



Liebert®

DSE™ Packaged Solution
Thermal Management System

Installer/User Guide
60-kW (15-ton) Capacity

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures. Visit <https://www.Vertiv.com/en-us/support/> for additional assistance.

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1 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of the Liebert® DSE Packaged Solution, 60 kW, Model DP060.. Read this manual thoroughly before attempting to install or operate this unit.

Only qualified personnel should move, install or service this equipment.

Adhere to all warnings, cautions, notices and installation, operating and safety instructions on the unit and in this manual. Follow all installation, operation and maintenance instructions and all applicable national and local building, electrical and plumbing codes.



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "Unit Off" mode of the controller. The factory-supplied disconnect switch is on the exterior of the enclosure. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



WARNING! Risk of electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' specifications. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.



WARNING! Risk of electric shock. Can cause serious injury or death. The Liebert® iCOM microprocessor does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "unit off" mode of the Liebert® iCOM control. Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before working on any component of the system.



WARNING! Risk of electric shock. Can cause serious injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within the fan-motor electric-connection enclosures. Fan-motor controls can maintain an electric charge for 10 minutes after power is disconnected. Wait 10 minutes after power is verified as off before working within the fan electric control/connection enclosures. Use only fully-trained and qualified HVAC technicians to perform maintenance on the fans.



WARNING! Risk of over-pressurization of the refrigeration system. Can cause explosive discharge of high-pressure refrigerant, loss of refrigerant, environmental pollution, equipment damage, injury, or death. This unit contains fluids and gases under high pressure. Use extreme caution when charging the refrigerant system. Do not pressurize the system higher than the design pressure marked on the unit's nameplate.



CAUTION: Risk of pressurized doors flying open or slamming closed suddenly. Can cause serious injury. Do not attempt to open doors while fans are running. Do not turn on fans with doors open. Before opening the door, open all local and remote electric power supply disconnect switches, verify with a voltmeter that power is off, and verify that all fans have stopped rotating. Do not leave unsecured objects in the fan's bay after any maintenance operation.



WARNING! Risk of contact with flying objects. Can cause serious injury or death. Do not leave unsecured objects or tools in the fan's bay after performing maintenance operations. Re-install all panels before starting up this unit after maintenance is performed.



WARNING! Risk of very heavy, 250-lb (113.4-kg) condenser fan modules dropping downward suddenly. Can cause injury or death. Support fan modules before removing mounting hardware. Use caution to keep body parts out of the fan modules pathway during repositioning. Only properly trained and qualified personnel should work on this equipment.



WARNING! Risk of improper moving. Can cause equipment damage, injury or death. Use only lifting equipment that is rated for the unit weight by an OSHA-certified rating organization. The center of gravity varies depending on the unit size and selected options. The slings must be equally spaced on either side of the center of gravity indicator. Unit weights are listed in **Table 3.4** on page 13. Use the center of gravity indicators on the unit to determine the position of the slings.



WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure. Do not operate the unit with any or all cabinet panels removed.



WARNING! Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, serious injury or death. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning equipment and who are wearing appropriate, OSHA-approved PPE.



WARNING! Risk of improper wire sizing/rating and loose electrical connections. Can cause overheated wire and electrical connection terminals resulting in smoke, fire, equipment and building damage, injury or death. Use correctly sized copper wire only and verify that all electrical connections are tight before turning power On. Check all electrical connections periodically and tighten as necessary.



CAUTION: Risk of explosive discharge of high-pressure refrigerant. Can cause serious injury. Neutral and service ports on the rotalock valve do not have a valve core. Front-seat the service valves and relieve pressure from the compressor before loosening a part or a component attached to the service valve. Follow local codes to properly reclaim refrigerant.



CAUTION: Risk of improper moving, lifting and handling. Can cause equipment damage or injury. Only properly trained and qualified personnel should work on this equipment. Fan modules weigh in excess of 125 lb (57 kg). Use proper lifting techniques and wear appropriate, OSHA-approved PPE to avoid injury and dropping the fan module during removal. Equipment used in handling/lifting, and/or installing the fan assembly must meet OSHA requirements. Use handling/lifting equipment rated for the weight of the fan assembly. Use ladders rated for the weight of the fan assembly and technicians if used during installation. Refer to handling/lifting, and/or installation equipment operating manual for manufacturer's safety requirements and operating procedures.



CAUTION: Risk of contact with sharp edges, splinters, and exposed fasteners. Can cause injury. Only properly trained and qualified personnel wearing appropriate, OSHA-approved PPE should attempt to move, lift, remove packaging from or prepare the unit for installation.



CAUTION: Risk of contact with hot surfaces. Can cause injury. The compressor, refrigerant discharge lines, fan motor, and some electrical components are extremely hot during unit operation. Allow sufficient time for them to cool to a touch-safe temperature before working within the unit cabinet. Use extreme caution and wear appropriate, OSHA-approved PPE when working on or near hot components.



CAUTION: Risk of exposure to harmful noise levels. Can cause hearing injury or loss. Depending on the installation and operating conditions, a sound pressure level greater than 70 dB(A) may arise. Take appropriate technical safety measures. Operating personnel must wear appropriate, OSHA-approved PPE and observe all appropriate hearing-protection safety requirements.

NOTICE

Risk of improper power-supply connection. Can cause equipment damage and loss of warranty coverage.

Prior to connecting any equipment to a main or alternate power source (for example: back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. In general, power-source voltages should be stabilized and regulated to within $\pm 10\%$ of the load nameplate nominal voltage. Also, ensure that no three-phase sources are single-phased at any time.

NOTICE

Risk of oil contamination with water. Can cause equipment damage.

Liebert® DSE Packaged Solutions, 60 kW, Model DP060 requires the use of POE (polyolester) oil. POE oil absorbs water at a much faster rate when exposed to air than previously used oils. Because water is the enemy of a reliable refrigeration system, extreme care must be used when opening systems during service. If water is absorbed into the POE oil, it will not be easily removed and will not be removed through the normal evacuation process. If the oil is too wet, it may require an oil change. POE oils also have a property that makes them act as a solvent in a refrigeration system. Maintaining system cleanliness is extremely important because the oil will tend to bring any foreign matter back to the compressor.

NOTICE

Risk of improper operation in high-humidity conditions. Can cause unit damage and water carryover.

The Liebert® DSE Packaged Solutions, 60 kW, Model DP060 operates only as a sensible cooling unit and does not provide dehumidification.

NOTE: The Liebert® cooling unit has a factory-installed high pressure safety switch in the high-side refrigerant circuit.

Agency Listed

Standard 60-Hz units are CSA Certified to the harmonized U.S. and Canadian product safety standard CSA C22.2 No 236/UL 1995 for "Heating and Cooling Equipment" and are marked with the CSA c-us logo.



2 NOMENCLATURE AND COMPONENTS

This section describes the configuration number for Liebert® DSE Packaged Solutions, 60 kW units and components.

2.1 Liebert® DSE Packaged Solution, 60 kW, Configuration Number Nomenclature

The following tables describe each digit of the 40-digit Liebert® DSE Packaged Solution, 60 kW, Model DP060 configuration number. The 14-digit model number consists of the first 10 digits and last 4 digits of the configuration number.

Table 2.1 Liebert® DSE Packaged Solution, 60 kW Configuration Number Digits 1 to 10 Example

Configuration -number Digits 1 to 10 = first 10 digits of 14-digit model number									
1	2	3	4	5	6	7	8	9	10
D	P	0	6	0	T	P	1	A	D

Table 2.2 Liebert® DSE Packaged Solutions, 60 kW Configuration Number Detail Digits 11 to 21 Example

Configuration-number Detail Digits 11 to 21										
11	12	13	14	15	16	17	18	19	20	21
0	2	0	8	1	6	L	D	B	0	P

Table 2.3 Liebert® DSE Packaged Solutions, 60 kW Configuration Number Detail Digits 22 to 36 Example

Configuration-number Detail Digits 22 to 36														
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
0	A	A	1	0	0	0	0	0	0	0	0	0	0	0

Table 2.4 Liebert® DSE Packaged Solutions, 60 kW Configuration Number Digits 37 to 40 Example

Configuration -number Digits 37 to 40 = last 4 digits of 14-digit model number			
37	38	39	40
#	#	#	A

Table 2.5 Liebert® DSE Packaged Solutions, 60 kW Configuration Number Digit Definitions

Digit	Description
Digits 1 and 2 = Product Family	DP = Liebert® Packaged DSE
Digit 3 to 5 = Cooling Capacity, kW	Nominal sensible capacity, kW
Digit 6 = Air Discharge	T = Perimeter, top inlet/front supply
Digit 7 = System Type	P = Air-cooled, EconoPhase ready
Digit 8 = Air-flow (Fan Type)	1 = EC plug fans
Digit 9 = Power Supply	A = 460 V / 3 ph / 60 Hz B = 575 V / 3 ph / 60 Hz C = 208 V / 3 ph / 60 Hz D = 230 V / 3 ph / 60 Hz
Digit 10 = Cooling System	D = Digital scroll, R-410A
Digit 11 = Humidifier	0 = None
Digit 12 = Display	2 = Liebert® iCOM High Definition
Digit 13 = Options	0 = None
Digit 14 = Air Filter	8 = MERV 8, 4-in. 9 = MERV 11, 4-in.
Digit 15 = Coil Option	1 = Non-coated coils, evaporator and condenser
Digit 16 = Enclosure Option	6 = Standard color, pebble-gray
Digit 17 = High-voltage option	L = Locking disconnect 6 = Dual disconnect with reversing starter
Digit 18 = Option packages	D = Low-voltage terminal package + Remote humidifier contact

Table 2.5 Liebert® DSE Packaged Solutions, 60 kW Configuration Number Digit Definitions (continued)

Digit	Description
Digit 19 = Monitoring B = Base Comms & Connectivity	
Digit 20 = Sensors 0 = None	
Digit 21 = Packaging P = Domestic	
Digit 22 = Controls 0 = None S = Quick-start and Capacitive buffer (contact the factory)	
Digit 23 = EconoPhase A = Standard capacity	
Digit 24 = Condenser Coil A = Standard ambient condenser	
Digit 25 = 120-V Options 1 = 120V Utility Power, Customer-supplied T = 120-V utility power from main-unit power supply	
Digit 26 = Option 0 = No power meter P = Power meter (Contact the factory)	
Digit 27 = Option 0 = None	
Digit 28 = Option 0 = None	
Digit 29 = Condensate Pump 0 = None	
Digit 30 to 36 0 = Placeholder	
Digit 37 to 39 = Factory Configuration Number	
Digit 40 = Configuration Code A = No SFA S = SFA	

2.2 Component Location

The unit component locations are described in the submittal documents included in the .

The following table lists the relevant documents by number and title.

Table 2.6 Component Location Drawings

Document Number	Title
DPN004597	Component Location Diagram Evaporator Compartment DP060 Top Inlet/Front Supply

2.3 Air Flow Configurations

Table 2.7 Air Flow Configuration Drawings

Document Number	Title
DPN004598	Airflow Schematic, Perimeter Unit
DPN004599	Evaporator Ducting Dimensional Data

3 PRE-INSTALLATION PREPARATION AND GUIDELINES

3.1 Storage before Installation

If storing the unit for long periods before installation:

- Remove the packaging from the unit, and allow proper clearance around the unit to perform periodic inspections and maintenance.
- Inspect the unit periodically for condensation inside the unit or other signs of other effects of the storage environment.
- Rotate the fans and motor shaft by hand periodically for several revolutions. Look for signs of lubrication problem or obstructions.
- If storing at low temperatures trapped moisture can collect on walls and electrical components. We recommend routine inspections and, if needed, install electric heaters to prevent condensation.

NOTE: Before installing unit, determine whether any building alterations are required to run wiring and duct work. Follow all unit dimensional drawings and refer to the submittal engineering dimensional drawings of individual units for proper clearances.

Refer to **Table 2.5** on page 6, and submittal drawings to determine the type of system being installed and anticipate building alterations and duct work needed.

The unit and anchor dimensions are described in the submittal documents included in the [Submittal Drawings](#) on page 61.

- Verify that mounting surface/roof top is level, solid and sufficient to support the unit. See **Table 3.4** on page 13, for unit weights.
- Verify that the support structure for the unit (concrete or other type) has a flat, regular surface and is adequate to support the unit operating weight.
- Verify that adequate water-control/drain system is in place per local code. Refer to the appropriate submittal drawing, listed in **Table 3.1** on the next page, for the condensate drain-line location and connection size.
- Verify that the high-voltage electric-supply lines are adequately sized based on the electrical specification on the unit's name plate and meet local code.
- Verify that the utility electric-supply lines (lights and outlet) are adequately sized and meet local code.
- Verify that all control and communication wiring are properly routed to the unit control panel and meet local code.
- Confirm that the conditioned space has a proper envelope and vapor barrier.
- Handle outside air and humidity control externally to the Liebert® DSE Packaged Solution, 60 kW, Model DP060 unit. The DSE Packaged Solution, 60 kW, Model DP060 does not control humidity and is not intended to handle outside air.
- Allow at least the minimum recommended clearances for maintenance and service. See the appropriate submittal documents for dimensions in [Submittal Drawings](#) on page 61
- Ensure that there is no obstruction when installing duct work connections and transitions to minimize friction losses and turbulence.
- Verify that all duct joints are sealed to prevent air leakage or water penetration.
- If unit is installed but will not be commissioned for a long period, operate the fans or install electric heaters to prevent internal condensation. Refer to [Storage before Installation](#) above, and follow the guidelines until commissioned.

3.2 Planning Dimensions

The unit and anchor dimensions are described in the submittal documents included in the [Submittal Drawings](#) on page 61.

The following table lists the relevant documents by number and title.

Table 3.1 Dimension Planning Drawings

Document Number	Title
DPN004600	Cabinet and Anchor Dimensional Data
DPN004599	Evaporator Ducting Dimensional Data
DPN004601	Condensate Drain Access and Location
DPN004602	Evaporator Compartment Service Area
DPN004756	Installation and Service Clearance for Multiple Units

3.3 Connections and System Setup

3.3.1 Electrical Connections

Three-phase electrical service is required for all models. Electrical service must conform to national and local electrical codes. See [Electrical Field Connections](#) on page 19, for the details.

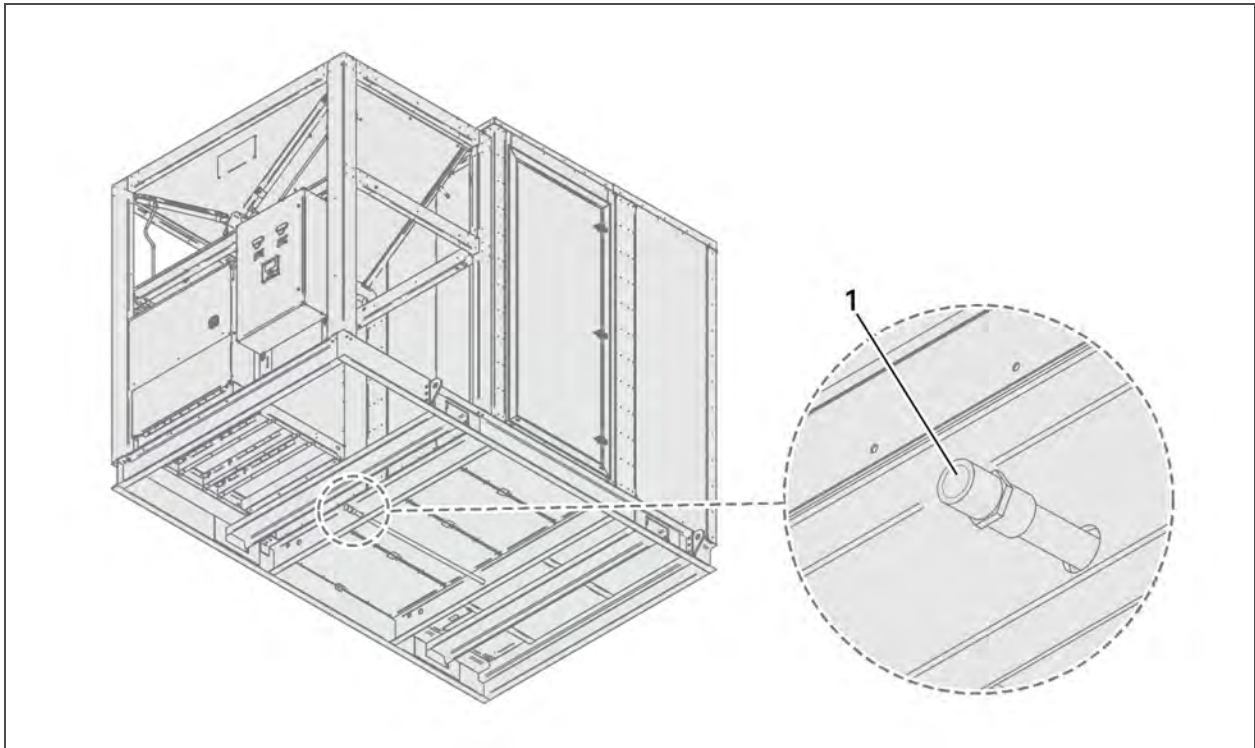
Plan the routing of wiring and duct work to the unit. Refer to the appropriate electrical connection drawings for your system in [Submittal Drawings](#) on page 61.

3.3.2 Evaporator Condensate Drain Connection

Connect the condensate-drain line to an adequate water-drain system. See **3.3** above, for the connection on the unit. Observe the following requirements and **Figure 3.2** on page 12, when installing and routing the drain line:

- Insulate the field-supplied condensate-drain piping with heat trace so it will not freeze.
- The line must be the full size of the drain connection. The connection port is 3/4-in. pipe with CPVC 3/4-in. FPT fitting.
- Slope the drain line continuously away from the unit, and pitch the drain line a minimum of 1/8-in. (3.2-mm) per 1 ft (305 mm) toward the drain.
- The line must be made of a material that is suitable for draining water and be rigid enough that it does not sag between supports, which creates unintentional traps.
- The drain line must comply with all applicable codes.

Figure 3.1 Condensate Drain Location



Item	Description
1	Condensate Drain Connection

Figure 3.2 Correct and Incorrect Condensate Drain Line

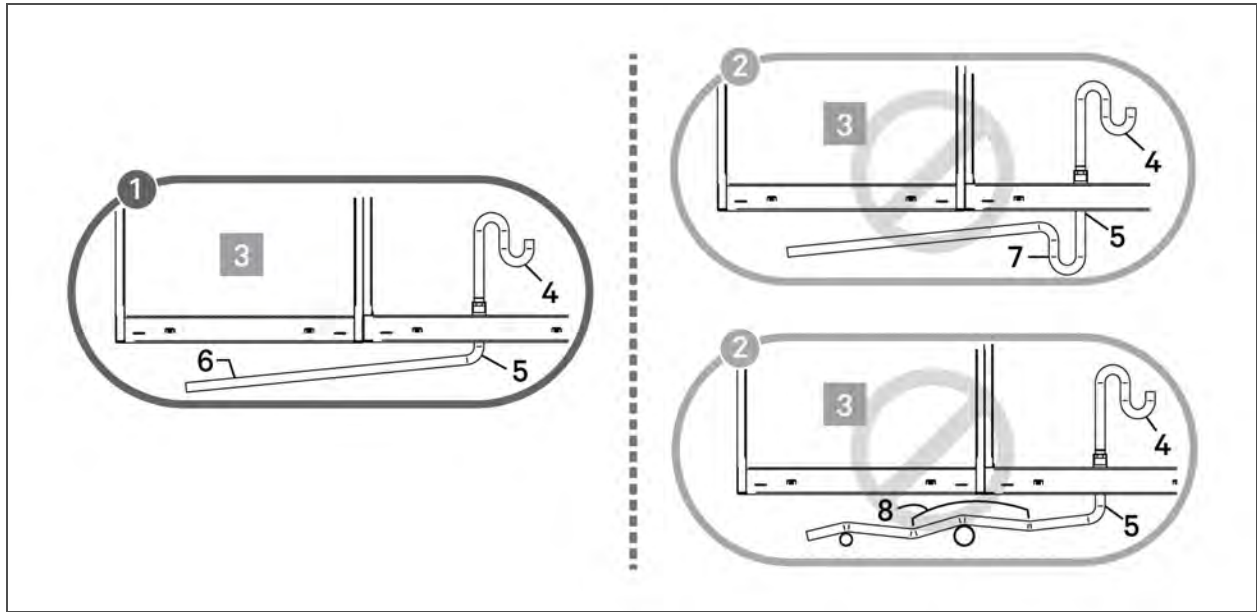


Table 3.2 Evaporator Drain Line Figure Descriptions

Item	Description
1	Correct drain line installation
2	Incorrect drain line installation
3	DSE unit
4	Internal drain
5	External drain
6	Continuous downward slope
7	External trap. Do not trap externally.
8	External traps, although unintentional. Lines must be rigid enough not to bow over top of other objects.

Table 3.3 Piping Schematic Drawings

Document Number	Title
DPN004566	Piping Schematic DP060

3.4 Operating Conditions

The Liebert® DSE Packaged Solution, 60 kW, Model O60 must supply air to a conditioned space within the operating envelope that ASHRAE recommends for data centers. Operating the DP060 outside of this envelope can decrease equipment reliability. Refer to ASHRAE’s publication, “Thermal Guidelines for Data Processing Environments.”

3.4.1 Cooling

The ASHRAE recommended maximum return-air temperature is 105°F (40°C) and maximum dew point is 59°F (15°C). The recommended minimum return-air temperature setpoint Dry Bulb is 85°F (29°C).

Operating outside this envelope can decrease equipment reliability.

NOTE: If running in supply-air control, the minimum supply-air setpoint is 68°F (20°C), and the maximum supply air temperature is 80°F (27°C).

NOTE: When running above 77°F (25°C) supply-air temperature, the superheat readings on the refrigeration circuits may be higher than 7.2°F (4°C). The EEVs will run out of stroke and limit mass flow, which will result in higher than normal superheat.

3.5 Unit Weights

Table 3.4 DSE Packaged Solution, 60 kW, Model DP060

Model	Weight, lb (kg)
Perimeter	5,500 (2,495)

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4 EQUIPMENT INSPECTION AND HANDLING

SAFETY INFORMATION



WARNING! Risk of improper moving. Can cause equipment damage, injury or death. Use only lifting equipment that is rated for the unit weight by an OSHA-certified rating organization. The center of gravity varies depending on the unit size and selected options. The slings must be equally spaced on either side of the center of gravity indicator. Use the center of gravity indicators on the unit to determine the position of the slings. Unit weights are listed in **Table 3.4** on page 13.



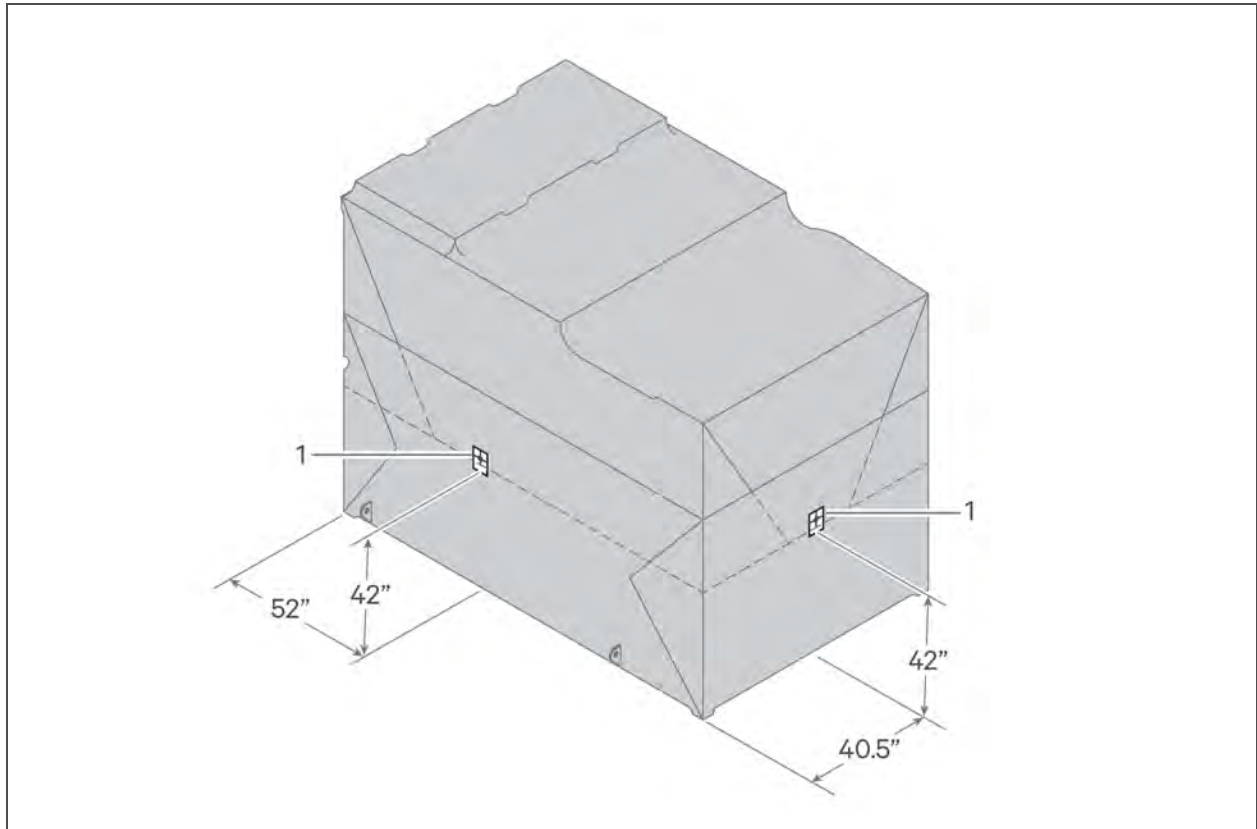
CAUTION: Risk of contact with sharp edges, splinters, and exposed fasteners. Can cause injury. Only properly trained and qualified personnel wearing appropriate, OSHA-approved PPE should attempt to move, lift, remove packaging from or prepare the unit for installation.

- Carefully inspect all items for visible or concealed damage.
- Report damage immediately to the carrier and file a damage claim with a copy sent to Vertiv or to your sales representative.
- Always refer to the location of the center-of-gravity indicators when lifting the unit, see **Figure 4.1** on the next page.

Equipment Recommended for Handling the Unit:

- Lift beam
- Slings
- Spreader bars
- Shims and blocks

Figure 4.1 Center of Gravity Indicators



Item	Description
1	Center of gravity marker

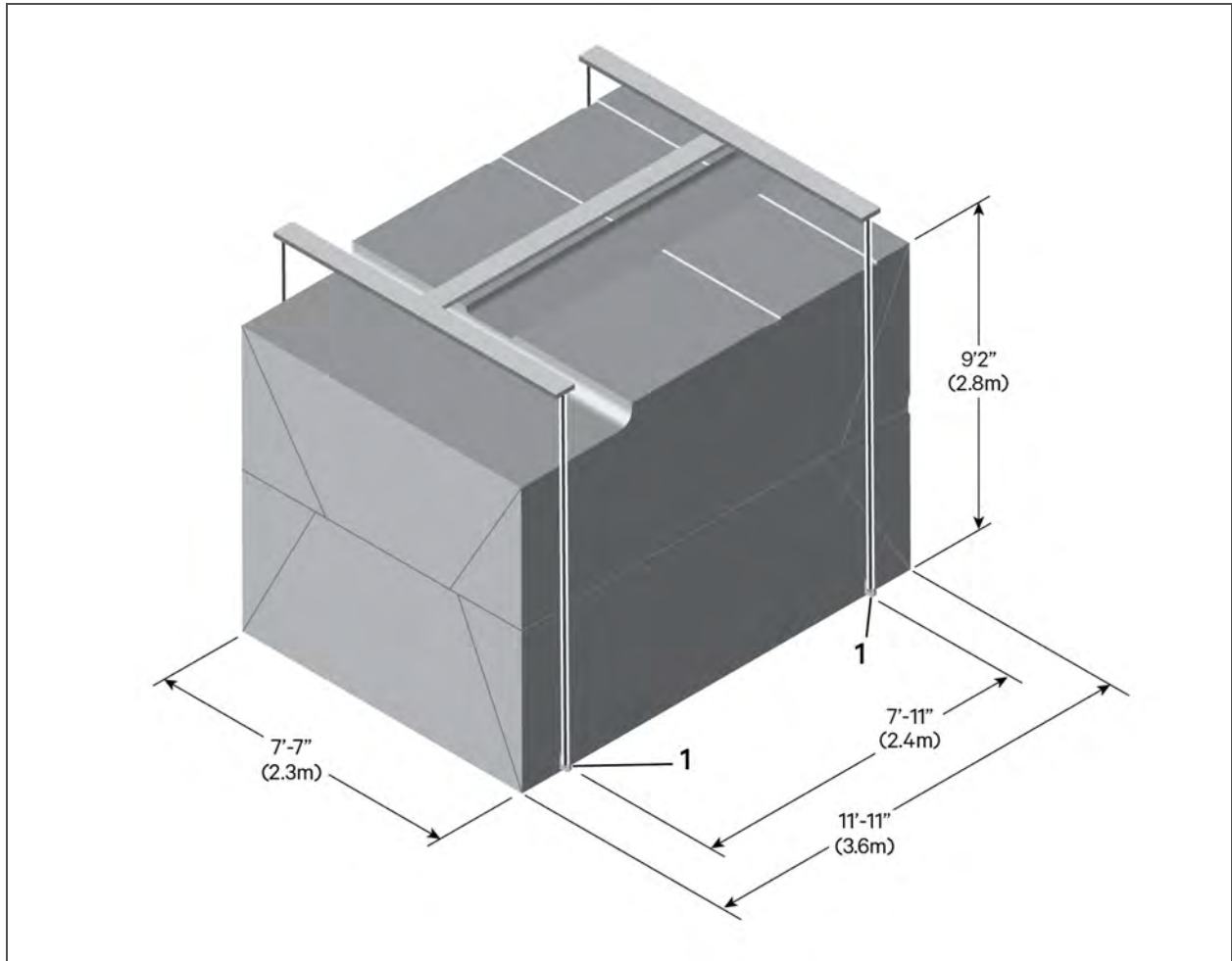
4.1 Rigging to Lift the Unit

See **Figure 4.2** on the facing page, for the location of the lifting lugs on the unit, and use spreader bars and/or shimmed blocks to prevent damage to the unit.

- Unit must remain level when lifted to prevent damage to internal equipment.
- Do not place unit directly on the ground. If the unit must be set down, use shims or blocks for leveling and to keep unit off the ground.

Before lifting or moving, clear the area of all unnecessary personnel. Clear the area of any debris and unrelated tools or foreign objects.

Figure 4.2 Lugs to Attach Rigging to a Perimeter Unit Configuration



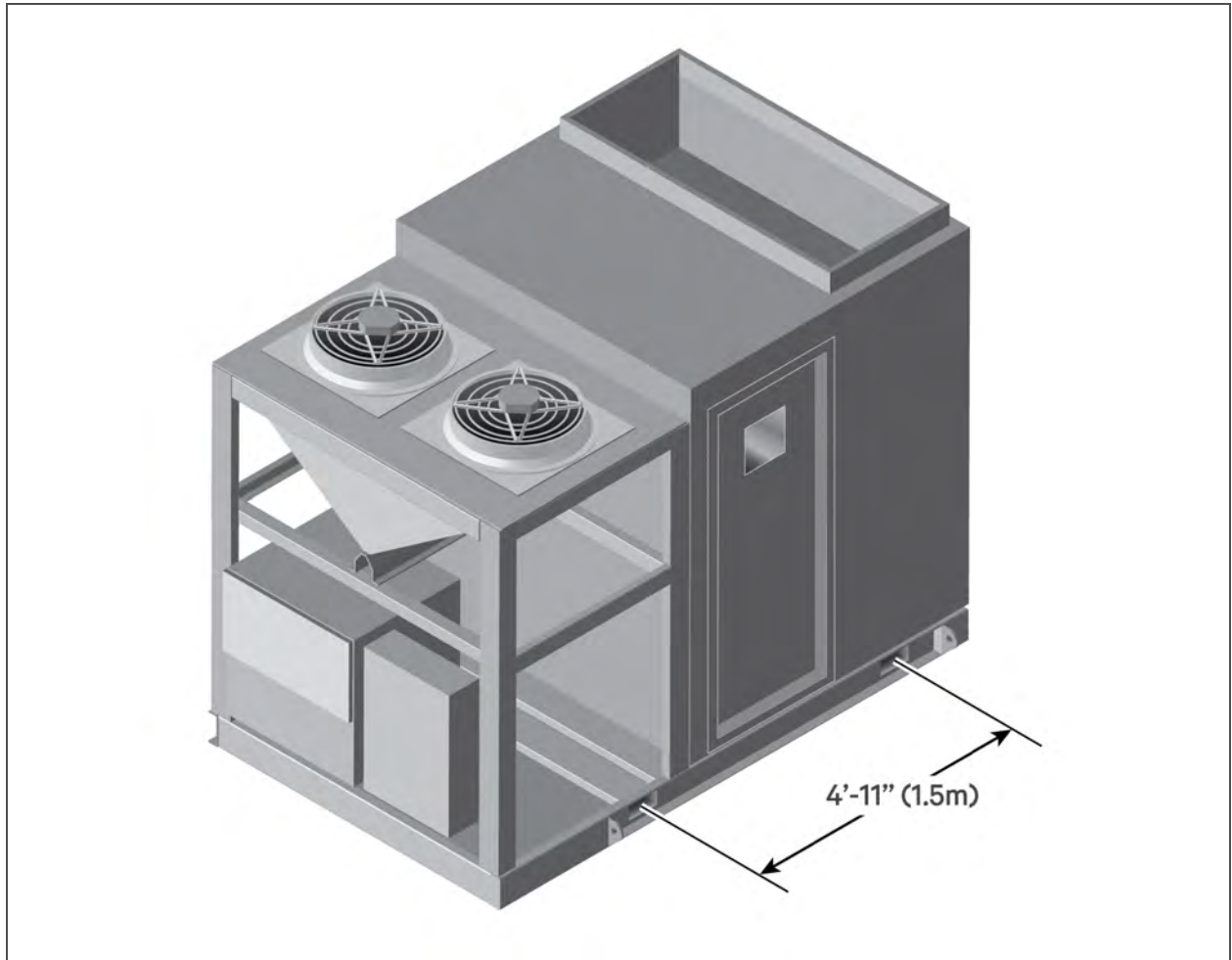
Item	Description
1	Lugs to attach rigging. Typical both sides.

4.2 Using Forklift to Install the Unpackaged Unit

The forklift must be rated for at least 5,500 lb (2495 kg) and the fork length can be no less than 8 ft (2.4 m). See [Typical Center Line of Fork Pockets](#) on the next page, for the location of fork pockets. The unit can be lifted from either side.

Place protective material between the fork mast and unit to prevent external damage to the unit.

Figure 4.3 Typical Center Line of Fork Pockets



5 ELECTRICAL FIELD CONNECTIONS

Three-phase electrical service is required for all models. Electrical service must conform to national and local electrical codes. Refer to equipment nameplate regarding wire size and circuit protection requirements. Refer to the appropriate submittal drawing, listed in **Table 5.2** on page 21, for electrical service entrances into unit

A manual electrical disconnect switch should be installed in accordance with local codes and distribution system. Consult local codes for external disconnect requirements.



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the controller. The factory-supplied disconnect switch is on the exterior of the enclosure. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



WARNING! Risk of electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers’ specifications. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.



WARNING! Risk of improper wire sizing/rating and loose electrical connections. Can cause overheated wire and electrical connection terminals resulting in smoke, fire, equipment and building damage, injury or death. Use correctly sized copper wire only and verify that all electrical connections are tight before turning power On. Check all electrical connections periodically and tighten as necessary.



WARNING! Risk of wiring damage, short circuits and electric shock. Can cause overheated wiring, smoke, fire, activation of fire suppression systems and EMS personnel and equipment, building and equipment damage, injury or death. Insert CSA certified or UL listed bushings into holes and or knockouts used to route wiring through metal panels to protect the wire insulation from contact with sheet metal edges.

NOTICE

Risk of improper power-supply connection. Can cause equipment damage and loss of warranty coverage.

Prior to connecting any equipment to a main or alternate power source (for example: back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. In general, power-source voltages should be stabilized and regulated to within $\pm 10\%$ of the load nameplate nominal voltage. Also, ensure that no three-phase sources are single-phased at any time.

NOTICE

Risk of improper electrical connection of three-phase input power. Can cause backward compressor rotation and unit damage. Service technicians should use a gauge set on the system during the initial start up to verify that the three-phase power is connected properly. The EC fans are not a reliable indicator of proper connection. The blowers will rotate the same direction, regardless of the three-phase power input. Three-phase power must be connected to the unit line voltage terminals in the proper sequence so that the compressors rotate in the proper direction. Incoming power must be properly phased to prevent compressors from running backward. We recommend checking the unit's phasing with proper instrumentation to ensure that power connections were made correctly. We also recommend verifying discharge and suction pressures during start up to ensure that the compressors are running in the correct direction.

NOTICE

Risk of improper power-supply connection. Can cause equipment damage and loss of warranty coverage.

Prior to connecting any equipment to a main or alternate power source (for example: back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. In general, power-source voltages should be stabilized and regulated to within $\pm 10\%$ of the load nameplate nominal voltage. Also, ensure that no three-phase sources are single-phased at any time.

See transformer label for primary tap connections. Installer will need to change transformer primary taps if applied unit voltage is other than pre-wired tap voltage.

NOTE: Use water-tight fittings for all electrical connections. Failure to do so risks damage to the outdoor unit.

A customer supplied three-phase power supply is required for all units. Customer must supply a single-phase 120 V power feed when the unit is not ordered with a 120 V transformer.

- A 3-phase; 208 V, 230 V, 460 V, or 575 V 60-Hz, power supply to the DSE Packaged Solution, 60 kW Model DP060 unit electrical enclosure.
- A separate 120 V power feed to the unit electrical enclosure (for light switches/convenience outlet).

Table 5.1 Electrical Data—DSE Packaged Solution, 60 kW, Model DP060

Unit Voltage Rating	Total system with standard ambient condenser:	without 120-V transformer	with 120-V transformer
208 V, 3 ph, 60 Hz	FLA	70.1	76.4
	WSA	84.4	90.6
	OPD	125	125
230 V, 3 ph, 60 Hz	FLA	66.9	79.4
	WSA	79.8	92.3
	OPD	125	125
460 V, 3 ph, 60 Hz	FLA	33.2	39.4
	WSA	39.6	45.8
	OPD	60	60
575 V, 3 ph, 60 Hz	FLA	27.5	33.8
	WSA	33.0	39.3
	OPD	50	60

NOTE: The customer supplied 120V utility connection requires a 20A supply. It will always be 20A regardless of the main unit supply.

The electrical connections are described in the submittal documents included in the [Submittal Drawings](#) on page 61. After all unit wiring is complete, you can use the iCOM control to set operating setpoints. See the *Liebert® iCOM User Guide*, SL-31075.

The following table lists the relevant documents by number and title.

Table 5.2 Electrical Field Connection Drawings

Document Number	Title
DPN004587	Electrical Connections Enclosure, Dual Power Input
DPN004732	Electrical Connections Enclosure, Single Power Input
DPN004591	DP060 Enclosure Electrical Locations
DPN004350	Unit Mounted Display

Table 5.2 Electrical Field Connection Drawings (continued)

Document Number	Title
DPN000960	RemoteTemperature and Humidity Sensor
DPN003144	Display Service Bracket (Optional)
Unit-to-Unit Networking	
DPN004351	Unit to Unit Network Connections

6 CHECKLIST FOR COMPLETED INSTALLATION

6.1 Moving and Placing Equipment

1. Unpack and check received material.
2. Proper clearance for service access has been maintained around the equipment.
3. Equipment is level and mounting fasteners are tight.
4. Proper condensate-drain system is in place.

6.2 Electrical Installation Checks

1. Supply voltage and phase matches equipment nameplate.
2. Power wiring connections completed to the disconnect switch.
3. Power line circuit breakers or fuses have proper ratings for equipment installed.
4. All internal and external high- and low-voltage wiring connections are tight.
5. Confirm that unit is properly grounded to an earth ground.
6. Control transformer setting matches incoming power.
7. Electrical service conforms to national and local codes.
8. Confirm that power-wiring connections to the utility box are completed.

6.3 Other Installation Checks

1. Ducting complete.
2. Confirm ducting is attached to unit and building structure, and any openings around supply- and return-duct connections are sealed.
3. Filters installed.
4. Check fasteners that secure evaporator-fan motors—some may have become loose during shipment.
5. Check blowers and compressor for proper rotation.
6. Drain line connected, not obstructed, and pitched per local code.
7. All fans are free of debris.
8. Seal openings around electrical connections and make sure that the seals are water-tight.
9. Installation materials and tools have been removed from equipment (literature, shipping materials, construction materials, tools, etc.).
10. Check for refrigerant leaks.
11. Make sure heat load is available during initial start-up. Consult factory for assistance.

6.4 BMS and Sensor Installation Checks

1. CAT5 cables are installed from each unit and the network switch, and all cables have RJ45 jacks on each end.
2. The network switch/Liebert® vNSA panel (if present) is installed and powered.
3. Confirm the static-pressure-sensor transducer (if present) is installed in the room and wired back to the DSE Packaged Solution, 60 kW, Model DP060 unit
4. Confirm the supply-air sensor is installed in the best location possible to obtain a temperature reading representative of the supply air in the duct or plenum serviced by the unit and that the sensor is wired back to the unit control panel.
5. All remote and 2T rack sensors (if present) are installed and wired using CANBUS cables.

7 INITIAL START-UP CHECKS AND COMMISSIONING PROCEDURE FOR WARRANTY INSPECTION



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the controller. The factory-supplied disconnect switch is on the exterior of the enclosure. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



WARNING! Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, serious injury or death. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning equipment and who are wearing appropriate, OSHA-approved PPE.

NOTICE

Risk of improper electrical connection of three-phase input power. Can cause backward compressor rotation and unit damage. Service technicians should use a gauge set on the system during the initial start up to verify that the three-phase power is connected properly. The EC fans are not a reliable indicator of proper connection. The blowers will rotate the same direction, regardless of the three-phase power input. Three-phase power must be connected to the unit line voltage terminals in the proper sequence so that the compressors rotate in the proper direction. Incoming power must be properly phased to prevent compressors from running backward. We recommend checking the unit's phasing with proper instrumentation to ensure that power connections were made correctly. We also recommend verifying discharge and suction pressures during start up to ensure that the compressors are running in the correct direction.

- Confirm that all items on [Checklist for Completed Installation](#) on page 23 have been done.
- Locate “Liebert® DSE Packaged Solution, 60 kW, Model DP060 Warranty Inspection Check Sheet” in the unit's electric panel.
- Complete “Liebert® DSE Packaged Solution, 60 kW, Model DP060 Warranty Inspection Check Sheet” during start-up.
- Forward the completed “Liebert® DSE Packaged Solution, 60 kW, Model DP060 Warranty Inspection Check Sheet” to your local sales office. **This information must be completed and forwarded to validate warranty.**
- Contact your local sales representative or technical support if you have any questions or problems during unit start-up and commissioning. Visit <https://www.Vertiv.com/en-us/support/> or call 1-800-543-2778 for contacts.

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8 MAINTENANCE



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the controller. The factory-supplied disconnect switch is on the exterior of the enclosure. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



WARNING! Risk of electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers’ specifications. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.



WARNING! Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, serious injury or death. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning equipment and who are wearing appropriate, OSHA-approved PPE.



WARNING! Risk of electric shock. Can cause serious injury or death. The Liebert® iCOM microprocessor does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "unit off" mode of the Liebert® iCOM control. Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before working on any component of the system.

The Liebert® DSE Packaged Solution, 60 kW, Model DP060 is a single component in the facility heat-removal system. Proper application and maintenance of the entire system is critical to the life and reliability of the thermal-management units.

- Good maintenance practices are essential to minimizing operation costs and maximizing product life.
- Read and follow monthly and semi-annual maintenance schedules included in this manual. These MINIMUM maintenance intervals may need to be more frequent based on site-specific conditions.
- See the Liebert®iCOM™ user manual, SL-31075, available at www.Vertiv.com, for instructions on using the controller to predict some service maintenance intervals.
- We recommend the use of trained and authorized service personnel, extended service contracts and factory-specified replacement parts. Contact your Vertiv sales representative.

8.1 Service/Maintenance Access to the Evaporator Compartment

The evaporator section includes access doors that swing inward on both sides to allow access for maintenance on components within the evaporator compartment.

For the location of components that require maintenance, see the appropriate pages of the submittal drawing DPN004597 included in the [Submittal Drawings](#) on page 61. Plan access through at least one door to allow for removal of evaporator coil. See notes on DPN004602 for recommended clearance.

NOTICE

Risk of equipment damage. The evaporator access panel cannot be opened while the exterior main door is closed.



CAUTION: Risk of low-hanging panels. Can cause injury or equipment damage. Wear appropriate, OSHA-approved PPE when entering and working within the enclosure.

8.2 Filters

NOTICE

Risk of improper filter installation. Can cause filter collapse and airflow reduction.

Pleat direction is non-standard. Use only short-pleat filters (see [Figure 8.1](#) on the facing page). Long-pleat filters are subject to collapse at high airflows.

To maximize the performance and reliability of the equipment, use only Vertiv filters. Contact your Vertiv representative to order replacement filters.

Verify that filters are installed and positioned so the air-flow direction marked on the filter is the same direction as unit air flow.

Table 8.1 Filter Quantities

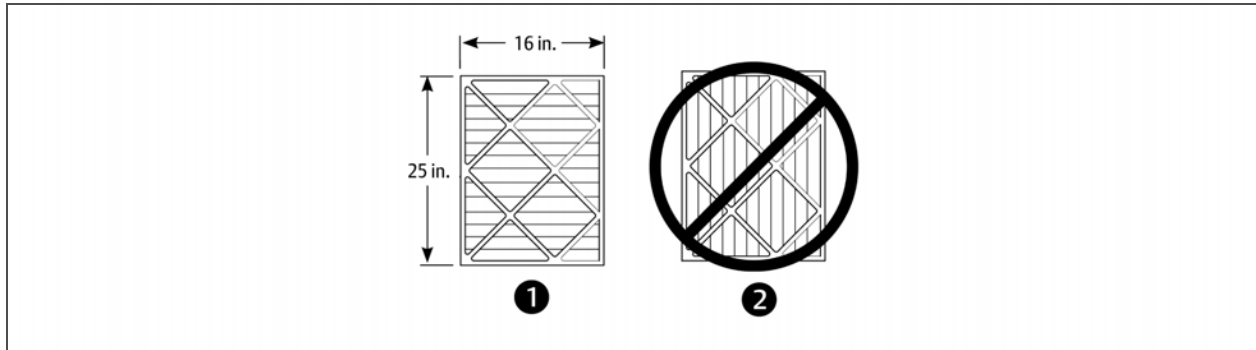
Unit Size	Filter Size, Width x Length, in. (mm)	Number of Filters
		4 in. (102 mm) Filter Option, MERV 8, MERV 11 or MERV 13
DPO60	25 x 16 (635 x 406)	1
	25 x 20 (635 x 508)	2

8.2.1 Filter Replacement

1. Disconnect power from the unit.
2. Open the front access panel, locate the filter above the electric panel, and slide the filter out the front of the unit.
3. Replace with new filter—install the filter in the proper direction of the airflow.
4. Test the operation of the filter clog switch.
The unit panels must be in place and closed to find this point.

5. Start the blower and turn the switch counterclockwise until the alarm is energized.
6. Turn the adjusting knob one turn clockwise or to the desired filter change point.

Figure 8.1 Proper Filter Pleat Direction



Item	Description
1	Short pleat construction
2	Long pleat construction

8.3 Evaporator Blower Drive System—EC Fans



WARNING! Risk of electric shock. Can cause serious injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within the fan-motor electric-connection enclosures. Fan-motor controls can maintain an electric charge for 10 minutes after power is disconnected. Wait 10 minutes after power is verified as off before working within the fan electric control/connection enclosures. Use only fully-trained and qualified HVAC technicians to perform maintenance on the fans.



WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure. Do not operate the unit with any or all cabinet panels removed. Do not operate upflow units without installing a plenum, ductwork of gaurd over the blower opening(s) on the top surface of the unit cabinet. Ductwork must be connected to the blower(s) or a plenum must be installed on the blower deck for protection from rotating blower wheel(s) on upflow units.



CAUTION: Risk of improper moving, lifting and handling. Can cause equipment damage or injury. Only properly trained and qualified personnel should work on this equipment. Evaporator fan modules weigh in excess of 125 lb (57 kg). Use proper lifting techniques and wear appropriate, OSHA-approved PPE to avoid injury and dropping the fan module during removal. Equipment used in handling/lifting, and/or installing the fan assembly must meet OSHA requirements. Use handling/lifting equipment rated for the weight of the fan assembly. Use ladders rated for the weight of the fan assembly and technicians if used during installation. Refer to handling/lifting, and/or installation equipment operating manual for manufacturer's safety requirements and operating procedures.

NOTICE

Risk of improper power-supply connection. Can cause equipment damage and loss of warranty coverage.

Prior to connecting any equipment to a main or alternate power source (for example: back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. In general, power-source voltages should be stabilized and regulated to within $\pm 10\%$ of the load nameplate nominal voltage. Also, ensure that no three-phase sources are single-phased at any time.

NOTICE

Risk of improper installation. Can cause equipment damage.

Only a properly trained and qualified technician should install or open this motor.

Use 60/75°C Class 1 copper wire only.

8.3.1 Protective Features

Monitoring functions protect the motor against overtemperature of electronics, overtemperature of motor and incorrect rotor position detection. With any of these failures, an alarm will display through the Liebert® iCOM controller and the motor stops electronically. There is no automatic restart. The power must be switched off for a minimum of 20 seconds once the motor is at a standstill.

The motor also provides locked rotor protection, undervoltage/phase failure detection and motor current limitation. These conditions will display an alarm through the Liebert® iCOM.

8.3.2 Fan Impellers and Bearings Maintenance

Fan impellers should be periodically inspected and any debris removed. Check to ensure that the impellers can rotate freely and that the fan guards are still properly mounted for sufficient protection against accidentally contacting the impeller. Bearings used on the units are maintenance-free. Consult the factory for more information.

8.3.3 Fan Assembly Troubleshooting

Any safety hazards stemming from the device must be re-evaluated once it is installed in the end device.

Do not make any modifications, additions or conversions to the fan assembly without the approval of Vertiv.



WARNING! Risk of electric shock. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches and verify with a voltmeter that power is off before opening the fan motor electric-connection enclosure. Use only fully-trained and qualified HVAC technicians to replace or perform maintenance on the EC fans.



WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure. Do not operate the unit with any or all cabinet panels removed.



CAUTION: Risk of exposure to harmful noise levels. Can cause hearing injury or loss. Depending on the installation and operating conditions, a sound pressure level greater than 70 dB(A) may arise. Take appropriate technical safety measures. Operating personnel must wear appropriate, OSHA-approved PPE and observe all appropriate hearing-protection safety requirements.



CAUTION: Risk of contact with hot surfaces. Can cause injury. The fan motor, and some electrical components are extremely hot during unit operation. Allow sufficient time for them to cool to a touch-safe temperature before working within the unit cabinet. Use extreme caution and wear appropriate, OSHA-approved PPE when working on or near hot components.

NOTICE

Risk of improper power-supply connection. Can cause equipment damage and loss of warranty coverage.

Prior to connecting any equipment to a main or alternate power source (for example: back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. In general, power-source voltages should be stabilized and regulated to within $\pm 10\%$ of the load nameplate nominal voltage. Also, ensure that no three-phase sources are single-phased at any time.

NOTE: Do not assume that the fan blades will not start to spin. If the motor is in a fault condition, it will safely shut down. Once the fault condition is cleared, there are certain conditions in which the motor will automatically resume operation.

EC Fan Fault Conditions

Table 8.2 EC Fan Fault Conditions

Fault Condition	Reset Trigger	Description
Phase Failure	Automatic	One phase is missing. In this case the motor will come to a stop and then automatically restart when all phases are present.
Locked/Blocked Rotor	Automatic	The rotor is blocked. Once the locking mechanism has been removed, the motor will automatically restart.
Hall Effect Sensor Error	Manual (Mains/Software)	The Hall Effect Sensor is used to monitor fan speed. If there is a hall sensor communication failure with the electronics, the motor will stop. In this case there has to be a manual restart (either with the mains power or software).
Motor Over Temperature	Manual (Mains/Software)	The motor will stop in the event there is a motor over temperature condition. In this case there has to be a manual restart (either with the mains power or software).
Electronics Over Temperature	Manual (Mains/Software)	The motor will stop in the event there is an electronics over temperature condition. In this case there has to be a manual restart (either with the mains power or software).
Line Under-Voltage	Automatic	Once the line voltage returns within permitted operating range, the fan will automatically restart.

EC Fan High Voltage Tests

1. Check fuses. If fuses are okay, perform the following:
 - Check all connections.
 - Make sure connections are on the wire strand and not on the wire insulation.
 - Cycle Power. Disconnect mains voltage to power down the motor and then re-apply power.
 - Check mains voltage at each phase (phase to ground) at the KL1 connector. Confirm phase failure not present.
 - Check that the voltage is within the acceptable voltage range at the KL1 connector. Confirm line under-voltage is not present.
2. Check fuses. If fuses are blown, perform the following:
 - Check resistances across the phases at the KL1 connector and note them in the following table..

NOTE: Power wires must be removed from the motor for resistance test.

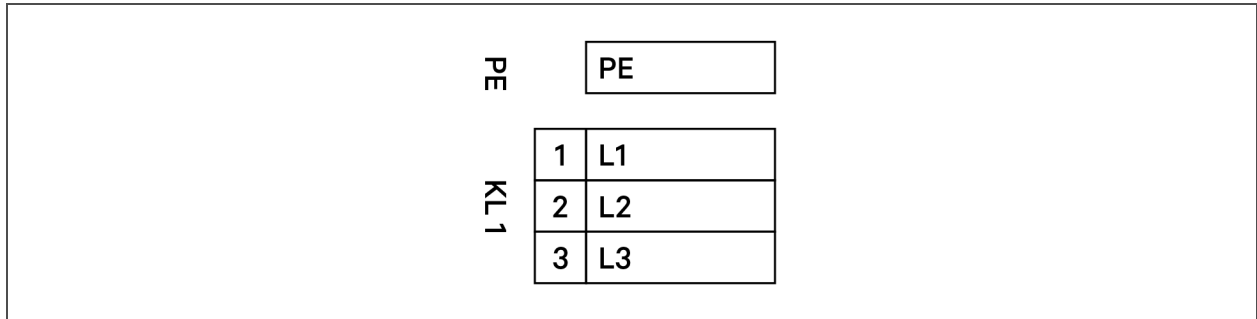
Table 8.3 Resistances at KL1 Connector

L1 - L2		Ohm
L2 - L3		Ohm
L1 - L3		Ohm

- Resistances should be similar for all 3 readings.

- Resistance readings should be greater than 2 Ohm.
 - Check all connections. Make sure connections are on the wire strand and not on the wire insulation.
 - Replace fuses.
 - Check mains voltage at each phase (phase to ground) at the KL1 connector. Confirms phase failure not present.

Figure 8.2 KL1 Connector



- Check that the voltage is within the acceptable voltage range at the KL1 connector. Confirms line under-voltage is not present.

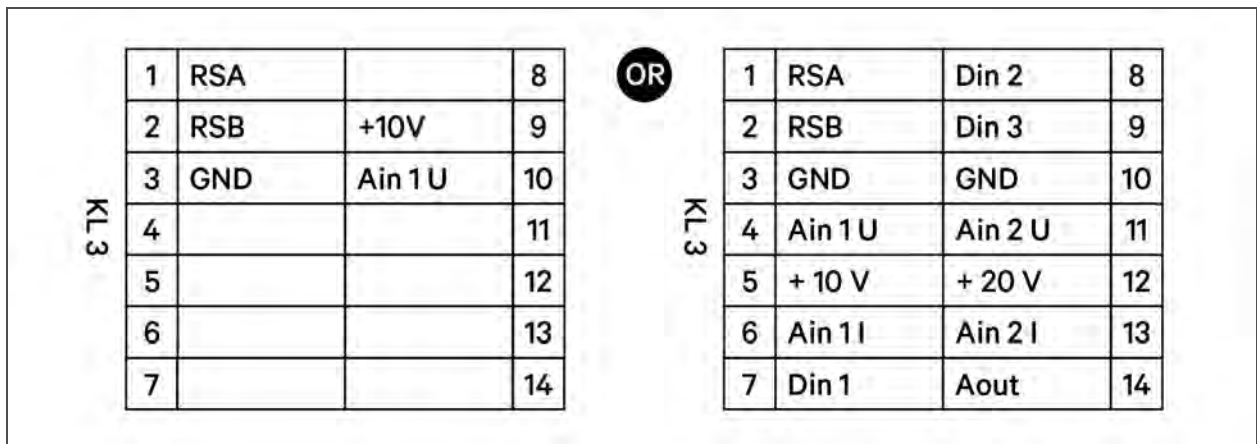
EC Fan Low Voltage Tests

- Check control input at the KL3 connector (Ain1U to GND). Confirm that there is a control voltage present at the KL3 connector.

NOTE: Use the GND in the KL3 connector. Do not connect the control ground to the PE in KL1!

- Check +10 V output on KL3 connector (between +10 V and GND).

Figure 8.3 KL3 Connector



EC Fan Alarm Contact Tests

Check the alarm contact at KL2 to determine if there are any fault conditions present.

Figure 8.4 KL2 Connector

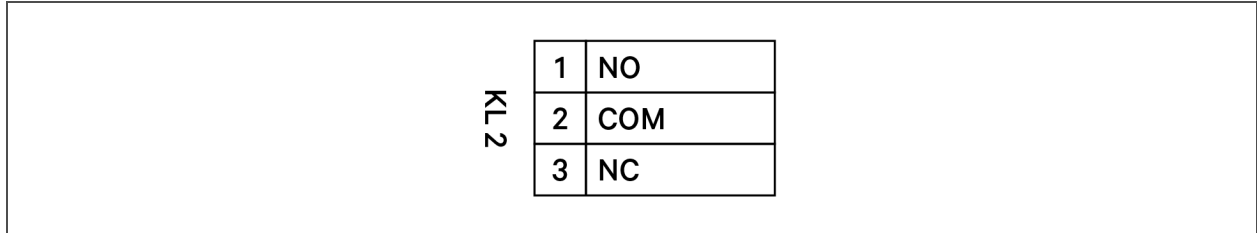


Table 8.4 No Fault/Fault Conditions while Motor Actively Energized

Condition	No Fault Condition	Fault Condition
NO - COM	Open	Closed
NC - COM	Closed	Open

NOTE: The table refers to conditions while the motor is actively energized. When the motor is de-energized, it will be in a fault condition.

- Check EC Control to determine the fault condition.

8.3.4 Removing Evaporator EC Fans

The EC fan in Liebert® DSE Packaged Solution, 60 kW, Model DP060 units can be removed for easier maintenance or for replacement.



WARNING! Risk of electric shock. Can cause serious injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within the fan-motor electric-connection enclosures. Fan-motor controls can maintain an electric charge for 10 minutes after power is disconnected. Wait 10 minutes after power is verified as off before working within the fan electric control/connection enclosures. Use only fully-trained and qualified HVAC technicians to perform maintenance on the fans.



WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure. Do not operate the unit with any or all cabinet panels removed.



WARNING! Risk of extremely heavy fan modules dropping downward suddenly. Can cause injury or death. Evaporator fan modules weigh in excess of 125-lb (56.7-kg) each. Support fan modules before removing mounting hardware. Use caution to keep body parts out of fan module pathway of movement during removal. Only properly trained and qualified personnel should work on this equipment.

Read these instructions and unit labeling before removing fan modules.

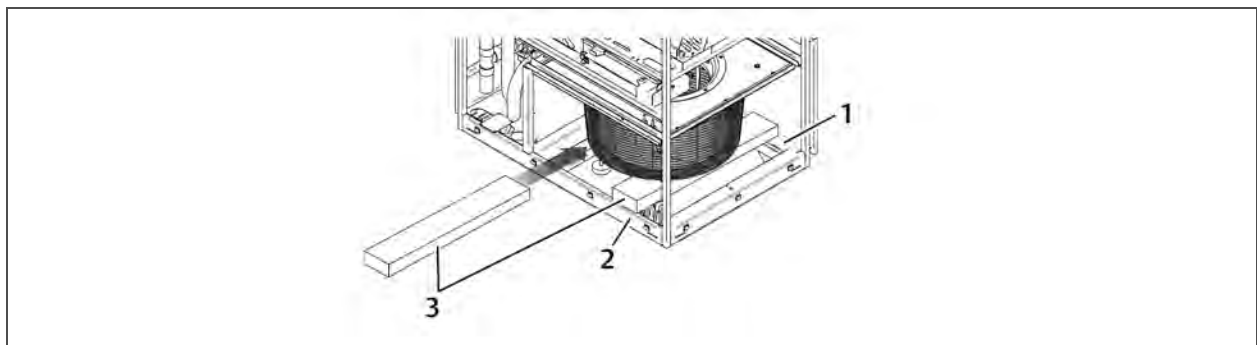
Hardware and tools required:

- 1/2" hex socket and wrench
- Cable tie cutter
- Field-supplied fan removal device capable of supporting fan assembly weight

To remove an EC fan module:

1. Remove middle and bottom panels from the front of the evaporator unit located inside of the side access door.
2. Insert a field-supplied fan-removal device securely on the front and rear frame channels under the fan module as shown in **Figure 8.5** below.
 - A suitable fan-removal device is two lengths of rigid material that is 4 inches (100 mm) wide and strong enough to support the weight of the fan module.

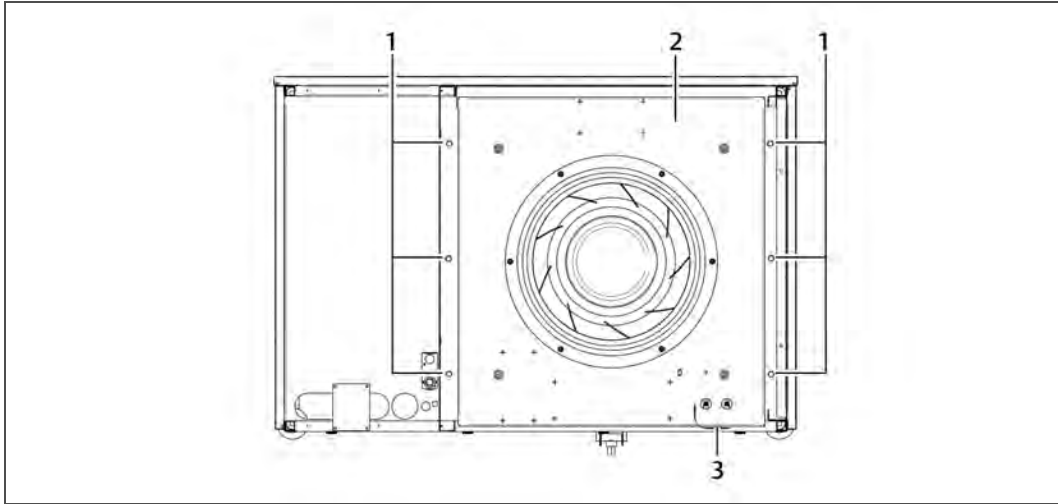
Figure 8.5 Slide EC Fan Out of the Unit



Item	Description
1	Rear frame channel (right-side panel not shown)
2	Front channel
3	Fan-removal devices

3. Remove hardware, **Figure 8.6** on the next page, and save it for re-installation.

Figure 8.6 Hardware Removal



Item	Description
1	1/2-in. (13-mm) Hex-head bolts (typical both sides)
2	Fan deck
3	Wiring loop

4. Disconnect high-voltage and low-voltage fan-motor wiring from the fan-motor electric component inside the electric panel. Cut cable ties as needed.
5. Using the removal device shown inserted in **Figure 8.5** on the previous page, slide the fan module out through the front of the evaporator unit.
6. To reinstall the fan module, reverse these steps. Remove the field-supplied fan-removal device before resuming operation.

NOTE: Refer to the unit's electrical schematic for specific wire-attachment points.

8.4 Electronic Expansion Valve (EEV) Maintenance

The EEV controls superheat through the Liebert® DSE Packaged Solution, 60 kW, Model DP060 controls by actively measuring suction pressure via a transducer attached to the suction-line rotalock and suction temperature via a thermister strapped to the suction line. The EEV actively adjusts the orifice size and resulting mass flow of refrigerant to maintain the superheat setpoint (set in Liebert® iCOM). The EEV is used in place of the standard thermal expansion valve (TXV).



WARNING! Risk of electric shock. Can cause serious injury or death. The Liebert® iCOM microprocessor does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "unit off" mode of the Liebert® iCOM control. Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before working on any component of the system.

NOTE: Intermittent loss of subcooling may result in EEV/superheat instability.

8.5 Compressor Maintenance



WARNING! Risk of over-pressurization of the refrigeration system. Can cause explosive discharge of high-pressure refrigerant, loss of refrigerant, environmental pollution, equipment damage, injury, or death. This unit contains fluids and gases under high pressure. Use extreme caution when charging the refrigerant system. Do not pressurize the system higher than the design pressure marked on the unit's nameplate.

8.5.1 Compressor Oil

NOTICE

Risk of improper compressor lubrication. Can cause compressor and refrigerant system damage.

Failure to use oil types, viscosities and quantities recommended by the compressor manufacturer may reduce compressor life and void the compressor warranty.

- Do not mix polyolester (POE) and mineral-based oils.
- Do not mix oils of different viscosities.
- Consult Vertiv technical support or the compressor manufacturer if questions arise.

8.5.2 Replacement Compressors

Replacement compressors are available through your Vertiv sales office. If the unit is under warranty, the replacement compressor must be obtained from and the original compressor returned to your local Vertiv sales office. Compressors are shipped in reusable packaging, and the original compressor should be returned in the same packaging.

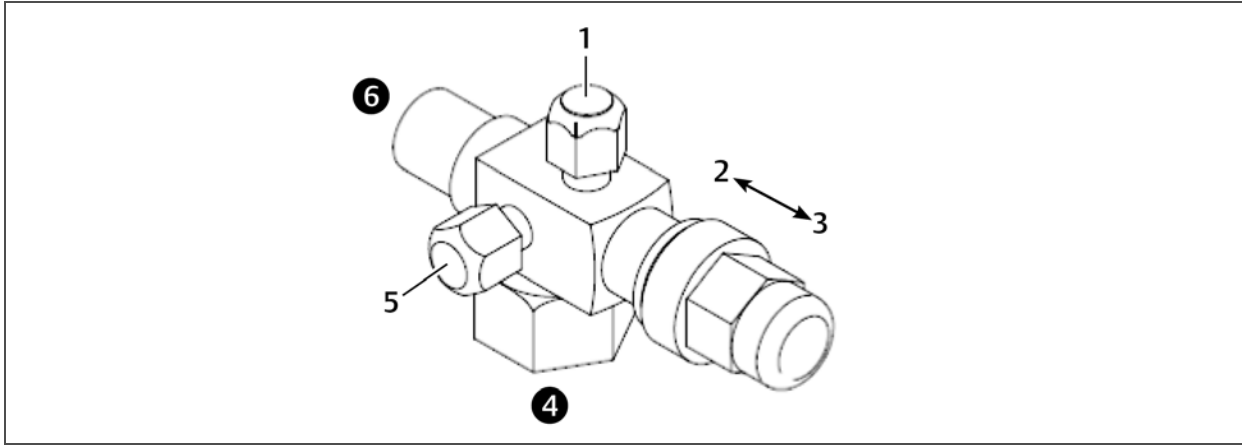
8.5.3 Rotalock Valve on Digital-Scroll Compressors



CAUTION: Risk of explosive discharge of high-pressure refrigerant. Can cause serious injury. Neutral and service ports on the rotalock valve do not have a valve core. Front-seat the service valves and relieve pressure from the compressor before loosening a part or a component attached to the service valve. Follow local codes to properly reclaim refrigerant.

- The Neutral port remains open to the compressor side in all positions of the valve stem, see **Figure 8.7** on the next page. A high-pressure cut-out switch or low-pressure switch/transducer will be connected to this port.
- The Service port is closed to the system when valve stem is back-seated, see **Figure 8.7** on the next page. It is open to the system as soon as the valve is adjusted away from the back-seated position.

Figure 8.7 Rotalock Valve



Item	Description
1	Service port (gauge)
2	Front seat
3	Back seat
4	Compressor side of valve
5	Neutral port
6	System side of valve

8.5.4 Unloading Solenoid(s) on a Digital-scroll Compressor

When replacing a digital-scroll compressor, the digital solenoid valve and coil must be replaced. The compressor and valve kit are shipped separately. The valve kit must be field-brazed to the top of the compressor in proper orientation and supported with the original factory bracket.

8.5.5 Compressor Electrical Failure (Motor Burnout)

If a burnout has occurred, a full system clean-out is required. If not cleaned, compressor and system problems will continue.

Consult the factory for compressor maintenance. Do not attempt to remove the compressor without first contacting Vertiv support at 1-800-543-2778.

8.5.6 Replacing a Compressor with Electrical Failure (Motor Burnout)

! **WARNING!** Risk of electric shock. Can cause serious injury or death. The Liebert® iCOM microprocessor does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "unit off" mode of the Liebert® iCOM control. Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before working on any component of the system.



WARNING! Risk of over-pressurization of the refrigeration system. Can cause explosive discharge of high-pressure refrigerant, loss of refrigerant, environmental pollution, equipment damage, injury, or death. This unit contains fluids and gases under high pressure. Use extreme caution when charging the refrigerant system. Do not pressurize the system higher than the design pressure marked on the unit's nameplate.

NOTE: Release of refrigerant to the atmosphere is harmful to the environment. Refrigerant must be recycled or discarded in accordance with federal, state, and local regulations.

1. Attach suction and discharge gauges to access fittings.
2. Recover refrigerant using an approved recovery procedure and equipment. Use a filter drier when charging the system with recovered refrigerant.
3. Remove marked pressure transducer and discharge pressure switch. Disconnect all electrical connections.
4. Remove failed compressor.
5. Follow compressor manufacturer's suggested clean-out procedures.
6. Install replacement compressor and make all connections. Replace unloading solenoid.
7. Evacuate, charge and operate per the appropriate procedure per local codes.

NOTICE

Risk of improper component re-installation. Can cause equipment damage.

Identify and mark location of suction pressure transducer and discharge pressure switch. These devices look similar and they must be reinstalled in their original location.

8.5.7 Compressor Mechanical Failure

If mechanical failure of the compressor has occurred, only the compressor needs replaced. A full system clean-out is not required..

8.5.8 Replacing a Compressor with Mechanical Failure



WARNING! Risk of electric shock. Can cause serious injury or death. The Liebert® iCOM microprocessor does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "unit off" mode of the Liebert® iCOM control. Open all local and remote electric power disconnect switches and verify with a voltmeter that power is Off before working on any component of the system.



WARNING! Risk of over-pressurization of the refrigeration system. Can cause explosive discharge of high-pressure refrigerant, loss of refrigerant, environmental pollution, equipment damage, injury, or death. This unit contains fluids and gases under high pressure. Use extreme caution when charging the refrigerant system. Do not pressurize the system higher than the design pressure marked on the unit's nameplate.

NOTE: Release of refrigerant to the atmosphere is harmful to the environment. Refrigerant must be recycled or discarded in accordance with federal, state, and local regulations.

1. Front-seat service valves to isolate the compressor. Recover refrigerant using an approved recovery procedure and equipment
2. Remove failed compressor.

3. Keep the replacement compressor sealed until installation is complete to the point that the system isolation valves are ready to be engaged. Keep exposure of the POE oil in compressor to atmosphere to a minimum.
4. Install replacement compressor, replace gaskets or seals on service valves, and make all connections. Replace unloading solenoid if equipped.
5. Once the compressor is completely installed, keep isolation valves closed to the system and open to compressor. Add dry nitrogen to compressor and check all connections for leaks. With no leaks confirmed, evacuate the isolated compressor prior to introducing to the rest of the system.
6. When evacuating the isolated compressor volume, pull a vacuum of 500 microns with no decay above 1000 microns within 20 minutes.
Once evacuation requirements of compressor are met, open the valves to open the compressor to the system.
7. Check compressor and system operation. Make any necessary adjustments for proper equipment operation.

8.6 Evaporator Coil

The DSE Packaged Solution, 60 kW, Model DP060 is a single-circuit A-frame coil.

8.7 General Maintenance

Periodic attention is necessary for continued satisfactory operation of your unit. Restricted air flow through the condenser coil, reduced airflow from non-functioning fans and low refrigerant system charge levels will reduce the operating efficiency of the unit and can result in high condensing temperatures and loss of cooling. In winter, do not permit snow to accumulate around the sides or underneath the condenser coil.

Monthly and semi-annual inspections and maintenance are recommended for proper system operation. Use copies of [Preventive Maintenance Checklist](#) on page 54 for each of these inspections.

8.8 Condenser Cleaning

Keeping the coils in the outdoor unit clean is an important factor in maintaining peak efficiency, reliability, and long life of the equipment. The unit will operate more efficiently with frequent cleanings. If you delay cleaning until heavy build-up occurs, head-pressure problems with the evaporator units can develop.

8.8.1 When to Clean the Condenser Coil

Normal conditions typically dictate cleaning twice a year, in spring and fall. On-site or area conditions such as cottonwood trees, construction, etc., can increase cleaning frequency. On your standard monthly preventive maintenance schedule, we recommend a visual inspection of the coil to monitor conditions.

8.8.2 What to Use to Clean the Condenser Coil

NOTICE

Risk of improper cleaning agent selection, including non-base paint solvents. Can cause building and equipment damage and loss of refrigerant charge.

Using acid-based or sodium hydroxide-based cleaners can damage the drycooler coil and cause a loss of charge. This could cause equipment damage as well as damage to the surrounding structure.

Start with removing dirt, leaves, fibers, etc. with a soft brush or vacuum cleaner fitted with a soft-brush attachment. Do not use a wire brush or scrape the coil with a metal vacuum hose. The best overall coil cleaner is plain water. If the coil is maintained and cleaned at regular intervals, water is sufficient to remove dirt and debris from the fins. Water pressure from a garden hose and sprayer usually works well. If a pressure washer is used, make sure that the equipment is set to a lower pressure setting and that the nozzle is set to the fan spray, not stream. Otherwise, damage to the fins could result. If a cleaner is required, we recommend using a neutral cleaner, neither acidic nor base. Acid-type cleaners can damage the coil fins and surrounding areas. Many sites do not allow the use of acidic cleaners for environmental reasons.

8.8.3 Cleaning the Condenser Coil

The condenser coil is accessible through the cleaning window, which allows you to clean the coil without removing the fans from the unit.

To clean the coil:

1. Disconnect the power supply before working on the unit.
2. Open the cleaning window(s) on the side of the condenser by loosening the mounting screws.
3. Insert a spray nozzle on the end of a suitable extension and apply the water/cleaning solution, working back and forth across the coil face.
The solution pushes dirt and debris out the bottom of the coil.
 - If you are using a cleaner along with the spraying process, follow recommended manufacturer instructions and be sure to rinse the coil thoroughly. Any residue left on the coil can act as a magnet to dirt.
4. Reinstall the cleaning window(s) and reconnect the power supply to the condenser.
5. Coils will possibly retain water after cleaning and rinsing, so manually reverse the fans briefly using condenser controls to speed drying of the coils and prevent a possible high-head-pressure condition when the condenser is put back into service.

NOTE: Spraying the coil from the outside repeatedly can push a majority of the dirt to the inner section of the fins and continue to restrict air flow. Keep in mind you may not have the luxury of shutting the unit(s) down for an extended time. A scheduled shutdown with the operator may be in order.

8.8.4 Cleaning the Condenser Fan

- Clean the EC fan with water only when temperatures are greater than 50°F (10°C)
- Make sure that no water gets into the inside of the motor.
- Do not hold the jet spray directly on the motor openings and seals.
- During cleaning work using a jet spray, no guarantee is assumed regarding corrosion formation/paint adhesion for unpainted/painted fans.

8.9 Replacing the Condenser Fan



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the controller. The factory-supplied disconnect switch is on the exterior of the enclosure. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



WARNING! Risk of electric shock. Can cause serious injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within the fan-motor electric-connection enclosures. Fan-motor controls can maintain an electric charge for 10 minutes after power is disconnected. Wait 10 minutes after power is verified as off before working within the fan electric control/connection enclosures. Use only fully-trained and qualified HVAC technicians to perform maintenance on the fans.



WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure. Do not operate the unit with any or all cabinet panels removed.



CAUTION: Risk of contact with hot surfaces. Can cause injury. The compressor, refrigerant discharge lines, fan motor, and some electrical components are extremely hot during unit operation. Allow sufficient time for them to cool to a touch-safe temperature before working within the unit cabinet. Use extreme caution and wear appropriate, OSHA-approved PPE when working on or near hot components.



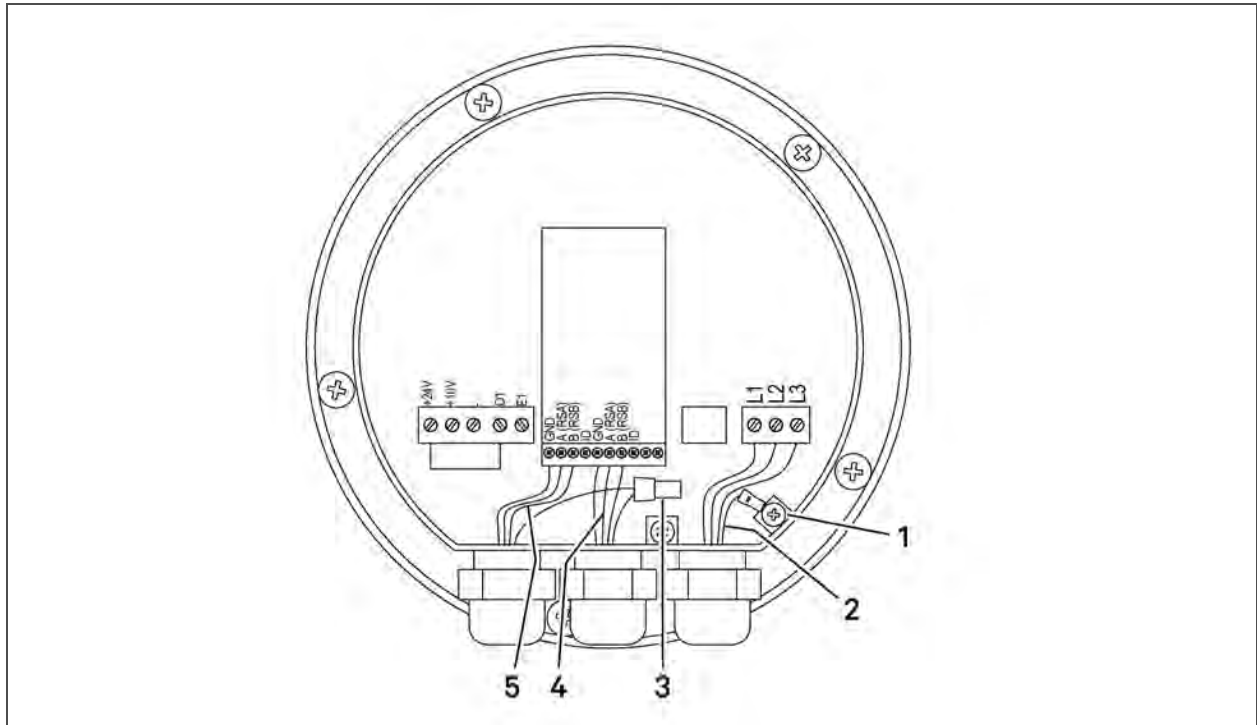
CAUTION: Risk of improper moving, lifting and handling. Can cause equipment damage or injury. Only properly trained and qualified personnel should work on this equipment. Condenser fan modules weigh in excess of 250 lb (113.4 kg). Use proper lifting techniques and wear appropriate, OSHA-approved PPE to avoid injury and dropping the fan module during removal. Equipment used in handling/lifting, and/or installing the fan assembly must meet OSHA requirements. Use handling/lifting equipment rated for the weight of the fan assembly. Use ladders rated for the weight of the fan assembly and technicians if used during installation. Refer to handling/lifting, and/or installation equipment operating manual for manufacturer's safety requirements and operating procedures.

NOTE: If at any time a parameter is entered and the condenser display does not show 888 or if the display shows Err, re-enter the parameter. If the display still shows Err after ENT is pressed, power cycle the control board by unplugging P24, waiting 15 seconds and plugging P24 back in. Contact the factory if the parameter still displays Err after ENT is pressed.

To replace the fan:

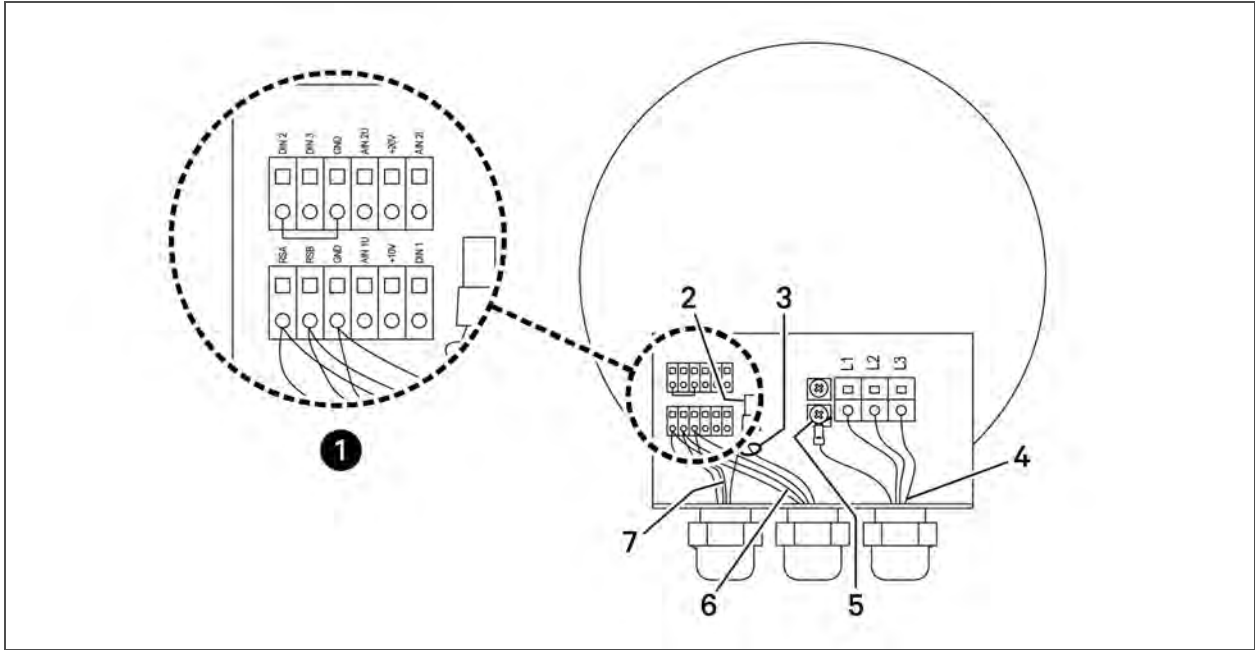
1. Turn Off power to the unit using the disconnect.
2. Use a voltmeter verify that voltage is no longer present at the unit. Wait a minimum of 10 minutes to allow the EC fan capacitors to discharge before proceeding.
3. Remove the fan cover, disconnect electrical connections internal to the EC fan and remove the cable glands from the EC fan to be replaced (see **Figure 8.8** below, and **Figure 8.9** on the next page).

Figure 8.8 Internal wiring of Ziehl-Abegg fan in Condenser



Item	Description
1	GND
2	Edge of cable's outer jacket should only extend far enough into the enclosure to make the electrical connections.
3	Not used on last fan.
4	Communication-cable connection to the next fan. Not used on last fan.
5	Communication-cable connection from the previous fan or electrical box.

Figure 8.9 Internal wiring of EBM fan in Condenser



Item	Description
1	Wiring terminal detail.
2	Not used on last fan.
3	Must be cable-tied together away from high-voltage terminals
4	Edge of out cable jacket should only extend far enough into enclosure to be able to make the electrical connections.
5	GND
6	Communication cable connected to the next fan (not used on the last fan).
7	Communication cable from the previous fan or from the electric box.

4. Remove hardware that attaches the EC fan to the condenser.
5. Use lifting equipment or an adequate number of personnel to remove the EC fan from the condenser.

NOTE: A spreader bar may be required for the lifting equipment if only one technician is performing the fan replacement.

6. Install a spreader bar over the new EC fan if only one technician is performing the fan replacement.
7. Verify that the wire harness on the new EC fan is secured out of the way before lifting the fan.
8. Verify that the lifting cable/chains are not in contact with fan blades before lifting the new fan into place on the condenser.
9. Install the new fan in the condenser and connect the mounting hardware.
10. Verify that the fan blades rotate freely when installed in unit.

11. Install the new cable glands included with the new EC Fan. Torque for the cable glands is:
 - 630-mm and 710-mm fans: 19.5 to 24.75 in-lb (2.2 to 2.8 Nm)
 - 800-mm fans: 32.75 to 38 in-lb (3.7 to 4.3Nm)

Dispose of the old cable glands once the new glands are installed.
12. Add a compression nut to the wire—Do not tighten the nut.
13. Reconnect the wiring to the proper terminals and verify that the run jumper is in place. See **Figure 8.8** on page 43, and **Figure 8.9** on the previous page, for wiring details.
 - The torque for the electrical terminals is 11.5 in-lb (1.3 Nm). Tighten the compression nut to a torque of 22 in-lb (2.5 Nm).
14. With the PCB powered, the board display should read *F00*.
15. Press the **ESC** button.
16. Press the **UP**-arrow button once:
 - If *P-* is displayed, perform step 17.
 - if *P-* is not displayed, perform steps 18 through 46.
17. If *P-* is displayed, press the **ENT** button to enter the *P-* Menu.

The *P-* Menu allows compact set-up/preparation of the condenser in the factory or in the field. Use the functions described in **Table 8.5** below, to establish a default control configuration for the board.

NOTE: The complete list of *P-*, *C-*, and *F-* parameters is located inside the lid of the electrical-box panel.

Table 8.5 P-- menu items and definitions

Item ID	Meaning	Default	Notes
P01	Enter Preparation Mode	0	Setting this value to '1' enables preparation mode. All other 'P--' menu items are disabled until this value is '1'. Note that control operations may be affected during preparation mode, therefore the cooling unit should be off. Setting this value back to '0' creates new default values based upon selections in this menu. After default values are established, the board exits preparation mode and reboots.
P02	Automatic VSD Configuration	1	This item should only be used to address the VSDs for the unit. The value entered indicates the model of the VSD: 1 – EBM 2 – Ziehl-Abegg 3 – Fans Tech All fans must be the same model to use this parameter. When <i>ENT</i> is pressed, the board will operate and power contactors for the VSDs and assign ModBus addresses. This procedure may take up to 5 minutes to complete.
P03	Refrigerant Type	2	1 = R22 2 = R407C 3 = R410A
P04	Number of Circuits	1	1 = Single Circuit 2 = Dual Circuit
P05	Liebert® Lee Temp Option	0	0 = No Lee Temp installed 1 = Liebert® Lee-Temp installed
P06	Condenser	1	0 = Small

18. Turn the power On.
19. The control board flashes *FOO* on the display when it has completed its boot cycle.
20. Press the **ESC** button.
21. Use the **UP** or **DOWN** arrow button until *C--* displays.
22. Press the **ENT** button.
23. Use the **UP** or **DOWN** arrow button until *C03* displays
24. Press the **ENT** button.
25. Use the **UP** or **DOWN** arrow button to select one of three options:

Table 8.6 Configuration Code Values

Configuration Code	Fan #	Value
C03	Fan 1	0 = No Fan 1 = EBM Papst 2 = Ziehl-Abegg
C04	Fan 2	
C05	Fan 3	
C06	Fan 4	

26. Press the **ENT** button.
27. If the new value is entered into the control board, the display flashes "888."
28. Press the **ESC** button to display *C03*.
29. Repeat steps 20 through 27 for the remaining fans' configuration codes, *C04*, *C05* and *C06*.
30. Unplug all the contactor output plugs except for the fan to be addressed. Plugs are:
 - P23 = Fan 1
 - P27 = Fan 2
 - P28 = Fan 3
 - P29 = Fan 4
31. Wait 30 seconds.
32. Use the **UP** or **DOWN** arrow button to select one of the following parameters.

The correct parameter depends on the supplier of the fan that will be addressed.

 - C00—EBM Papst fan
 - C01—Ziehl-Abegg fan
33. Press the **ENT** button.
34. Use the **UP** or **DOWN** arrow button to the correct fan address number. Fan 1 should be 1 (fan closest to electric panel end). Fan 2 should be 2, etc.
35. Press the **ENT** button. The display flashes "888" when the command is accepted.
36. Press the **ESC** button for the parameter to be shown on the display.
37. Repeat steps 30 through 36 for the rest of the fans that need to be addressed.
38. After the last fan is addressed, unplug the power plug, P24, from the control board, and wait 30 seconds.
39. Plug all the contactor output plugs back into the board in their correct positions.
40. Plug P24 back into the control board.
41. After the control board completes its boot cycle and all the contactors are energized, wait 5 seconds.
42. Press the **ESC** button.

43. Use the **UP** or **DOWN** arrow button until A-- is on the display.
44. Press **ENT** button.
45. Use the **UP** or **DOWN** arrow button to see if any of the following errors are shown.
 - 115: Unable to communicate with Fan 1.
 - 215: Unable to communicate with Fan 2.
 - 315: Unable to communicate with Fan 3.
 - 415: Unable to communicate with Fan 4.
 - If any of these errors appear, check the communication wiring at the problem fan and the fan before it.
 - If the wiring is correct and properly wired to the terminal, repeat the fan addressing procedure in steps 30 through 36.
46. If none of the errors listed in step 45 displays, press the **ESC** button.

8.9.1 Verifying the Fan Address

To verify that each fan has a unique address:

1. Use the **UP** or **DOWN** arrow button until C-- displays.
2. Press the **ENT** button.
3. In the Manual/System Control Selection parameter use the **UP** or **DOWN** arrow button until C24 displays.
4. In the Manual Control configuration parameter, press the **ENT** button.
5. Use the **UP** or **DOWN** arrow button to select 0.
6. Press the **ENT** button.
The reads "888" if the command is accepted.
7. Press the **ESC** button to display C24 .
8. Use the **UP** or **DOWN** arrow button until C34 displays.
9. Press **ENT** button.
If Fan 1 is running, the fans speed should display in terms of percentage of full speed. If Fan 1 is not running, 0.00 should display.
10. Use the **UP** or **DOWN** arrow button to enter 100% speed.
11. Press the **ENT** button.
The display reads "888" if the command is accepted.
 - Fan 1 should speed up to 100%, and all the other fans should stay the same speed.
12. If Fan 1 is not running or if any of the other fans also speed up to 100%, steps 30 through 36 of [Replacing the Condenser Fan](#) on page 42, must be repeated.
13. Press the **ESC** button for the parameter to be shown on the display.
14. Repeat steps 3 through 8 for the rest of the fans, if present.
 - C35: for Fan 2.
 - C36: for Fan 3.
 - C37: for Fan 4.

NOTE: All fans should be at 100% speed.

15. Use the **UP** or **DOWN** arrow button until C24 displays.
16. Press the **ENT** button.

17. In the System Control configuration parameter, use the **UP** or **DOWN** arrow button to select 1.
18. Press the **ENT** button.
The display flashes "888" if the command is accepted.
19. Press the **ESC** button to display C24.
All fans should return to a normal speed based on the pressure input and the state of indoor unit's compressor.

Notes on the Premium-efficiency Control Board

- J6 is the CANbus termination jumpers. If the condenser is the last device in the CANbus communication line, the jumper must be placed between Pins 1 and 2 of J6. If the condenser is not the last device in the CANbus communication line, then the jumper on J6 must be placed on Pins 2 and 3. CANbus communication errors may occur if the jumpers are not in the correct positions.
- A jumper must be present at J2. If a jumper is not present, the control board will not boot properly during power start-up.

Table 8.7 Premium Efficiency Control Board Configuration-parameter List

Submenu ID	Meaning	Default R410a		Comments
		Metric	Imperial	
C00	EBM address	1		Do not change unless properly instructed.
C01	ZIEHL_ABEGG address	1		
C02	FANS_TECH address	1		
C03	EC Fan 1 model ID	0		
C04	EC Fan 2 model ID	0		
C05	EC Fan 3 model ID	0		
C06	EC Fan 4 model ID	0		
C07	System model ID	0		*0" = Single, *1" = Dual
C09	System refrigerant type	3		*2" = R407c, *3" = R410a
C10	Condenser pressure absolute max 1	28.0 bar	406 psi	R407c - 17-25 bar; 247-362 psi
C11	Condenser pressure absolute max 2	28.0 bar	406 psi	R410a - 25-38 bar; 363-550 psi
C12	Condenser pressure absolute min 1	18.0 bar	261 psi	R407c - 11-17 bar; 160-246 psi
C13	Condenser pressure absolute min 2	18.0 bar	261 psi	R410a - 16-24 bar; 232-347 psi
C14	Condenser pressure PID Kp	1.00		Do not change unless properly instructed.
C15	Condenser pressure PID Kip	0.02		
C16	Condenser pressure PID Kdp	0.00		
C17	Refrigerant temperature max 1	35°C	95.0°F	Range 30 - 40°C; 86 - 104°F
C18	Refrigerant temperature max 2	35°C	95.0°F	
C19	Refrigerant temperature min 1	25°C	77.0°F	Range 20 - 30°C, 68 - 86°F
C20	Refrigerant temperature min 2	25°C	77.0°F	
C21	Refrigerant temperature PID Kp	0.36		Do not change unless properly instructed.
C22	Refrigerant temperature PID Kip	162.00		
C23	Refrigerant temperature PID Kdp	1.00		
C24	System control state	1		*0" = Manual, *1" = Auto
C25	Condenser pressure setting point 1	20.0 bar	290 psi	R407c - 12-18 bar; 174-261 psi
C26	Condenser pressure setting point 2	20.0 bar	290 psi	R410a - 18-26 bar; 261-376 psi
C27	Lee Temp Option	0		*0" - No Lee Temp installed, *1" - Lee Temp installed

Table 8.7 Premium Efficiency Control Board Configuration-parameter List (continued)

Submenu ID	Meaning	Default R410a		Comments
		Metric	Imperial	
C28	Minimum Speed with LeeTemp	10%		Range 8 - 20%
C32	Refrigerant temp. set point 1	1.67°C	35°F	Range -40 - +40°C; -39.9 - +104°F
C33	Refrigerant temp. set point 2	1.67°C	35°F	
C34	EC Fan1 request speed	0%		Manually sets fan speed (RPM) when C24 is set to "0".
C35	EC Fan2 request speed	0%		
C36	EC Fan3 request speed	0%		
C37	EC Fan4 request speed	0%		
C38	EC Fan Reverse Request	0		"0" = Off, "1" = On
C39	EC Fan start-up speed offset for pressure mode	0		Offset to the start-up speed of the EC Fan in range -10% to 10%
C50-C58				
C90	Preferred display units.	1		"0" = Metric (bar, °C) "1" = Imperial (psi, °F)
C91	Save configuration to USB flash drive. Pressing ENT will execute the function immediately.			
C92	Load configuration from USB flash drive. Pressing ENT will execute the function immediately.			
C98	Clear alarm history.			
C99	Restore Factory Defaults except EC fan control parameters			
Note: Please consult factory before making any changes to the parameter settings. Changing the parameters without proper instructions can lead to poor system performance.				

8.10 Replacing the Premium Efficiency Control Board

Use these steps to replace the Premium Efficiency Control Board in the condenser.



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the controller. The factory-supplied disconnect switch is on the exterior of the enclosure. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.

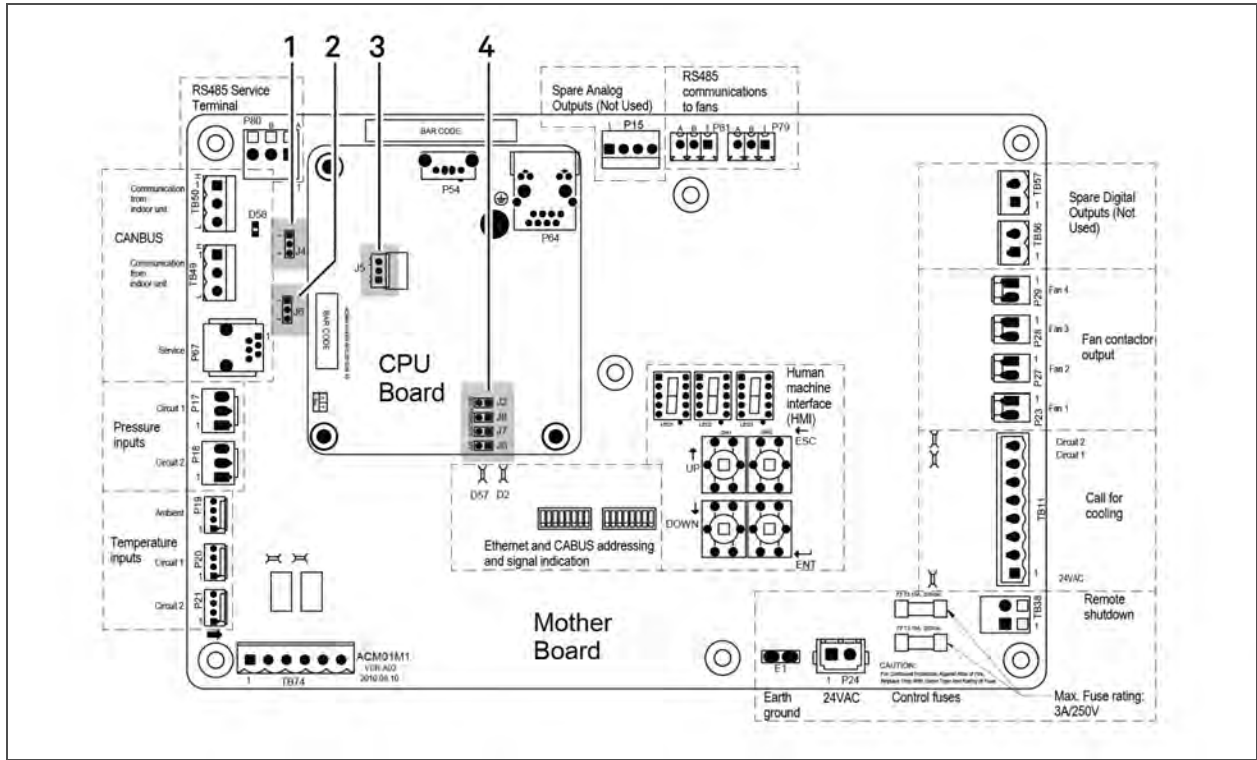
8.10.1 Preparing to Replace the Board

1. Verify that the following jumpers are installed on the new board (see **Figure 8.10** on the next page):
 - Jumper at J4 and J6 on Pins 2 and 3.
 - Jumper on J2.
 - Jumper on J5 on Pins 1 and 2.
2. Locate the latest revision of the HMI parameters label, 303847P1, included with the new control board.

NOTE: In **Figure 8.10** on the next page, J6 is the CANbus termination jumper. J4 is the RS485 service termination jumper. If the condenser is the last device in the CANbus communication line, the jumper must be placed between Pins 1 and 2 of J6. If the condenser is not the last device in the CANbus communication line, the jumpers on J6 must be placed on Pins 2 and 3. If the jumper is not in the correct positions, CANbus communication errors may occur. The jumper on J4 will always be placed between Pins 1 and 2.

NOTE: In **Figure 8.10** on the next page, a jumper must be present at J2. If a jumper is not present, the control board will not boot properly during power start-up.

Figure 8.10 Jumper locations on Control Board



Item	Description
1	J4, RS485 service termination jumper
2	J6, Canbus termination jumper
3	J5
4	J2

8.10.2 Installing the Replacement Board



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the “Unit Off” mode. Some internal components require and receive power even during the “Unit Off” mode of the controller. The factory-supplied disconnect switch is on the exterior of the enclosure. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.

1. Turn Off the disconnect switch on the condenser enclosure cover.
2. Open the control enclosure cover.

3. Manually turn On the disconnect switch.

NOTE: Power is On and a shock hazard exists with exposure to hazardous voltage components.

4. If the board can still be powered up and has a display, record the parameter settings.
 - To obtain parameters go to the C-- menu and press the **UP** or **DOWN** arrow button to read and record the values for C03-09 and C27.
5. Record all of the DIP switch positions for the CANbus DIP switch package. Retain these for setting up the new board.
6. Record the positions of the jumpers for J2, J4, J5 and J6 on control board in the unit. Retain these for setting up the new board.
7. Disconnect power from the condenser by turning Off the main disconnect switch.
8. Use a voltmeter to verify that voltage is no longer present in the unit.
9. Remove the plugs and field-installed wires from the old board. Note the polarity for the CANbus wiring going to P49 and P50, if present.
10. Mark wires P49-1, P49-3, etc, if they are not already marked.
11. Remove the mechanical fasteners holding the control board in place and remove the old control board.
12. Install the new control board using the fasteners removed in step 11.
13. Reattach the plugs. Refer to the hot-stamps on the wire harnesses that correspond to the correct plug on the board. Verify that the plugs are installed properly.
14. Change the CANbus DIP switch positions so they match the control board that was removed. If the condenser is the second condenser on the CANbus communication line, set Position 1 of the CANbus DIP switch from On to Off.
15. Change the jumper positions for J2, J4, J5 and J6 to match the control board that was removed. If the condenser is the last device on the CANbus communication line, move the jumper at J6 from Pins 2 and 3 to Pins 1 and 2 (see **Figure 8.10** on the previous page).
16. Power up the unit.
17. Change the parameters to match the parameters from the control board that was removed if they were obtained from the old board in step 4. See step 18 if the parameters were unavailable.
18. If the old board parameters were unavailable, use the new HMI label included in kit to obtain the proper settings. Parameters C03, C04, C05 and C06 must be programmed with the proper EC fan supplier used on the unit.
19. Address the fans (refer to [Replacing the Condenser Fan](#) on page 42).
20. Compare the HMI label on the unit with the latest revision.
 - If there are differences, clean and dry the surface of the old HMI label; attach the new label on top of the old label, covering the old label with the new one.
21. Verify that the control board is reading pressure and temperature.
22. Verify that there are no communication alarms with the fans or with the cooling unit the condenser is serving.
23. Verify proper fan operation by adjusting the cooling unit that this condenser serves so that it calls for cooling.

8.11 Pumped Refrigerant Economizer (PRE)

Your Liebert® DSE Packaged Solution, 60 kW, Model DP060 includes a Liebert® PRE system. Refer to the Liebert® EconooPhase Installer/User Guide, if available at www.Vertiv.com, for the maintenance and operations details.

9 PREVENTIVE MAINTENANCE CHECKLIST

Inspection Date			Job Name
Unit Model #			Unit Serial Number #
Room Temperature/Humidity	°	%	Ambient Temperature °

Not all units will have all components. To determine your unit's configuration, compare the [Unit Model #](#) above and the information in the Components and Nomenclature section.

Good maintenance practices are essential to minimizing operation cost and maximizing product life. Read and follow all applicable maintenance checks listed below. At a minimum, these checks should be performed semi-annually. However, maintenance intervals may need to be more frequent based on site-specific conditions. Review the unit user manual and the iCOM user manual (SL-31075) for further information on unit operation. We recommend the use of trained and authorized service personnel, extended service contracts, and factory-certified replacement parts. Contact your local sales representative for more details.

Check all that apply:

Evaporator/Filters

1. Check/replace filters.
2. Wipe section clean.
3. Coil clean.
4. Clean condensate pan.
5. Check/test filter-clog switch operation.

Blower Section (evaporator fans)

1. Mounting bolts tight.
2. Blower wheels free of debris and spins freely.
3. Motor bearings in good condition and lubricated..
4. Check motor mount.
5. Check/test air sail switch.
6. Motor amp draw
7. Compare to nameplate amps.

#1	L1	L2	L3
----	----	----	----

Electrical Panel

1. Check fuses.
2. Check contactors for pitting. (Replace if pitted.)
3. Check/re-torque wire connections.

Controls

1. Check/verify control operation (sequence).
2. Check/test changeover device(s) (if equipped).

Compressor

1. Check oil level.
2. Check for oil leaks.
3. Check compressor mounts (bushings).
4. Cap tubes (not rubbing).
5. Check/re-torque wire connections (inside compressor box).
6. Compressor operation (vibration/noise).
7. Check crank-case heater fuses/operation (if equipped).
8. Check for refrigerant leaks.
9. Check suction pressure. Circuit # 1. _____
10. Check discharge pressure. Circuit # 1 _____
11. Check discharge pressure. Circuit #1 _____
12. Check low pressure switch cut out. Circuit #1 _____
13. Check low pressure cut in. Circuit #1 _____
14. Check High pressure cut out. Circuit #1 _____
15. Check amp draw.

Compressor #1	L1	L2	L3
---------------	----	----	----

Condenser

1. Clean coil.
2. Check that fans are free of debris.
3. Check that fans are securely mounted.
4. Check that motor bearings are in good condition.
5. Check all refrigerant lines for vibration isolation. Support as necessary.
6. Check for refrigerant leaks.
7. Check surge-protection device (if installed) status-indicator lights.
8. Check/re-torque wire connections.
9. Check contactors for pitting. (Replace if pitted.)
10. Verify the operation sequence/set points.
11. Charge verification:
 - a. Outdoor Ambient Temperature _____
 - b. Subcooling _____
 - c. Indoor-unit Return-air Temperature _____
 - d. Sight-glass level (if Lee-Temp or pumped refrigerant) _____
12. Check motor amp draw.

Condenser Motor#1	L1	L2	L3
Condenser Motor#2	L1	L2	L3

Pumped Refrigerant Economizer

1. Check for refrigerant leaks.
2. Check/re-torque wire connections.
3. Check contactors for pitting. (Replace if pitted.)
4. Verify pump speed control operation.
5. Check pump mounting.

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APPENDICES

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv™ Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2778

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

1050 Dearborn Drive

Columbus, OH, 43085, USA

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road

Wanchai, Hong Kong

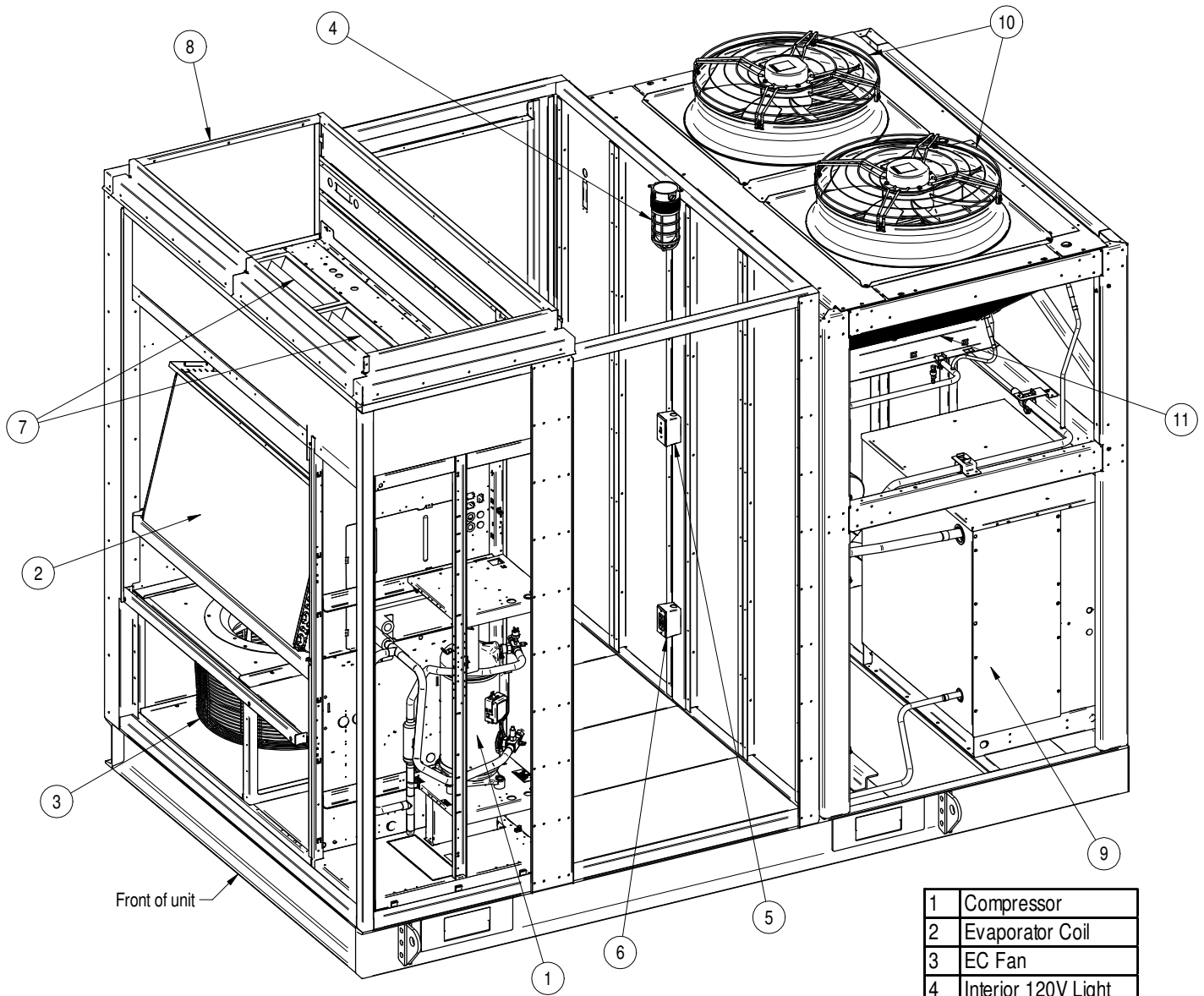
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Appendix B: Submittal Drawings

Table B.1 Submittal Drawings Contents

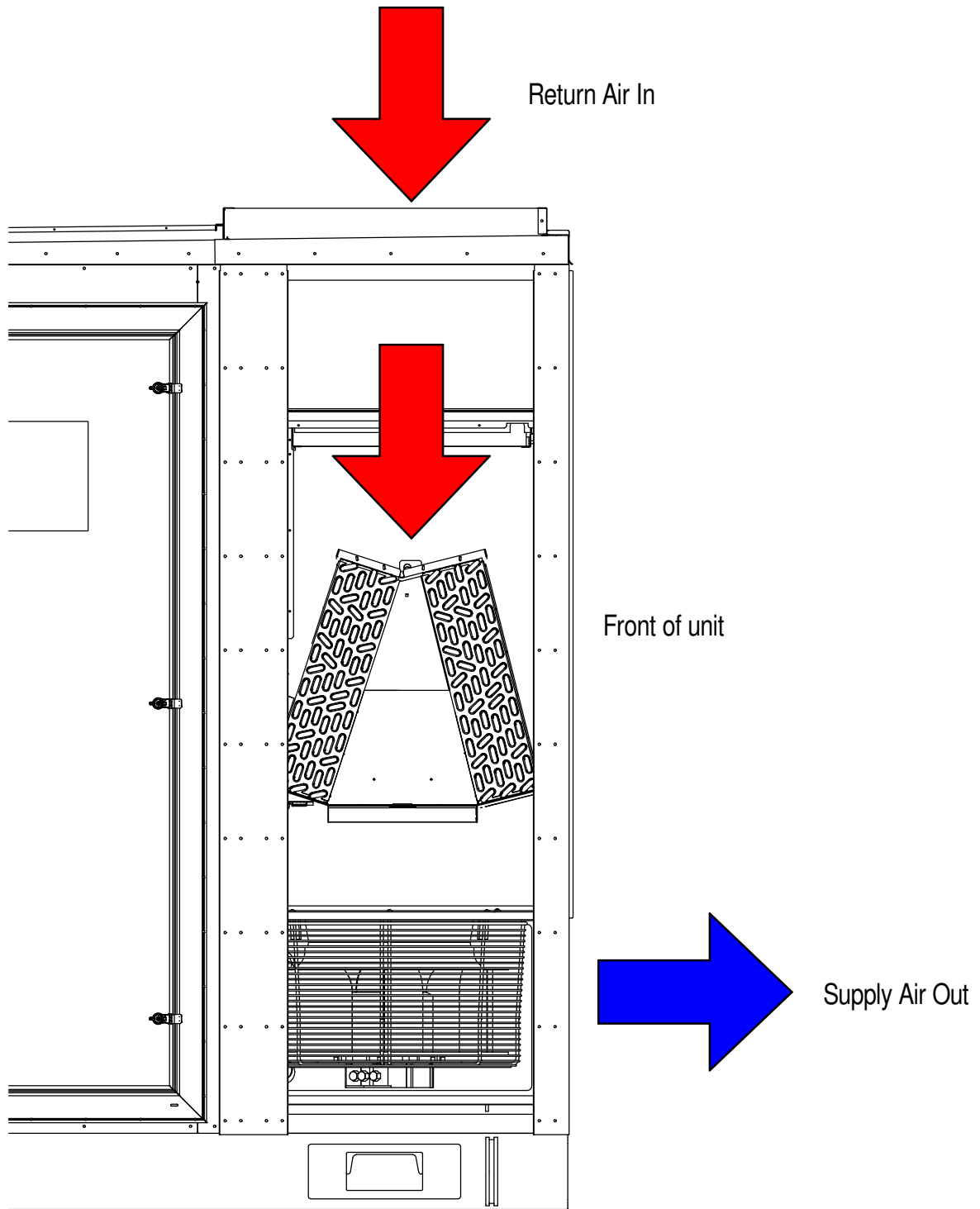
Document Number	Title
Component Location Drawings	
DPN004597	Component Location Diagram Evaporator Compartment DP060 Top Inlet/Front Supply
Air Flow Configuration Drawings	
DPN004598	Airflow Schematic, Perimeter Unit
DPN004599	Evaporator Ducting Dimensional Data
Dimension Planning Drawings	
DPN004600	Cabinet and Anchor Dimensional Data
DPN004599	Evaporator Ducting Dimensional Data
DPN004601	Condensate Drain Access and Location
DPN004602	Evaporator Compartment Service Area
DPN004756	Installation and Service Clearance for Multiple Units
Piping Schematic Drawings	
DPN004566	Piping Schematic DP060
Electrical Field Connection Drawings	
DPN004587	Electrical Connections Enclosure, Dual Power Input
DPN004732	Electrical Connections Enclosure, Single Power Input
DPN004591	DP060 Enclosure Electrical Locations
DPN004350	Unit Mounted Display
DPN000960	Remote Temperature and Humidity Sensor
DPN003144	Service Bracket
Unit to Unit Networking	
DPN004351	Unit to Unit Network Connections

COMPONENT LOCATION DIAGRAM EVAPORATOR COMPARTMENT DP060 TOP INLET/FRONT SUPPLY



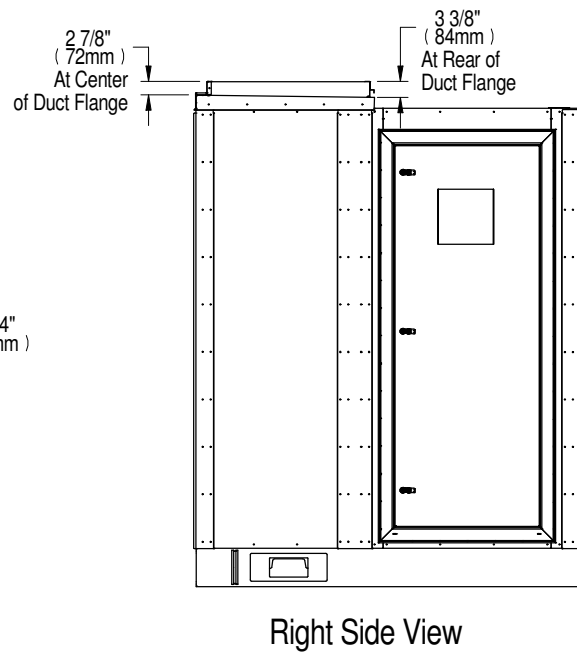
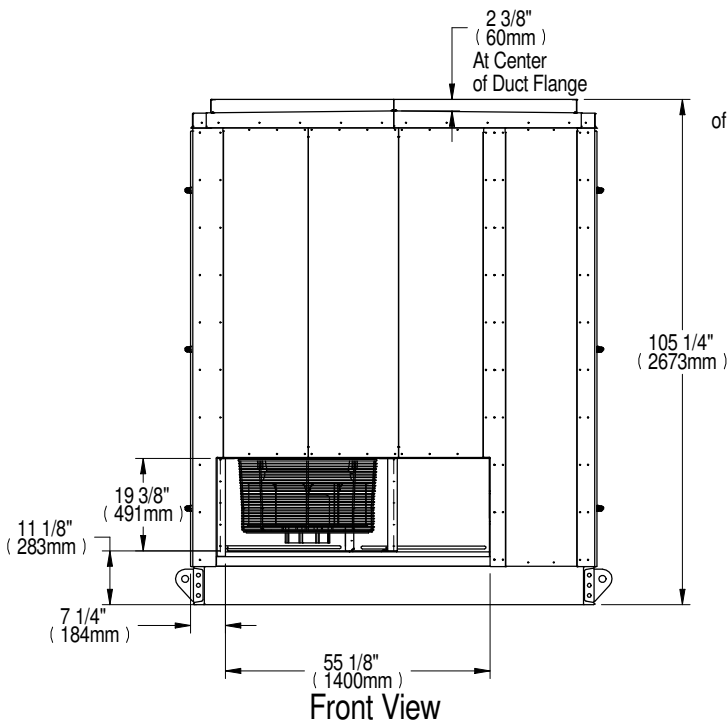
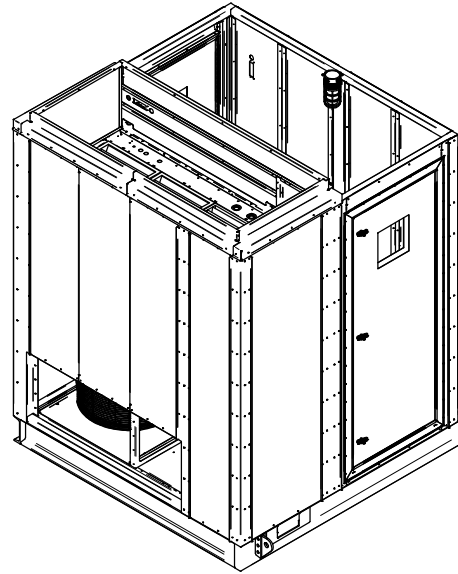
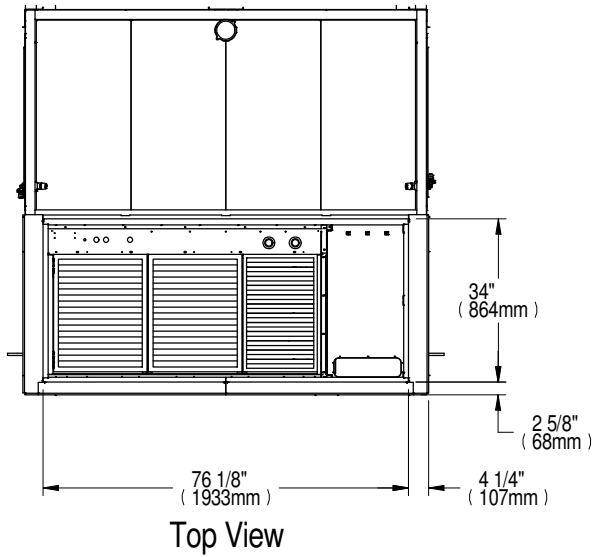
1	Compressor
2	Evaporator Coil
3	EC Fan
4	Interior 120V Light
5	Light Switch
6	GFI Outlet
7	Filters (qty. 3)
8	Duct Collar
9	Liebert EconoPhase
10	Condenser Fans
11	Condenser Coil

AIRFLOW SCHEMATIC DP060 TOP INLET/FRONT SUPPLY



Some panels removed for clarity

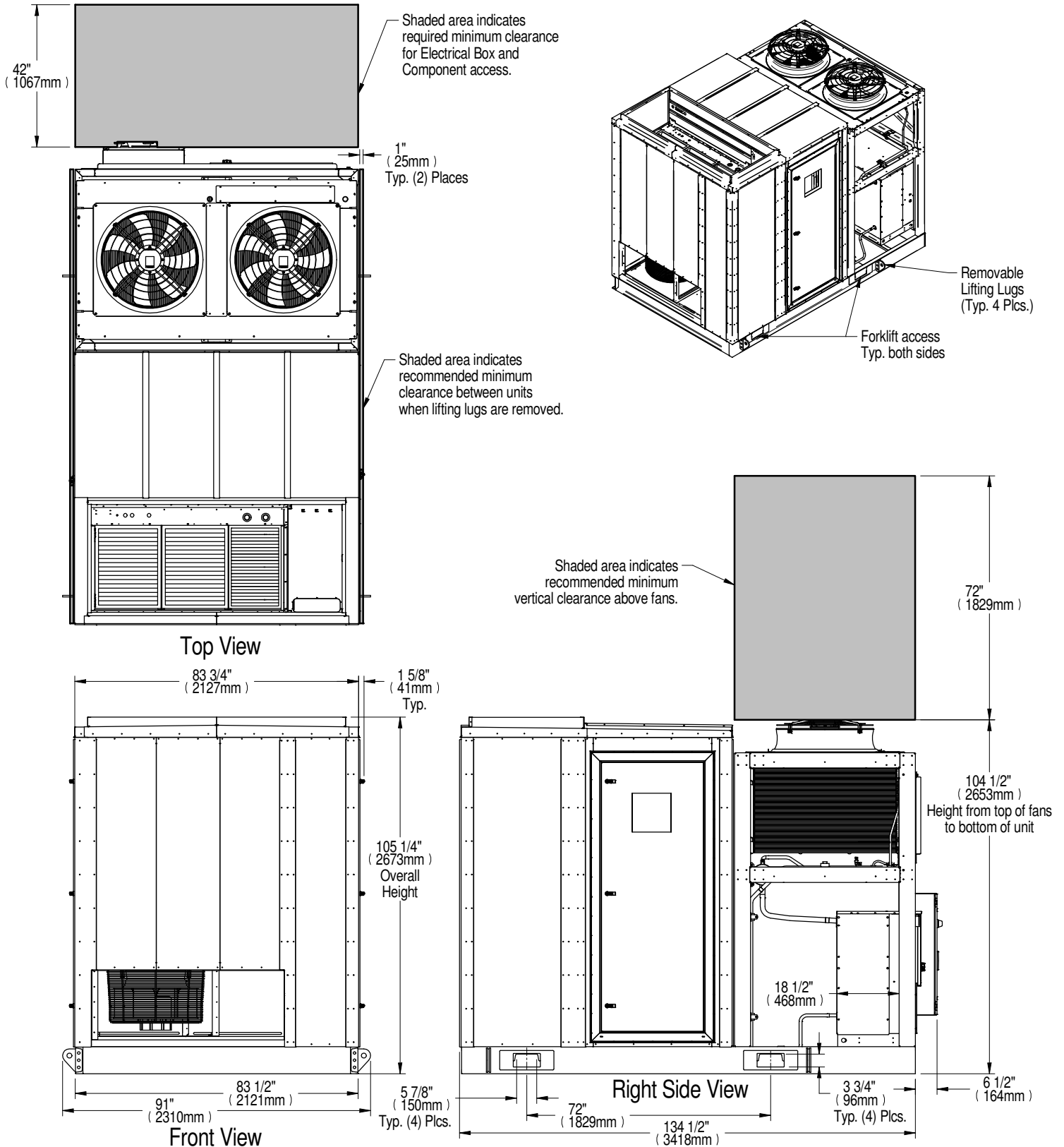
EVAPORATOR DUCTING DIMENSIONAL DATA DP060 TOP INLET/FRONT SUPPLY



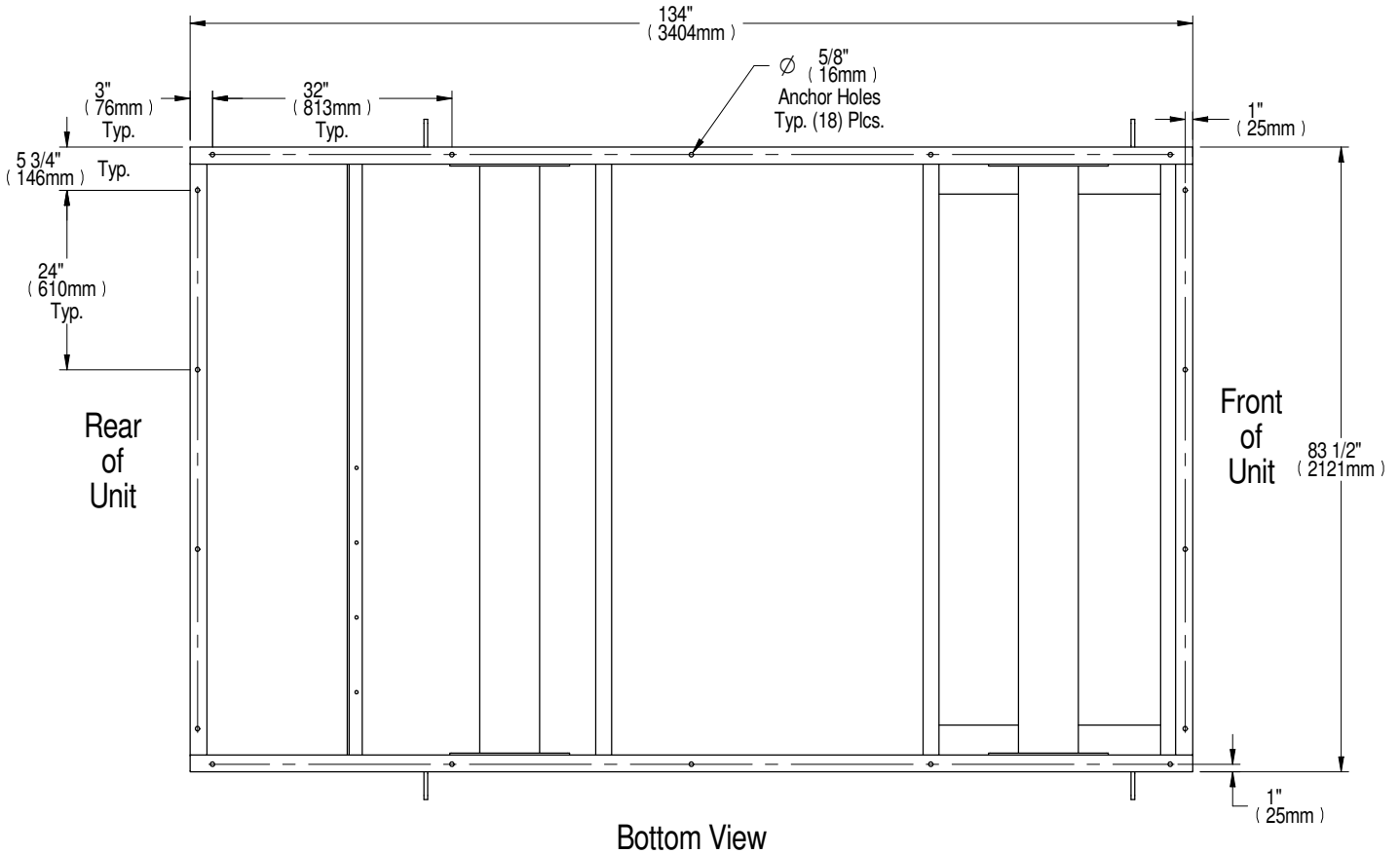
Notes:

1. Seal all ducts.

CABINET & ANCHOR DIMENSIONAL DATA DP060 TOP INLET/FRONT SUPPLY



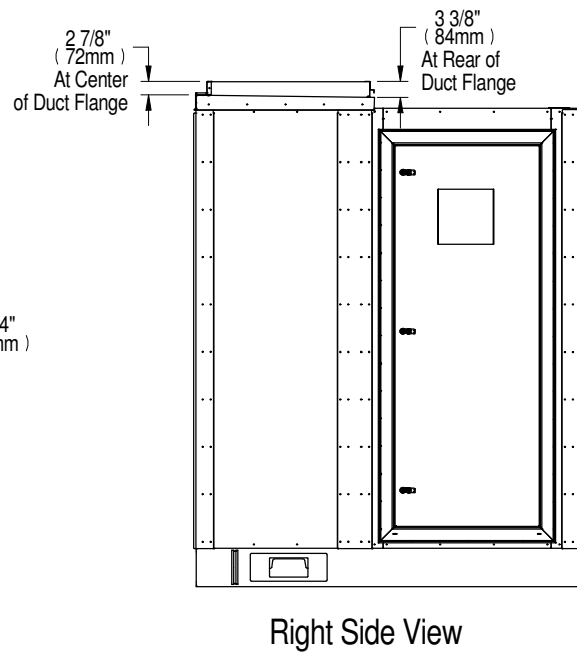
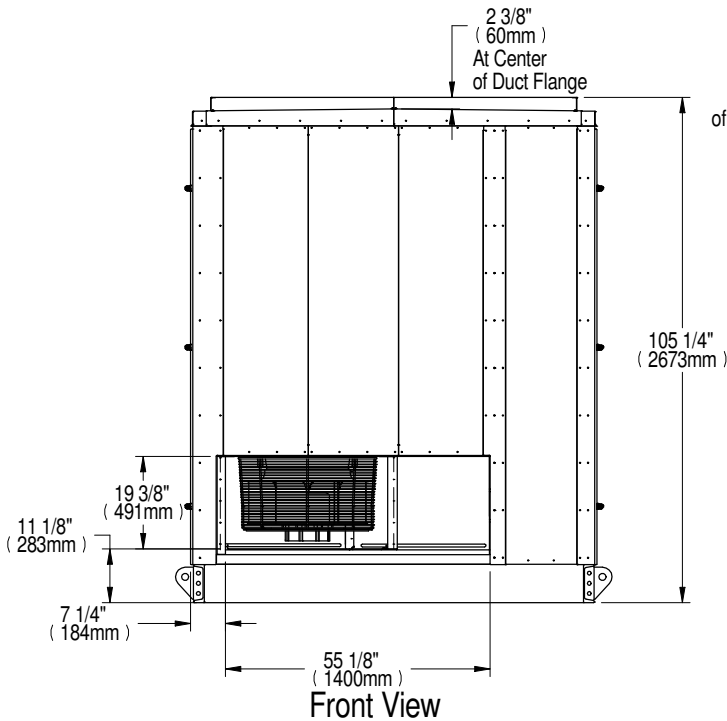
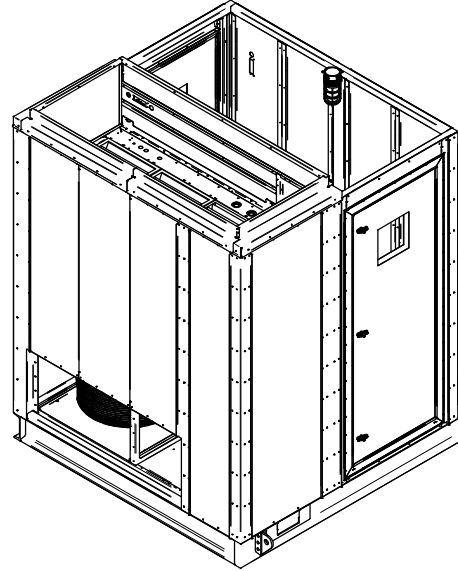
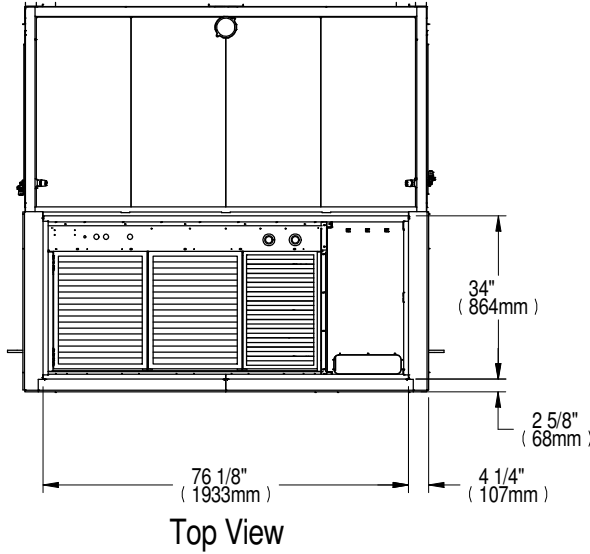
CABINET & ANCHOR DIMENSIONAL DATA DP060 TOP INLET/FRONT SUPPLY



Notes:

1. Underside of base of unit. Components removed for clarity.
2. Mounting requirement details such as brand type, embedment depth, edge spacing, anchor spacing, concrete strength, wall bracing, and special inspection must be outlined and approved by the project Structural Engineer of Record.

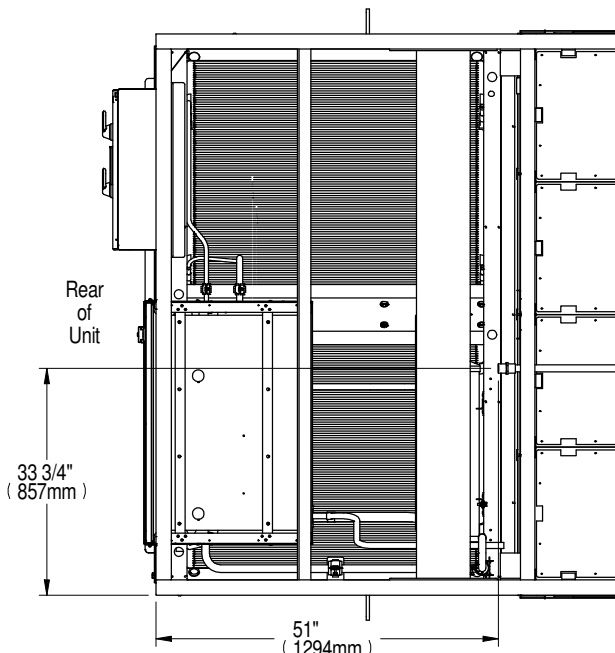
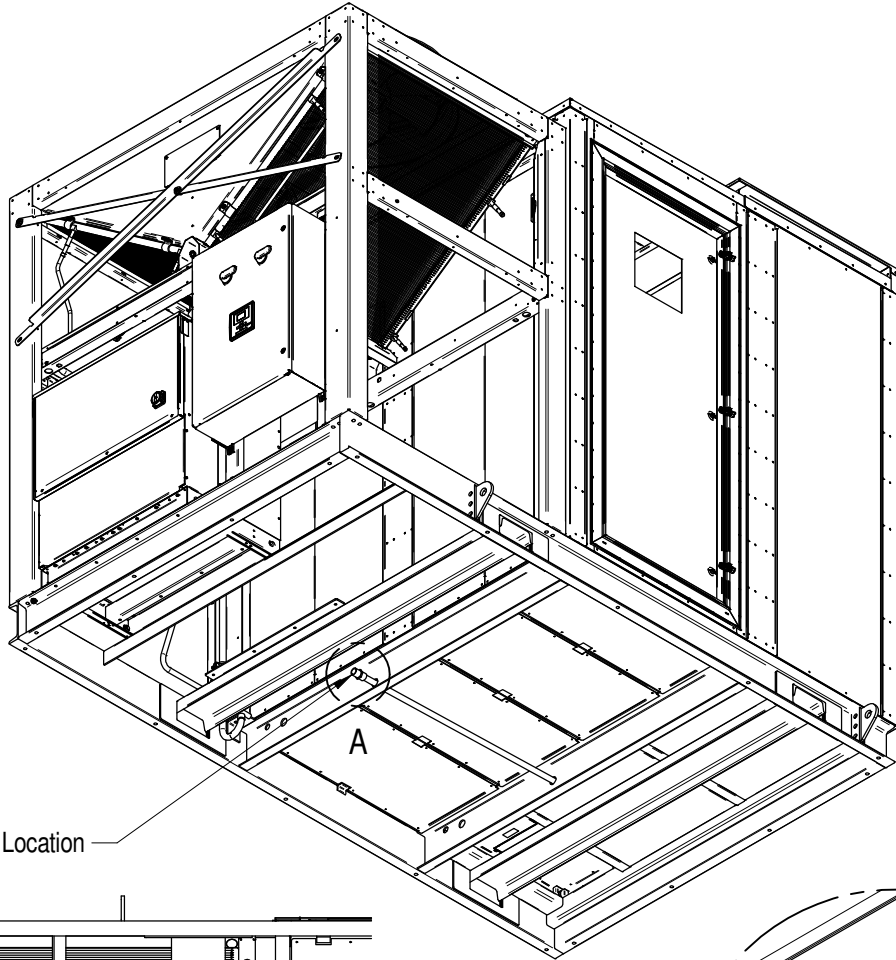
EVAPORATOR DUCTING DIMENSIONAL DATA DP060 TOP INLET/FRONT SUPPLY



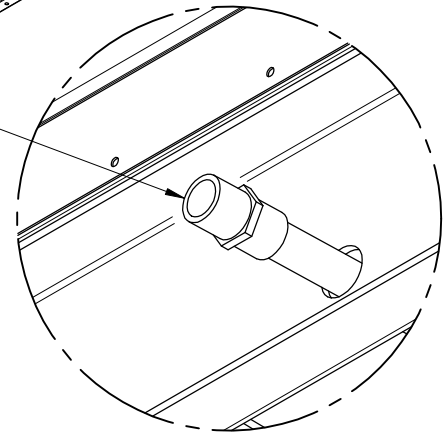
Notes:

1. Seal all ducts.

CONDENSATE DRAIN ACCESS & LOCATION DP060 PERIMETER UNIT



3/4" NPT female fitting
for Condensate Drain



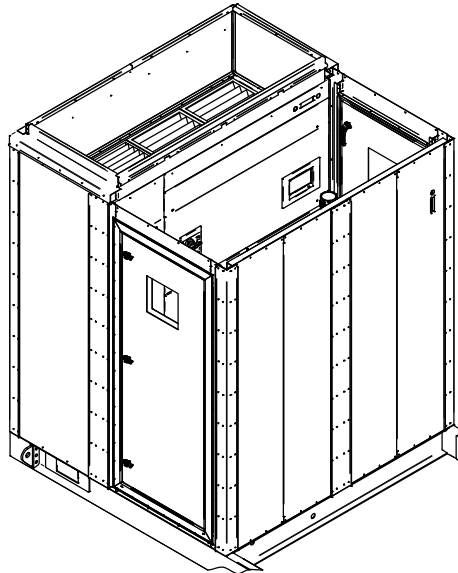
DETAIL A
Condensate Drain Location

Bottom View
showing Condensate Drain locating dimensions

EVAPORATOR COMPARTMENT SERVICE AREA DP060 TOP INLET/FRONT SUPPLY

Notes:

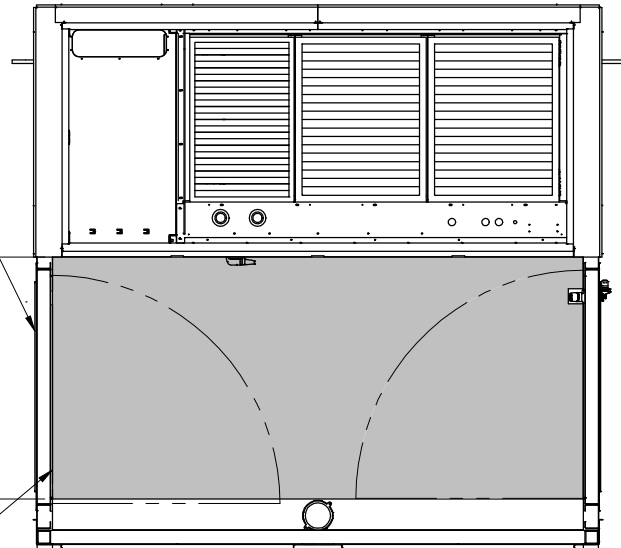
1. Evaporator Coil is removed into service area and through either door.
Requires 36" (914mm) X 60" (1524mm) clearance outside of door area.
2. NOTICE: Risk of equipment damage. Evaporator accent panel cannot be opened while exterior man door is closed.



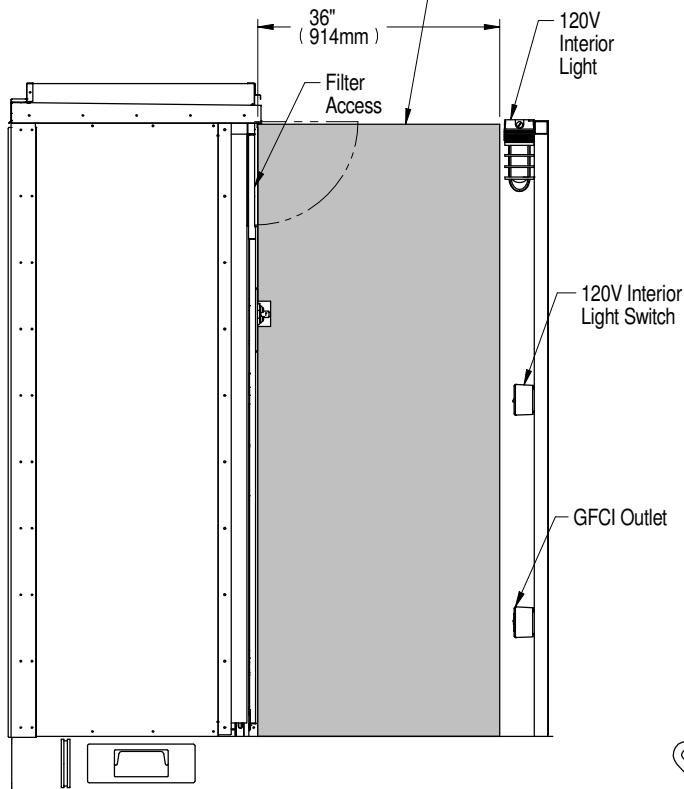
Access Door swings inward as shown (Typ. both sides)

1 36" (914mm)

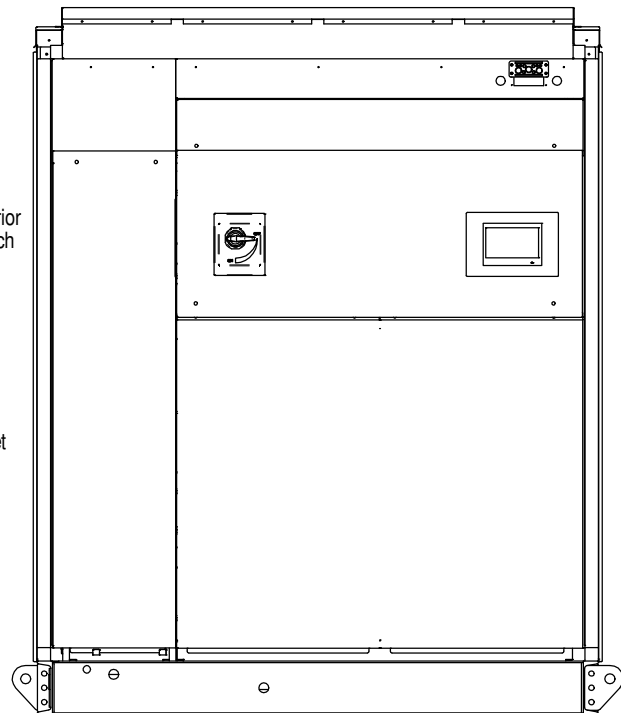
Shaded area indicates minimum clearance required in front of Liebert DSE unit.



Top View of Evaporator Section

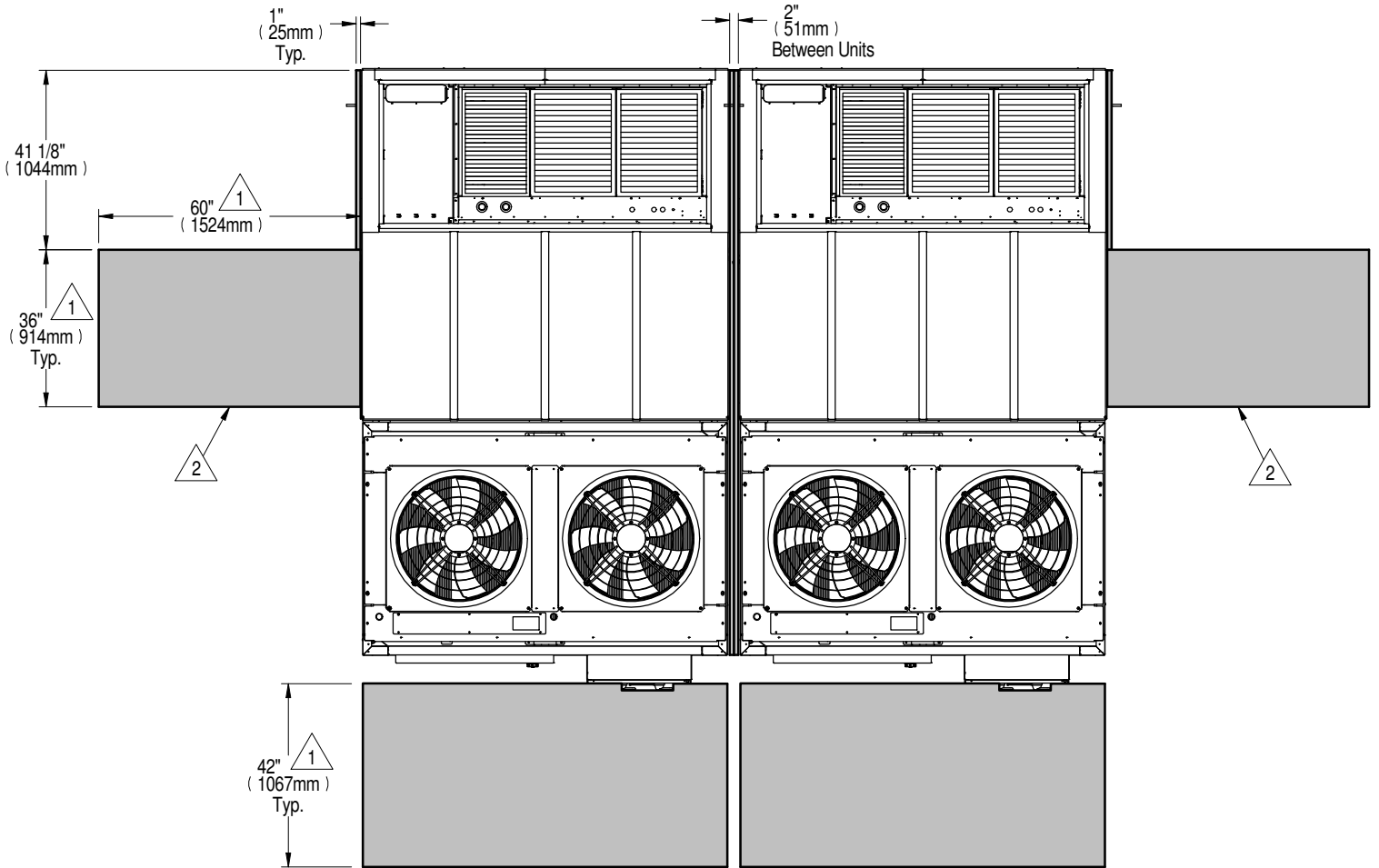


Side View of Evaporator Compartment
Access Door removed for clarity



Front View of Evaporator Unit
Wall & Access Doors removed for clarity

INSTALLATION & SERVICE CLEARANCE DATA DP060

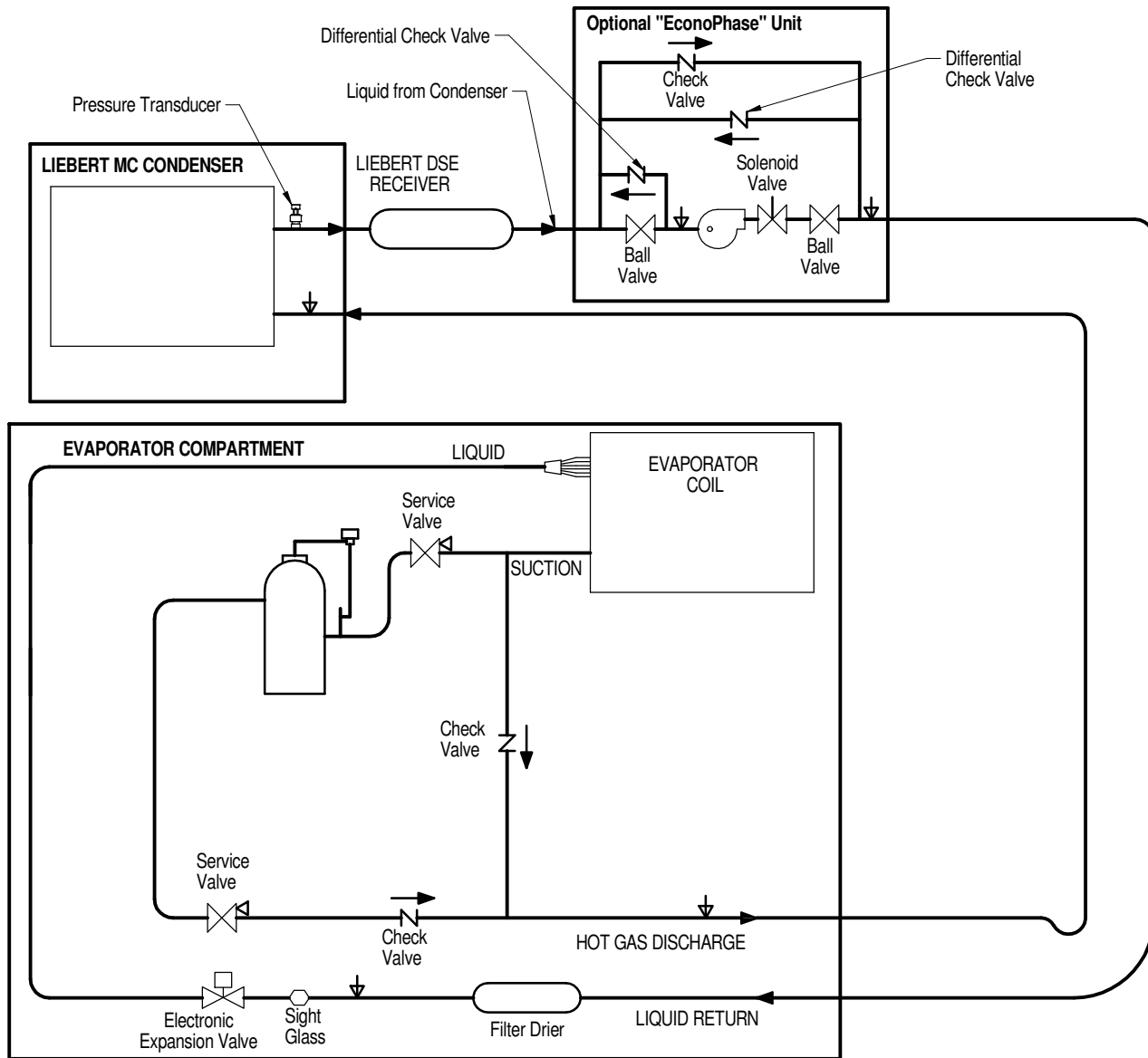


Top View
Rear of Units

Notes:

- 1. Required clearance between the end unit and the nearest obstruction.
- 2. Evaporator Coil may be removed into service area and through either door.
- 3. See DPN004600 for additional dimensional information.
- 4. Multiple units can be placed side by side. Two units shown for reference.

PIPING SCHEMATIC DP060



— FACTORY REFRIGERANT PIPING



SERVICE/SCHRADER (ACCESS) CONNECTION, NO VALVE CORE.



SERVICE/SCHRADER (ACCESS) CONNECTION, WITH VALVE CORE.

ELECTRICAL FIELD CONNECTIONS DP060 UNIT DEFINITIONS AND LOCATIONS DUAL POWER INPUT

STANDARD ELECTRICAL CONNECTIONS

- 1) **HIGH VOLTAGE ENTRANCE** – This area will be used for the high voltage fittings. Enclosure is not provided with holes or knockouts, which must be done by the installer in the field. The fittings, supplied by others, must have the proper environmental rating per code.
- 2) **LOW VOLTAGE ENTRANCE** – This area will be used for the low voltage and communication fittings. Enclosure is not provided with holes or knockouts, which must be done by the installer in the field. The fittings, supplied by others, must have the proper environmental rating per code.
- 3) **HIGH VOLTAGE WIRE DUCT** – Wire duct to be used by the installer for high voltage wire routing.
- 4) **SOURCE 1 MAIN UNIT POWER CONNECTIONS** – Terminals are located on top of the locking disconnect switch. See side of disconnect switch for wire range and tightening torque. Three phase service not provided by Liebert. Wire range and tightening torque will vary based on disconnect size. Refer to label on side of disconnect.
- 5) **EARTH GROUND CONNECTION FOR SOURCE 1 MAIN UNIT POWER** – Terminal for field supplied Source 1 earth grounding wire. Earth grounding required for Liebert units. 14-2AWG wire range, 275 in-lb wire tightening torque.
- 6) **SOURCE 2 MAIN UNIT POWER CONNECTIONS** - Terminals are located on top of the locking disconnect switch. See side of disconnect switch for wire range and tightening torque. Three phase service not provided by Liebert. Wire range and tightening torque will vary based on disconnect size. Refer to label on side of disconnect.
- 7) **EARTH GROUND CONNECTION FOR SOURCE 2 MAIN UNIT POWER** - Terminal for field supplied Source 2 earth grounding wire. Earth grounding required for Liebert units. 14-2AWG wire range, 275 in-lb wire tightening torque.
- 8) **REMOTE SHUTDOWN** - Replace existing jumper between terminals 37 & 38 with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
- 9) **CUSTOMER ALARM INPUTS** – Terminals for field supplied, normally open contacts, having a minimum 75va, 24vac rating, between terminals 24 & 50, 51, 56. Use field supplied Class 1 wiring. Terminal availability varies by unit options.
- 10) **COMMON ALARM** – On any alarm, normally open dry contact is closed across terminals 75 & 76 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 11) **REMOTE HUMIDIFIER** – On any call for humidification, normally open dry contact is closed across terminals 11 & 12 to signal field supplied remote humidifier. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 12) **FIELD SUPPLIED 120V UTILITY POWER** – Terminals for the connection of a field supplied 120V 20A utility power to feed the light and service electrical outlet. 22-8AWG wire range, 14.2lb-in tightening torque.
- 13) **EARTH GROUNDING CONNECTION FOR FIELD SUPPLIED 120V UTILITY POWER** - Terminal for field supplied 120V earth grounding wire. Earth grounding required for Liebert units. 14-2/0AWG wire range, 14-8AWG – 75lb-in, 6-4AWG – 110lb-in, 2-1AWG – 150lb-in, 1/0 – 2/0AWG – 180lb-in.

LOW VOLTAGE TERMINAL PACKAGE CONNECTIONS

- 14) **EXTRA REMOTE UNIT SHUTDOWN** – Two additional contact pairs available for unit shutdown (labeled as 37B & 38B, 37C & 38C). Replace jumpers with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
- 15) **EXTRA COMMON ALARM** – On any alarm, two additional normally open contacts are closed across terminals 94 & 95 and 96 & 97 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 16) **MAIN FAN AUXILIARY SWITCH** – On closure of the main fan contactor, normally open dry contact is closed across terminals 84 & 85 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 17) **LIQUITECT SHUTDOWN AND DRY CONTACT** – On LiquiTect activation, normally open dry contact is closed across terminals 58 & 59 for remote indication (LiquiTect sensor ordered separately). 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

NOTE: All low voltage terminal connections are spring-cage with a wire range of 28-12AWG.

NOTE: Items 12 and 13 may not be present if Unit supplied 120V utility option is selected.



LIEBERT DSE

ELECTRICAL FIELD CONNECTIONS DP060 UNIT DEFINITIONS AND LOCATIONS DUAL POWER INPUT

STANDARD COMMUNICATION CONNECTIONS

- 18) **RS485 BMS CONNECTION** – Terminal TB3-1 is TX/RX+. Terminal TB3-2 is TX/RX-. Terminal TB3-3 is earth ground. Use shielded cable with 120ohm characteristic impedance. (Supplied by other).
- 19) **CANBUS REMOTE SENSOR CONNECTION(P67)** – Remove the inserted plug from this connector and attach the remote sensor cable to power and communicate with Liebert remote Temperature/humidity sensors. Use shielded cable with 120ohm characteristic impedance. (Supplied by other).
- 20) **ETHERNET BMS CONNECTION(P74)** – RJ-45 connection for connecting to BMS Ethernet network. Use Class 5 shielded cable (Supplied by other).
- 21) **ETHERNET UNIT TO UNIT CONNECTION(P64)** – RJ-45 connection for connecting to other units. Use Class 5 shielded cable (Supplied by other).

NOTE: All low voltage terminal connections are spring-cage with a wire range of 28-12AWG.

NOTE: All communication cables should be kept separate from high-voltage wiring.

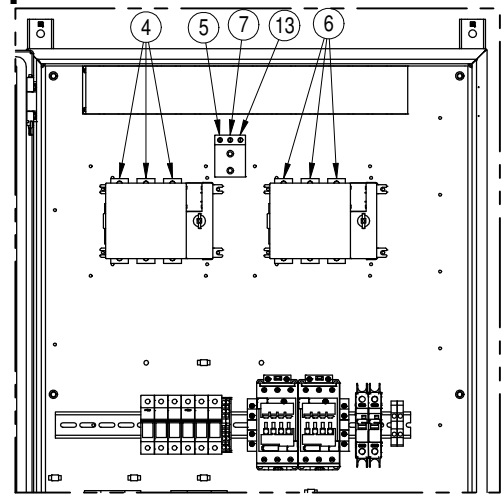
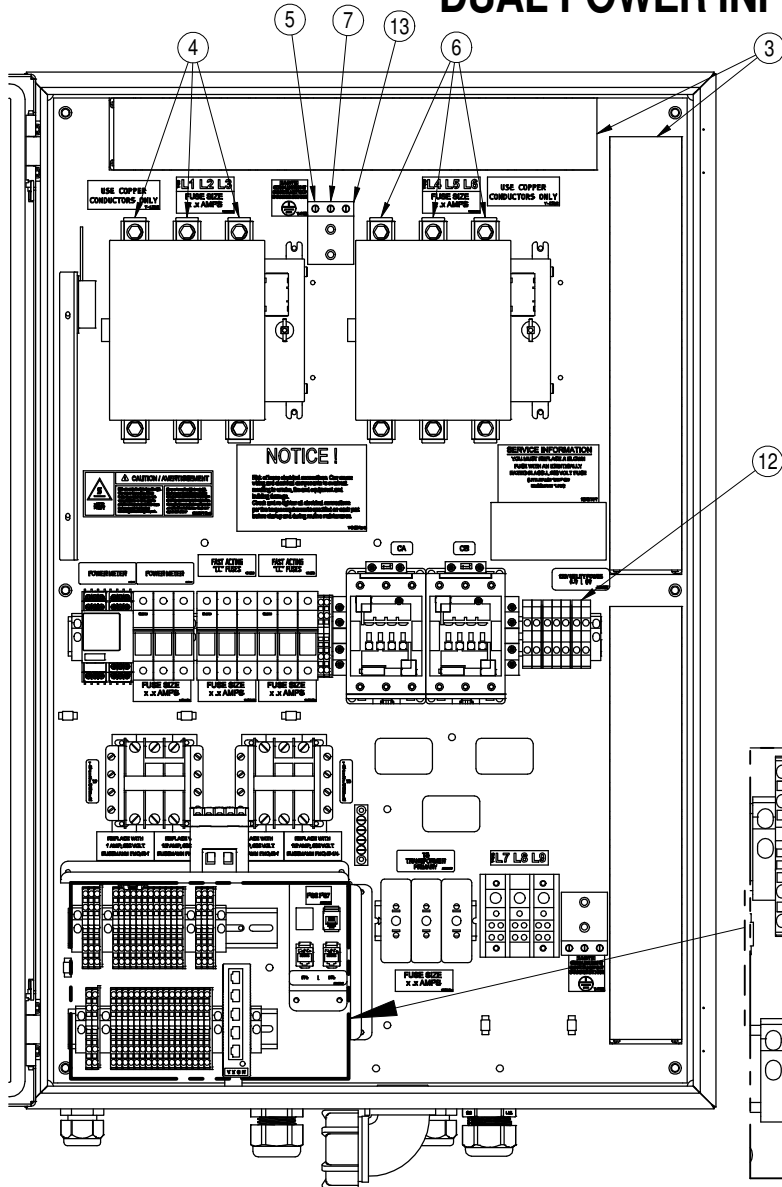
OPTIONAL ELECTRICAL CONNECTIONS

(Check factory for availability)

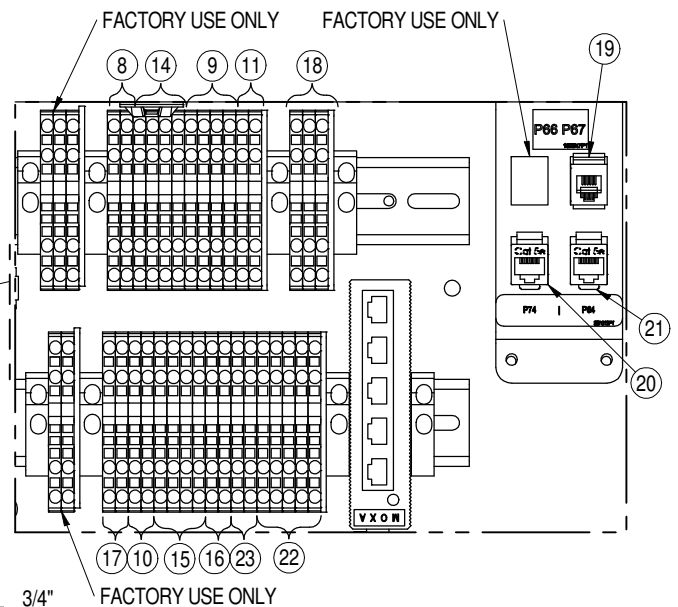
- 22) **SMOKE SENSOR ALARM** – Factory wired dry contacts from smoke sensor are 91-common, 92-Normally Open, and 93-Normally Closed. Supervised contacts, 80 & 81, open on sensor trouble indication. This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 23) **SPARE TERMINALS** – Spare terminals for Class 1 field supplied wiring.

NOTE: Terminals for item 22 and 23 are always present. Refer to the order to verify if the options are installed on the unit. Refer to specification sheet for total unit full load amps, wire size amps, and max overcurrent protection device size.

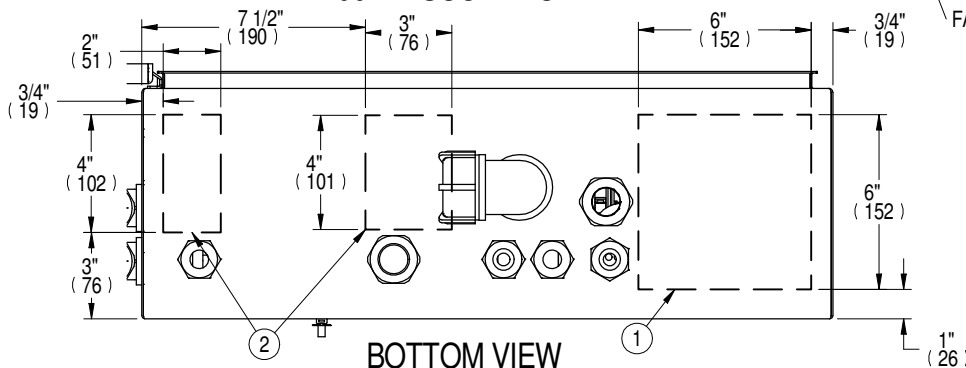
ELECTRICAL FIELD CONNECTIONS DP060 UNIT DEFINITIONS AND LOCATIONS DUAL POWER INPUT



60A DISCONNECT VIEW
FOR REFERENCE

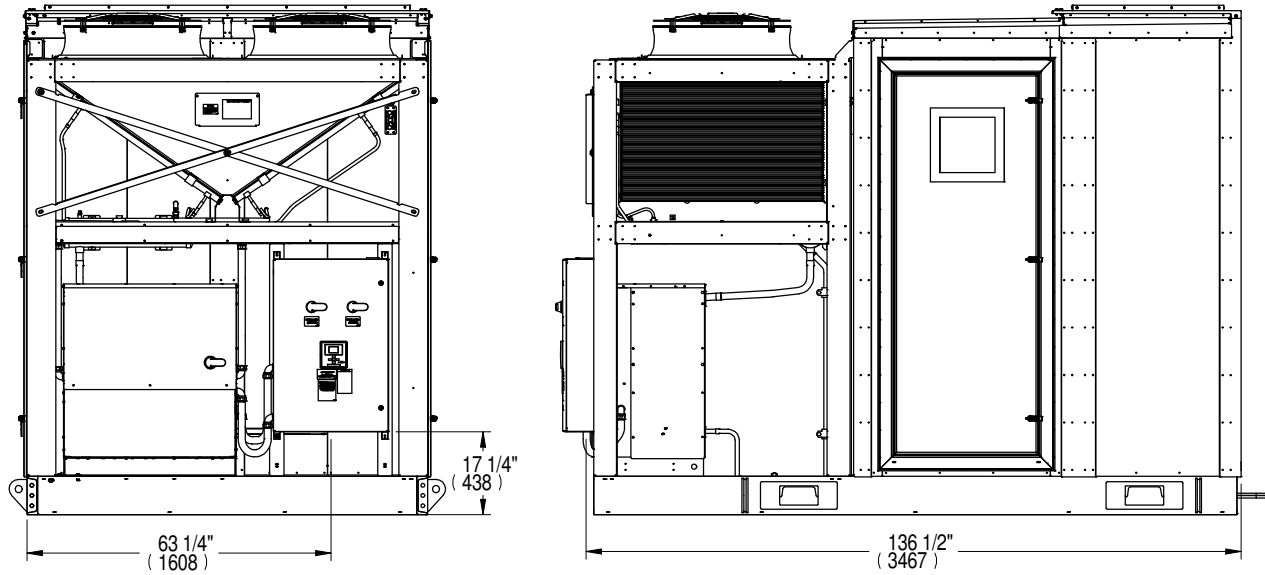


200A DISCONNECT VIEW



BOTTOM VIEW

ELECTRICAL FIELD CONNECTIONS DP060 UNIT DEFINITIONS AND LOCATIONS DUAL POWER INPUT



APPROXIMATE LOCATION OF EP ON UNIT

ELECTRICAL FIELD CONNECTIONS DP060 UNIT DEFINITIONS AND LOCATIONS SINGLE POWER INPUT

STANDARD ELECTRICAL CONNECTIONS

- 1) **HIGH VOLTAGE ENTRANCE** – This area will be used for the high voltage fittings. Enclosure is not provided with holes or knockouts, which must be done by the installer in the field. The fittings, supplied by others, must have the proper environmental rating per code.
- 2) **LOW VOLTAGE ENTRANCE** – This area will be used for the low voltage and communication fittings. Enclosure is not provided with holes or knockouts, which must be done by the installer in the field. The fittings, supplied by others, must have the proper environmental rating per code.
- 3) **HIGH VOLTAGE WIRE DUCT** – Wire duct to be used by the installer for high voltage wire routing.
- 4) **MAIN UNIT POWER CONNECTIONS** – Terminals are located on top of the locking disconnect switch. See side of disconnect switch for wire range and tightening torque. Three phase service not provided by Liebert. Wire range and tightening torque will vary based on disconnect size. Refer to label on side of disconnect.
- 5) **EARTH GROUND CONNECTION FOR MAIN UNIT POWER** – Terminal for field supplied Source 1 earth grounding wire. Earth grounding required for Liebert units. 14-2AWG wire range, 275 in-lb wire tightening torque.
- 6) **REMOTE SHUTDOWN** - Replace existing jumper between terminals 37 & 38 with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
- 7) **CUSTOMER ALARM INPUTS** – Terminals for field supplied, normally open contacts, having a minimum 75va, 24vac rating, between terminals 24 & 50, 51, 56. Use field supplied Class 1 wiring. Terminal availability varies by unit options.
- 8) **COMMON ALARM** – On any alarm, normally open dry contact is closed across terminals 75 & 76 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 9) **REMOTE HUMIDIFIER** – On any call for humidification, normally open dry contact is closed across terminals 11 & 12 to signal field supplied remote humidifier. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 10) **FIELD SUPPLIED 120V UTILITY POWER** – Terminals for the connection of a field supplied 120V 20A utility power to feed the light and service electrical outlet. 22-8AWG wire range, 14.2lb-in tightening torque.
- 11) **EARTH GROUNDING CONNECTION FOR FIELD SUPPLIED 120V UTILITY POWER** - Terminal for field supplied 120V earth grounding wire. Earth grounding required for Liebert units. 14-2AWG wire range, 275 in-lb wire tightening torque.

LOW VOLTAGE TERMINAL CONNECTIONS

- 12) **EXTRA REMOTE UNIT SHUTDOWN** – Two additional contact pairs available for unit shutdown (labeled as 37B & 38B, 37C & 38C). Replace jumpers with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
- 13) **EXTRA COMMON ALARM** – On any alarm, two additional normally open contacts are closed across terminals 94 & 95 and 96 & 97 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 14) **MAIN FAN AUXILIARY SWITCH** – On closure of the main fan contactor, normally open dry contact is closed across terminals 84 & 85 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 15) **LIQUITECT SHUTDOWN AND DRY CONTACT** – On LiquiTect activation, normally open dry contact is closed across terminals 58 & 59 for remote indication (LiquiTect sensor ordered separately). 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

NOTE: All low voltage terminal connections are spring-cage with a wire range of 28-12AWG.

NOTE: Items 10 and 11 are not present when the Unit supplied 120V utility option is selected.



LIEBERT DSE

ELECTRICAL FIELD CONNECTIONS DP060 UNIT DEFINITIONS AND LOCATIONS SINGLE POWER INPUT

STANDARD COMMUNICATION CONNECTIONS

- 16) **RS485 BMS CONNECTION** – Terminal TB3-1 is TX/RX+. Terminal TB3-2 is TX/RX-. Terminal TB3-3 is earth ground. Use shielded cable with 120ohm characteristic impedance. (Supplied by other).
- 17) **CANBUS REMOTE SENSOR CONNECTION(P67)** – Remove the inserted plug from this connector and attach the remote sensor cable to power and communicate with Liebert remote Temperature/humidity sensors. Use shielded cable with 120ohm characteristic impedance. (Supplied by other).
- 18) **ETHERNET BMS CONNECTION(P74)** – RJ-45 connection for connecting to BMS Ethernet network. Use Class 5 shielded cable (Supplied by other).
- 19) **ETHERNET UNIT TO UNIT CONNECTION(P64)** – RJ-45 connection for connecting to other units. Use Class 5 shielded cable (Supplied by other).

NOTE: All low voltage terminal connections are spring-cage with a wire range of 28-12AWG.

NOTE: All communication cables should be separated from high-voltage wiring.

OPTIONAL ELECTRICAL CONNECTIONS

(Contact factory for availability)

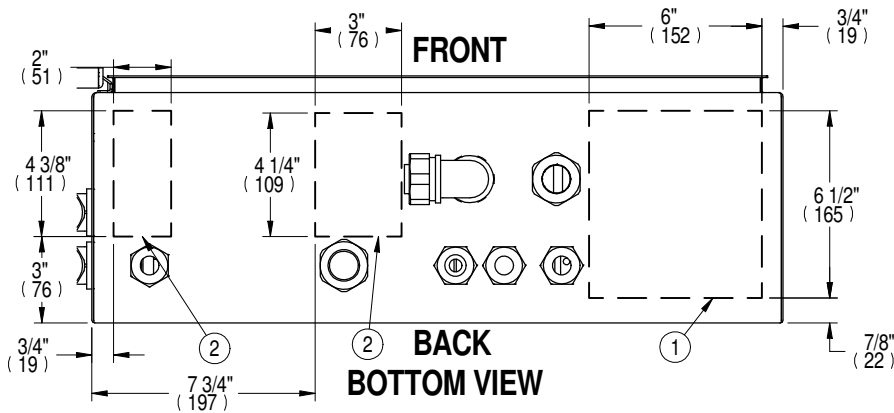
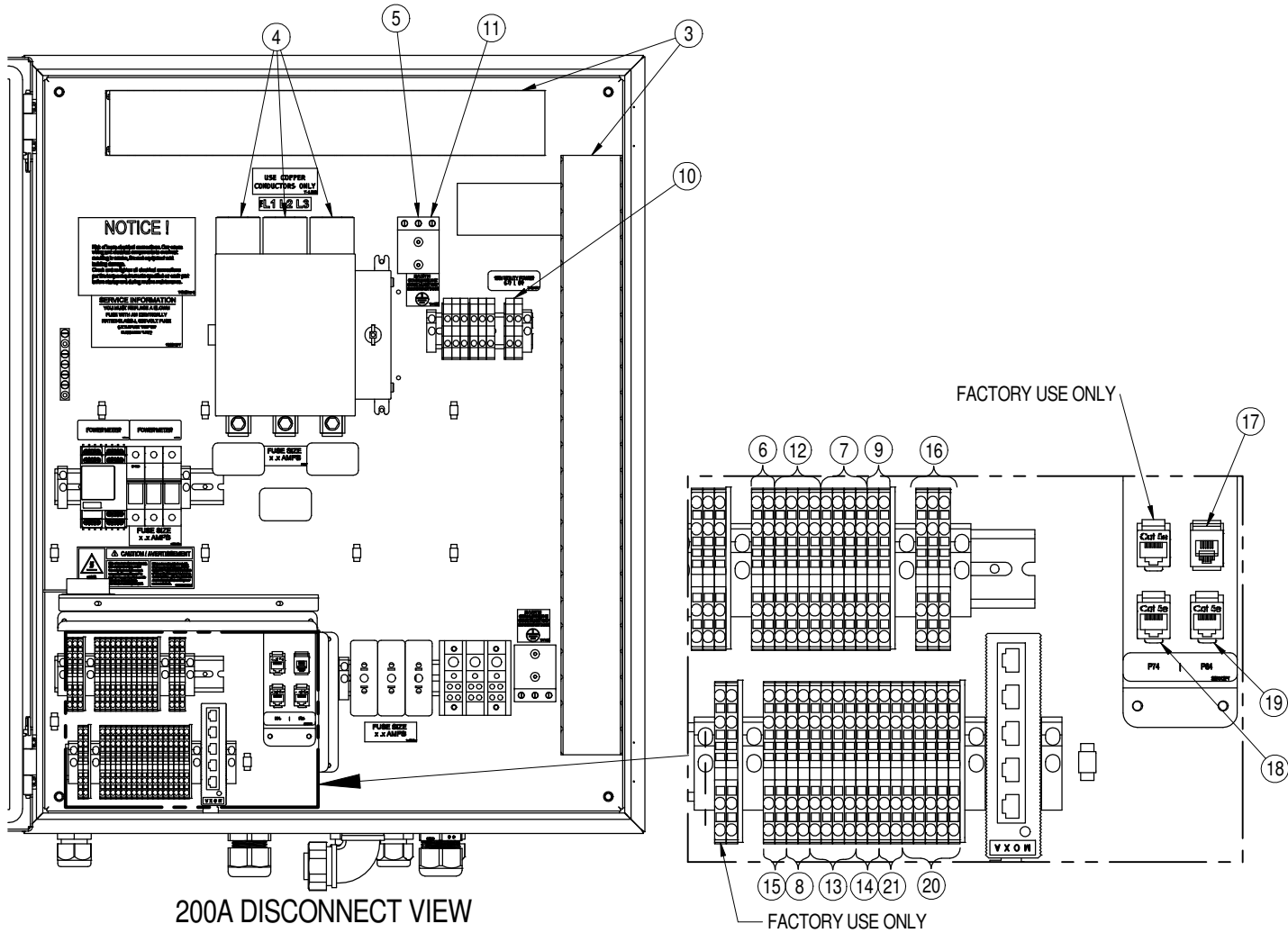
- 20) **SMOKE SENSOR ALARM** – Factory wired dry contacts from smoke sensor are 91-common, 92-Normally Open, and 93-Normally Closed. Supervised contacts, 80 & 81, open on sensor trouble indication. This smoke sensor is not intended to function as, or replace, any room smoke detection system that may be required by local or national codes. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 21) **SPARE TERMINALS** – Spare terminals for Class 1 field supplied wiring.

NOTE: All low voltage terminal connections are spring-cage with a wire range of 28-12AWG.

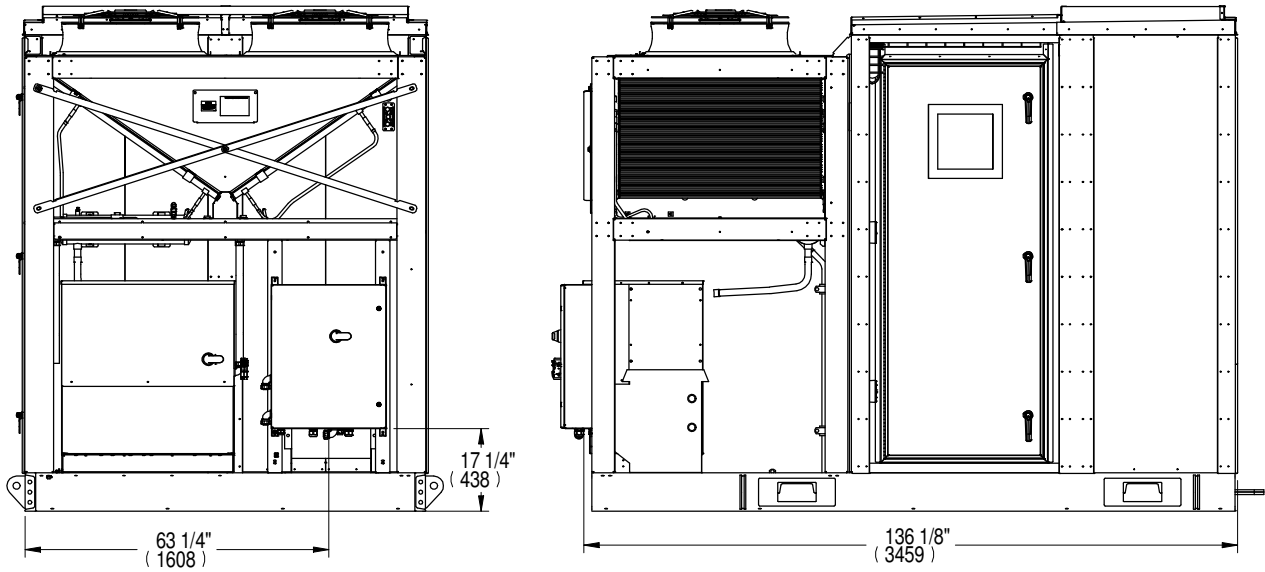
NOTE: Terminals for item 20 and 21 are always present. Refer to the order to verify if the options are present.

Refer to specification sheet for total unit full load amps, wire size amps, and max overcurrent protection device size.

ELECTRICAL FIELD CONNECTIONS DP060 UNIT DEFINITIONS AND LOCATIONS SINGLE POWER INPUT

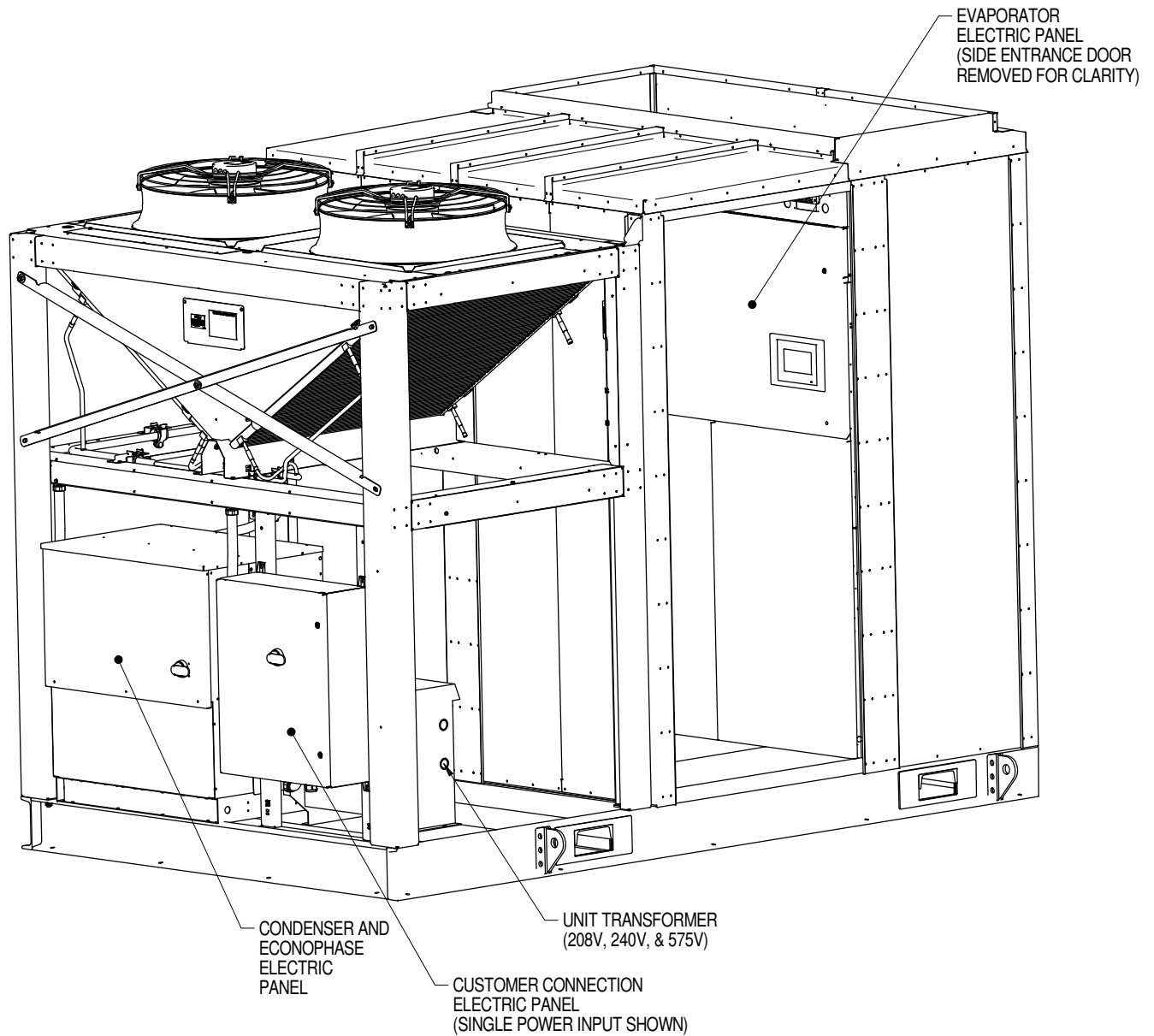


ELECTRICAL FIELD CONNECTIONS DP060 UNIT DEFINITIONS AND LOCATIONS SINGLE POWER INPUT

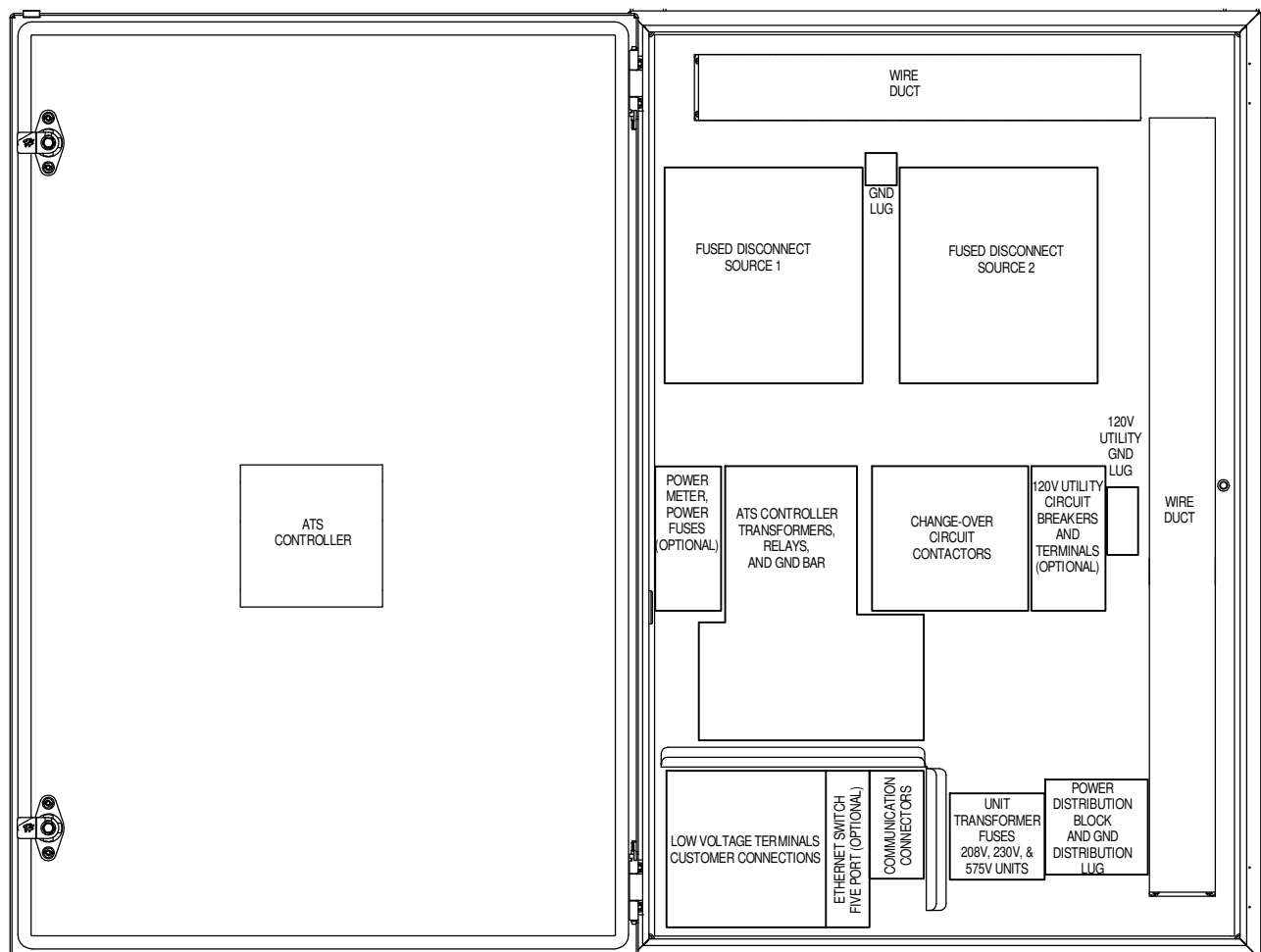
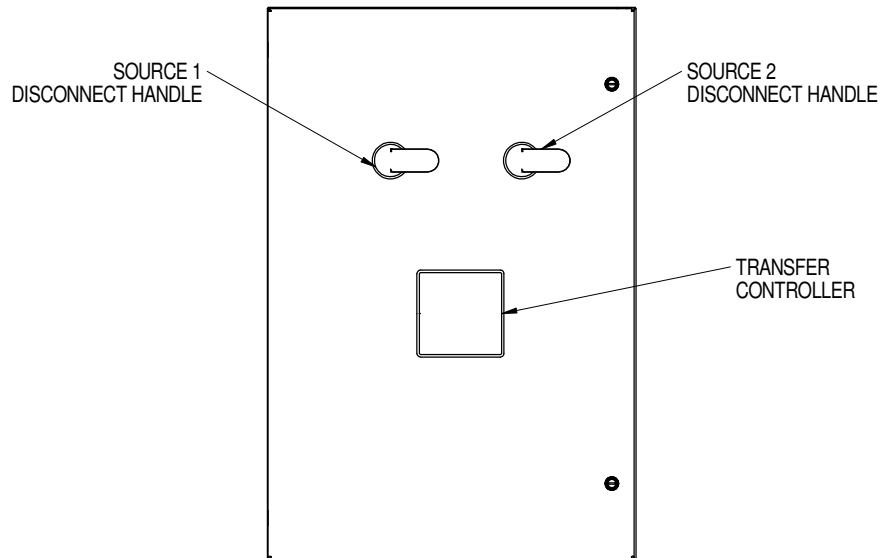


APPROXIMATE LOCATION OF EP ON UNIT

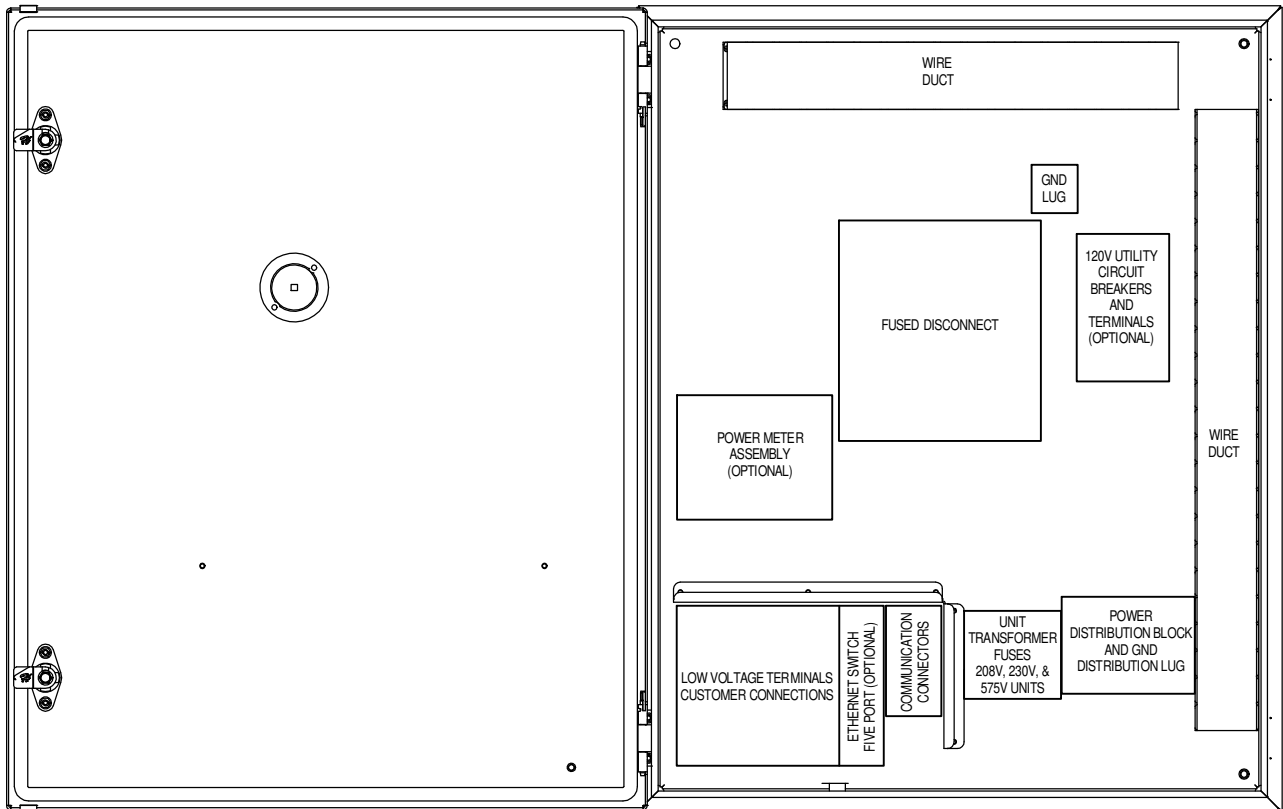
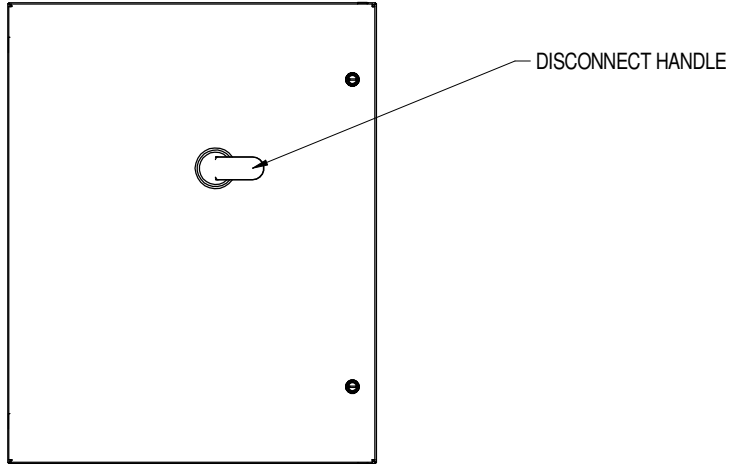
DP060 ENCLOSURE ELECTRICAL LOCATIONS



DP060 CUSTOMER CONNECTION ELECTRICAL PANEL COMPONENT DEFINITIONS AND LOCATIONS DUAL POWER INPUT



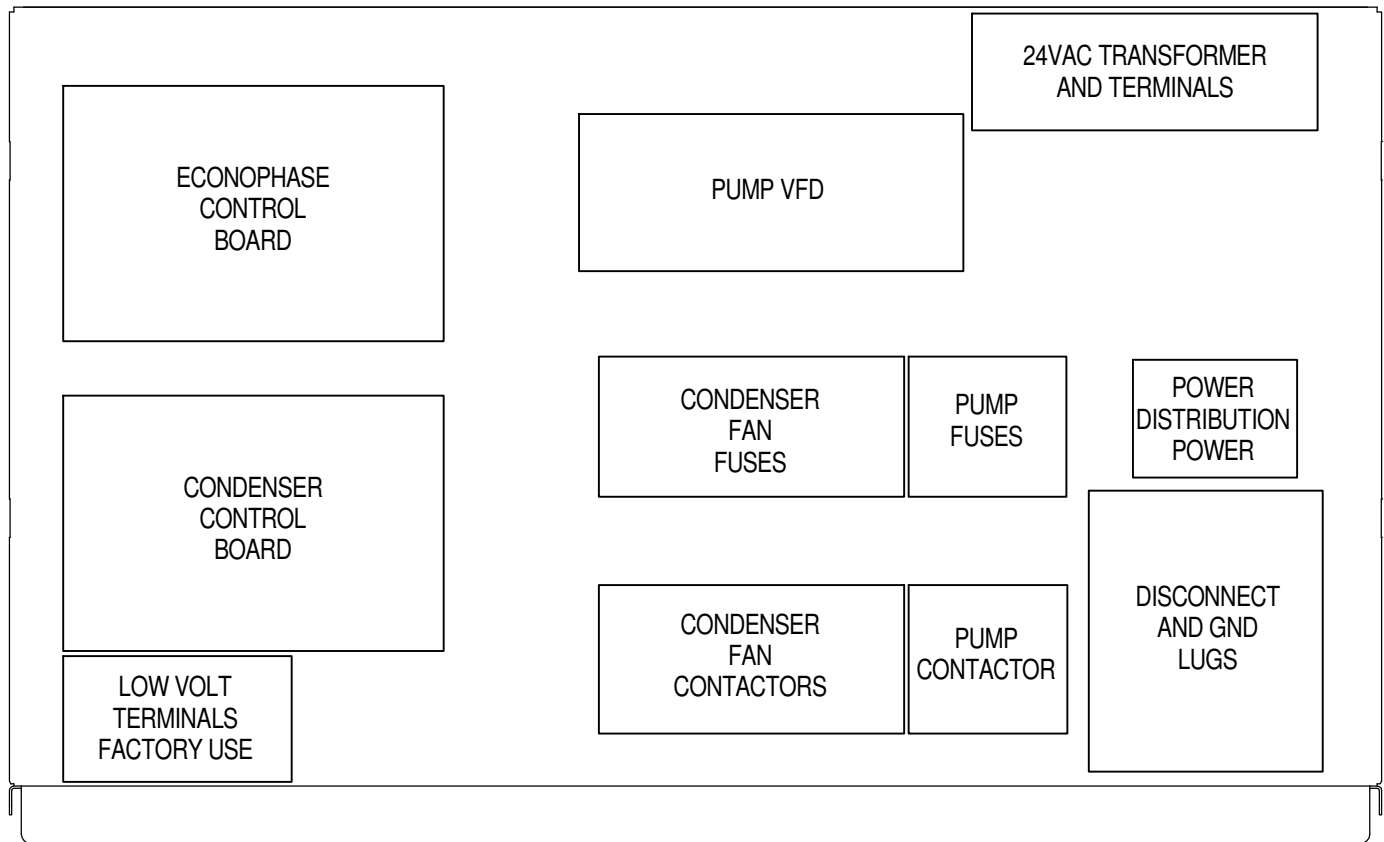
DP060 CUSTOMER CONNECTION ELECTRICAL PANEL COMPONENT DEFINITIONS AND LOCATIONS SINGLE POWER INPUT





LIEBERT DSE

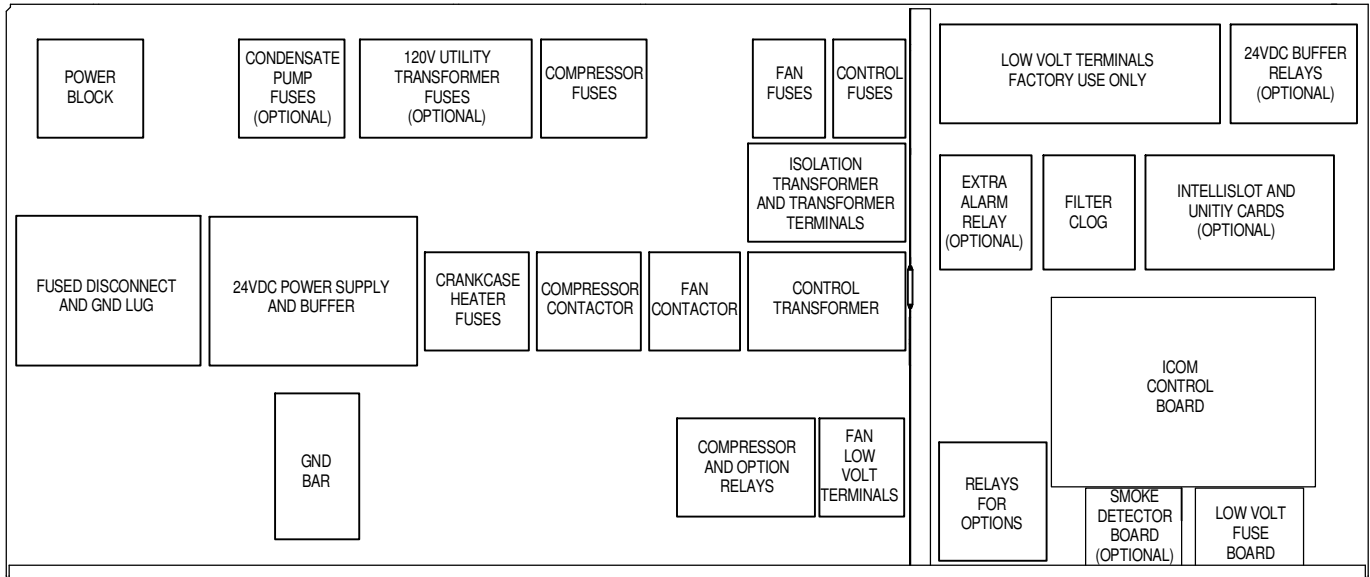
DP060 CONDENSER AND ECONOPHASE ELECTRICAL PANEL COMPONENT DEFINITIONS AND LOCATIONS





LIEBERT DSE

DP060 EVAPORATOR ELECTRICAL PANEL COMPONENT DEFINITIONS AND LOCATIONS



PRODUCT INFORMATION UNIT MOUNTED DISPLAY



The Liebert iCOM™ display is a 7-inch capacitive, color-touchscreen display in an ergonomic, aesthetically pleasing housing. The display and housing will be viewable while the unit accent panels are open or closed. The display can be easily detached to view while the panel is open.

Menu Layout- The menus will be broken out into two main menu screens: User screen and Service screen. The User screen contains the menus to access parameters required for basic unit control and setup. The Service screen is designed for service personal and provides access to advanced control setup features and diagnostic information.

Password Protection- The display will contain two unique passwords to protect against unauthorized changes. An auto hide/show feature allows the user to see applicable information based on the login used. These four-digit passwords may be customized according to User preference.

Parameter Search- The display has search fields for efficient navigation and parameter lookup.



LIEBERT iCOM™

PRODUCT INFORMATION UNIT MOUNTED DISPLAY

Context Sensitive Help- The display will have an onboard help database. The database will provide context sensitive help to assist with setup and navigation of the menus.

Display Setup- The user has the ability to configure the display information based on the specific user's preference. Language, units of measure, screen contrast, home screen layout, back light timer and the hide/show of certain readouts will be configurable through the display.

Additional Readouts- The display has the ability for the user to configure custom widgets on the main screen. Widget options will include items such as fan speed, call for cooling, call for free cooling, maintenance status, call for hot water reheat, call for electric reheat, call for dehumidification, call for humidification, airflow, static pressure, fluid flow rate and cooling capacity.

Status LEDs- The display will provide the user with the unit's operating status using an integrated LED. The LED will indicate if the unit has an active alarm; if the unit has an active alarm that has been acknowledged; or if the unit is on, off, or in a standby status.

Unit Alarms – All unit alarms are annunciated through both audio and visual cues, clearly displayed on the screen, automatically recorded in the event log, and communicated to monitoring plug connections.

Event Log – The display will automatically store the last 400 unit-only events (messages, warnings, and alarms).

Service Contact Information – The display has the ability to store the local service or sales contact information.

Upgradeable – Display and Control Board software upgrades are performed through a USB connection.

Unit-to-Unit (U2U) Communication – Communication via private Ethernet network allows for advanced control functionality (Teamwork modes, sharing sensor data, Standby Rotation, Lead-Lag, and Cascade operation).



LIEBERT iCOM™

PRODUCT INFORMATION UNIT MOUNTED DISPLAY

Parameter Directory- The Liebert iCOM shall provide a directory that lists all parameters in the control. The list shall provide Line ID numbers, parameter labels, and current parameter values.

Timers/Sleep Mode- The menus shall allow various customer settings for turning the unit On or Off.

Sensor Calibration- The menus shall allow unit sensors to be calibrated with external sensors.

Maintenance/Wellness Settings- The menus shall allow reporting of potential component problems before they occur.

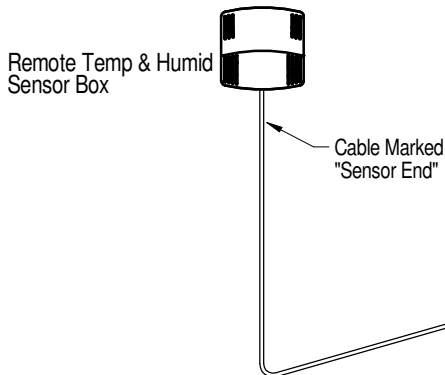
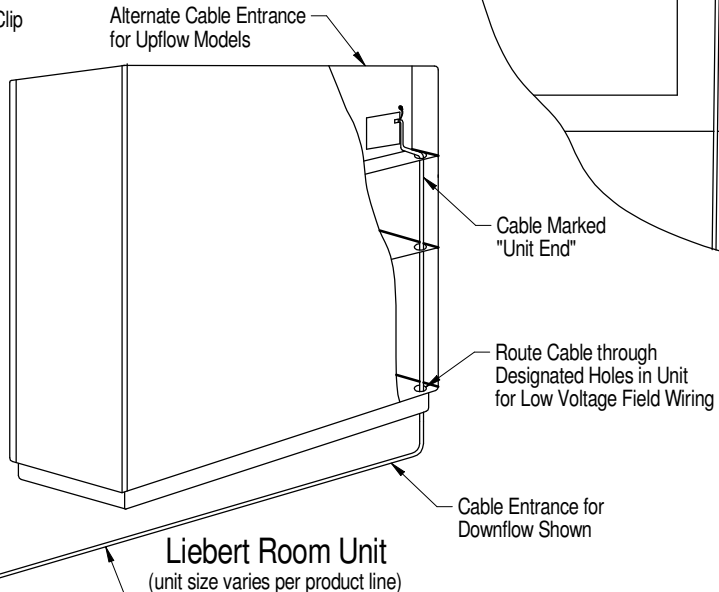
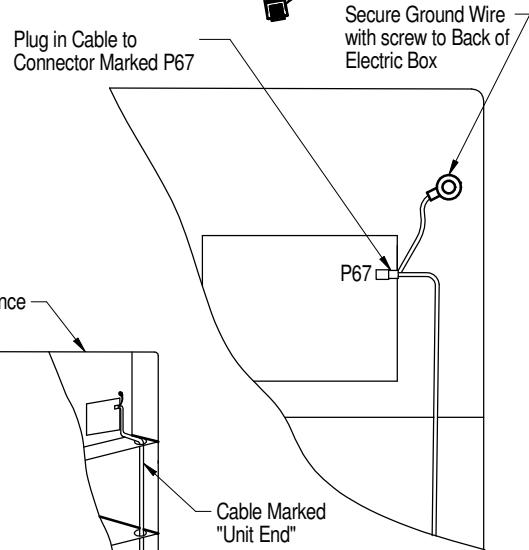
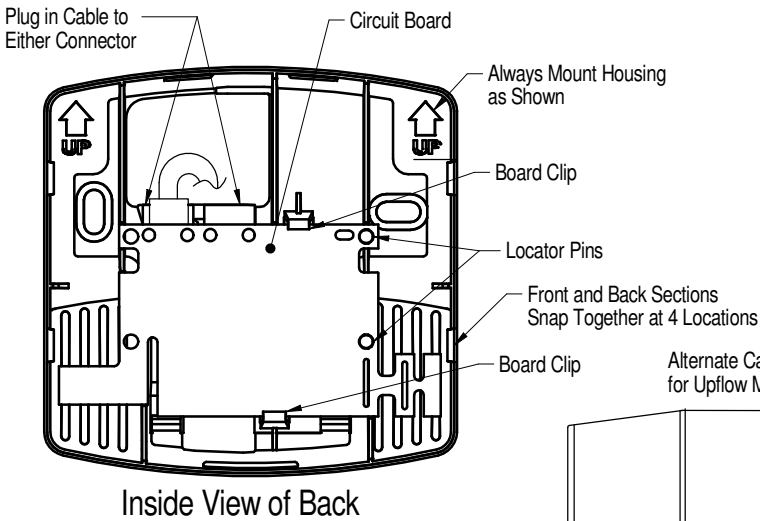
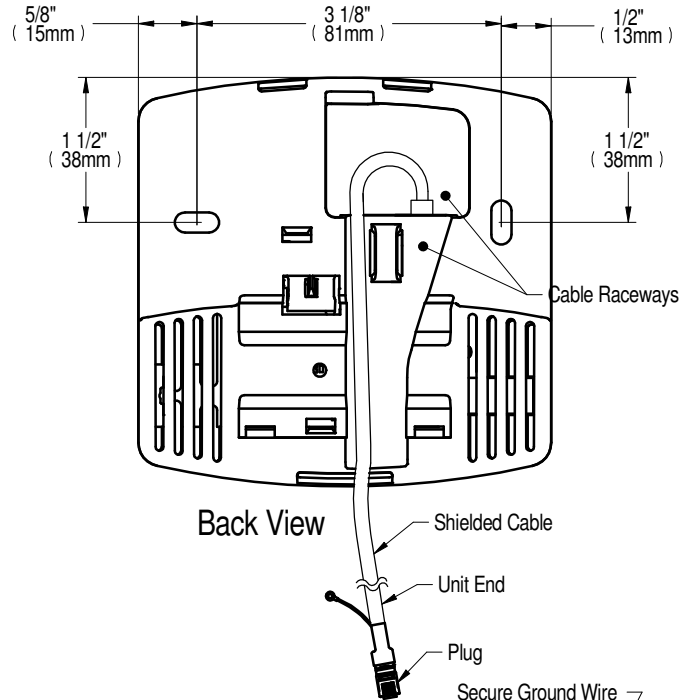
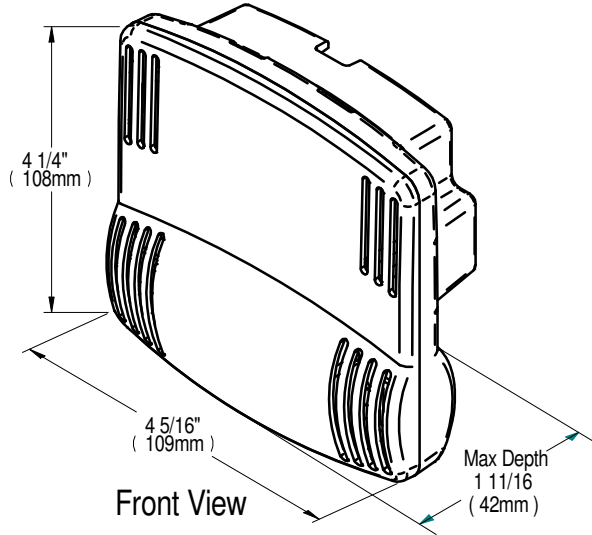
Options Setup- The menus shall provide operation settings for the installed components.

Auxiliary Boards- The menus shall allow setup of optional expansion boards.

Various Sensors: The menus shall allow setup and display of optional custom sensors. The control shall include four customer accessible analog inputs for field-supplied sensors. The analog inputs shall accept a 4 to 20mA signal. The user shall be able to change the input to 0 to 5VDC or 0 to 10VDC. The gains for each analog input shall be programmable from the front display. The analog inputs shall be able to be monitored from the front display.

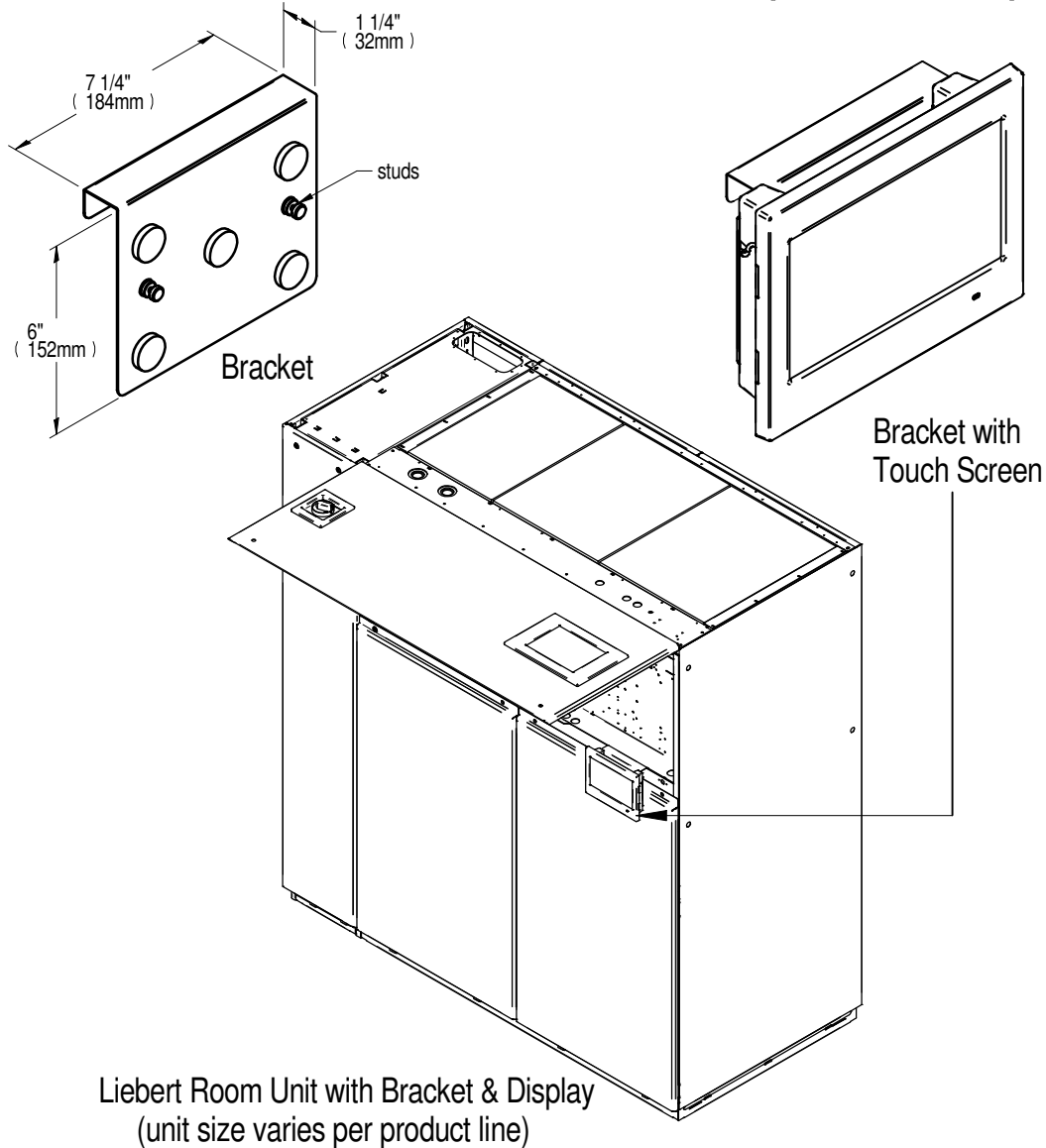
Diagnostics/Service Mode- The Liebert iCOM control shall be provided with self-diagnostics to aid in troubleshooting. The microcontroller board shall be diagnosed and reported as pass/not pass. Control inputs shall be indicated as On or Off at the front display. Control outputs shall be able to be turned On or Off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

REMOTE TEMPERATURE & HUMIDITY SENSOR



Factory supplied, field installed shielded cable. See specification sheet for length.

DISPLAY SERVICE BRACKET (OPTIONAL)



Liebert Room Unit with Bracket & Display
(unit size varies per product line)

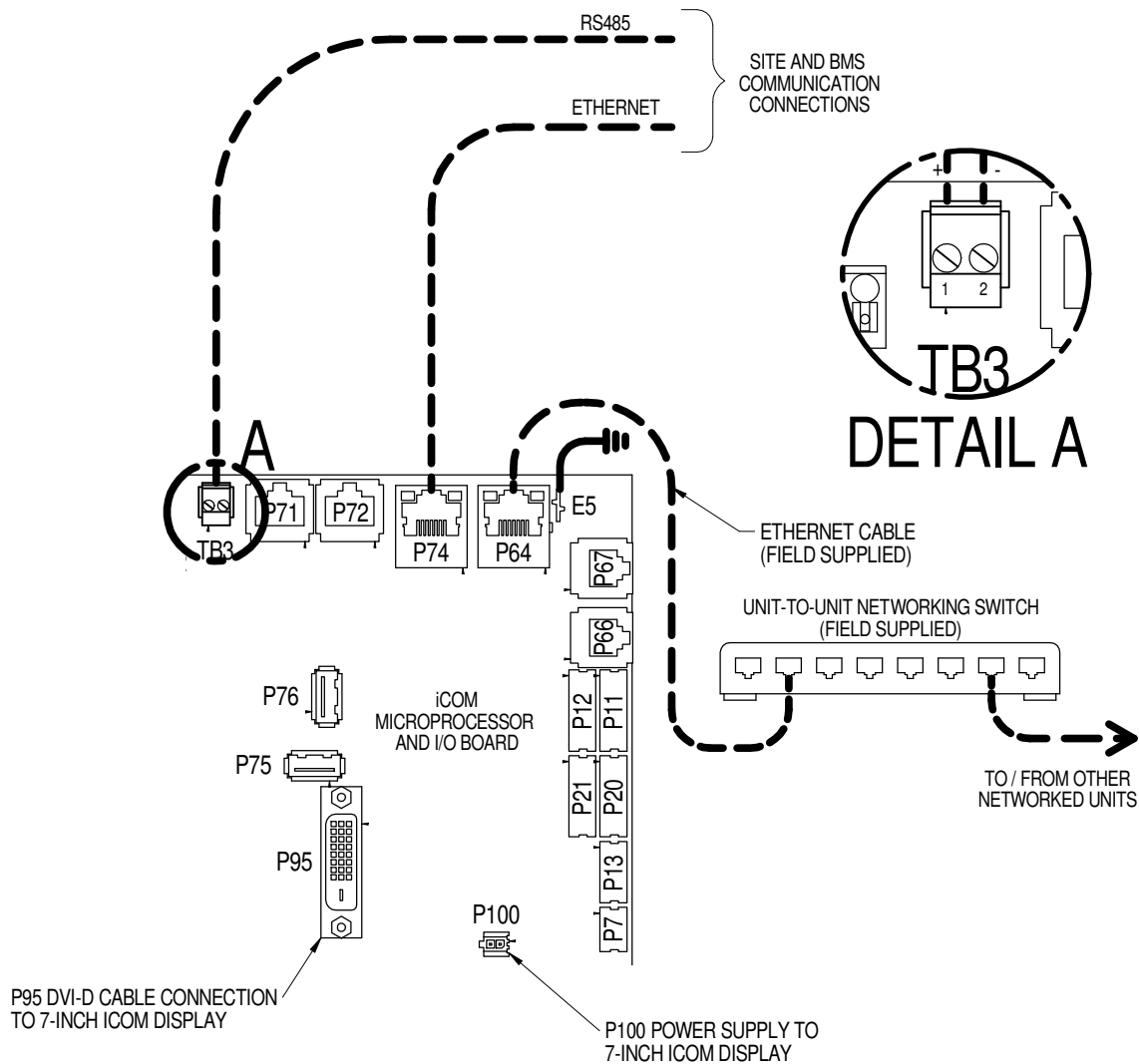
PURPOSE: Bracket with display assembly may be hand held for adjustments. Bracket enables hanging the display between service tasks.

STEPS:

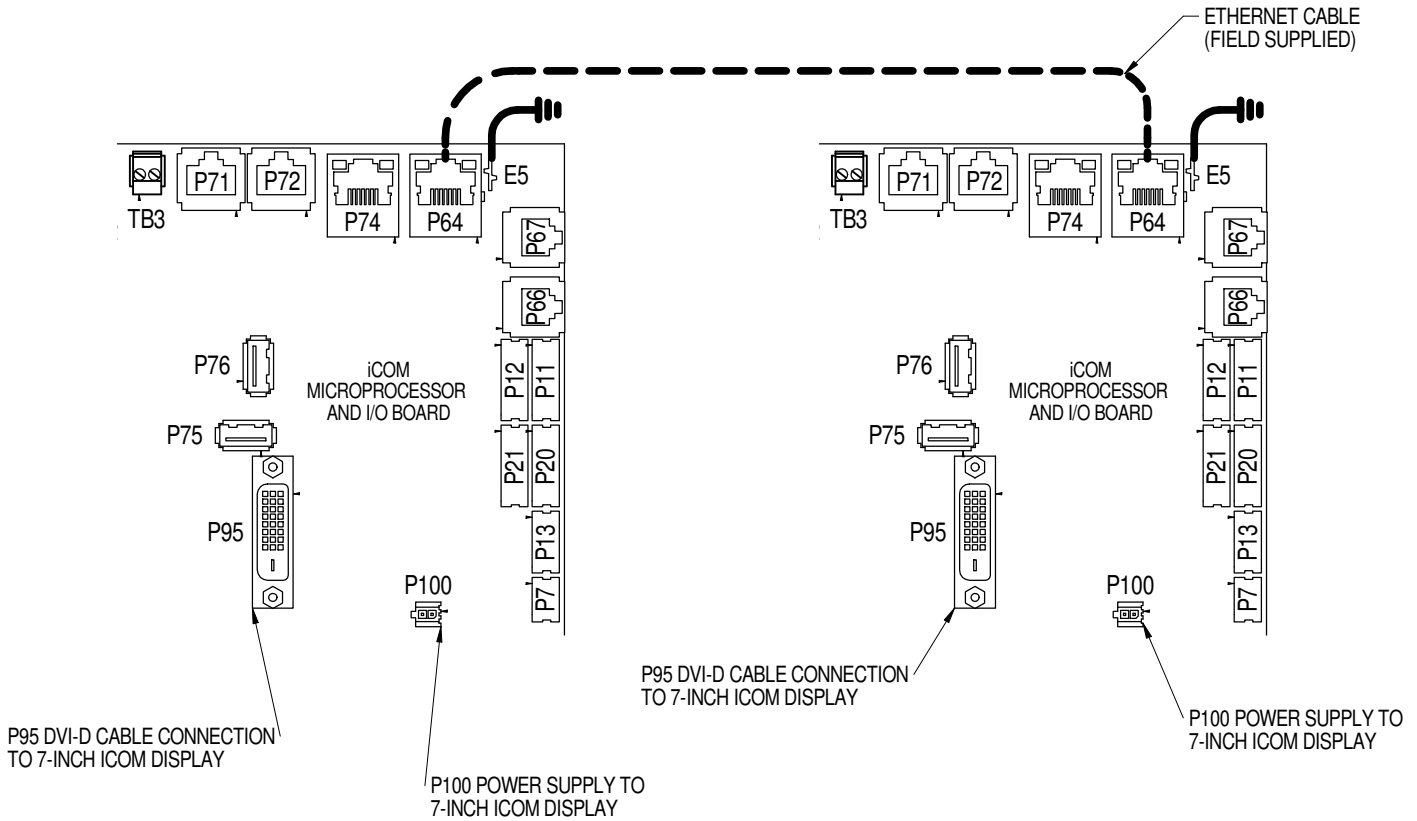
- 1) Verify that unit vertical panels are in place.
- 2) Unlatch display from cradle by pinching top tab while holding back of display - careful not to drop or let display hang by cables.
- 3) Align studs of bracket with keyholes on back of display.
- 4) Compress bracket and display at stud points together until bracket studs slide into slots of keyholes - careful not to pinch cables. There should be a tight fit once bracket is in place.
- 5) Hold display in hand to make adjustments.
- 6) Hang from lower edge of low voltage compartment between service tasks.
- 7) After use, remove and store bracket in tool box (do not store in electric panel).
- 8) Return Liebert iCOM™ display to cradle/bezel assembly.

LIEBERT DS, DSE, CW, PDX & PCW

UNIT TO UNIT NETWORK CONNECTIONS



UNIT TO UNIT NETWORK CONNECTIONS



NOTE* For dual-unit network configurations only

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