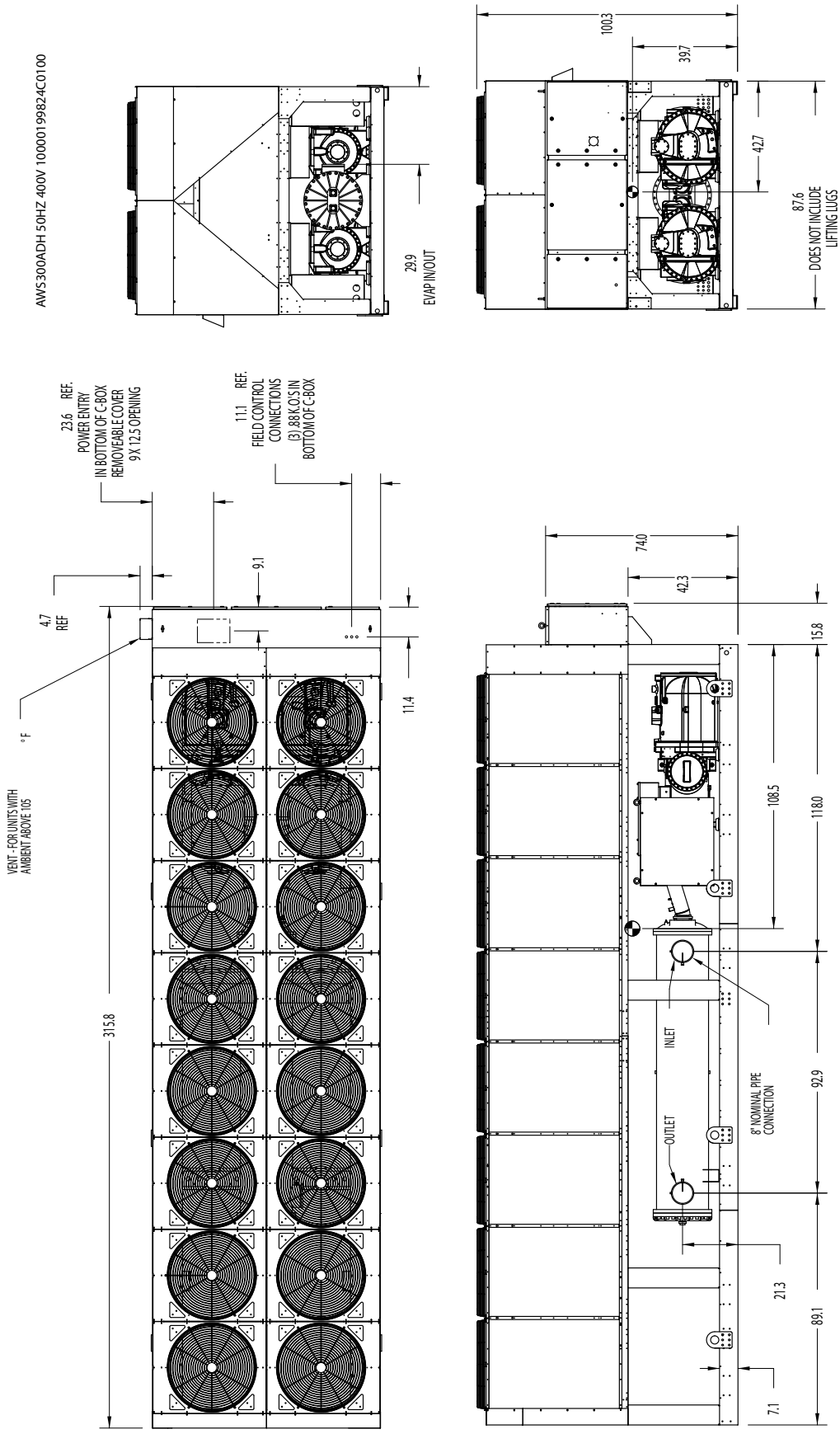


Figure 13: Physical Dimensions - AWS300 High Efficiency, 50 Hz
Note: All dimensions in decimal inches. Allow 1-inch manufacturing tolerance on all dimensions



Dimensions

Figure 14: Physical Dimensions - AWS320 High Efficiency, 50 Hz

Note: All dimensions in decimal inches. Allow 1-inch manufacturing tolerance on all dimensions

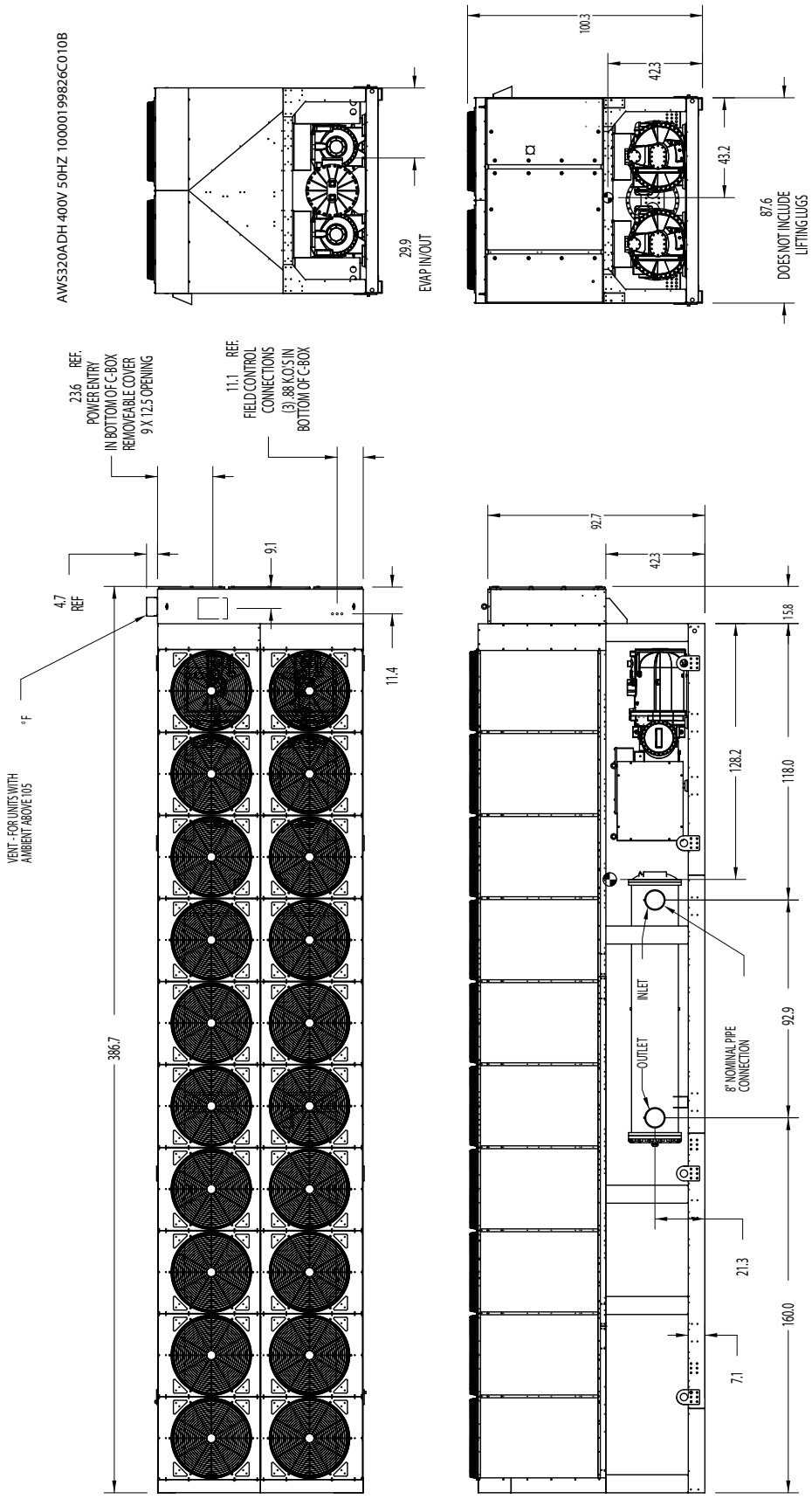
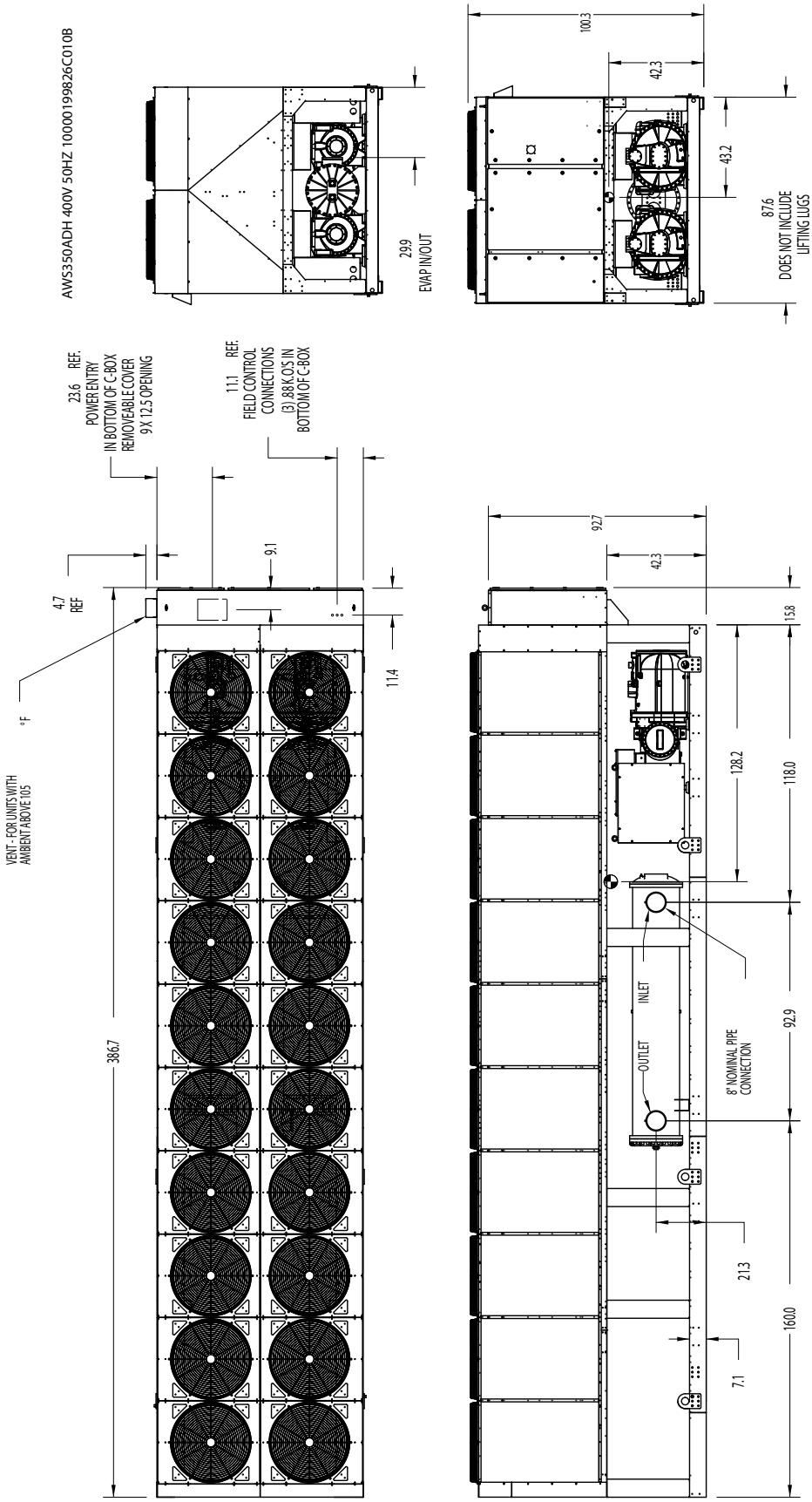


Figure 15: Physical Dimensions - AWS350 High Efficiency, 50 Hz

Note: All dimensions in decimal inches. Allow 1-inch manufacturing tolerance on all dimensions



Lifting & Mounting Weights

Table 11: Lifting and Mounting Weights (I-P Units)

UNIT SIZE	VOLT	Hz	# OF FANS	LIFTING WEIGHT FOR EACH POINT (LBS)								MOUNTING LOADS FOR EACH POINT (LBS)									
				L1	L2	L3	L4	L5	L6	L7	L8	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
AWS280 Std Eff	400	50	16	3092	2920	2500	2361	1768	1670	1161	1097	3240	3061	2758	2605	1854	1751	1114	1052	-	-
AWS300 Std Eff	400	50	16	3092	2920	2500	2361	1768	1670	1161	1097	3240	3061	2758	2605	1854	1751	1114	1052	-	-
AWS300 High Eff	400	50	16	3154	3003	2541	2420	1784	1699	1156	1101	3300	3143	2802	2669	1870	1781	1107	1054	-	-
AWS320 High Eff	400	50	20	3379	3284	2875	2795	1950	1895	1324	1287	3269	3177	2941	2859	2327	2262	1431	1391	-	-
AWS350 High Eff	400	50	20	3379	3284	2875	2795	1950	1895	1324	1287	3269	3177	2941	2859	2327	2262	1431	1391	-	-

Note: Lifting and Mounting locations begin onpage 21
Note: See Physical Data Tables, beginning on page 13, for Shipping and Operating Weights, and weight adjustments for accessories and options.

Table 12: Lifting and Mounting Weights (SI Units)

UNIT SIZE	VOLT	Hz	# OF FANS	LIFTING WEIGHT FOR EACH POINT (KG)								MOUNTING LOADS FOR EACH POINT (KG)									
				L1	L2	L3	L4	L5	L6	L7	L8	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
AWS280 Std Eff	400	50	16	1403	1325	1134	1071	802	758	527	498	1470	1388	1251	1182	841	794	505	477	-	-
AWS300 Std Eff	400	50	16	1403	1325	1134	1071	802	758	527	498	1470	1388	1251	1182	841	794	505	477	-	-
AWS300 High Eff	400	50	16	1431	1362	1153	1098	809	771	524	499	1497	1426	1271	1211	848	808	502	478	-	-
AWS320 High Eff	400	50	20	1533	1490	1304	1268	885	860	601	584	1483	1441	1334	1297	1056	1026	649	631	-	-
AWS350 High Eff	400	50	20	1533	1490	1304	1268	885	860	601	584	1483	1441	1334	1297	1056	1026	649	631	-	-

Lifting and Mounting locations begin onpage 21
See Physical Data Tables, beginning on page 13, for Shipping and Operating Weights, and weight adjustments for accessories and options.

Figure 16: Lifting & Mounting Locations - AWS280 Standard Efficiency, 50Hz

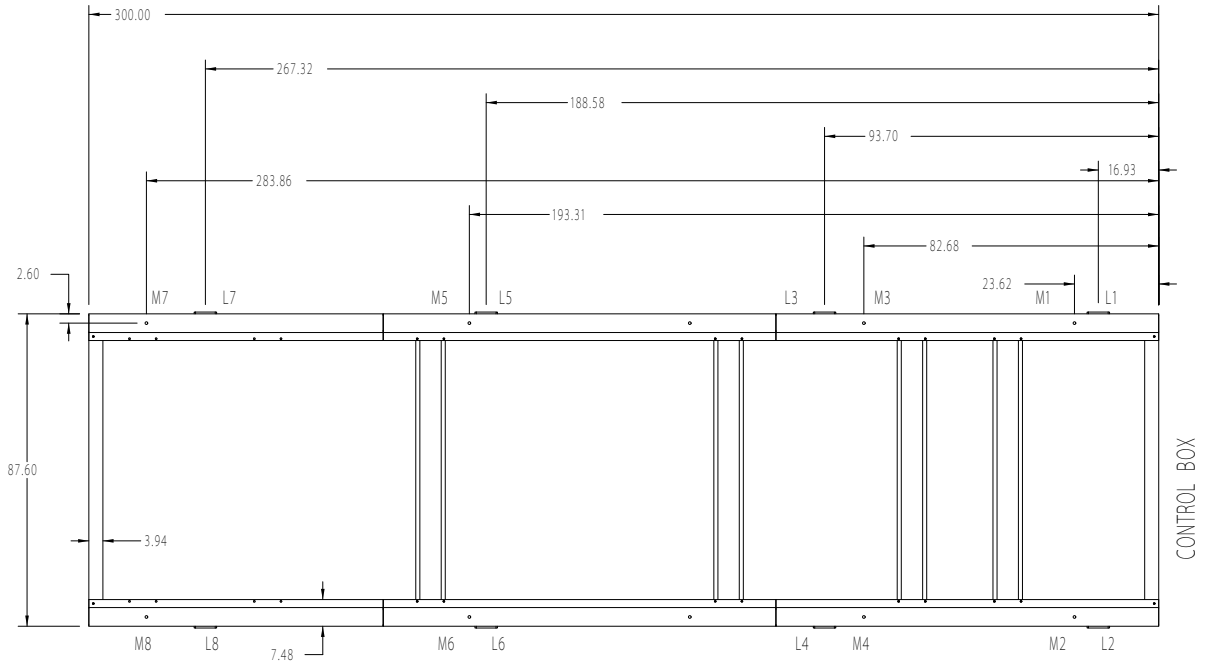


Figure 17: Lifting & Mounting Locations - AWS300 Standard Efficiency, 50Hz

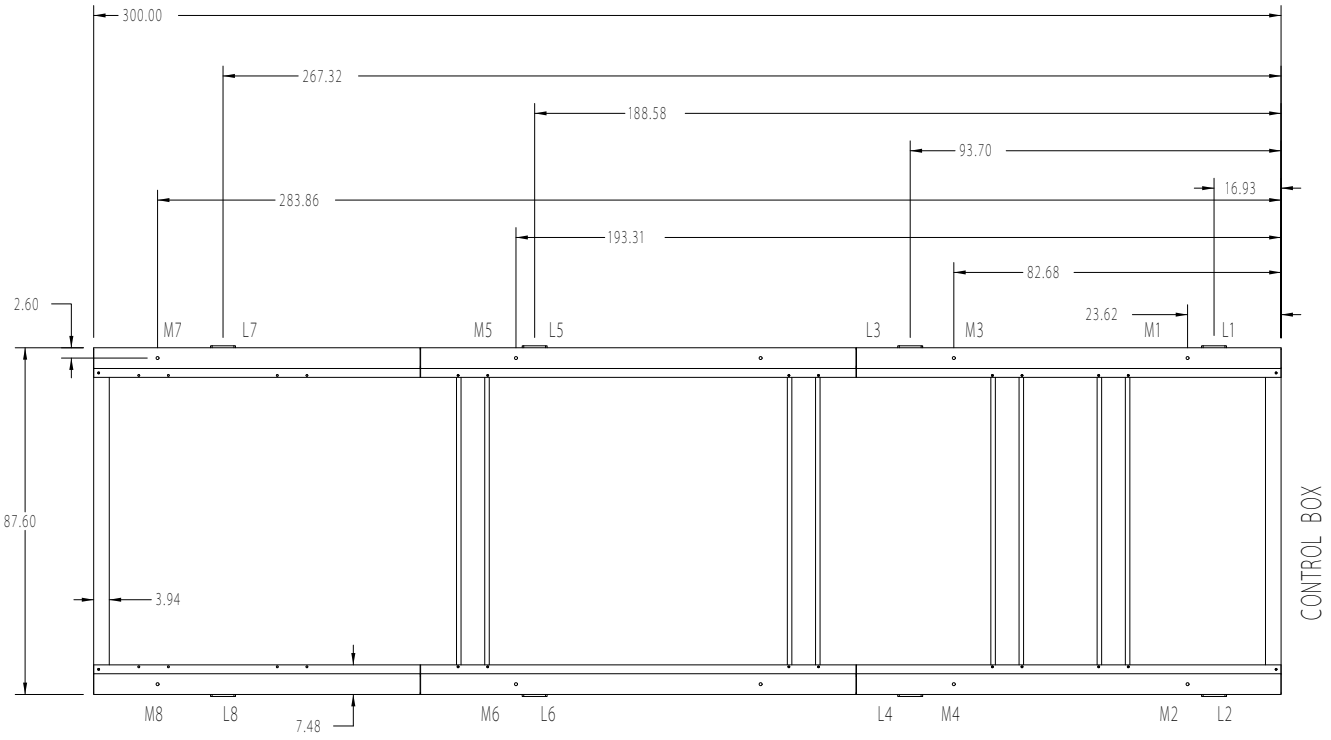


Figure 18: Lifting & Mounting Locations - AWS300 High Efficiency, 50Hz

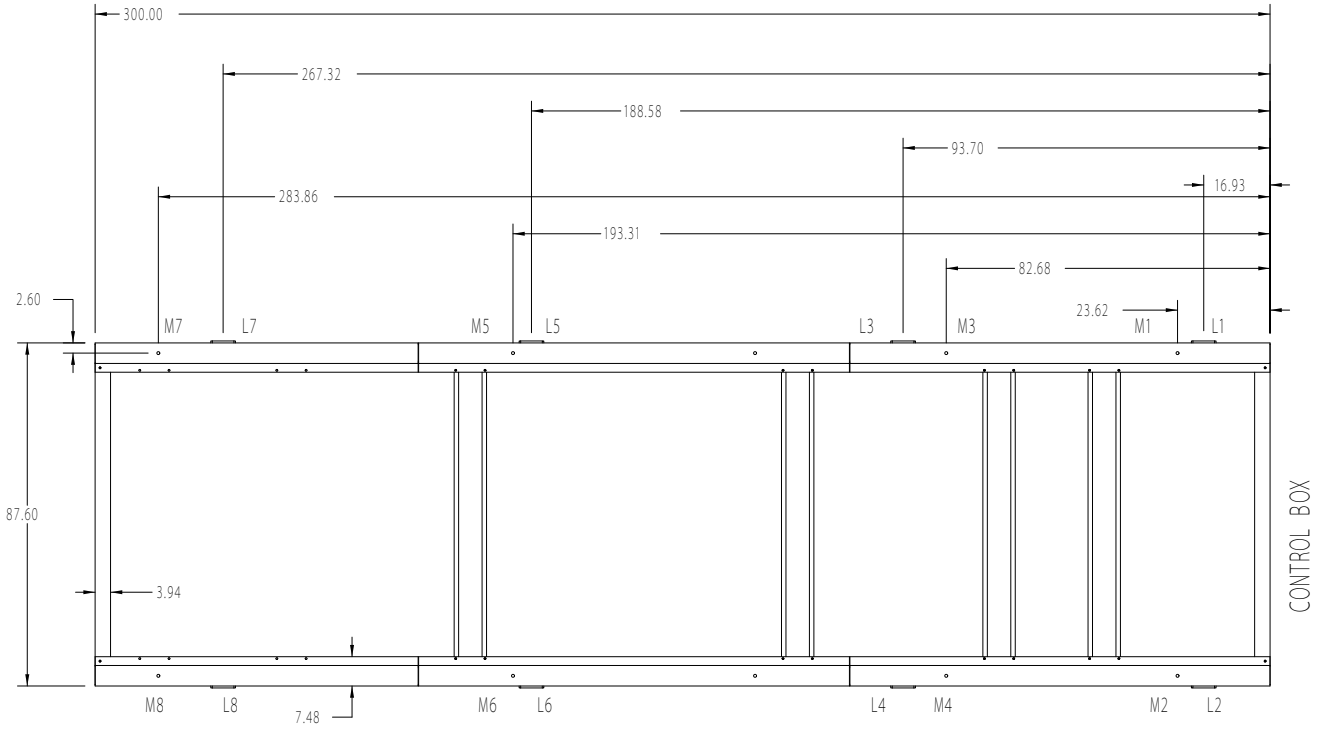


Figure 19: Lifting & Mounting Locations - AWS320 High Efficiency, 50Hz

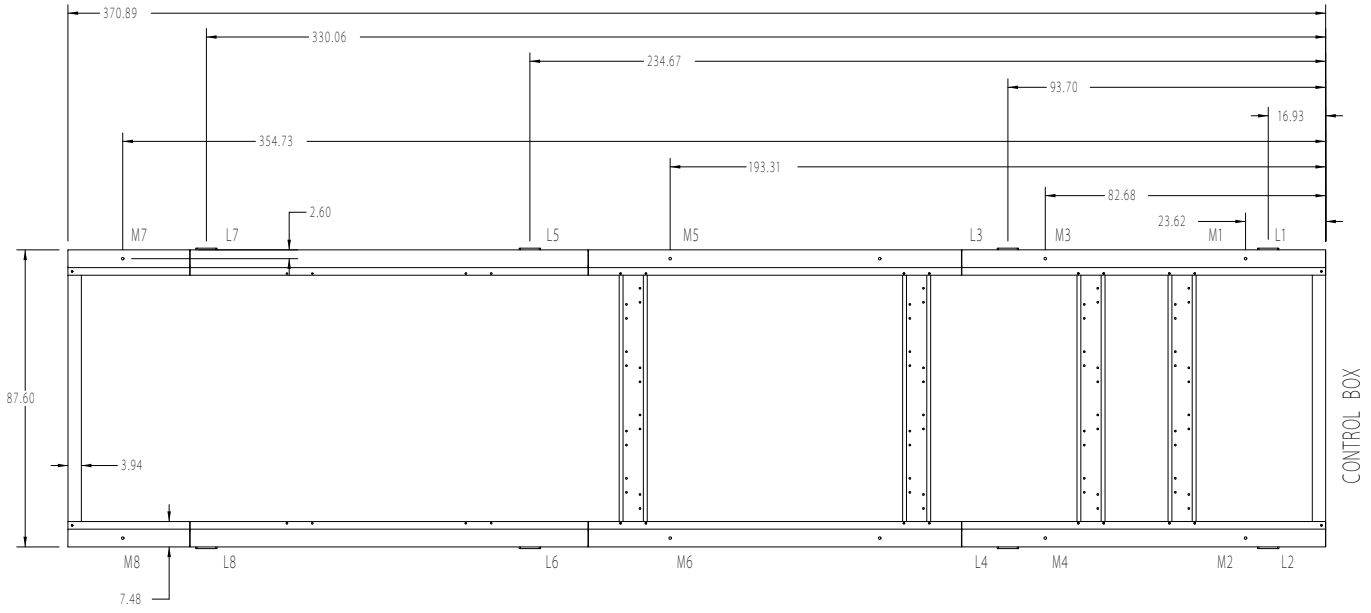
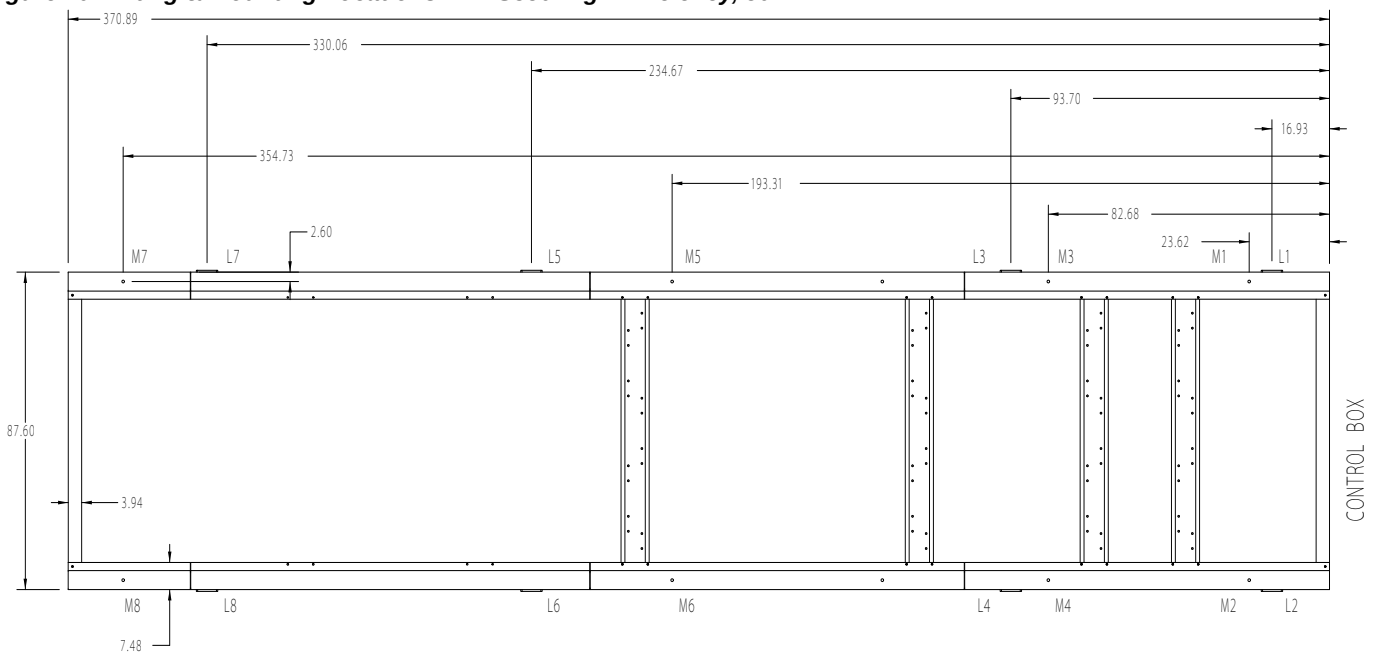


Figure 20: Lifting & Mounting Locations - AWS350 High Efficiency, 50Hz



Isolator Locations and Kit Numbers

Transfer the unit as indicated under Handling on page 4. In all cases, set the unit in place and level with a spirit level. When spring-type isolators are required, install springs running under the main unit supports.

The unit should be set initially on shims or blocks at the listed spring free height. When all piping, wiring, flushing, charging, etc., is completed, the springs are adjusted upward to loosen the blocks or shims that are then removed.

A rubber anti-skid pad should be used under isolators if hold-down bolts are not used.

Installation of spring isolators requires flexible piping connections and at least three feet of flexible electrical conduit to avoid straining the piping and transmitting vibration and noise.

Figure 21: Spring Isolators - CP-4

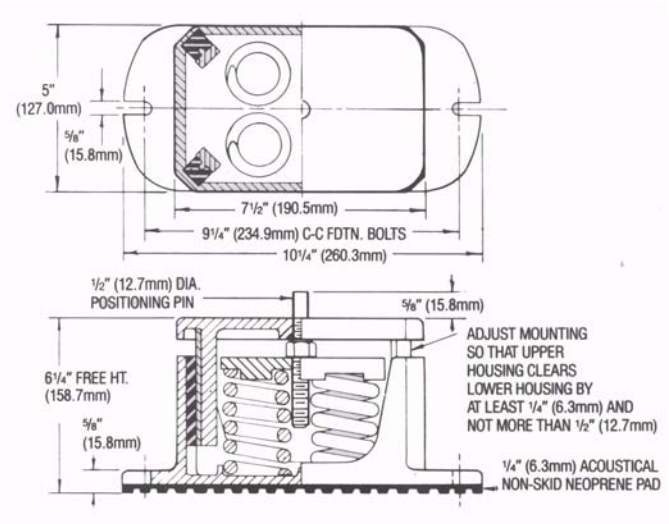
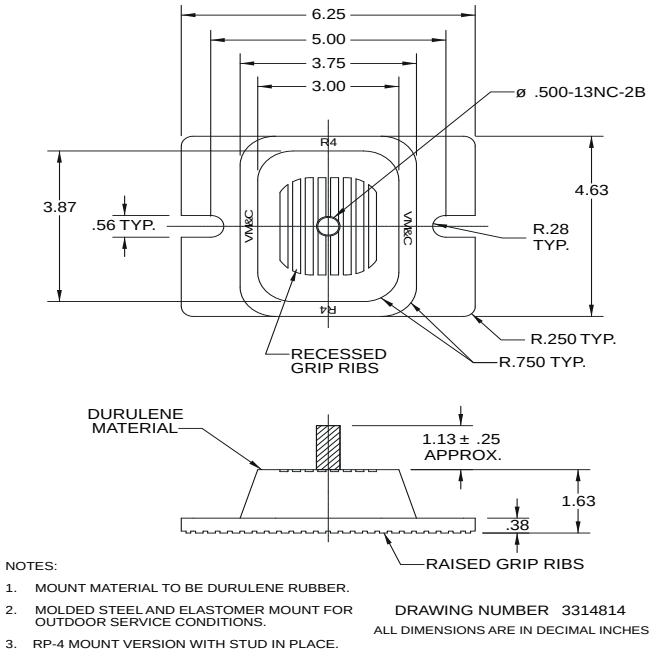


Figure 22: Neoprene-in-Shear Isolators - RP-4



NOTES:

1. MOUNT MATERIAL TO BE DURULENE RUBBER.
2. MOLDED STEEL AND ELASTOMER MOUNT FOR OUTDOOR SERVICE CONDITIONS.
3. RP-4 MOUNT VERSION WITH STUD IN PLACE.

DRAWING NUMBER 3314814

ALL DIMENSIONS ARE IN DECIMAL INCHES

Table 13: Spring Isolators (for Units with Aluminum Fin Condensers)

UNIT SIZE	VOLT	Hz	# OF FANS	Kit P/N	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
AWS280 Std Eff	400	50	16	332320801	332620800	332620800	332620800	332620800	332620600	332620600	332620400	332620400	N/A	N/A
					Dk. Green	Dk. Green	Dk. Green	Dk. Green	Dk. Purple	Dk. Purple	Red	Red		
AWS300 Std Eff	400	50	16	332320801	332620800	332620800	332620800	332620800	332620600	332620600	332620400	332620400	N/A	N/A
					Dk. Green	Dk. Green	Dk. Green	Dk. Green	Dk. Purple	Dk. Purple	Red	Red		
AWS300 High Eff	400	50	16	332320801	332620800	332620800	332620800	332620800	332620600	332620600	332620400	332620400	N/A	N/A
					Dk. Green	Dk. Green	Dk. Green	Dk. Green	Dk. Purple	Dk. Purple	Red	Red		
AWS320 High Eff	400	50	20	332320802	332620900	332620900	332620900	332620900	332620800	332620800	332620500	332620500	N/A	N/A
					Gray	Gray	Gray	Gray	Dk. Green	Dk. Green	Black	Black		
AWS350 High Eff	400	50	20	332320802	332620900	332620900	332620900	332620900	332620800	332620800	332620500	332620500	N/A	N/A
					Gray	Gray	Gray	Gray	Dk. Green	Dk. Green	Black	Black		

Table 14: Spring Isolators (for Units with Copper Fin Condensers)

UNIT SIZE	VOLT	Hz	# OF FANS	Kit P/N	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
AWS280 Std Eff	400	50	16	332320802	332620900	332620900	332620900	332620900	332620800	332620800	332620500	332620500	N/A	N/A
					Gray	Gray	Gray	Gray	Dk. Green	Dk. Green	Black	Black		
AWS300 Std Eff	400	50	16	332320802	332620900	332620900	332620900	332620900	332620800	332620800	332620500	332620500	N/A	N/A
					Gray	Gray	Gray	Gray	Dk. Green	Dk. Green	Black	Black		
AWS300 High Eff	400	50	16	332320802	332620900	332620900	332620900	332620900	332620800	332620800	332620500	332620500	N/A	N/A
					Gray	Gray	Gray	Gray	Dk. Green	Dk. Green	Black	Black		
AWS320 High Eff	400	50	20	332320803	332620900	332620900	332620900	332620900	332620800	332620800	332620600	332620600	N/A	N/A
					Gray	Gray	Gray	Gray	Dk. Green	Dk. Green	Dk. Purple	Dk. Purple		
AWS350 High Eff	400	50	20	332320803	332620900	332620900	332620900	332620900	332620800	332620800	332620600	332620600	N/A	N/A
					Gray	Gray	Gray	Gray	Dk. Green	Dk. Green	Dk. Purple	Dk. Purple		

Table 15: Neoprene-in-shear Isolators (for Units with Aluminum Fin Condensers)

UNIT SIZE	VOLT	Hz	# OF FANS	Kit P/N	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
AWS280 Std Eff	400	50	16	332325801	331481404	331481404	331481403	331481403	331481403	331481403	331481401	331481401	N/A	N/A
					Gray	Gray	Green	Green	Green	Green	Brown	Brown		
AWS300 Std Eff	400	50	16	332325801	331481404	331481404	331481403	331481403	331481403	331481403	331481401	331481401	N/A	N/A
					Gray	Gray	Green	Green	Green	Green	Brown	Brown		
AWS300 High Eff	400	50	16	332325801	331481404	331481404	331481403	331481403	331481403	331481403	331481401	331481401	N/A	N/A
					Gray	Gray	Green	Green	Green	Green	Brown	Brown		
AWS320 High Eff	400	50	20	332325801	331481404	331481404	331481403	331481403	331481403	331481403	331481401	331481401	N/A	N/A
					Gray	Gray	Green	Green	Green	Green	Brown	Brown		
AWS350 High Eff	400	50	20	332325801	331481404	331481404	331481403	331481403	331481403	331481403	331481401	331481401	N/A	N/A
					Gray	Gray	Green	Green	Green	Green	Brown	Brown		

Table 16: Neoprene-in-shear Isolators (for Units with Copper Fin Condensers)

UNIT SIZE	VOLT	Hz	# OF FANS	Kit P/N	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
AWS280 Std Eff	400	50	16	332325803	331481404	331481404	331481404	331481404	331481402	331481402	331481402	331481402	N/A	N/A
					Gray	Gray	Gray	Gray	Red	Red	Red	Red		
AWS300 Std Eff	400	50	16	332325803	331481404	331481404	331481404	331481404	331481402	331481402	331481402	331481402	N/A	N/A
					Gray	Gray	Gray	Gray	Red	Red	Red	Red		
AWS300 High Eff	400	50	16	332325803	331481404	331481404	331481404	331481404	331481402	331481402	331481402	331481402	N/A	N/A
					Gray	Gray	Gray	Gray	Red	Red	Red	Red		
AWS320 High Eff	400	50	20	332325802	331481404	331481404	331481404	331481404	331481403	331481403	331481403	331481403	N/A	N/A
					Gray	Gray	Gray	Gray	Green	Green	Green	Green		
AWS350 High Eff	400	50	20	332325802	331481404	331481404	331481404	331481404	331481403	331481403	331481403	331481403	N/A	N/A
					Gray	Gray	Gray	Gray	Green	Green	Green	Green		

Field Wiring

Wiring must comply with all applicable codes and ordinances. Warranty does not cover damage to the equipment caused by wiring not complying with specifications.

An open fuse indicates a short, ground, or overload. Before replacing a fuse or restarting a compressor or fan motor, the trouble must be found and corrected.

Copper wire is required for all power lead terminations at the unit, and copper must be used for all other wiring to the unit.

Pathfinder chillers can be ordered with main power wiring for either multi-point power connection (standard) or single-point connection (optional).

If the optional single-point power connection is ordered, a single power connection is made to a power block (or optional disconnect switch) in the unit power panel. A separate disconnect is required if the optional factory-mounted disconnect is not ordered. Factory-mounted isolation circuit breakers for each circuit are included as standard on all single-point connection options.

If the standard multiple-point power wiring is ordered, two power connections are required. They are made to factory-mounted disconnect switches in the power panel. See the dimension drawings beginning on page 15 for entry locations.

It can be desirable to have the unit evaporator heaters on a separate disconnect switch from the main unit power supply so that the unit power can be shut down without defeating the freeze protection provided by the evaporator heaters. See the field wiring diagram on page 30 for connection details.

The 120-volt control transformer is factory mounted and wired.

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⚠ CAUTION

If a separate disconnect is used for the 120V supply to the unit, it must power the entire control circuit. It must be clearly marked so that it is not accidentally shut off during freezing temperatures, thereby de-energizing the evaporator heaters. Freeze damage to the evaporator could result. If the evaporator is drained for winter freeze protection, the heaters must be *de-energized* to prevent heater burnout.

⚠ CAUTION

Pathfinder unit compressors are single-direction rotation compressors and can be damaged if rotated in the wrong direction. For this reason, proper phasing of electrical power is important. Electrical phasing must be A, B, C for electrical phases 1, 2 and 3 (A=L1, B=L2, C=L3) for single or multiple point wiring arrangements. The solid-state starters contain phase reversal protection. DO NOT ALTER THE WIRING TO THE STARTERS.

Table 17: Multi-Point Electrical Data

Model	HZ	Voltage	# of Fans	Multiple Point Field Data - Circuit #1 (Wire 75C for SP Power Block / Disconnect Sw. - 90C for SP HSCCR)						
				MCA	Recommended Fuse Size	Maximum Fuse Size	# of Leads	Wire Size	# of Hubs	Hub Size
280 Std Eff	50	400V	8	362	500	600	3	500 MCM	1	3
300 Std Eff	50	400V	8	402	600	600	6	4/0 AWG	2	2
300 High Eff	50	400V	8	390	600	600	6	3/0 AWG	2	2
320 High Eff	50	400V	10	398	600	600	6	3/0 AWG	2	2
350 High Eff	50	400V	10	435	600	700	6	4/0 AWG	2	2
				Multiple Point Field Data - Circuit #2						
Model	HZ	Voltage	# of Fans	MCA	Recommended Fuse Size	Maximum Fuse Size	# of Leads	Wire Size	# of Hubs	Hub Size
280 Std Eff	50	400V	8	402	600	600	6	4/0 AWG	2	2
300 Std Eff	50	400V	8	402	600	600	6	4/0 AWG	2	2
300 High Eff	50	400V	8	390	600	600	6	3/0 AWG	2	2
320 High Eff	50	400V	10	435	600	700	6	3/0 AWG	2	2
350 High Eff	50	400V	10	435	600	700	6	4/0 AWG	2	2

Note: 400A and larger circuit breakers are 100% rated; 250A and smaller are 80% rated.

Table 18: Multipoint Electrical Data

Model	HZ	Voltage	Compressor Rated Load Amps			# of Fans	Fan Motors FLA	Fan Motor LRA	Inrush Amps LRA (ATL)			Inrush Amps LRA (SS)			Inrush Amps LRA (YD)		
			CIRC 1	CIRC 2	CIRC 3				Cir. 1	Cir. 2	Cir. 3	Cir. 1	Cir. 2	Cir. 3	Cir. 1	Cir. 2	Cir. 3
280 Std Eff	50	400V	264	296	--	16	4.0	15	1724	2014	-	1000	1168	-	576	673	-
300 Std Eff	50	400V	296	296	--	16	4.0	15	2014	2014	-	1168	1168	-	673	673	-
300 High Eff	50	400V	286	286	--	16	4.0	15	1724	1724	-	1000	1000	-	576	576	-
320 High Eff	50	400V	286	316	--	20	4.0	15	1724	2014	-	1000	1168	-	576	673	-
350 High Eff	50	400V	316	316	--	20	4.0	15	2014	2014	-	1168	1168	-	673	673	-

Electrical Data

Table 19: Multi-Point Field Wiring Information

Circuit #1									
Model	HZ	Voltage	# of Fans	Power Block		Disconnect Switch		High Short Circuit Current Rating Circuit Breaker (note 1)	
				Size	Std Lug Size	Size	Std Lug Size	Size	Std Lug Size
280 Std Eff	50	400V	8	380A	(1/PH) #4 - 500	400A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
300 Std Eff	50	400V	8	760A	(2/PH) #2 - 500 kcmil	400A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
300 High Eff	50	400V	8	760A	(2/PH) #2 - 500 kcmil	400A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
320 High Eff	50	400V	10	760A	(2/PH) #2 - 500 kcmil	400A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
350 High Eff	50	400V	10	760A	(2/PH) #2 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
Circuit #2									
Model	HZ	Voltage	# of Fans	Power Block		Disconnect Switch		High Short Circuit Current Rating Circuit Breaker (note 1)	
				Size	Std Lug Size	Size	Std Lug Size	Size	Std Lug Size
280 Std Eff	50	400V	8	760A	(2/PH) #2 - 500 kcmil	400A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
300 Std Eff	50	400V	8	760A	(2/PH) #2 - 500 kcmil	400A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
300 High Eff	50	400V	8	760A	(2/PH) #2 - 500 kcmil	400A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
320 High Eff	50	400V	10	760A	(2/PH) #2 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
350 High Eff	50	400V	10	760A	(2/PH) #2 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil	600A	(2/PH) 3/0 - 500 kcmil
Note: 400A and larger circuit breakers are 100% rated; 250A and smaller are 80% rated.									

Table 20: Single Point Electrical Data

Pathfinder Chiller Model	HZ	Voltage	# of Fans	**Compressor Rated Load Amps**		Fan Motors FLA	Single Point Electrical Data						
				Comp #1	Comp #2		MCA	Rec Fuse Size	Max Fuse Size	# of Leads	Wire Size	# of Hubs	Hub Size
280 Std Eff	50	400V	16	264	296	4.0	698	800	800	6	500 MCM	2	3
300 Std Eff	50	400V	16	296	296	4.0	730	1000	1000	6	500 MCM	2	3
300 High Eff	50	400V	16	286	286	4.0	708	800	800	6	500 MCM	2	3
320 High Eff	50	400V	20	286	316	4.0	761	1000	1000	12	250 MCM	2	3
350 High Eff	50	400V	20	316	316	4.0	791	1000	1000	12	250 MCM	2	3

Table 21: Single Point Terminal Amp Data

Pathfinder Chiller Model	HZ	Voltage	# of Fans	Power Block		Disconnect Switch		High Short Circuit Current Rating ircuit Breaker	
				Size	Std Lug Size	Size	Std Lug Size	Size	Std Lug Size
280 Std Eff	50	400V	16	760A	(2/PH) #2 - 500 kcmil	800A	(4/PH) 250 - 500 kcmil	1200A	(4/PH) 250 mcm - 500 kcmil
300 Std Eff	50	400V	16	760A	(2/PH) #2 - 500 kcmil	800A	(4/PH) 250 - 500 kcmil	1200A	(4/PH) 250 mcm - 500 kcmil
300 High Eff	50	400V	16	760A	(2/PH) #2 - 500 kcmil	800A	(4/PH) 250 - 500 kcmil	1200A	(4/PH) 250 mcm - 500 kcmil
320 High Eff	50	400V	20	1400A	(4/PH) 1/0 - 750 mcm	800A	(4/PH) 250 - 500 kcmil	1200A	(4/PH) 250 mcm - 500 kcmil
350 High Eff	50	400V	20	1400A	(4/PH) 1/0 - 750 mcm	1200A	(4/PH) 250 - 500 kcmil	1200A	(4/PH) 250 mcm - 500 kcmil

Note: 400A and larger circuit breakers are 100% rated; 250A and smaller are 80% rated.

Figure 23: Field Wiring Diagram

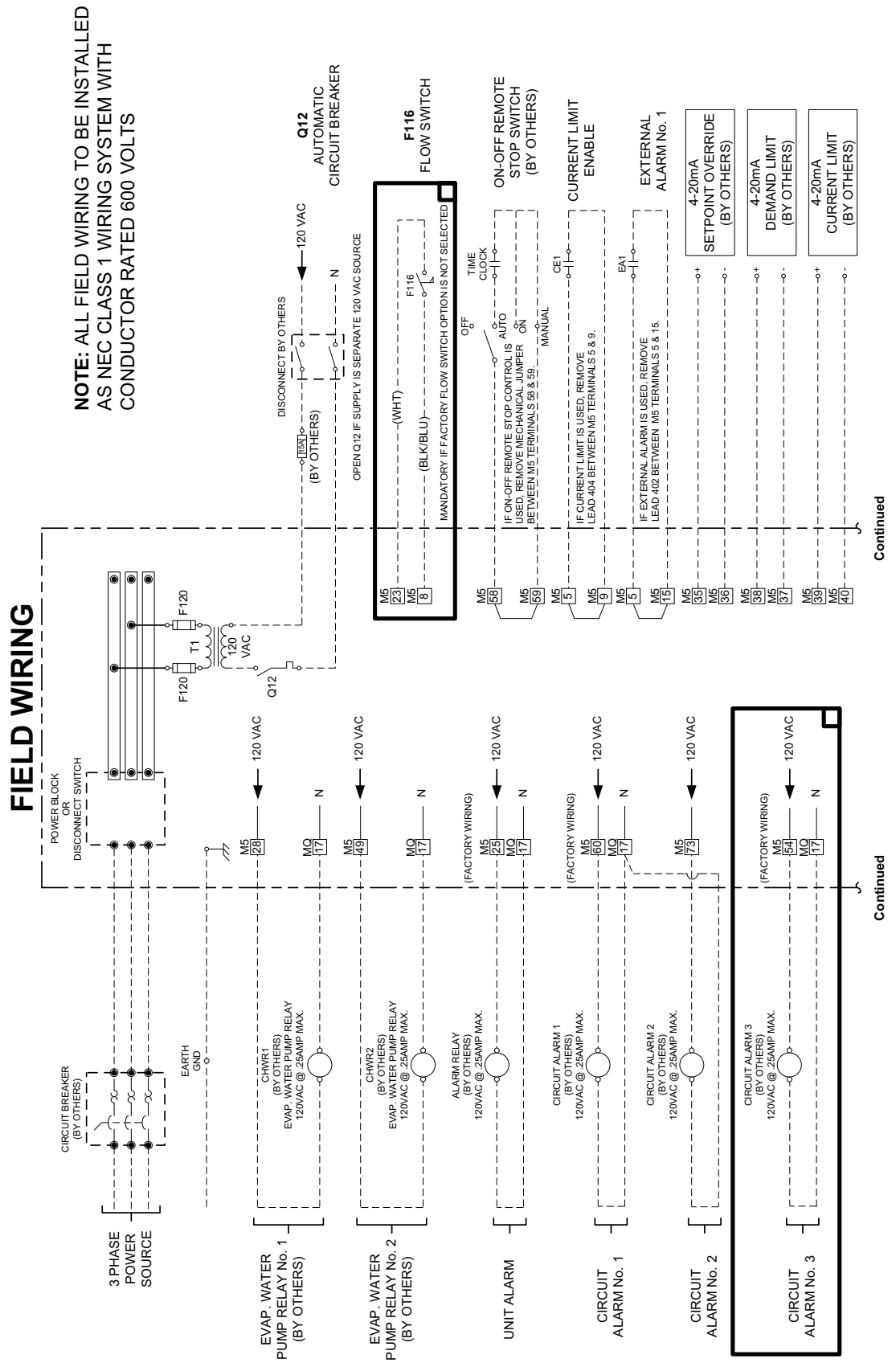
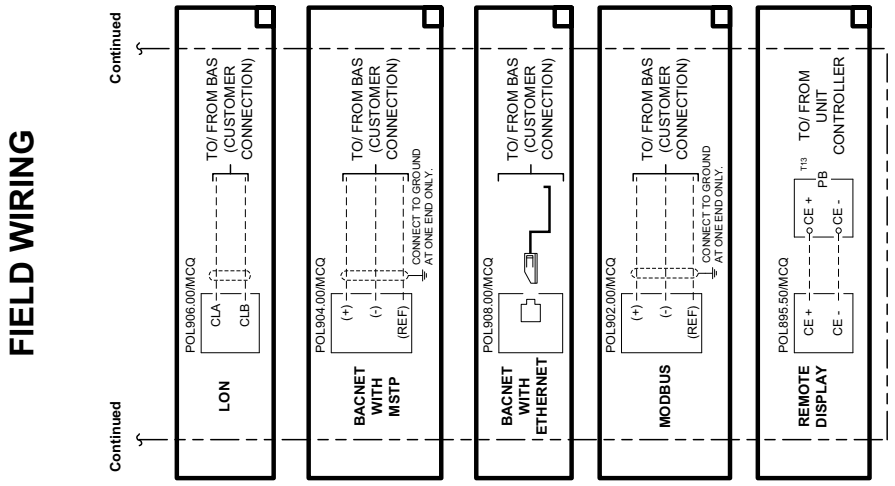


Figure 24: Field Wiring Diagram (continued)



Wiring Diagram

Table 22: Troubleshooting Chart

PROBLEM	POSSIBLE CAUSES	POSSIBLE CORRECTIVE STEPS
Compressor will not run.	1. Main power switch open. 2. Unit system switch open. 3. Circuit switch in pumpdown position. 4. Chilled water flow switch not closed. 5. Circuit breakers open. 6. Fuse blown or circuit breakers tripped. 7. Compressor overload tripped. 8. Defective compressor contactor or contactor coil. 9. System shut down by protection devices. 10. No cooling required. 11. Motor electrical trouble. 12. Loose wiring. 13. Cycle timer active	1. Close switch. 2. Check unit status on MicroTech III display. Close switch. 3. Check circuit status on MicroTech III display. Close switch. Check pump operation for flow. 4. Check unit status on MicroTech display. Check Chilled water pump. 5. Close circuit breakers. 6. Check electrical circuits and motor windings for shorts or grounds. Investigate for possible overloading. Check for loose or corroded connections. Reset breakers or replace fuses after fault is corrected. 7. Overloads are manual reset. Reset overload at button on overload. Clear alarm on Microtech III display. 8. Check wiring. Repair or replace contactor. 9. Determine type and cause of shutdown and correct problem before attempting to restart. 10. Check control settings. Wait until unit calls for cooling. 11. See 6,7,8 above. 12. Check circuits for voltage at required points. Tighten all power wiring terminals. 13. Check timer operation
Compressor Noisy or Vibrating	1. Compressor Internal problem. 2. Oil injection not adequate. 3. Liquid slugging	1. Contact McQuayService. 2. Check that oil sight glass has oil visible during steady operation Check pressure drop across oil filter and oil separator sight glasses 3. Check suction and discharge superheat
Compressor Overload Tripped or Circuit Breaker Trip or Fuses Blown	1. Low voltage during high load condition. 2. Loose power wiring. 3. Power line fault causing unbalanced voltage. 4. Defective or grounded wiring in the motor. 5. High discharge pressure.	1. Check supply voltage for excessive voltage drop. 2. Check and tighten all connections. 3. Check supply voltage. 4. Check motor and replace if defective. 5. See corrective steps for high discharge pressure.
Compressor Will Not Load or Unload	1. Defective capacity control solenoids. 2. Unloader mechanism defective.	1. Check solenoids for proper operation. See capacity control section. 2. Contact McQuayService .
High Discharge Pressure	1. Noncondensables in the system. 2. Fans not running. 3. Fan control out of adjustment. 4. System overcharged with refrigerant. 5. Dirty condenser coil. 6. Air recirculation from fan outlet into unit coils. 7. Air restriction into unit.	1. Remove noncondensables from the condenser coil after shutdown per EPA regulations. 2. Check fan fuses and electrical circuits. 3. Check that fan setup in the controller matches unit fan number. Check Microtech III condenser pressure sensor for proper operation. 4. Check discharge superheat and condenser subcooling. Remove the excess charge. 5. Clean the condenser coil. 6. Remove the cause of recirculation. 7. Remove obstructions near unit.
Low Discharge Pressure	1. Wind effect or a low ambient temperature. 2. Condenser fan control not correct. 3. Low suction pressure. 4. Compressor operating unloaded. 5. Compressor problem, not pumping properly	1. Protect unit against excessive wind into vertical coils. 2. Check that fan setup in the Microtech III controller matches unit fan number. Check VFD fan on units with VFD option. 3. See corrective steps for low suction pressure. 4. See corrective steps for failure to load. 5. Repair or replace compressor

Troubleshooting Chart

Table 22: Troubleshooting Chart

Low Suction Pressure	1. Inadequate refrigerant charge quantity.	1. Check liquid line sight glass. Check unit for leaks. Repair and recharge to clear sight glass at full load, all fans on, 75°F min OAT..
	2. Clogged liquid line filter-drier.	2. Check pressure drop across the filter-drier. Replace filter-driers.
	3. Expansion valve malfunctioning.	3. Check expansion valve superheat and valve opening position. Replace valve only if certain valve is not working.
	4. Insufficient water flow to evaporator.	4. Check water pressure drop across the evaporator and adjust gpm.
	5. Water temperature leaving evaporator is too low.	5. Adjust water temperature to higher value.
	6. Evaporator tubes fouled.	6. Inspect by removing water piping. Clean chemically.
	7. Suction valve (partially) closed.	7. Open valve.
	8. Glycol in chilled water system	8. Check glycol concentration
Low Oil Level Trip	1. Insufficient oil.	1. Check oil line and separator sight glasses.
	2. Low discharge pressure.	2. Faulty EXV.
	3. Low discharge superheat	3. Check and correct cause of low DSH
High Suction Pressure	1. Excessive load - high water temperature.	1. Reduce load or add additional equipment.
	2. Compressor unloaders not loading compressor.	2. See corrective steps below for failure of compressor to load.
	3. Superheat is too low.	3. Check superheat on Microtech III display. Check suction line sensor installation and sensor.
	4. System overcharged	4. Check charge, an overcharge raises suction pressure
	5. Compressor bypassing gas	5. Check evaporator, suction and discharge pressures

McQuay Training and Development

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