INSTALLATION & MAINTENANCE MANUAL

IM 1402-1

MAY 2026

AIR-COOLED SPLIT CONDENSING SYSTEM

REBEL APPLIED®

- COOLING
- R-32 REFRIGERANT
- MODEL: DCSA
- 20 TO 75 TONS

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Table of Contents

Safety Information

Hazardous Information Messages

⚠ DANGER

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

⚠ WARNING

Warning indicates a potentially hazardous situations, which can result in property damage, personal injury, or death if not avoided.

⚠ CAUTION

Caution indicates a potentially hazardous situations, which can result in minor injury or equipment damage if not avoided.

NOTICE

Notice indicates practices not related to physical injury.

NOTE: Indicates important details or clarifying statements for information presented.

ANSI Z83.8/CSA 2.6

⚠ WARNING

Risque D'Incedie ou D`Explosion

Le non respect des mises en garde pourrait entrainer des blessures graves, la mort, ou des pertes materielles. Prendre soin de lire et de comprendre les instructions d'installation, de fonctionement et d'entretien contenues dans ce guide. Une installatoin, un reglage, une modification, une reparation ou un entretien inapproprie peut entrainer des blessures graves, la mort, ou des pertes materielles.

Ne pas entreposer ni utiliser d'essence ou autre vapeurs ou liquides inflammables a proximite de cet appareil ou de tout autre appareil.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

- Ne tentez pas d'alumer un appareil.
- Ne touchez pas a un interupteur; n'utilisez pas de telephone dan l'edifice ou vous trouvez.
- Sortez de l'edifice immediatement.
- Appelez immediatement le fournisseurde gas a partir d'un telephone a l'exterieur de l'edifice. Suivez les instructions du fournisseur de gaz.
- Si vous ne pouvez joindre le fournisseur de gaz, appelez les pompiers.
  - — L'installation et les reparations doivent etre confiees a un installateur qualifie ou au fournisseur de gaz.

⚠ WARNING

Fire or Explosion Hazard

LOCKOUT/TAGOUT all power sources prior to installing the gas furnace. Failure to follow warnings exactly could result in serious injury, death, or property damage. Be sure to read and understand the installation, operation, and service instructions within this manual. Improper installation, adjustments, alterations, service, or maintenance can cause serious injury, death, or property damage.

Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this appliance.

What to do if you smell gas:

- Do not try to light any product that is fueled by or contains an open flame.
- Do not touch any electrical switch.
- Do not use any telephone in the building.
- Leave the building immediately.
- Immediately call the gas supplier from a remote telephone and follow the gas supplier's instructions.
- If you cannot reach the gas supplier, call the local fire department or 911.
  - — Installation and service must be performed by a qualified installer, service agency, or gas supplier.

R-32 Refrigerant Information

⚠ WARNING

This unit contains R-32, a class A2L refrigerant that is flammable. This unit should only be installed, serviced, repaired, and disposed of by qualified personnel licensed or certified in their jurisdiction to work with R-32 refrigerant. Installation and maintenance must be done in accordance with this manual. Improper handling of this equipment can cause equipment damage or personal injury.

Be aware that R-32 refrigerant may not contain an odor. Place in a well ventilated area to prevent accumulation of refrigerant. Excessive refrigerant leaks, in the event of an accident in a closed ambient space, can lead to oxygen deficiency.

Do not pierce or burn this unit.

Never use an open flame during service or repair. Never store in a room with continuously operating ignition sources (for example: open flames, an operating gas appliance, or and operating electric heater), where there is ignitable dust suspension in the air, or where volatile flammables such as thinner or gasoline are handled.

Only use pipes, nuts, and tools intended for exclusive use with R-32 refrigerant in compliance with national codes (ASHRAE15 or IRC).

Do not mix air or gas other than R-32 in the refrigerant system. If air enters the refrigerant system, an excessively high pressure results, which may cause equipment damage or injury.

For more information, consult "R-32 Guidelines" on page 17.

⚠ WARNING

When moving flammable A2L refrigerant to/from the unit from an auxiliary tank, a grounding strap must be used. An electrical charge builds when halocarbon refrigerant travels in a rubber hose. A grounding strap must be used between the auxiliary refrigerant tank and the unit's end sheet (earth ground), which will safely take the charge to the ground. A fire risk could occur if this procedure is not followed.

Unit Labels

Pictogram warning and informational labels may be present on the unit. Consult the table below for reference.

Label	Description
	WARNING - flammable refrigerant present
	Read the technical manual for service instructions
	WARNING - A2L low-burning velocity refrigerant present
	Pressurized medium present
	Ultraviolet (UV) radiation present
	Read the technical manual for instructions
	WARNING - flammable refrigerant present

Introduction

This manual provides installation information about the Rebel Applied air-cooled split condensing rooftop unit - model DCSA. In addition to an overall description of the unit, it includes mechanical and electrical installation and start-up procedures.

Nameplate Information

Unit Nameplate

The unit nameplate is located on the outside lower right corner on the main control box door. It includes the unit model number, serial number, unit part number, and electrical characteristics. There is also a duplicate inside the main control box door.

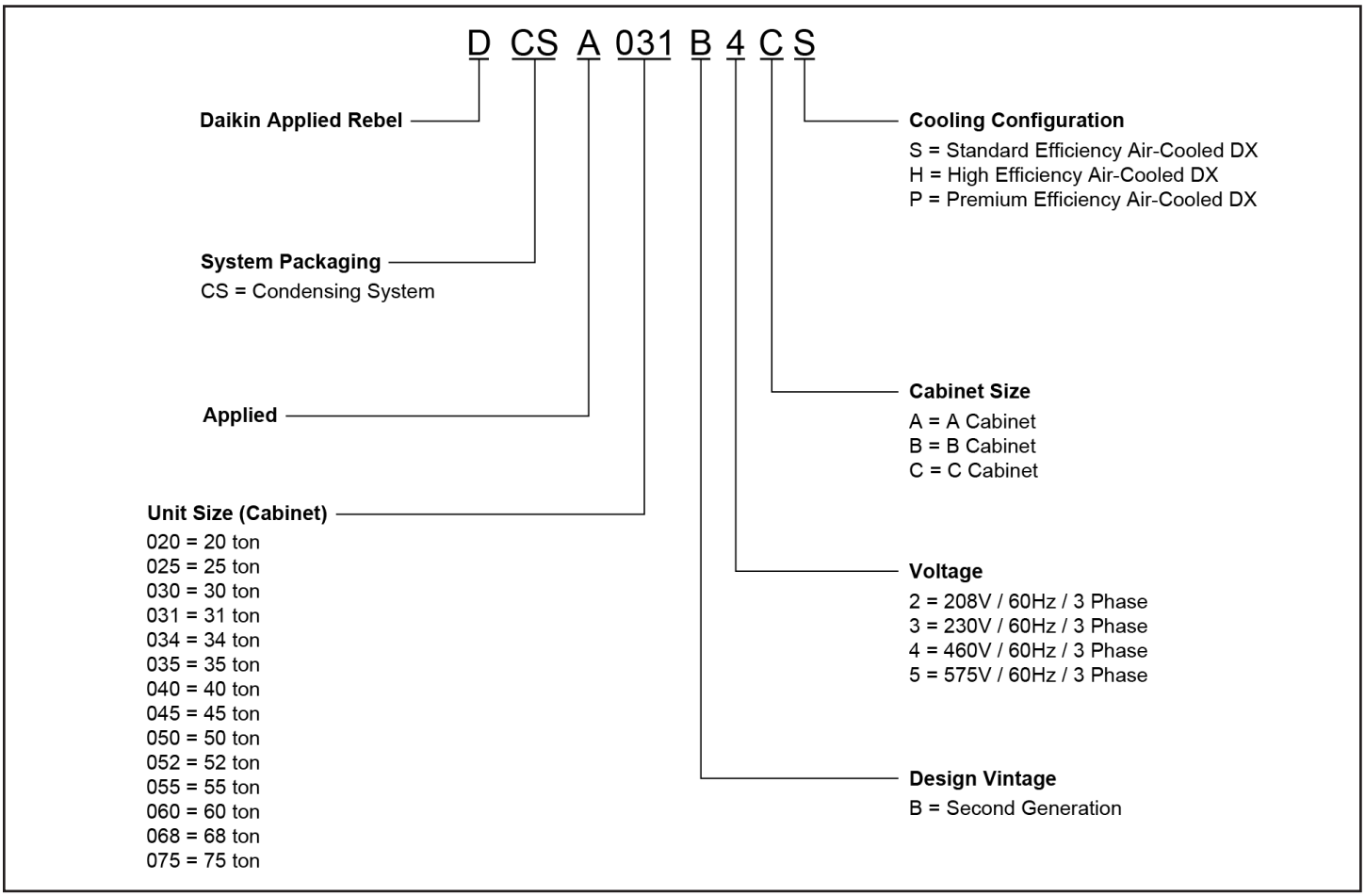
Compressor Nameplate

Each compressor includes an individual nameplate.

Fusing

The use of properly sized time delay fuses, in accordance with nameplate data, is permitted for this unit.

Figure 1: Nomenclature



Refrigeration Piping

This section presents the unit refrigeration piping diagrams for the various available configurations.

Figure 2: Schematic, Standard Circuit

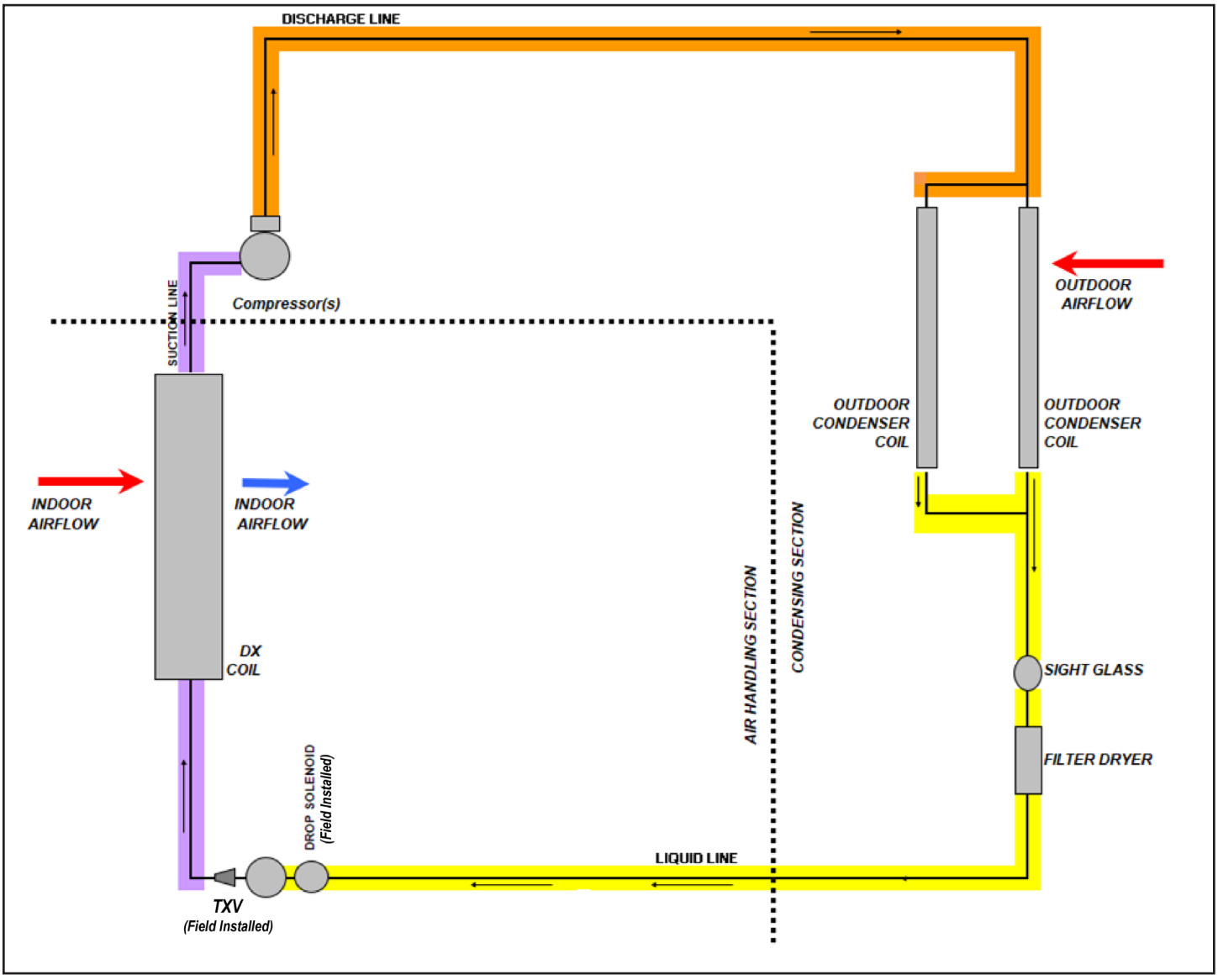
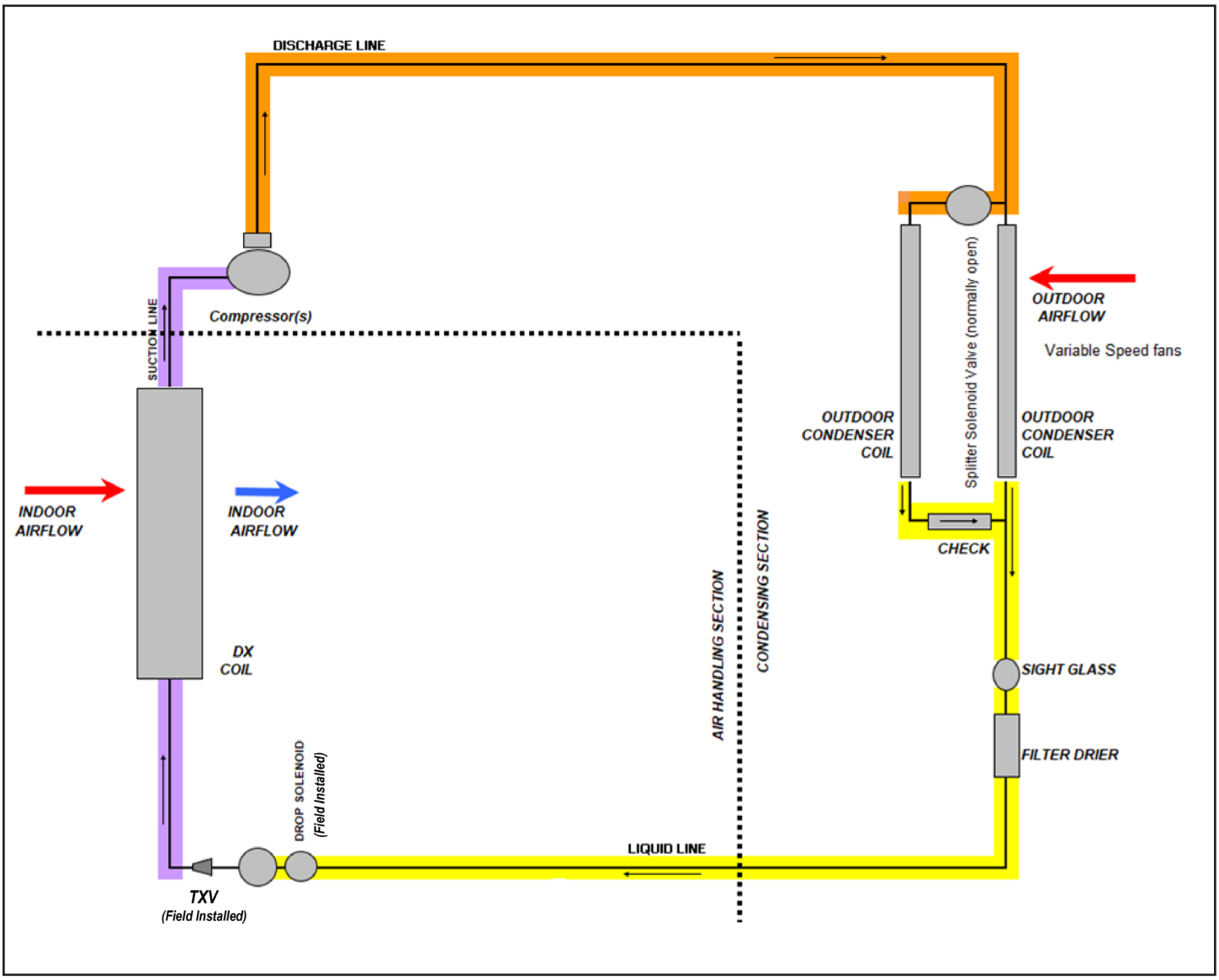


Figure 3: Schematic, Low Ambient Circuit

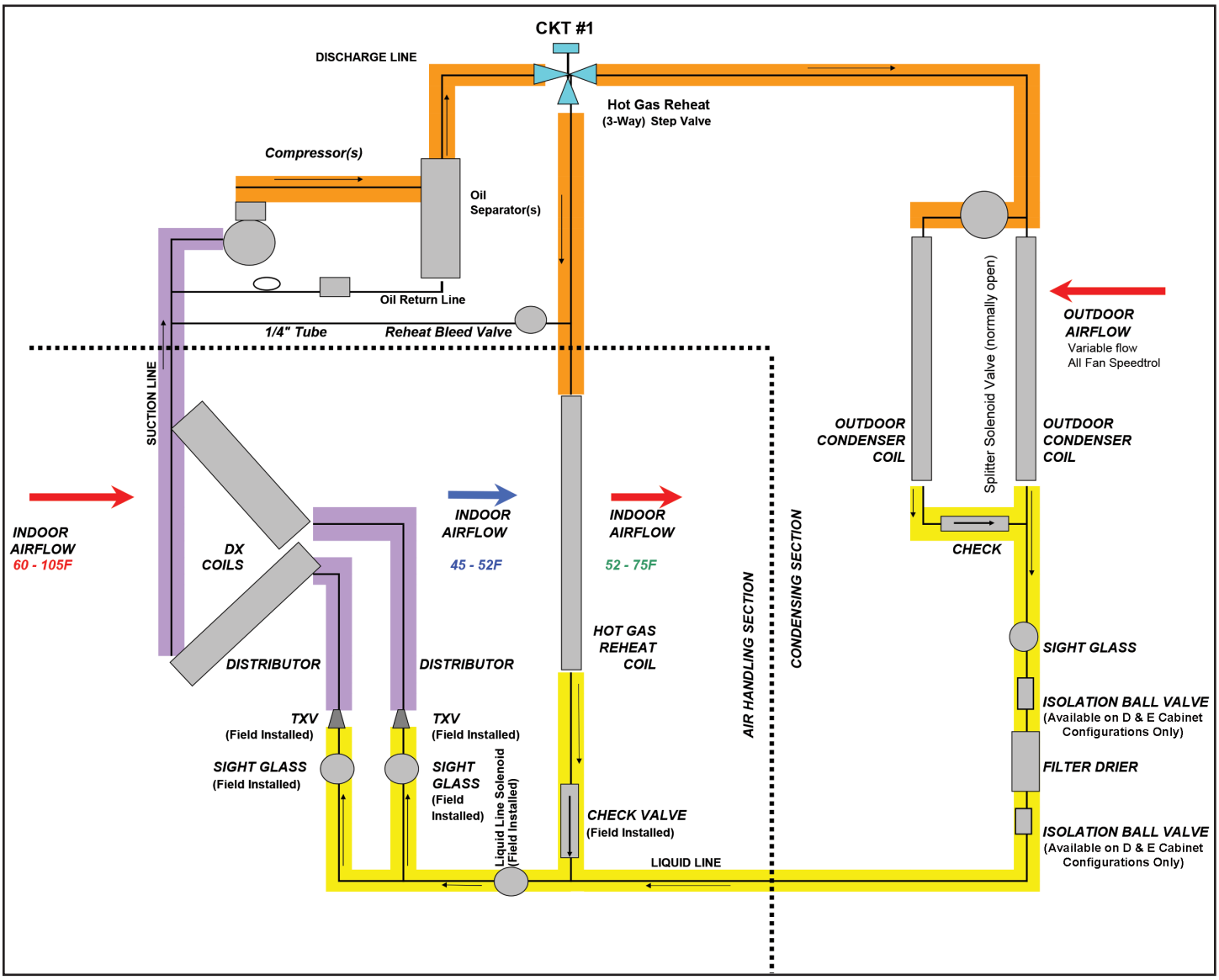


NOTE: Low Ambient Configurations:

Speedtrol (variable speed fans) down to 25°F (-4°C)

Speedtrol (variable speed fans) + splitter solenoid down to -10°F (-23°C)

Figure 4: Schematic, MHGRH Circuit 1



Condenser and Compressor Piping

Figure 5: Typical Condenser Piping

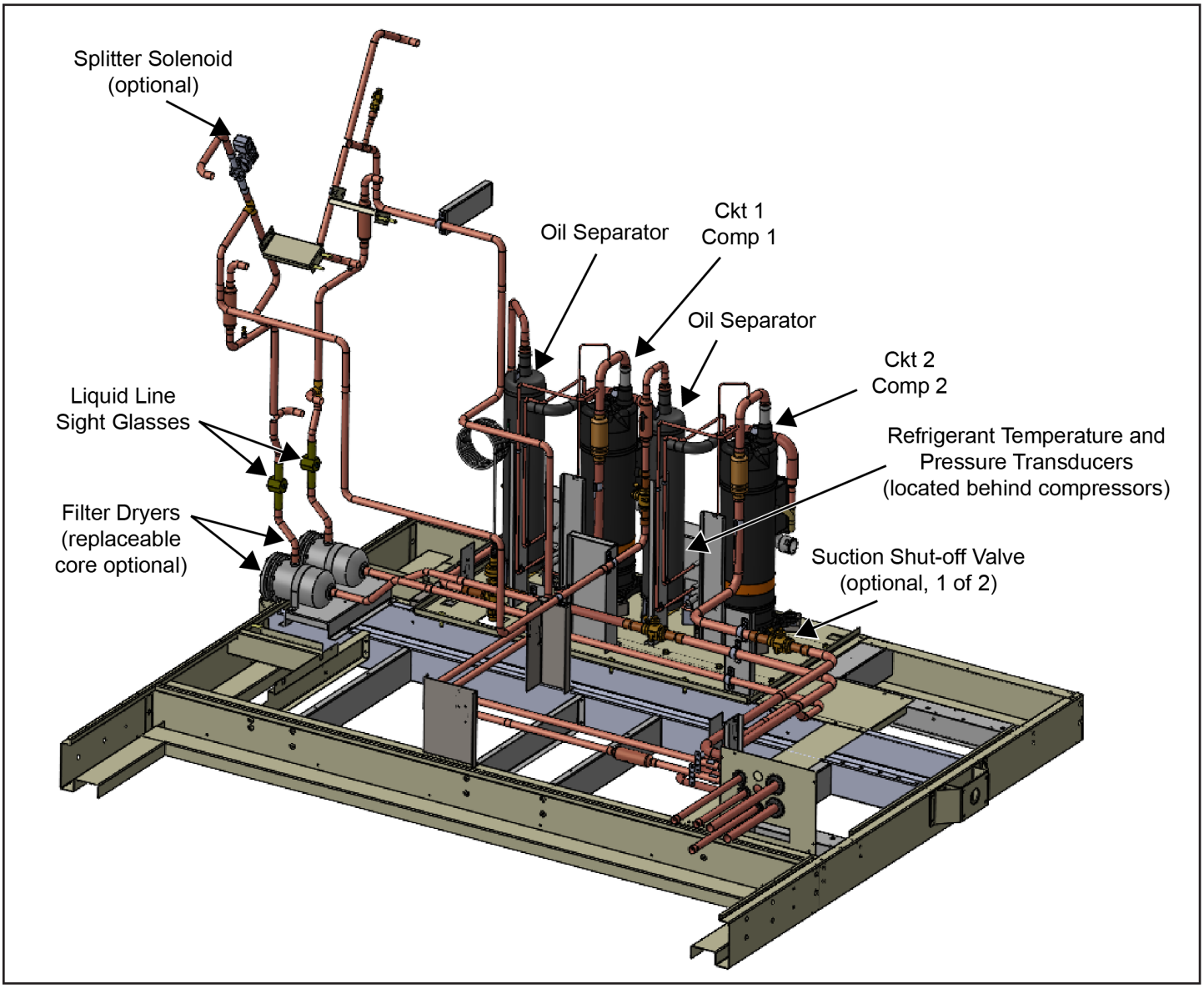


Figure 6: Typical Condenser Piping (Inverter Compressors)

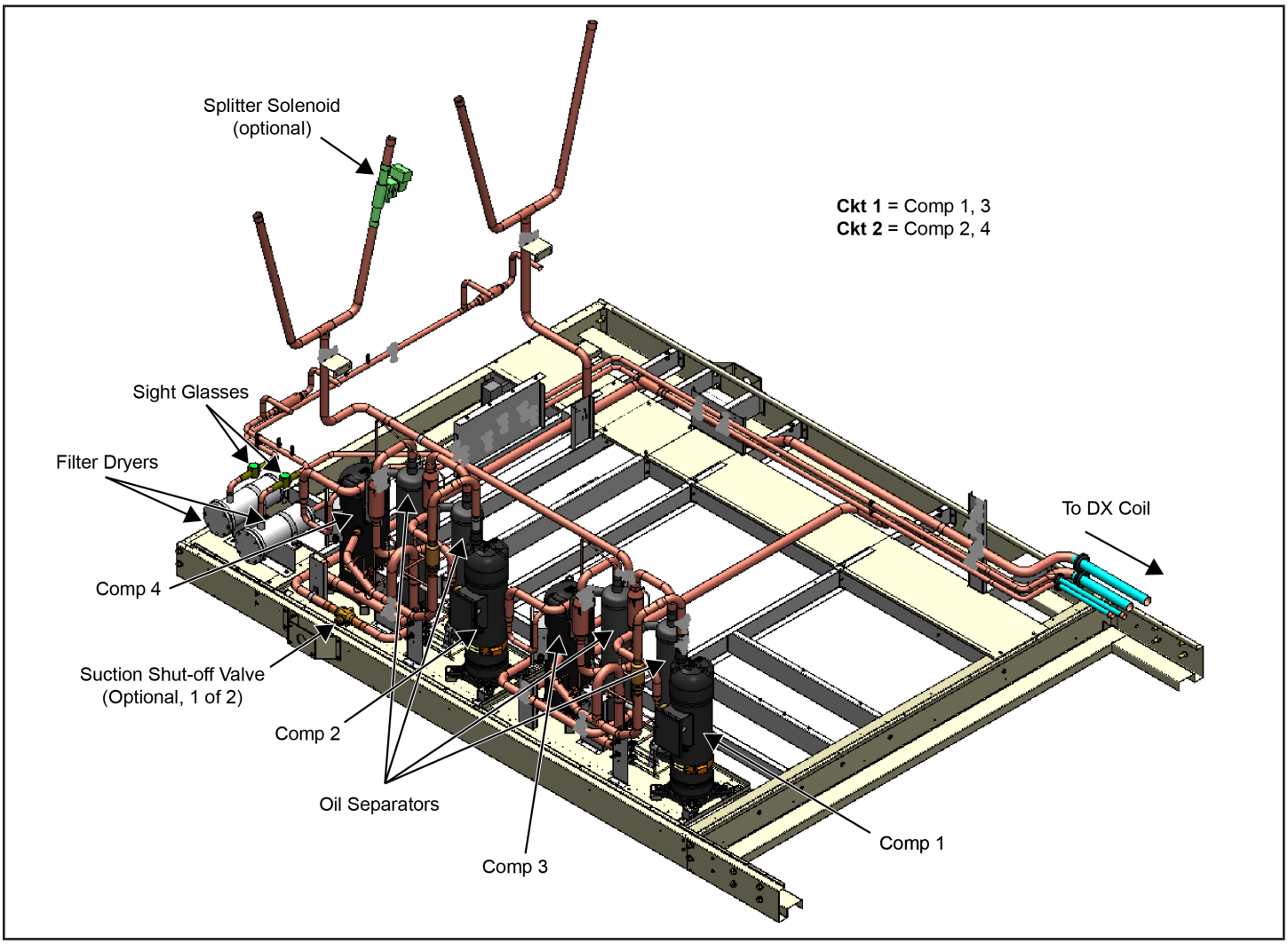


Figure 7: Typical Trio Compressor Configuration

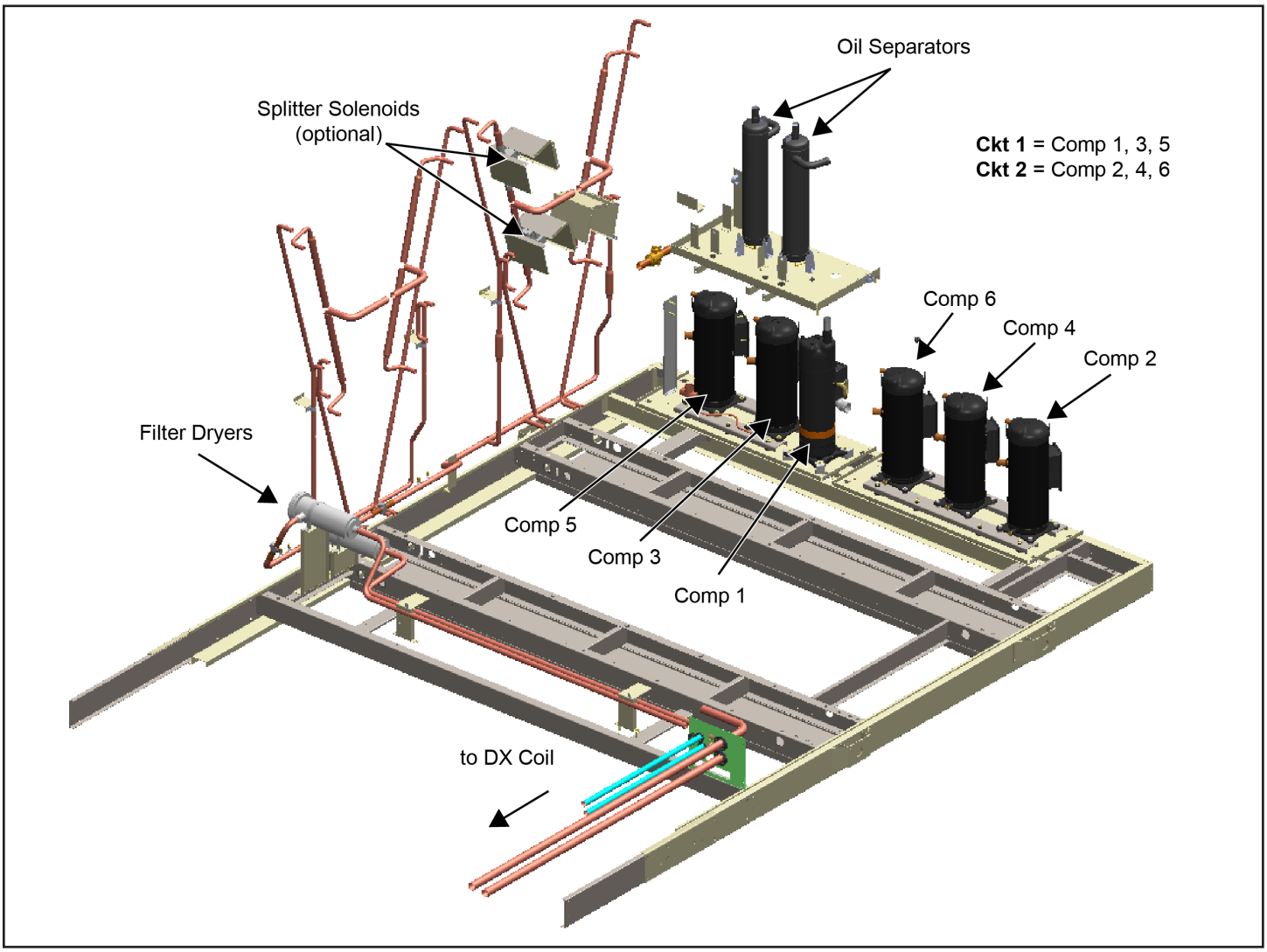
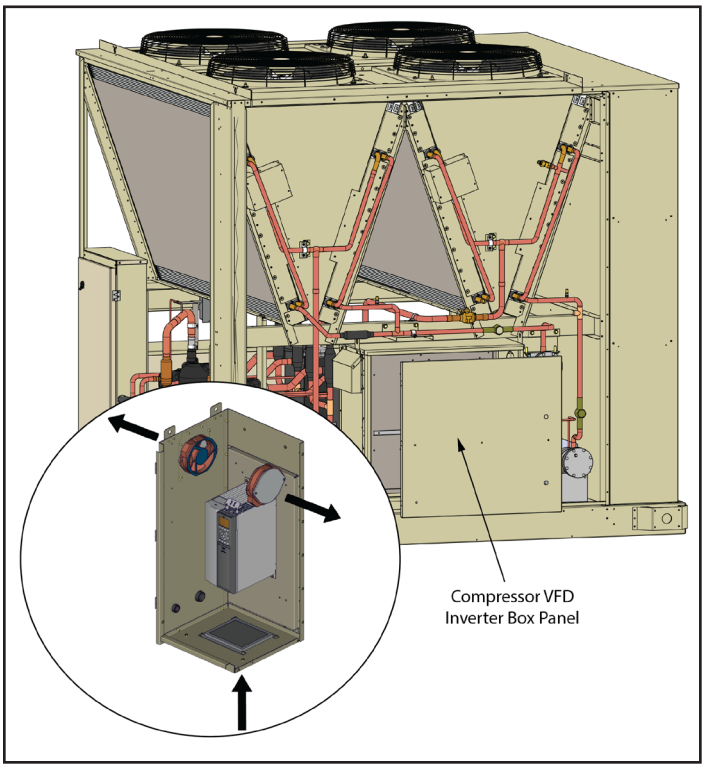
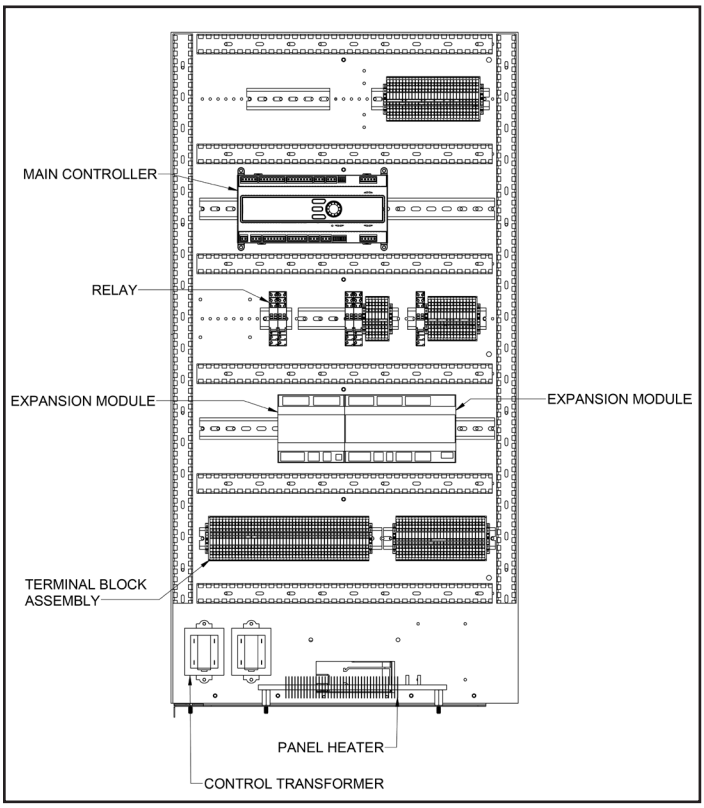


Figure 8: Compressor VFD Inverter Box Components



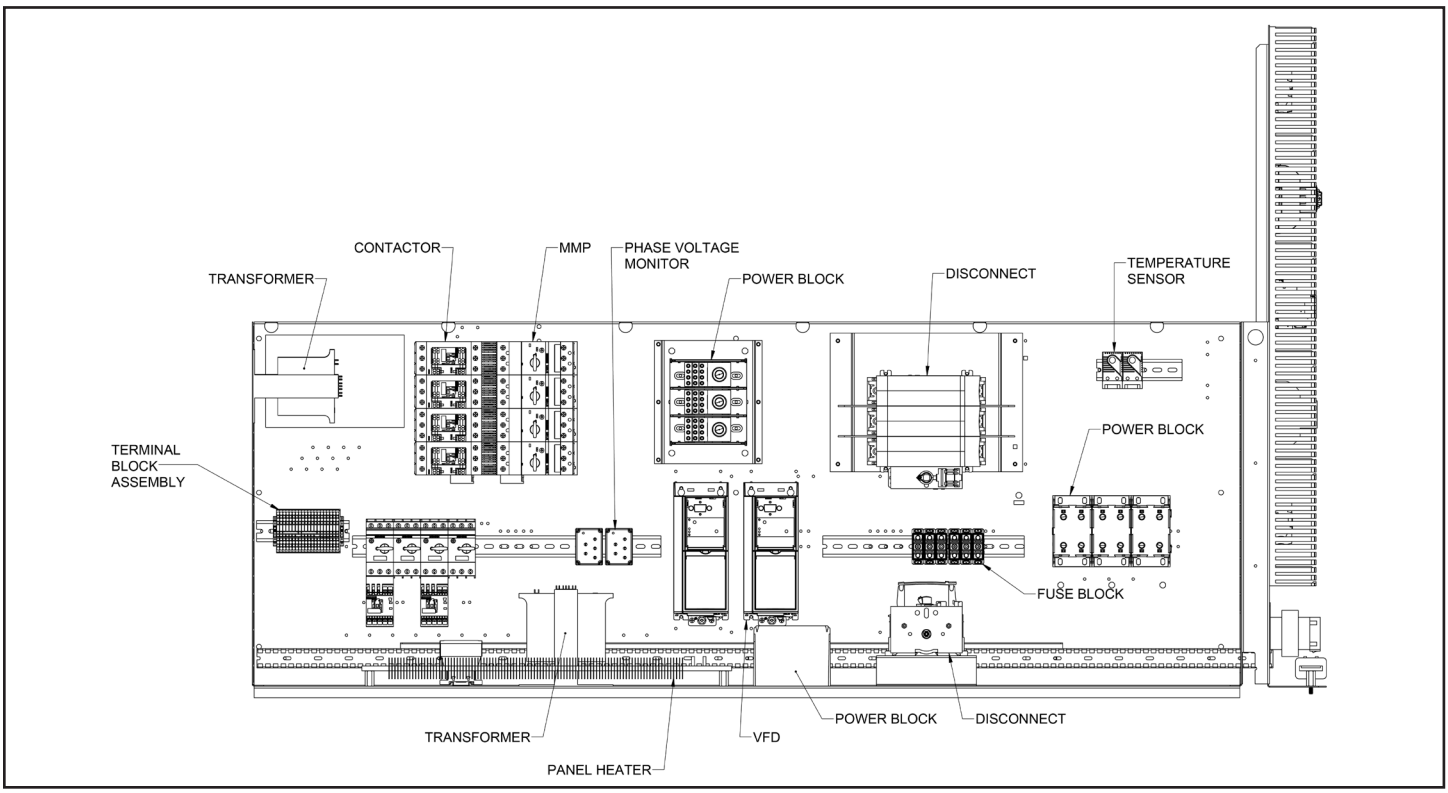
NOTE 1: Arrows indicate airflow direction.
NOTE 2: B-Cabinet shown.

Figure 9: Typical Low Voltage Control Panel



NOTE: Panel heater is optional.

Figure 10: Typical Main Control Panel



Installation

⚠ WARNING

Sharp edges on sheet metal and fasteners can cause personal injury. Please wear appropriate personal protective equipment (PPE) such as gloves, protective clothing, footwear, eye protection, etc. This equipment must be installed, operated, and serviced only by an experienced installation company and fully trained personnel.

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes. It is the responsibility of the installer to determine and follow the applicable codes.

NOTICE

Unit/equipment must be installed in a location that is not accessible to the general public.

Receiving and Handling

Carefully check equipment against the bill of lading to ensure all items have been received. Before unloading any unit, check the nameplate to make sure the voltage complies with the power supply available.

Inspect all units for damage upon arrival. If a unit has become dirty during shipment, carefully clean it prior to completing the inspection. Daikin Applied is not responsible for physical damage after the unit leaves the factory unless the contract with Daikin Applied states otherwise.

NOTICE

All units should be carefully inspected for damage when received. Report all loss or shipping damage using a claim form supplied by Daikin Applied.

VISIBLE LOSS OR DAMAGE: Any external evidence of loss or damage must be noted on the freight bill or carrier's receipt, and signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusal to honor a damage claim.

CONCEALED LOSS OR DAMAGE: Concealed loss or damage means loss or damage which does not become apparent until the unit has been unpacked or unwrapped. The contents may be damaged in transit due to rough handling even though the exterior may not show damages. When the damage is discovered, make a written request for inspection by the carrier's agent within **five (5) days** of the delivery date and file a claim with the form provided by Daikin Applied. Refer to the Daikin Applied Freight Policy for further information.

Compliance Statements

Depending on the unit configuration, the unit will come with either a Fused Disconnect, a Non-Fused Disconnect, a power block, or a combination in cases where multiple sources of power are specified. Consult the Unit Specific Electrical Schematics to determine the number of required sources of power. Refer to page 36 for the standard multiple point power connection options and their function.

Children should be supervised to ensure that they do not play with the appliance.

This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Unit Clearances

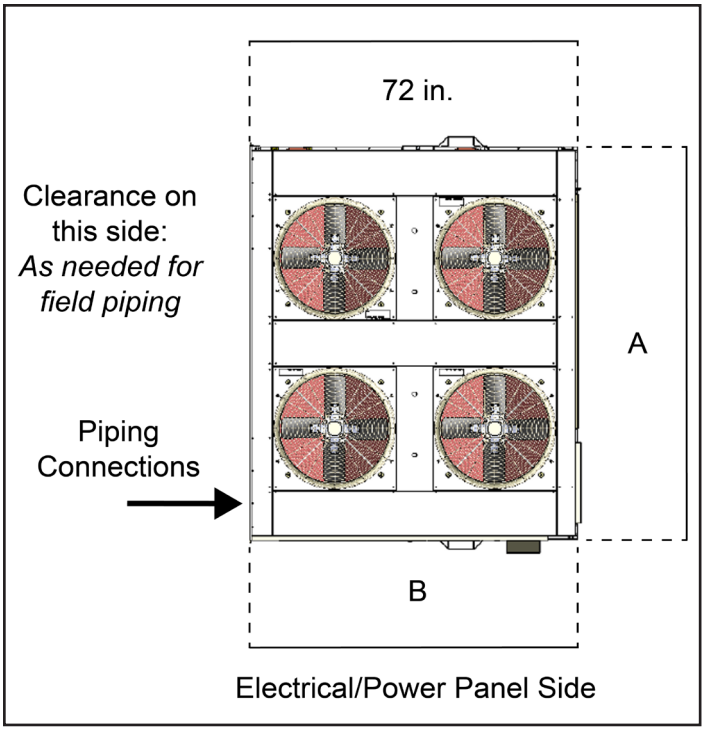
Service Clearance

Allow service clearance as indicated in the following figures. Also, Daikin Applied recommends providing a walkway around the entire unit for access to controls and serviceable components.

Table 1: Unit Service Clearances by Unit Size

Cabinet Configuration	"A" Dimension	"B" Dimension
A	60	96
B (Cooling)	60	
B (Heat Pump)	100	
C	100	
D	72	120
E	72	144

Figure 11: Unit Service Clearances



Ventilation Clearance

The system designer must consider each application and provide adequate ventilation. If this is not done, the unit will not perform properly.

NOTICE

Units equipped with furnace flues should have no overhead obstructions. There should also be no obstructions within 9 in. of the flue in any other direction.

Unit(s) surrounded by a screen or a fence:

1. The bottom of the screen or fence should be at least 1 ft. (305 mm) above the roof surface.
2. The distance between the unit and a screen or fence should be as described in Figure 11.
3. The distance between any two units within a screen or fence should be at least 120 in. (3048 mm).

Unit(s) Surrounded by Solid Walls:

1. If there are walls on one or two adjacent sides of the unit, the walls may be any height. If there are walls on more than two adjacent sides of the unit, the walls should not be higher than the unit.
2. The distance between the unit and the wall should be at least 96" (2438 mm) on all sides of the unit.
3. The distance between any two units within the walls should be at least 120" (3048 mm).

Do not locate outside air intakes near exhaust vents or other sources of contaminated air.

If the unit is installed where windy conditions are common, install wind screens around the unit, maintaining the clearances specified (Figure 11). This is particularly important to prevent blowing snow from entering outside air intake and to maintain adequate head pressure control when mechanical cooling is required at low outdoor air temperatures.

Overhead Clearance

⚠ WARNING

Obstructions above models equipped with heat pump technology could result in the formation of icicles in colder ambient temperatures. Do not examine, operate, or service the unit if icicle formations are present above the unit, as serious injury or property damage may occur.

1. If unit is surrounded by solid walls or screens, then unit must not have any overhead obstructions over any part of the unit.
2. The area above the condenser must be unobstructed in all installations to allow vertical air discharge.
3. Overhead obstructions must be no less than 96" (2438 mm) above the top of the unit.

Post and Rail Mounting

⚠ WARNING

The unit must be level side to side and over the entire length. Equipment damage can result if the unit is not level.

⚠ WARNING

Lifting points may not be symmetrical to the center of gravity of the unit. Ballast or unequal cable lengths maybe required.

⚠ CAUTION

Use all lifting points. Improper lifting can cause injury, death, and property damage.

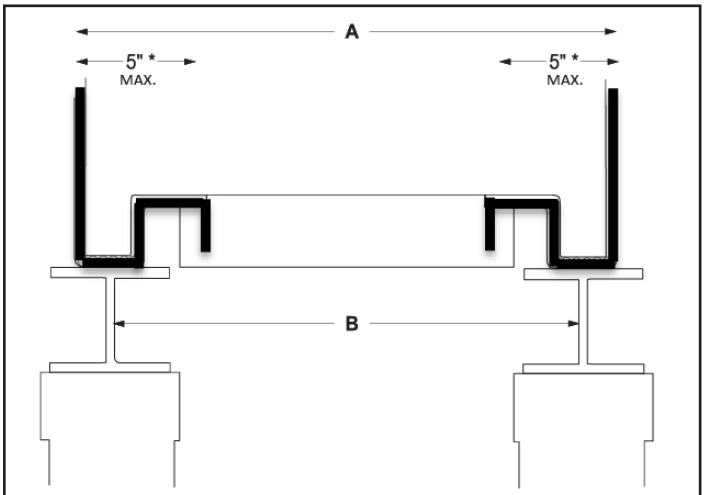
When mounting by post and rail, run the structural support the full length of the unit. Locate the structural member at the base of the unit, assuring the structural steel is well supported by the structural member (see Figure 12 and Figure 13).

If resilient material is placed between the unit and the rail, insert a heavy steel plate between the unit and the resilient material to distribute the load. Seal cabinet penetrations (electrical, piping, etc.) properly to protect against moisture and weather.

Table 2: Post and Rail Mounting Dimensions

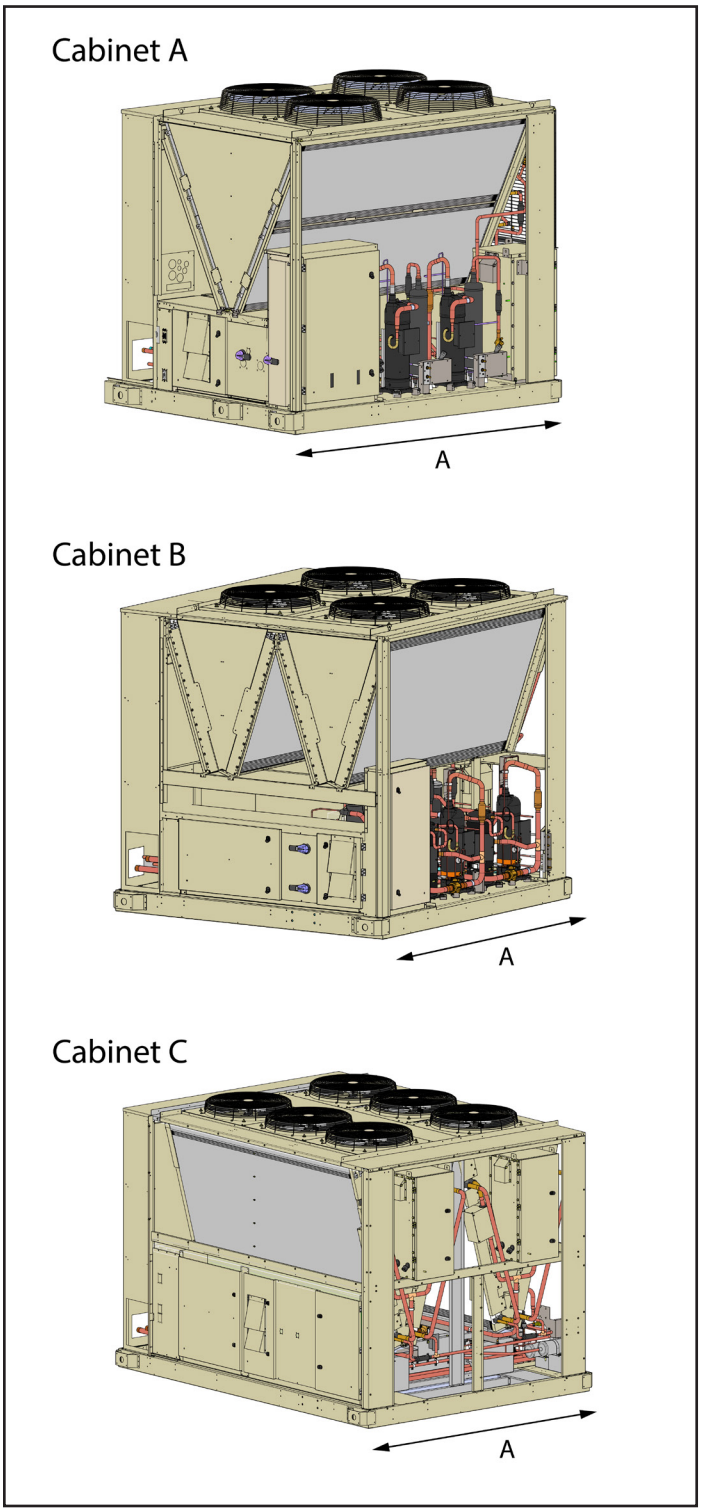
Cabinet Size	Dimension A	Dimension B
A	96.5 in.	94.5 in.
B		
C		

Figure 12: Post and Rail Mounting



* Beam can extend beneath unit no more than 5" to allow adequate space for electrical entry.

Figure 13: Post and Rail Mounting - Dimension A Orientation



Lifting Guidance

Daikin Applied equipment is designed to withstand the loads of the lifting and rigging process resulting from ASME Standard P30.1 - Planning for Load Handling Activities or equivalent. Lifting guidance is intended for installations of newly delivered equipment. If moving previously installed equipment for re-location or disposal, consideration should be given to unit condition. Equipment should also be drained as unit weight and center of gravity values do not reflect the addition of water for lifting.

⚠ DANGER

Improper rigging, lifting, or moving of a unit can result in unit damage, property damage, severe personal injury, or death. See the as-designed, certified dimensioned drawings included in the job submittal for the weights and center of gravity of the unit. If the drawings are not available, consult the local Daikin Applied sales office for assistance.

Installation is to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment. Lifting equipment and mechanisms must be determined by the Lifting Director per the current version of ASME Standard P30.1 or equivalent and must be suited for the load capacity. Daikin Applied is not a licensed nor certified rigging specialist. Therefore it is the customer's responsibility to consult a certified rigging contractor to rig, lift, and move components and subcomponents properly and safely as needed.

⚠ CAUTION

Forklifts may not be used to lift or move Rebel Applied DCSA units as the method may result in unit damage.

⚠ CAUTION

When around sharp edges, wear appropriate Personal Protective Equipment (PPE), such as gloves, protective clothing, foot wear, eye protection, etc., to prevent personal injury.

Lifting Brackets

Lifting bracket designs vary from product to product. Rules of engagement with the lifting brackets are the same regardless of the bracket type. For Rebel Applied units, a typical lifting bracket with 2" (51 mm) diameter holes found on the sides of the unit base are illustrated in Figure 14. See the as-designed certified drawings for specific lifting points on this product model.

Engagement with each bracket is to be as close to vertical as possible. The maximum allowable lift angle from the vertical is 30 degrees as shown in Figure 15. If the lift angle shifts beyond 30° from vertical on any of the lift points, the lift shall not proceed until a plan and rigging can be secured that will correct the angle of lift.

⚠ WARNING

The lifting angle must not go beyond 30 degrees from vertical or the unit can become unstable which may result in unit damage, property damage, severe personal injury, or death.

Figure 14: Illustration of Lifting Bracket and Allowed Angle for Lifting

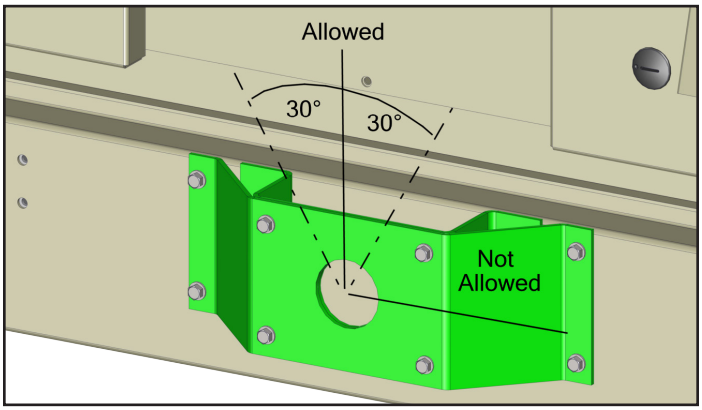
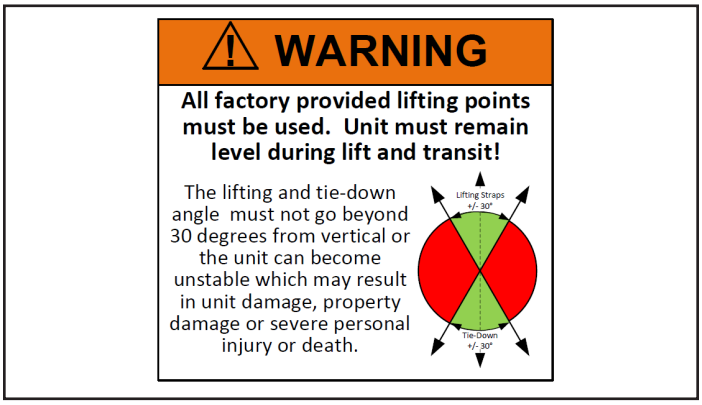


Figure 15: Example Illustrations of Allowed Angle Label



Lifting Equipment

Lifting equipment is supplied by the user or their designate. This is typically selected around the unit certified information of the equipment to be lifted and the available lifting equipment planned to be at the site where the lift is to take place. It is the responsibility of the Lifting Director to follow a standard practice of lift planning and equipment selection, like that found in the ASME P30 series of standards. Lifting plan and equipment must ensure that the only contact with the unit is at that lifting brackets. Straps, chains or spreader bars that are likely to be used shall not come in contact with the unit.

⚠ CAUTION

Lifting mechanisms must not make contact with the unit beyond the lifting bracket. Extreme care must be used when rigging the unit to prevent damage to the control panels, unit handles, unit piping, and unit frame.

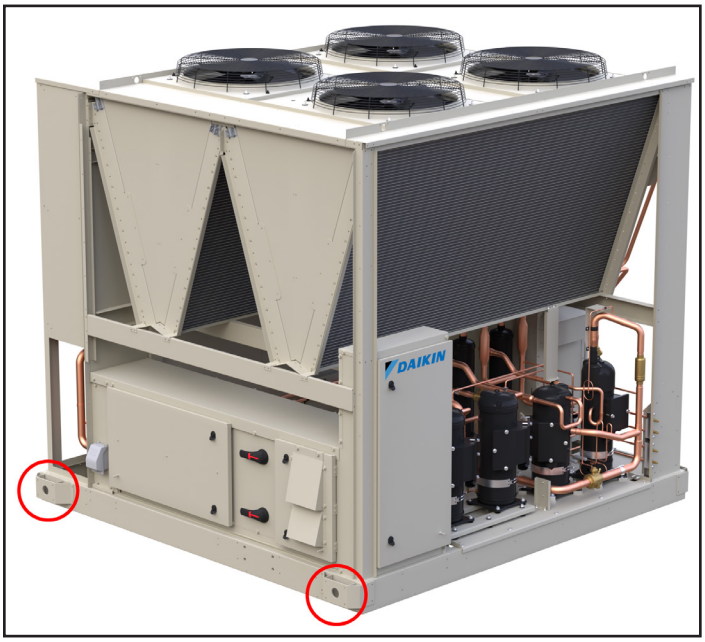
Lifting Points

Lifting points are predetermined by design. When lifting, all factory installed lifting brackets must be used. Figure 16 illustrates typical 4 point lifting configurations. Unit must remain level throughout the entire lifting event. Level is defined as one end being no more than 0.25 in. per foot of unit length to the opposite end.

⚠ WARNING

Be aware that the center of gravity may not necessarily be in the geometric center of the unit. No additional items can be added to a lift with the unit as it may affect the center of gravity and cause unit damage, property damage, severe personal injury, or death. Refer to as-designed, certified drawings for weight, center of gravity location and details specific to unit configuration.

Figure 16: Typical Lifting Points Locations (4 Points)



Transit and Temporary Storage

If the unit is stored for an intermediate period before installation or moved to a different location, take these additional precautions:

1. Support the unit well along the length of the base rail.
2. Level the unit (no twists or uneven ground surface).
3. Provide proper drainage around the unit to prevent flooding of the equipment.
4. Provide adequate protection from vandalism, mechanical contact, etc.
5. Securely close the doors and lock the handles.
6. Long term storage in humid environments may cause condensate corrosion on steel surfaces. Consider adding a desiccant material to alleviate corrosion concerns.

When the unit is being tied down for transit, the maximum allowable attachment angle from the vertical is 30 degrees in the opposite direction of lifting in Figure 15. Shimming of the unit under the lifting brackets or tie-down points must be used to ensure even contact along the length of the base rail.

R-32 Guidelines

⚠ WARNING

This unit contains R-32, a class A2L refrigerant that is flammable. This unit should only be installed, serviced, repaired, and disposed of by qualified personnel licensed or certified in their jurisdiction to work with R-32 refrigerant. Installation and maintenance must be done in accordance with this manual. Improper handling of this equipment can cause personal injury or equipment damage.

Be aware that R-32 refrigerant may not contain an odor. Place in a well ventilated area to prevent accumulation of refrigerant. Excessive refrigerant leaks, in the event of an accident in a closed ambient space, can lead to oxygen deficiency.

Do not pierce or burn this unit.

Never use an open flame during service or repair. Never store in a room with continuously operating ignition sources (for example: open flames, an operating gas appliance, or and operating electric heater), where there is ignitable dust suspension in the air, or where volatile flammables such as thinner or gasoline are handled.

Only use pipes, nuts, and tools intended for exclusive use with R-32 refrigerant in compliance with national codes (ASHRAE15 or IRC).

Do not mix air or gas other than R-32 in the refrigerant system. If air enters the refrigerant system, an excessively high pressure results, which may cause equipment damage or injury.

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to servicing the unit or opening any panels or doors. This Appliance is equipped with a Refrigerant Leak Detection system and the system components such as supply fans may begin operation unexpectedly and without warning.

⚠ WARNING

The appliance is designed to activate leak mitigation airflow in the event a refrigerant leak is detected. This is required to ensure dilution and prevent stagnation of any leaked refrigerant. Always ensure the supply fans are able to operate freely. Always maintain proper airflow and do not allow filters, air inlets, or air outlets to become blocked.

Safety Considerations

Maintaining and servicing R-32 refrigerant should only be performed as recommended by this manual and by personnel licensed or certified in their jurisdiction to handle A2L refrigerants under a controlled procedure. Dismantling the unit and treatment of the refrigerant, oil, and additional parts must be done in accordance with the relevant local, state, and national regulations.

Only use tools meant for use on R-32 refrigerant, such as a gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, vacuum gauge, or refrigerant recovery equipment.

Field Installation Considerations

All Field installed or modified refrigerant containing pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed. Reference Piping Guide for recommendations on field piping and charge estimation.

After completion of any field installed piping for split systems the pipework shall be pressure tested with an inert gas and vacuum tested prior to being charged with refrigerant per the following procedure:

1. The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
2. Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected.

Minimum Room Area

⚠ WARNING

Failure to maintain the required Minimum Room Area for leaked refrigerant dilution may result in property damage, personal injury, or death.

This unit will be charged in the field with R-32, an A2L refrigerant. The served indoor space must be larger than or equal to the Minimum Room Area as shown in Figure 17 on page 19. In the unlikely event of a refrigerant leak this room area must meet this requirement to ensure dilution and prevent stagnation of any leaked refrigerant.

When the appliance is connected to an unventilated space the following rules shall apply to determine if connected spaces can be used in the Minimum Room Area calculation. The room area shall be defined as the room area enclosed by the projection to the floor of the walls, partitions and doors of the space in which the unit serves. Spaces connected by only drop ceilings, ductwork, or similar connections shall not be considered a single space. Rooms on the same floor and connected by an open passageway between the spaces can be considered a single room when determining compliance to Minimum Room Area, if the passageway complies with all of the following:

- It is a permanent opening.
- It extends to the floor.
- It is intended for people to walk through.

The area of the adjacent rooms, on the same floor, connected by a permanent opening in the walls and/or doors between occupied spaces, including gaps between the wall and the floor, can be considered a single room when determining compliance to the Minimum Room Area, provided all of the following are met:

- The minimum opening area connecting the spaces/rooms shall not be less than 0.0123 m^2.
- The area of any openings above 300 mm from the floor shall not be considered part of the minimum opening area.
- At least 50 % of the minimum opening area shall be below 200 mm from the floor.
- Openings are permanent openings which cannot be closed.
- For openings extending to the floor the height shall not be less than 20 mm above the surface of the floor covering.
- A second higher opening shall be provided. The total size of the second opening shall not be less than 50% of the minimum opening area and shall be at least 1.5 m above the floor.

NOTE: The requirement for the second opening can be met by drop ceilings, ventilation ducts, or similar arrangements that provide an airflow path between the connected rooms.

Altitude Considerations for Minimum Room Area

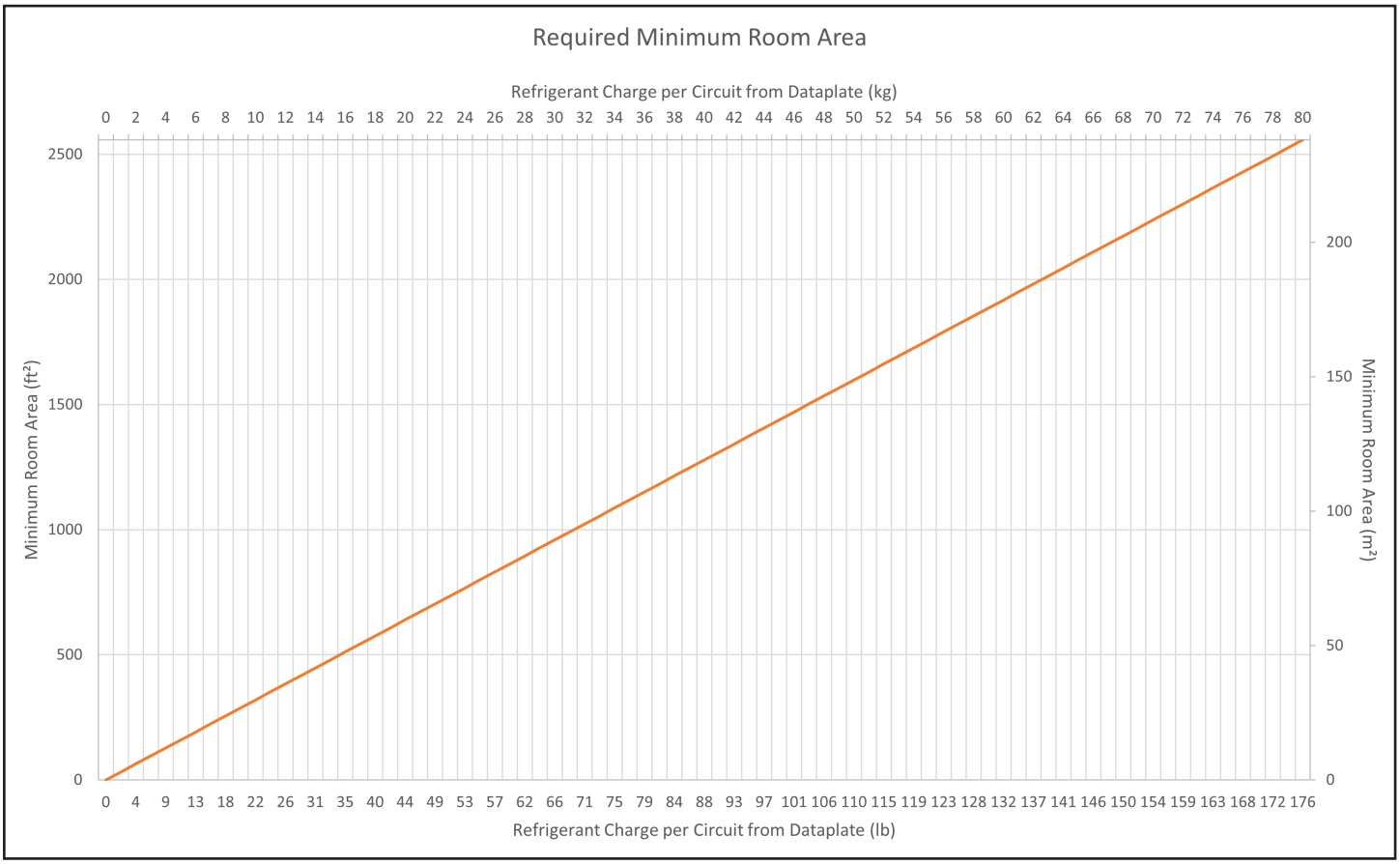
When the unit is installed at altitude above sea level the minimum room area must be adjusted by the multiplier shown in Table 3 on page 19. This will increase the required minimum room area of the served space.

If the actual room area served by the appliance is not large enough to meet the Minimum Room Area additional measures such as mechanical ventilation of the space may need to be employed. Please contact Daikin Applied for additional information.

Table 3: Minimum Room Area Multipliers by Altitude

Altitude (Meters)	Minimum Room Area Multiplier
0	1
305	1.047
500	1.078
750	1.117
1000	1.156
1250	1.195
1500	1.234
1750	1.273
2000	1.312
2250	1.351
2500	1.39
2750	1.429
3000	1.468
3250	1.507
3500	1.546

Figure 17: Required Minimum Room Area Chart



Leak Mitigation System and Sensors

See air handler manual for details. Leak mitigation is the responsibility of the air handler controls contractor. A leak mitigation system can turn off the compressors in the DCSA condensing unit by opening the Emergency Off circuit. Field terminals are provided to wire a normally closed (NC) dry contact into the circuit. Wire to terminals TBLV3 A2L-1 & A2L-2. When a leak is detected, this normally closed contact should open and therefore shut down the condenser via the Emergency Off sequence.

NOTE: Wire shall be minimally 22 AWG twisted pair suitable for application installation. Route the wire through conduit separate from any power wiring to avoid electrical noise.

Performing Service

Remove Ignition Sources

Always perform a safety check of the area to ensure the risk of ignition is minimized before servicing the unit.

Personnel Awareness

Inform maintenance staff and others working in the local area of the nature of work being carried out. Only personnel attending to the refrigerant system should be present.

Check for Presence of Airborne Refrigerant

Check the area with an appropriate refrigerant detector prior to and during work to ensure all personnel are aware of potentially toxic or flammable gases in the air. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.

Presence of fire extinguisher

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment should be available. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

No Ignition Sources

No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

Ventilated area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out.

Checks to the refrigerating equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.

The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

- The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed.
- The ventilation machinery and outlets are operating adequately and are not obstructed.
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
- Marking to the equipment continues to be visible and legible. Markings that are illegible shal be corrected.
- Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

Checks to electrical devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- that no live electrical components and wiring are exposed while charging, recovering or purging the system;
- that there is continuity of earth bonding.

Repairs to sealed components

Sealed electrical components must be replaced.

Repair to intrinsically safe components

Intrinsically safe components must be replaced.

Cabling

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Detection of flammable refrigerants

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.
- The following leak detection methods are deemed acceptable for all refrigerant systems.
- Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. Detection equipment shall be calibrated in a refrigerant-free area. Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.
- Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE: Examples of leak detection fluids are:

— bubble method; or

— fluorescent method agents.

- If a leak is suspected, all naked flames shall be removed/ extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to instructions above.

Removal and evacuation

NOTE: Follow the steps outlined in the unit controller operation manual for the air handling unit.

- When breaking into the refrigerant circuit to make repairs, or for any other purpose, conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration.
- The following procedure shall be adhered to:
  a. Safely remove refrigerant following local and national regulations.
  b. Evacuate refrigerant from circuit.
  c. Purge the circuit with inert gas.
  d. Evacuate (optional for A2L).
  e. Purge the inert gas (optional for A2L)
  f. Continuously flush or purge with inert gas when using flame to open circuit.
  g. Open the circuit by cutting or brazing.
- The refrigerant charge shall be recovered into the correct recovery cylinders. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times.
- Compressed air or oxygen shall not be used for purging refrigerant systems.
- For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.
- When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
- Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

Charging procedures

In addition to conventional charging procedures, follow the requirements below:

NOTE: To aid this process, there is an evacuation/charging mode built into the MicroTech unit controller. Follow the steps outlined in the unit controller operation manual for the air handling unit.

- Unit should be charged at a recommended ambient temperature of 70°F or warmer.
- Charge the system to the subcooling values in Table 9 on page 31.
- Ensure that contamination of different refrigerants does not occur when using charging equipment.
- Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete.
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.
- Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant.

It is essential that electrical power is available before the task is commenced.

- Become familiar with the equipment and its operation.
- Isolate system electrically.
- Before attempting the procedure, ensure that mechanical handling equipment is available, if required, for handling refrigerant cylinders; all personal protective equipment is available and being used correctly; the recovery process is supervised at all times by a competent person; recovery equipment and cylinders conform to the appropriate standards.
- Pump down refrigerant system, if possible.
- If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- Make sure that cylinder is situated on the scales before recovery takes place.
- Start the recovery machine and operate in accordance with instructions.
- Do not overfill cylinders (no more than 80 % volume liquid charge).
- Do not exceed the maximum working pressure of the cylinder, even temporarily.
- When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Labeling

Equipment shall be labeled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

Recovery

- When removing refrigerant from a system, either for servicing or decommissioning, the refrigerant must be removed safely.
- When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipmenthat is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, FLAMMABLE REFRIGERANTS. In addition, a set of calibrated weighing scales shall be availableand in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that FLAMMABLE REFRIGERANT does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Lubrication

R-32 should only be used with manufacturer-approved oil. The HFC refrigerant components in R-32 will not be compatible with mineral oil or alkylbenzene lubricants. R-32 systems will be charged with the OEM recommended lubricant, ready for use with R-32.

Leak Detection

NEVER use the following when attempting to detect R-32 refrigerant leaks:

- A halide torch (or any other detector using a naked flame)
- Substances containing chlorine

Pressure Testing and Refrigerant Evacuation

- Make sure that air or any matter other than R-32 refrigerant does not enter the refrigeration cycle.
- If refrigerant gas leaks occur in an enclosed area, ventilate the space as soon as possible.
- R-32 should always be recovered and never released directly into the environment.
- Only use tools meant for use on R-32 refrigerant (such as a gauge manifold, charging hose, or vacuum pump adapter).

Commissioning

- Ensure proper connection of all piping and carry out a leak test before charging with refrigerant.
- Check safety equipment before putting into service.

Decommissioning

ALWAYS remove refrigerant charge before decommissioning the unit.

- Ensure sufficient ventilation at the equipment location.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark.
- R-32 should always be recovered and never released directly into the environment. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.

Recovery

Recovery Cylinders

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used should be designated for the recovered refrigerant and labeled for that refrigerant. Cylinders should be complete with a pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders should be evacuated and, if possible, cooled before recovery occurs.

Recovery Equipment

The recovery equipment should be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, FLAMMABLE REFRIGERANTS. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

Recovered Refrigerant

The recovered refrigerant should be returned to the refrigerant supplier in the correct recovery cylinder with the relevant waste transfer note assigned. Do not mix refrigerants in recovery units and especially not in cylinders.

Compressor or Compressor Oils

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that no refrigerant remains within the lubricant. The evacuation process should be carried out prior to returning compressors to the supplier(s). Only electric heating to the compressor body shall be employed to accelerate this process.

Handling and Storage

Precautions for Safe Handling

- Waste air is to be released into the atmosphere only via suitable separators. Open and handle receptacle with care.
- Keep ignition sources away.
- Do not smoke near the unit.
- Protect against electrostatic charges.

Conditions for Safe Storage

- Requirements to be met by storerooms and receptacles:
  - Store only in unopened original receptacles
  - Store in a cool and dry location
- Further information about storage conditions:
  - Keep container tightly sealed
  - Store in cool, dry conditions in well sealed receptacle
  - Protect from heat and direct sunlight
- Maximum storage temperature:
  - 104°F (40°C)

Disposal

- Waste treatment method recommendation:
  - Must be specially treated adhering to official regulations.
  - Incineration in an adequate incinerator is recommended.
  - Uncleaned packaging disposal must be made according to official regulations.
- Ensure sufficient ventilation at the working place.
- Remove the refrigerant. R-32 should always be recovered and never released directly into the environment. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
- Evacuate the refrigerant circuit.
- Purge the refrigerant circuit with nitrogen for 5 min.
- Evacuate again.
- Cut out the compressor and drain the oil.

Competence of Personnel

There are specific procedures that must be followed for the installation, repair, maintenance, and decommissioning of equipment that uses A2L refrigerants.

Training for these procedures is carried out by national training organizations or manufacturers that are accredited to teach the relevant national competency standards that may be set in legislation. The achieved competence should be documented by a certificate.

Information and Training

The training should include the substance of the following:

- Information about the explosion potential of flammable refrigerants to show that flammables may be dangerous when handled without care.

- Information about potential ignition sources, especially those that are not obvious, such as lighters, light switches, vacuum cleaners, electric heaters.
- Information about the different safety concepts:
  - — Unventilated: Safety of the appliance does not depend on ventilation of the housing. Switching off the appliance or opening of the housing has no significant effect on safety. Nevertheless, it is possible that leaking refrigerant may accumulate inside the enclosure and flammable atmosphere will be released when the enclosure is opened.
  - — Ventilated enclosure: Safety of the appliance depends on ventilation of the housing. Switching off the appliance or opening of the enclosure has a significant effect on safety. Care should be taken to ensure sufficient ventilation before.
  - — Ventilated room: Safety of the appliance depends on the ventilation of the room. Switching off the appliance or opening of the housing has no significant effect on safety. The ventilation of the room shall not be switched off during repair procedures.
- Information about refrigerant detectors:
  - — Principle of function, including influences on the operation.
  - — Procedures, how to repair, check or replace a refrigerant detector or parts of it in a safe way.
  - — Procedures, how to disable a refrigerant detector in case of repair work on the refrigerant carrying parts.
- Information about the concept of sealed components and sealed enclosures according to IEC 60079-15:2010.
- Information about the correct working procedures:
  - — Commissioning
    a. Ensure that the floor area is sufficient for the refrigerant charge or that the ventilation duct is assembled in a correct manner.
    b. Connect the pipes and carry out a leak test before charging with refrigerant.
    c. Check safety equipment before putting into service.
  - — Maintenance
    a. Portable equipment shall be repaired outside or in a workshop specially equipped for servicing units with flammable refrigerants.
    b. Ensure sufficient ventilation at the repair place.
    c. Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
    d. Discharge capacitors in a way that won't cause any spark. The standard procedure to short circuit the capacitor terminals usually creates sparks.
    e. Reassemble sealed enclosures accurately. If seals are worn, replace them.
    f. Check safety equipment before putting into service.
  - — Repair
    a. Portable equipment shall be repaired outside or in a workshop specially equipped for servicing units with flammable refrigerants.
    b. Ensure sufficient ventilation at the repair place.
    c. Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
    d. Discharge capacitors in a way that won't cause any spark.
    e. When brazing is required, the following procedures shall be carried out in the right order:
- Removal of the refrigerant. R-32 should always be recovered and never released directly into the environment. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
- Evacuation of the refrigerant circuit.
- Removal of parts to be replaced by cutting, not by flame.
- Purging the braze point with nitrogen during the brazing procedure.
- Carry out a leak test before charging with refrigerant.
    a. Reassemble sealed enclosures accurately. If seals are worn, replace them.
    b. Check safety equipment before putting into service.
  - — Decommissioning
    a. The refrigerant charge must be removed before decommissioning.
    b. Ensure sufficient ventilation at the equipment location.
    c. Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
    d. Discharge capacitors in a way that won't cause any spark.
    e. Remove the refrigerant. R-32 should always be recovered and never released directly into the environment. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
  - — Disposal
    a. Ensure sufficient ventilation at the working place.
    b. Remove the refrigerant. R-32 should always be recovered and never released directly into the environment. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.

Maintenance

- Equipment shall be repaired outside or in a workshop specially equipped for servicing units with A2L refrigerants.
- Ensure sufficient ventilation at the location where repairs are taking place.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause sparks.
- When repairs are necessary, reassemble sealed enclosures. If seals are worn, replace them.
- Check safety equipment before putting into service.

Repair

- Portable equipment shall be repaired outside or in a workshop specially equipped for servicing units with FLAMMABLE REFRIGERANTS.
- Ensure sufficient ventilation at the repair place.
- Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.
- Discharge capacitors in a way that won't cause any spark.
- When brazing is required, the following procedures shall be carried out in the right order:
  - Remove the refrigerant. R-32 should always be recovered and never released directly into the environment. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
  - Evacuate the refrigerant circuit.
  - Remove parts to be replaced by cutting, not by flame.
  - Purge the braze point with nitrogen during the brazing procedure.
  - Carry out a leak test before charging with refrigerant.
- Reassemble sealed enclosures accurately. If seals are worn, replace them.
- Check safety equipment before putting into service.

Refrigerant Piping Guidelines

General

The DCSA condensing unit is leak tested at the factory and ships with a nitrogen holding charge. Upon receiving the unit, check that the holding charge has not leaked out. The unit should be under a slight positive pressure. If no pressure is measured, the unit shall be leak tested to locate any leaks and repaired prior to evacuation and charging.

The DCSA condensing unit uses R-32, an A2L refrigerant that will require a Refrigerant Leak Detection System (RDS) provided by the air handler manufacturer and a leak mitigation system installed in the air handling unit. The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes. It is the responsibility of the installer to determine and follow applicable codes. The DCSA unit has field accessible terminals dedicated for connection to the RDS or mitigation system. Dry contacts should be wired to these terminals to open the emergency off circuit in the DCSA unit, which will turn the refrigeration system off. Additional details can be found in the DCSA operation manual.

⚠ WARNING

This unit contains R-32, a class A2L refrigerant that is flammable. This unit should only be installed, serviced, repaired, and disposed of by qualified personnel licensed or certified in their jurisdiction to work with R-32 refrigerant. Installation and maintenance must be done in accordance with this manual. Improper handling of this equipment can cause personal injury or equipment damage.

Be aware that R-32 refrigerant may not contain an odor. Place in a well ventilated area to prevent accumulation of refrigerant. Excessive refrigerant leaks, in the event of an accident in a closed ambient space, can lead to oxygen deficiency.

Do not pierce or burn this unit.

Never use an open flame during service or repair. Never store in a room with continuously operating ignition sources (for example: open flames, an operating gas appliance, or and operating electric heater), where there is ignitable dust suspension in the air, or where volatile flammables such as thinner or gasoline are handled.

Only use pipes, nuts, and tools intended for exclusive use with R-32 refrigerant in compliance with national codes (ASHRAE15 or IRC).

Do not mix air or gas other than R-32 in the refrigerant system. If air enters the refrigerant system, an excessively high pressure results, which may cause equipment damage or injury.

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

Refrigerant Piping

The DCSA condensing unit is leak tested at the factory and ships with a nitrogen holding charge. Upon receiving the unit, check that the holding charge has not leaked. The unit should be under a slight positive pressure. If no pressure is measured, the unit shall be leak tested to locate any leaks and repair prior to evacuation and charging.

NOTICE

The customer is responsible for providing a piping sketch and submittal information for both the DCSA and the DX Coil prior to ordering the DCSA unit.

NOTICE

A qualified architect or systems HVAC design engineer familiar with refrigerant piping design, as well as local codes and regulations, must provide refrigerant piping design. The following manufacturer recommendations serve as a general guide and should not replace a qualified professional's refrigerant piping system design.

All field installed piping containing refrigerant, including piping material, and pipe routing shall include protection from physical damage in operation and service. The installation shall be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed. In addition, consult the ASHRAE Handbook and follow industry standards to design a reliable system.

Good piping design results in a balance between the initial cost, pressure drop, and system reliability. The initial cost is impacted by the diameter and layout of the piping. The pressure drop in the piping must be minimized to avoid adversely affecting performance and capacity. Pressure drop in the suction line reduces the refrigerant pressure entering the compressor which results in a lower mass flow rate which reduces system cooling capacity. Excessive pressure drop in the liquid line may cause refrigerant flashing and, resulting the expansion valve not functioning properly. Because all field-piped systems have compressor oil passing through the refrigeration circuit and back to the compressor, a minimum velocity must be maintained in the piping so that sufficient oil is returned to the compressor sump at full and part load conditions. If refrigerant velocity is low and the oil does not return to the compressor, the oil in the sump will empty and if it becomes too low, will cause the compressor to fail. Consult with Daikin Applied applications group for help in calculating piping losses.

Properly sized and routed interconnecting piping will take into consideration the following:

- The unit's maximum high-side design pressure is 600 PSIG and the maximum low-side design pressure is 240 PSIG.
- When choosing a pipe diameter, consider both pressure drop and refrigerant velocity. Increasing the pipe diameter reduces pressure drop which results in increased capacity and performance. Too large of a diameter, may reduce the refrigerant velocity below the minimum speed to keep oil in circulation, particularly in the suction gas piping.

- Minimize the number of bends/elbows to reduce the pressure drop.
- Minimize vertical distances between condenser and air handler to reduce pressure drop.
- Use equivalent line lengths when determining system pressure drop. Consider all elbows, valves, and other specialty refrigeration components.
- Avoid running refrigerant piping lines underground.

MHGRH Coils

In some instances, the DCSA unit will be paired with modulating hot gas reheat (MHGRH) coils.

Hot gas from the compressor is split in parallel fashion between the main condenser and the MHGRH coil by way of a stepper-motor-driven 3-way valve. The 3-way valve is a modulating valve (range: 5% - 100%). The MHGRH coil resides in the air handler section of the split system. Proper care must be taken to ensure that the coil is sized correctly.

MHGRH coils are typically selected per the desired temperature change across the coil. This can range from 15-30°F. Once a condenser is selected, allow the unit to run at worst-case conditions to obtain the saturated condensing temperature (Tc), vapor temperature (LRT), and mass flow at the compressor. Subtract the line losses on the discharge line, as per the field piping design, to obtain inlet conditions at the MHGRH coil. Select the reheat coil using a mass flow that is 75% of the selected condenser mass flow at worst-case conditions.

NOTICE

Field installation of Hot Gas Bypass (HGBP) is not permitted on DCSA configurations. For capacity control, DCSA units shall be ordered with a factory-installed variable-speed compressor option.

Retrofit applications

A DCSA condensing system with R-32, an A2L refrigerant, cannot be used to replace a non-A2L unit. Safety standards and federal rules prohibit dual ratings for refrigerant safety classification.

- The EPA has indicated A2L refrigerants may be used only in new equipment designed specifically and clearly identified for the refrigerant. In other words, none of these substitutes are being listed for use as a conversion or “retrofit” refrigerant for existing equipment. “New” equipment must include a new compressor, evaporator and condenser.
- UL prohibits retrofitting equipment from A1 to A2L as the existing equipment is not tested and listed to UL 60335-2-40 required for all A2L systems.

Piping Length

The DCSA unit has been qualified with up to 150 feet of suction pipe, liquid pipe, and discharge pipe (for reheat). Included in that 150 feet is 60 feet of vertical pipe. These length restrictions are actual pipe length, not equivalent pipe length. Equivalent pipe length is considered when calculating the pressure drop for the interconnecting piping. Applying unit piping beyond these measurements falls outside of Daikin Applied’s recommended restrictions and will void the warranty.

Liquid Piping

When sizing liquid lines, it is important to minimize line size to reduce cost and refrigerant charge. Excessive pressure drop needs to be avoided to minimize refrigerant flashing which may affect the expansion valve function. Flashing will occur if the liquid line pressure drop causes the sub-cooled liquid leaving the condenser results in the refrigerant entering the vapor dome. If the unit is charged properly, with a minimum of 10°F (5.6°C) of sub-cooling, the pressure drop at full load would need to exceed 40 PSI before flashing would occur. In addition to pressure loss due to friction, consider the effect from elevation differences between the condenser and the evaporator. If the evaporator is above the condenser, add the pressure drop equivalent to the difference in elevation to the piping friction pressure drop. If the evaporator is below the condensing unit, subtract the pressure drop equivalent to the difference in elevation from the piping friction pressure drop. In most applications, the liquid line size should not need to be decreased smaller than the connection size leaving the DCSA unit. See Table 6 on page 28.

NOTE: Maximum piping length (horizontal and vertical) is 150 feet, including up to 60 feet of vertical piping for elevation change between the air handler and condensing unit.

Liquid lines should be sized so that the refrigerant velocity does not exceed 300 fpm, at full capacity, to avoid liquid hammering when the liquid line solenoid valve closes. A liquid line solenoid valve must be installed on each circuit just upstream of the thermal expansion valve. The liquid line solenoid valves must be wired back to the DCSA unit so it can be controlled by the MicroTech unit controller. See the MicroTech unit controller operation manual for DCSA for details on wiring valves to the unit controller. The valve provides 2 functions:

- It allows the system to be pumped down at the end of call for cooling.
- It limits refrigeration migration when the refrigeration system is off.

See Table 4 and Table 5 on page 28 for optional valve and harness kits.

Table 4: DCSA Optional Kits

Part Number	Description	Contents	Selection Logic
910507055	Field installed TXVs. Danfoss Model TGE10-6.	2 TXV valves	Sizes 020, 025
910507056	Field installed TXVs. Danfoss Model TGE10-8.	2 TXV valves	Sizes 030, 034, 031
910507057	Field installed TXVs. Danfoss Model TGE10-9.	2 TXV valves	Sizes 035, 040
910507059	Field installed TXVs. Danfoss Model TGE10-12.5.	2 TXV valves	Sizes 050, 052, 045
910507060	Field installed TXVs. Danfoss Model TGE20-12.5.	2 TXV valves	Sizes 055, 060
910507061	Field installed TXVs. Danfoss Model TGE20-16.	2 TXV valves	Sizes 068, 075
910507062	Field installed liquid line solenoid valves - 7/8 in.	2 solenoid valves	Standard selection for all sizes
910507063	Field installed liquid line solenoid valves - 1-1/8 in.	2 solenoid valves	To be used if upsizing liquid line to 1-1/8 in.
910507064	Wires for field installed liquid line solenoid valves	#14 AWG Red & #14 AWG White, to wire both solenoid valves	Wiring distance less than or equal to 75 ft.
910507065	Wires for field installed liquid line solenoid valves	#14 AWG Red & #14 AWG White, to wire both solenoid valves	Wiring distance greater than 75 ft., up to maximum of 150 ft.
910486395	75 ft. harness for refrigerant leak detection	2-cond cable #22 AWG	Wiring distance less than or equal to 75 ft.
910486378	150 ft. harness for refrigerant leak detection	2-cond cable #22 AWG	Wiring distance greater than 75 ft., up to maximum of 150 ft.

NOTE 1: Kits for valves include 2 valves, 1 per circuit.

NOTE 2: If the listed harness selections are not used for installation, ensure that wires used are minimally 22 AWG twisted pair for refrigerant leak detection and minimally 14 AWG (AWM or MTW) for the liquid line solenoid valves.

Table 5: DCSA Optional Kits for Split Circuits - 2 Valves per Circuit

Part Number	Description	Contents	Selection Logic
910515309	Field installed TXVs for split circuit, Danfoss model TGE 10-3	4 TXV valves	Sizes 20, 25
910515310	Field installed TXVs for split circuit, Danfoss model TGE 10-4	4 TXV valves	Sizes 30, 34, 31, 35
910515717	Field installed TXVs for split circuit, Danfoss model TGE 10-6	4 TXV valves	Sizes 40, 50, 52, 45
910515718	Field installed TXVs for split circuit, Danfoss model TGE 10-8	4 TXV valves	Sizes 55, 60, 68
910515719	Field installed TXVs for split circuit, Danfoss model TGE 10-9	4 TXV valves	Size 75

NOTE: Kits include 4 valves (2 per circuit) for split circuits.

Table 6: DCSA Connection Sizes

DCSA Model	Cooling Efficiency	Circuit 1			Circuit 2		MHGRH		
		Suction	Liquid	Discharge	Suction	Liquid	Suction	Liquid	Discharge
020, 025, 030, 034	Standard	1-1/8	7/8	7/8	1-1/8	7/8	1-5/8	1-1/8	1-3/8
	High	1-1/8	7/8	7/8	1-1/8	7/8	1-5/8	1-1/8	1-3/8
	Premium	1-1/8	7/8	7/8	1-1/8	7/8	1-5/8	1-1/8	1-3/8
031	Standard	1-1/8	7/8	1-1/8	1-5/8	7/8	1-5/8	1-1/8	1-3/8
	High	1-1/8	7/8	1-1/8	1-5/8	7/8	1-5/8	1-1/8	1-3/8
	Premium	1-3/8	7/8	1-1/8	1-3/8	7/8	1-5/8	1-1/8	1-3/8
035,040	Standard	1-1/8	7/8	1-1/8	1-5/8	7/8	1-5/8	1-1/8	1-3/8
	High	1-1/8	7/8	1-1/8	1-5/8	7/8	1-5/8	1-1/8	1-3/8
	Premium	1-5/8	7/8	1-1/8	1-5/8	7/8	1-5/8	1-1/8	1-3/8
045, 050, 052, 055, 060, 068, 075	Standard	1-5/8	7/8	1-3/8	1-5/8	7/8	1-5/8	1-1/8	1-3/8
	High	1-5/8	7/8	1-3/8	1-5/8	7/8	1-5/8	1-1/8	1-3/8
	Premium	1-5/8	7/8	1-3/8	1-5/8	7/8	1-5/8	1-1/8	1-3/8
065, 070	Standard	1-5/8	1-1/8	1-3/8	1-5/8	1-1/8	1-5/8	1-1/8	1-3/8
	High	1-5/8	1-1/8	1-3/8	1-5/8	1-1/8	1-5/8	1-1/8	1-3/8
	Premium	1-5/8	1-1/8	1-3/8	1-5/8	1-1/8	1-5/8	1-1/8	1-3/8

Suction Piping

NOTE: Maximum piping length (horizontal and vertical) is 150 feet, including up to 60 feet of vertical piping for elevation change between the air handler and condensing unit.

Proper sizing and routing of the suction lines is critical. Since the refrigerant is a gas, the velocity needs to be high enough to keep the liquid oil flowing and returned to the compressor(s). While a high velocity improves oil return, it results in higher pressure drop, which reduces the capacity of the system. A properly designed system needs to ensure that the velocity is high enough to return the oil even if it results in some loss in performance. If possible, pitch the suction line down in the direction of refrigerant flow to improve oil return, minimally 4 inches per 100 feet of horizontal run.

Suction lines should be sized so that the refrigerant velocity is greater than 500 fpm on horizontal runs and greater than 1000 fpm on vertical runs. Since it may be difficult to meet these requirements at minimum capacity, particularly on variable speed circuits, an oil return mode is included in the controller to return oil after the unit has been operating at low capacity (less than 50% circuit capacity). You should expect approximately a 0.4°F (0.2°C) drop in saturated suction temperature per 1 PSI drop in the suction line. The expected capacity reduction is 2,250 BTU/Hr per 1°F (0.6°C) drop in saturated suction temperature, or 900 BTU/Hr per 1 PSI drop.

Use of oil traps and double risers are common to help in returning oil at low-capacity conditions. The DCSA unit has an oil return mode that is automatically activated when the system has been operating at low speeds for a long duration. The oil return mode is designed to avoid the need for oil traps and double riser designs. Oil traps and double risers are not required.

Discharge/Hot Gas Piping

Proper sizing and routing of the discharge lines is critical. Since the refrigerant is a gas, the velocity needs to be high enough to keep the liquid oil flowing and returned to the compressor(s). While a high velocity improves oil return, it results in higher pressure drop, which reduces the reheat capacity. A properly designed system needs to ensure that the velocity is high enough to return the oil even if it results in some loss in performance. If possible, pitch the discharge line down in the direction of refrigerant flow to improve oil return, minimally 4 inches per 100 feet of horizontal run.

Discharge lines should be sized so that the refrigerant velocity is greater than 500 fpm on horizontal runs and greater than 1000 fpm on vertical runs. Since it may be difficult to meet these requirements at minimum capacity, particularly on variable speed circuits, an oil return mode is included in the controller to return oil after the unit has been operating at low capacity (less than 50% circuit capacity).

Use of oil traps and double risers are common to help in returning oil at low-capacity conditions. The DCSA unit has an oil return mode that is automatically activated when the system has been operating at low speeds for a long duration. The oil return mode is designed to avoid the need for oil traps and double riser designs. Oil traps and double risers are not required.

Piping insulation

Suction Lines:

Install a minimum of 1 inch of insulation on all suction lines to minimize the chance of condensate forming and to avoid increased super-heat, which can reduce capacity.

Liquid Lines:

Install insulation to pipes running through areas where the temperature may be warmer than the liquid temperature to avoid reducing sub-cooling. Insulation is not required if the piping runs through areas where the temperature is less than the refrigerant temp at all expected operations.

Discharge Lines:

Install a minimum of 1 inch of insulation on all discharge lines to minimize the chance of condensate forming and to avoid heat loss in the piping before the hot gas reaches the modulating hot gas reheat (MHGRH) coil.

Leak Testing

After completion of any field installed piping for split systems, the pipework shall be pressure tested with an inert gas. Ensure that the entire refrigeration system is open by manually opening any isolation valves and powering other electrically controlled valves in the system.

1. The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure. If the high side of the system cannot be isolated from the low side of the system, the entire system shall be pressure tested to the low side design pressure. See data plate for the design pressures.
2. Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected.

Evacuation Instructions

After the system piping is complete and all leaks are repaired, evacuate the system. A robust evacuation process is required to ensure that moisture and non-condensables are removed prior to charging the system. Ensure that the entire refrigeration system is open by manually opening any isolation valves and powering other electrically controlled valves in the system. Use a vacuum pump with a pumping capacity of approximately 3 cu.ft./min. and the ability to reduce the vacuum in the unit to at least 1 mm (1000 microns).

1. Connect a mercury manometer or an electronic gauge (or other type of micron gauge) to the unit at a point remote from the vacuum pump. For readings below 1 millimeter, use an electronic or other micron gauge.
2. Use the triple evacuation method, which is particularly helpful if the vacuum pump is unable to obtain the

desired 1 mm of vacuum. The system is first evacuated to approximately 29 in. (740 mm) of mercury. Then add enough refrigerant vapor to the system to bring the pressure up to 0 pounds (0 microns).

3. Evacuate the system again to 29 in. (740 mm) of vacuum. Repeat his procedure three times. This method is most effective by holding system pressure at 0 pounds (0 microns) for a minimum of 1 hour between evacuations. The first pulldown removes about 90% of the non-condensables; the second removes about 90% of that remaining from the first pulldown. After the third pulldown, only 1/10 of 1% of non-condensables remains.

Charging Instructions

After the system has been properly evacuated, charge the system using the following recommendations:

- Ensure that contamination of different refrigerants does not occur when using charging equipment.
- Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating system is grounded prior to charging the system with refrigerant.
- Extreme care shall be taken not to overfill the refrigerating system.

Procedure:

1. Calculate an estimated refrigerant charge using Table 7 and Table 8 on page 30 and the piping lengths between the condenser and the DX coil.
2. Connect the refrigerant drum to the discharge gauge port on the manifold provided on the DCSA condensing unit. Repeat for each additional refrigerant circuit.
3. Purge the charging line between the refrigerant cylinder and the valve.
4. If the system is under a vacuum, stand the refrigerant drum with the connection up, open the drum, and break the vacuum with refrigerant gas.
5. With a system gas pressure higher than the equivalent of a freezing temperature, invert the charging cylinder and elevate the drum above the condenser. With the drum in this position and the valves open, liquid refrigerant flows into the condenser. Approximately 75% of the total requirement estimated for the unit can be charged in this manner.
6. After 75% of the required charge enters the condenser, reconnect the refrigerant drum and charging line to the suction side of the system. Again, purge the connecting line, stand the drum with the connection side up, and place the service valve in the open position.

NOTICE

At this point, interrupt the charging procedure and do prestart checks before attempting to complete the refrigerant charge.

7. Slowly add refrigerant to the suction to prevent damage. Adjust the charging tank hand valve so that liquid leaves the tank but vapor enters the compressor.
8. Continue to add charge with the unit operating until the condenser subcooling is in the range identified in Table 9 on page 31. Subcooling should be calculated using the difference between the liquid refrigerant temperature leaving the condenser and the compressor saturated discharge temperature. Do not use the liquid pressure.

NOTE 1: Upon completion of the charging process, label the system with the working fluid, the amount of refrigerant in each circuit and the date the system was charged.

NOTE 2: The DCSA unit is shipped with the proper oil amount, based on the piping length. Additional oil is not required.

Table 7: Approximate DCSA Refrigerant Charge

Model	DCSA Operation Charge (lbs)	
	Circuit #1	Circuit #2
020	17.54	17.37
025	17.30	17.13
030	17.90	17.73
031	27.12	24.96
034	17.60	17.43
035	27.10	24.76
040	26.89	24.55
045	48.48	45.61
050	28.60	24.31
052	28.15	23.90
055	48.12	45.30
060	47.72	44.91
068	46.98	44.17
075	46.18	43.40

Table 8: Approximate Weight of R-32 Refrigerant in Field Copper Lines (lbs per 100 ft of Type L Tubing)

Line Size OD (in.)	Volume per 100 ft (ft^3)	Weight of Refrigerant (lbs/100 ft)		
		Liquid Tc = 115°F (46°C) & 15°F (8.3°C) SC	Suction Gas Te = 40°F (4°C) & 10°F (5.6°C) SH	Discharge Gas (Reheat) Te = 40°F (4°C) & 10°F (5.6°C) SH
3/8	0.054	3.06	0.08	0.08
1/2	0.100	5.67	0.15	0.15
5/8	0.162	9.19	0.25	0.25
7/8	0.336	19.06	0.51	0.51
1-1/8	0.573	32.51	0.88	0.88
1-3/8	0.872	49.47	1.33	1.33
1-5/8	1.237	70.18	1.89	1.89
2-1/8	2.147	121.80	3.28	3.28
2-5/8	3.312	187.89	5.06	5.06
3-1/8	4.728	268.22	7.23	7.23
3-5/8	6.398	362.96	9.78	9.78
4-1/8	8.313	471.60	12.71	12.71

Table 9: Typical Subcooling Operating Values

Outdoor Ambient	Subcooling Range
75 - 85°F (24°C - 29°C)	5 - 10°F (2.8°C - 5.6°C)
85 - 95°F (29°C - 35°C)	10 - 15°F (5.6°C - 8.3°C)
95 - 105°F (35°C - 41°C)	15 - 20°F (8.3°C - 11.1°C)

Table 10: Factory- and Field-Provided Refrigeration Components

	Factory-Installed	Field-Installed
Factory Provided (if ordered through Daikin Applied)		
Liquid-line solid core filter driers (removable core optional)	X	
Liquid line solenoid valves (optional)		X
Liquid line solenoid harness (optional)		X
Suction and discharge gauge ports	X	
Sight glasses	X	
Compressor isolation valves - Schrader ports (optional)	X	
Splitter solenoid valves (low ambient configuration and/or MHGRH configuration)	X	
Compressor HGRH check valve - on reheat outlet (with MHGRH configuration)		X
Compressor modulating reheat valve (with MHGRH configuration)	X	
Field Provided		
TXVs (if not ordered through Daikin Applied)		X
Liquid line piping		X
Suction line piping		X
Liquid solenoid valves (if not ordered through Daikin Applied)		X
R-32 refrigerant		X

NOTE 1: The DCSA system does not eliminate the requirement for field-supplied refrigeration components. Any components not explicitly identified as factory-installed within the installation manual shall be provided by the installing contractor.

NOTE 2: Optional components can be ordered through Daikin Applied.

Figure 18: DX Coil Circuiting Options

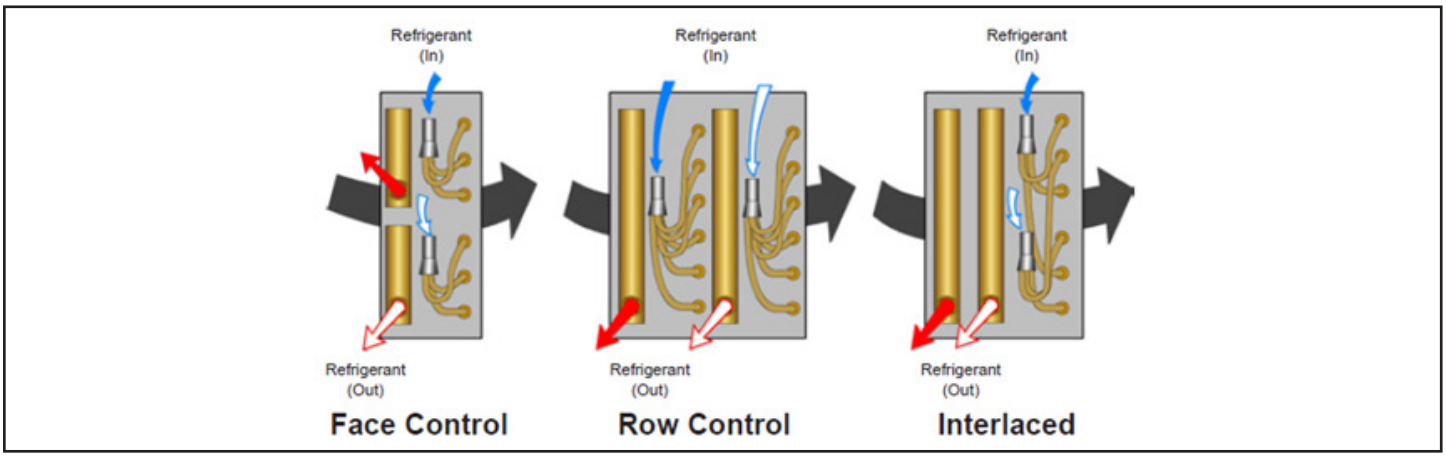


Figure 19: Condensing Unit with DX Air Handling Unit

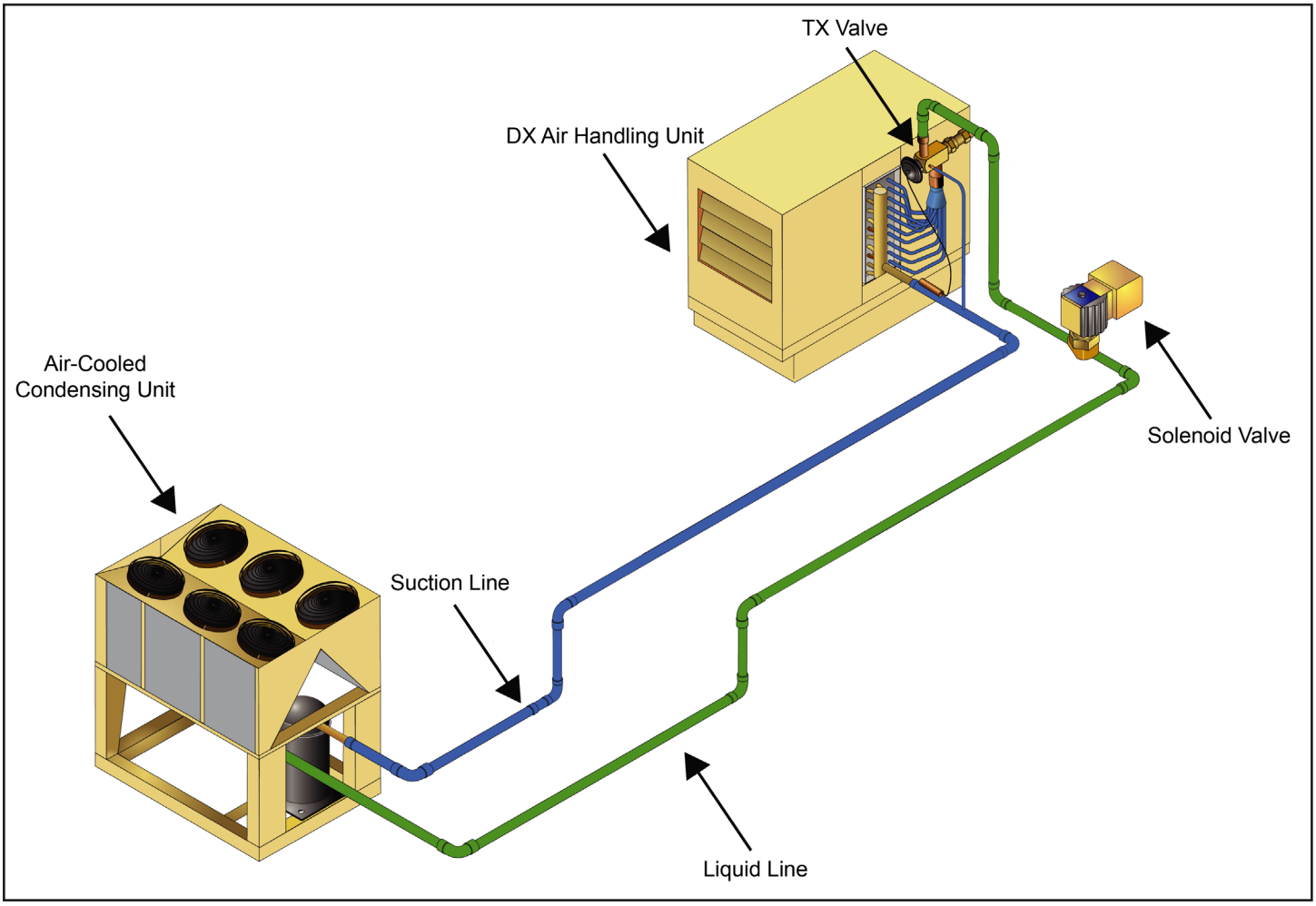
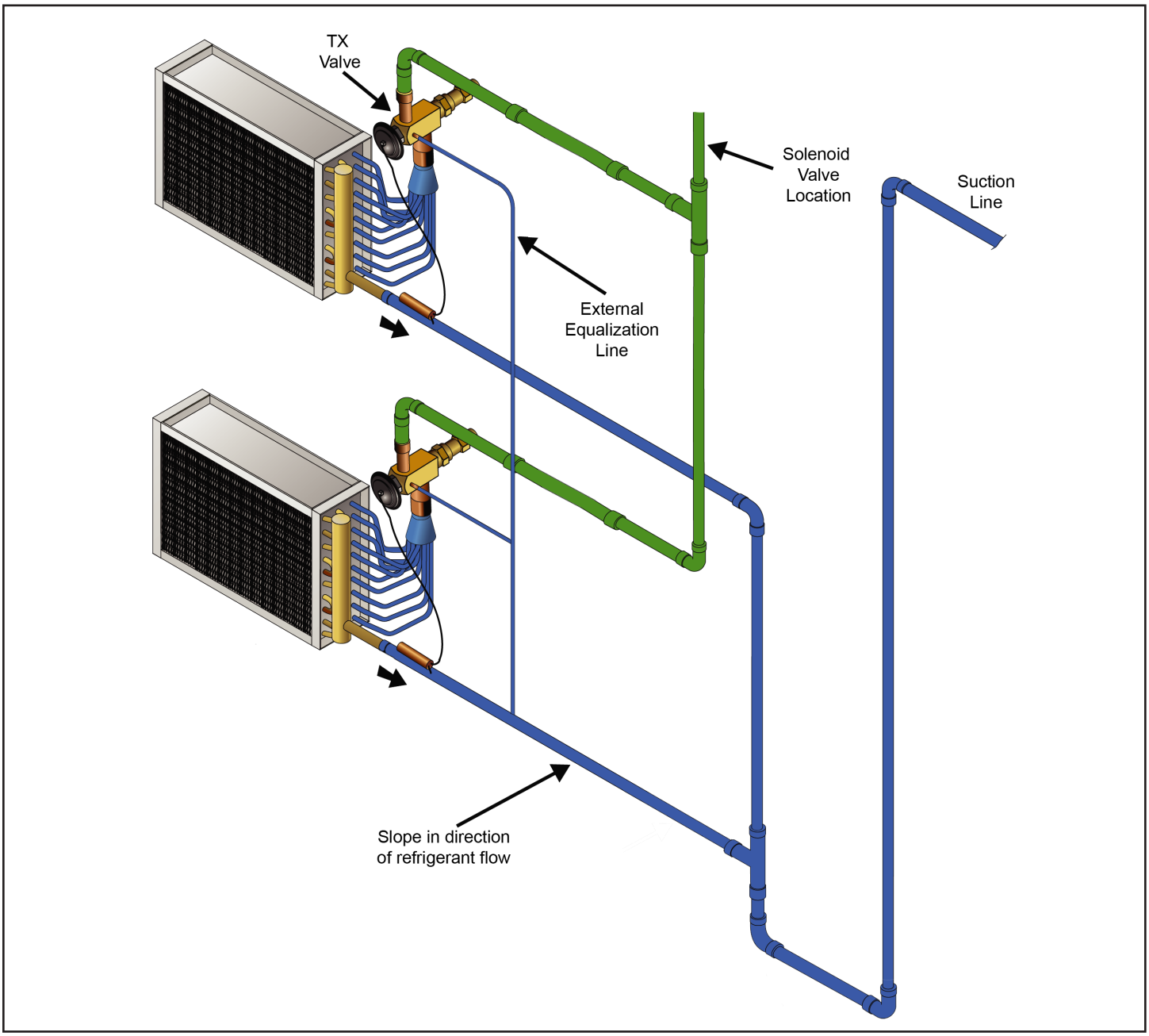


Figure 20: Two Evaporators on Common Refrigerant Circuit



NOTE: For two-evaporator system configurations, a trap shall be installed at the suction outlet to maintain a free-draining condition. Suction line traps are not required for DCSA units outside of this specific application.

Thermal Expansion Valves

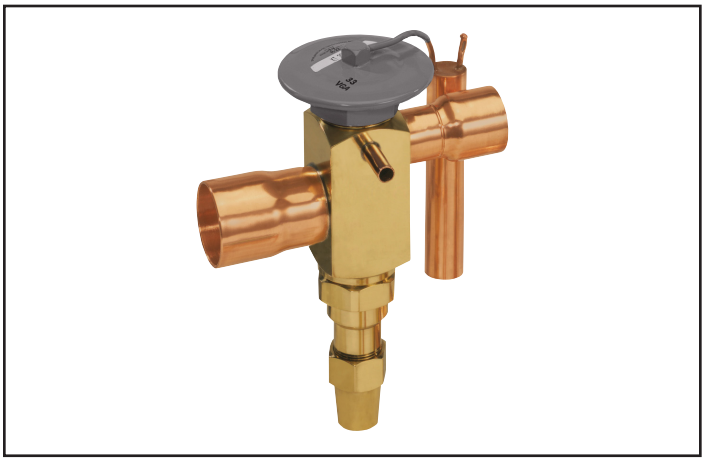
TX valves (Figure 21) are excellent for DX systems because they modulate refrigerant flow and maintain constant superheat at the evaporator. As superheat climbs, the TX valve opens allowing more refrigerant to flow. As superheat drops, the valve closes to maintain superheat.

TX valves are sized by:

- Refrigerant type
- Refrigeration circuit capacity
- Pressure drop across the valve
- Equalization (internal or external)

For smaller systems, an internally equalized TX valve is acceptable. For larger systems (greater than 2 PSI [13.8 kPa] pressure drop across the evaporator, or if a distributor is used) an externally equalized TX valve is recommended. An external line accounts for the pressure drop through the evaporator which becomes an issue on larger evaporator coils.

Figure 21: Thermal Expansion (TX) Valve



TX valves and distributors (common with air coils) should be installed in vertical pipes. If a TX valve with a distributor is installed in a horizontal pipe, there is a possibility that the liquid portion of the two-phase flow downstream of the TX valve will fill the distributor tubes on the bottom, leading to different refrigerant flow rates in the individual tubes. This is not an issue with nozzles, so horizontal installations are acceptable.

TX valves should be sized as close to capacity as possible. Use of nominal TX valve capacity is discouraged. Follow the manufacturer's selection procedures and select the valve for the actual operating conditions. Under-sizing up to 10% is acceptable if there will be significant part load operation. Higher superheat conditions at full load are allowable.

There must be one TX valve for each distributor. For large DX field applications there are often multiple refrigeration circuits, each with its own compressor, evaporator circuit, and TX valve. Evaporator circuits may be in a common evaporator coil such as interlaced, face split, or row split type. On occasions where there are multiple evaporators on a common refrigeration circuit, separate TX valves and solenoid valves are required for each evaporator.

Figure 22 on page 35 shows a typical TX valve installation.

1. The sensing bulb is strapped to the suction line on the top (12 o'clock) for line sizes under 7/8 inch (22 mm) and at 4 or 8 o'clock for larger line sizes. The bulb should be tightly strapped to a straight portion of the suction line and insulated unless it is in the leaving airstream.
2. The equalization line should be downstream of the bulb. Refer to manufacturer's installation instructions for specific details.
3. Neither the bulb nor the equalization line should be installed in a trap.

NOTICE

The use of EEVs (Electronic Expansion Valves) is not permitted on DCSA configurations.

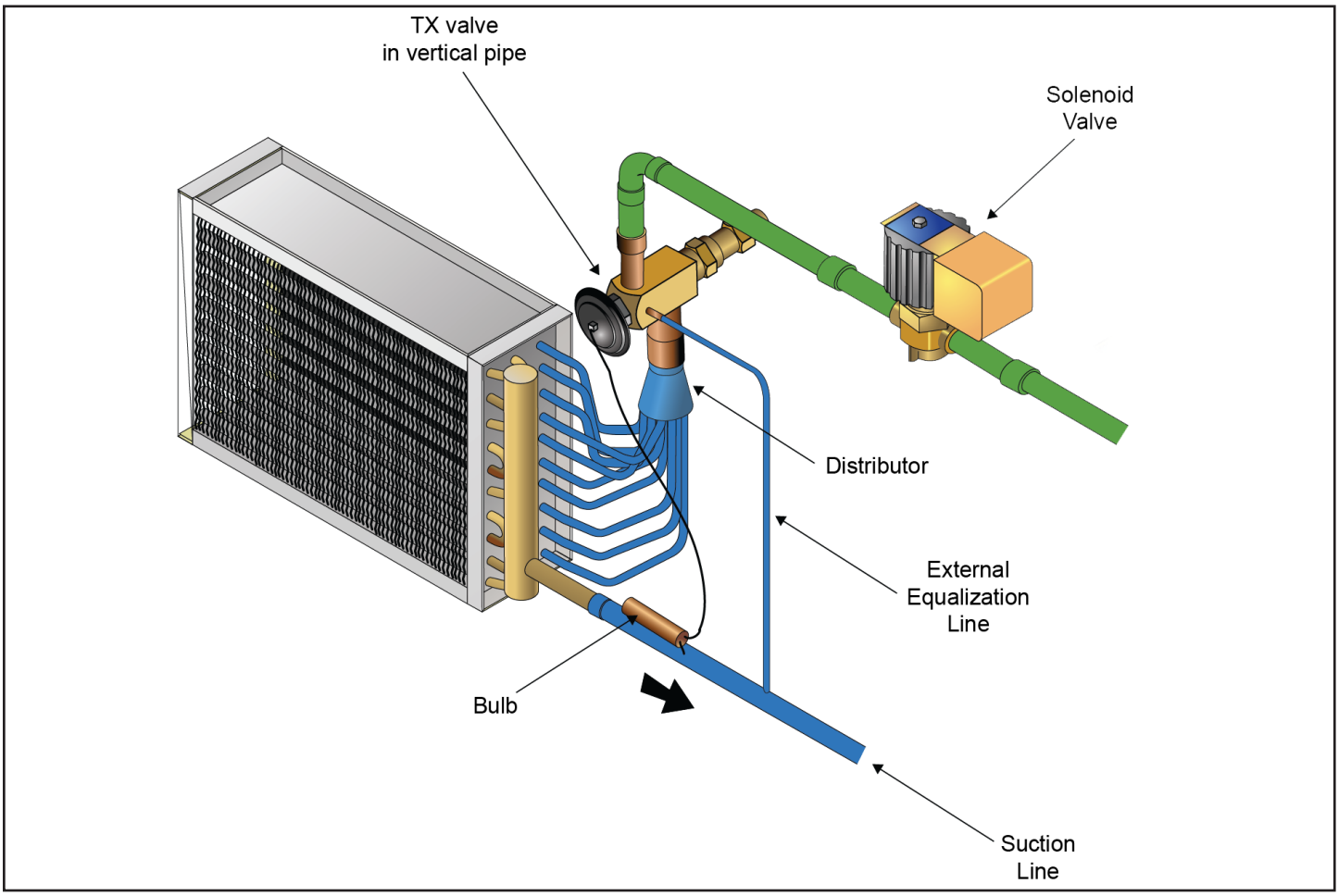
Expansion Valve Superheat Adjustment

It is important that the expansion valve superheat setting be set between 10°F (5.5°C) to 15°F (8.3°F). Low superheat can cause liquid flooding back to the compressor; resulting in loss of oil and damage to the compressor. High superheat will reduce system capacity.

Check the superheat by measuring the pressure and temperature near the evaporator when the compressors are operating at full capacity and with a load on the evaporator.

If adjustments are needed, turn the adjustment stem clockwise to increase the superheat or counter-clockwise to lower the superheat. Do not exceed one full turn in either direction. Allow system to operate and rebalance for 30 minutes between adjustments.

Figure 22: Typical TX Valve Installation



NOTE 1: A liquid line solenoid valve must be installed on each circuit just upstream of the thermal expansion valve.

NOTE 2: Sight glass and liquid filter drier are located on the condensing unit.

Unit Wiring

Field Power Wiring

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to wiring or servicing the unit. Hazardous voltage can cause serious injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

⚠ DANGER

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

⚠ DANGER

Proper line voltage and phase balance must be provided. Improper voltage or excessive phase imbalance may result in severe damage to the electrical components within the unit.

NOTICE

Remove power when making field connections. Damage to the MicroTech unit controller could occur if connections are made with the power applied.

For the unit to operate, power must be supplied to the unit through field installed service conductors. Electrical characteristics, such as Unit Voltage, Minimum Current Ampacity (MCA), and Maximum Overcurrent Protection (MOP) are found on the Unit Nameplate. These characteristics must be considered when planning the installation of the service conductors and other applicable field wiring.

NOTE: The installation of all field wiring, must comply with all applicable local codes and ordinances. The warranty is void if the field wiring is not in accordance with these standards.

Depending on the unit configuration, the unit will come with either a Fused Disconnect (factory-installed or field supplied), a Non-Fused Disconnect, a power block, or a combination in cases where multiple sources of power are specified. Consult the Unit Specific Electrical Schematics to determine the number of required sources of power.

The recommended entrance for field installed service conductors that terminate in the Main Control Panel is through the Panel Entrance Plate in the bottom right corner of the control panel enclosure. This entrance to the Main Control Panel is shown in page 37.

When planning the installation of the service conductors, consider the information in Table 11, Table 12, and Table 13 on page 36. These tables provide details for the field wired service conductor connections including the number of ports that will be available per phase as well as the range of conductor gauge that they will accept. Table 11 provides this information for non-fused disconnects, Table 12 covers the fused disconnects, and Table 13 details power block ports.

Table 11: Non-Fused Disconnect Lug Port Details

Non Fused	Type 1 Ports			Type 2 Ports		
Disconnect Size	Qty	Min AWG	Max AWG	Qty	Min AWG	Max AWG
30	1	#10	2/0	—	—	—
60	1	#10	2/0	—	—	—
100	1	#10	2/0	—	—	—
200	1	#6	300MCM	—	—	—
400	2	1/0	250MCM	1	#4	600MCM
600	2	2	600MCM	—	—	—
800	4	2	600MCM	—	—	—

Table 12: Fused Disconnect Lug Port Details

Fused	Type 1 Ports			Type 2 Ports		
Disconnect Size	Qty	Min AWG	Max AWG	Qty	Min AWG	Max AWG
60	1	#14	#6	—	—	—
100	1	#12	#1	—	—	—
200	1	#6	300MCM	—	—	—
400	2	1/0	250MCM	1	#4	600MCM
600	2	2	600MCM	—	—	—
800	2	2	600MCM	—	—	—

Table 13: Power Block Port Details

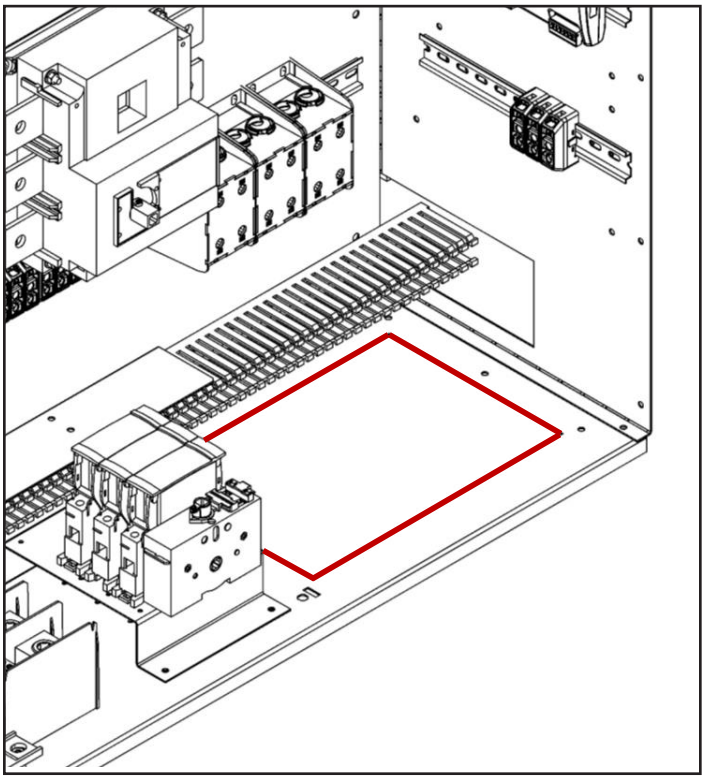
Power Block	Type 1 Ports			Type 2 Ports		
Ampacity	Qty	Min AWG	Max AWG	Qty	Min AWG	Max AWG
510	1	#2	600MCM	12	#14	#4
760	4	#4	500MCM	—	—	—
950	2	1/0	750MCM	10	#14	2/0

Copper wire is required for all field installed conductors. Supply voltage must not vary by more than 10% of the unit voltage specified on the nameplate. Phase voltage imbalance must not exceed +/- 2%. (Calculate the average voltage of the three legs. The leg with voltage deviating the farthest from the average value must not be more than 2% away.) Contact the local power company for correction of improper voltage or phase imbalance.

The unit has an option to come with a GFCI service outlet pre-installed in order to satisfy the code requirements of NEC 210.63. If the GFCI or the service lights were selected as field powered, conductors supplying a 115V 20/15A source must be run to terminals in the control panel as shown in the example in Figure 23. These terminals are typically located in the Main Control Panel at the High Voltage Terminal Block, TBHV.

If the GFCI or service lights were selected as unit powered, then no additional wiring must be run beyond the 3 phase service conductors to power the 115V service outlet. Consult the Unit Specific Electrical Schematics to determine the installation requirements.

Figure 23: Typical Field Power Entrance – Power Entrance Plate



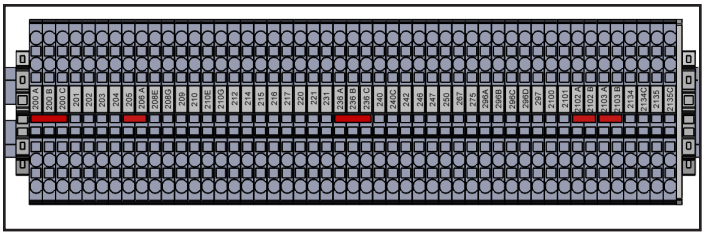
Field Control Wiring

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to wiring or servicing the unit. Electrical shock hazard that may cause severe injury or death. Connect only low voltage NEC Class II circuits to the terminal blocks. Reinstall and secure all protective front panels when the wiring installation is complete.

Rebel Applied DCSA units are available with several control schemes which may require low voltage field wiring. Use the Unit Specific Electrical Schematics to determine which control connections will be required for installation. Check unit specific electrical documentation in the door of the control panel. Figure 24 is a graphical representation of TB2 and Table 14 on page 37 shows the possible field connections that can be made.

Figure 24: Graphical Representation of TBLV2



Rebel Applied DCSA units operate with 115V and 24V control circuit power. All field control wiring connections are made at the class II terminal block TBLV2 or TBLV3 which is located in the Low Voltage Control Panel.

NOTE: The installation of all field wiring, must comply with all applicable local codes and ordinances. The warranty may be limited or certain aspects excluded if the field wiring is not in accordance with these standards.

If a single conduit containing 24V and 115V wiring is run above the roofline between units, consider the 24V wiring within as an NEC Class I wiring system.

Table 14: Potential field Connections and Locations

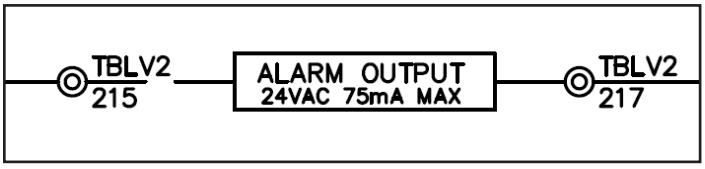
Terminal Block Number	Description	Signal
TBLV2		
200	Power	24VAC
215	Alarm Output	24VAC Relay
217	Alarm Return	24VAC Relay
231	Alarm Reset	Contact Closure
236	Controller Common	Common
240	Local/Remote Status	Relay Output
240C	Local/Remote Status	Relay Output
242	Cooling System Interlock	Contact Closure
246	Reheat Capacity Input	0-10VDC
247	Compressor Capacity Input	0-10VDC
250	Compressor Actual Capacity Output	0-10VDC
2134	Liquid Line Solenoid Valve 1	120V
2134C	Liquid Line Solenoid Valve 1	120V Neutral
2135	Liquid Line Solenoid Valve 2	120V
2135C	Liquid Line Solenoid Valve 2	120V Neutral
M	EEV Output	Common
TBLV3		
A2L-1	Air Handler A2L Leak Input	Contact Closure
A2L-2	Air Handler A2L Leak Input	Contact Closure

Field Output Signals

There are several output signals on the MicroTech Controller that may be available for field connections. For example, the Alarm Output and the Auxiliary Output, shown in Figure 25, can be used to send signals to external systems.

A field supplied 24VAC relay must be installed in order to interface these outputs with a system external to the unit. When the respective signal is active, the signal terminal will be energized with 24VAC. The coil of the field supplied 24VAC relay must be wired between the signal terminal and the common terminal. These would be terminals TBLV2-215 and TBLV2-217 in the case of the Alarm Output. The field installed relay coil may draw no more than 75mA at 24VAC.

Figure 25: Field Output Schematic



Unit Operation

Power-up

There is a 115 VAC control circuit transformer and several 24VAC circuit transformers within the unit to control the various loads and sensors within the unit. See as-built schematics that are sent with the unit to familiarize yourself with the various features and control circuits.

NOTE: Unit ships with factory installed jumpers in the emergency override circuit between TBLV2 terminal 200 and TBLV3 terminal 500 and TBLV3 terminal A2L-1.

Compressor Operation

Compressor Configuration - 1 Variable, 2 Fixed

In this configuration there are three total compressors across two refrigeration circuits.

Circuit #1 contains one variable speed compressor.

Circuit #2 contains two fixed speed compressors.

In this configuration the variable speed compressor is the lead.

Compressor Configuration - 1 Two-speed, 2 Fixed

In this configuration there are three total compressors across two refrigeration circuits.

Circuit #1 contains one two-speed compressor.

Circuit #2 contains two fixed speed compressors.

In this configuration the two-speed compressor is the lead.

Compressor Configuration - 2 Variable

In this configuration there are two variable speed compressors, one on each circuit.

The two compressors operate in parallel (same speed) except when the capacity demand is lower than the capacity provided by both compressors operating at minimum speed (low demand scenarios) or when the unit is operating in dehumidification mode.

Compressor Configuration - 2 Variable, 2 Fixed

In this configuration there are two variable speed compressors and two fixed speed compressors - one of each on each circuit.

The two variable speed compressors operate in parallel (same speed) except when the capacity demand is lower than the capacity provided by both compressors operating at minimum speed (low demand scenarios) or when the unit is operating in dehumidification mode. Fixed speed compressors are switched on only if capacity demand is high enough, with circuit 1 fixed speed compressor being brought online prior to the fixed speed compressor on circuit 2.

Cross Load - 4 Fixed

During a call for mechanical cooling, if HP1 is closed, then DO1 on expansion module C closes, energizing the M1 compressor contactor. The M1 auxiliary brings on required condenser fans and de-energizes the crankcase heater.

The second stage of cooling is controlled by DO1 on expansion module D. Compressor 2 is on circuit 2 and is brought on in the same manner as compressor #1, as well as the condenser fans and crankcase heater on the circuit.

The 3rd stage of cooling is controlled by DO2 on expansion module C and brings on compressor 3.

The 4th stage of cooling is controlled by DO2 on expansion module D and brings on compressor 4.

Compressor Configuration - 2 Variable, 4 Fixed

In this configuration there are two variable speed compressors and four fixed speed compressors – one variable and two fixed on each circuit.

The two variable speed compressors operate in parallel (same speed) except when the capacity demand is lower than the capacity provided by both compressors operating at minimum speed (low demand scenarios) or when the unit is operating in dehumidification mode. Fixed speed compressors are switched on only if capacity demand is high enough, with circuit 1 and circuit 2 adding compressors in the way that best balances efficiency and capacity demand. The fixed compressor with the least amount of run hours will be turned on first (of the two fixed compressors on each circuit).

In the case where this compressor configuration is used in a high output heat pumps, the last fixed speed compressors on both circuits, referred to as “boost compressors”, will be switched on only when extra capacity is needed in extra low ambient scenarios (<15 deg F).

Lead Load

The loading and unloading process is similar except that both compressors in the lead cooling circuit 1 energize before energizing any compressors in lag circuit 2.

Phase Voltage Monitor

The phase voltage monitor protects against high voltage, phase imbalance, and phase loss (single phasing) when any one of three line voltages drops to 74% or less of setting. This device also protects against phase reversal when improper phase sequence is applied to equipment, and low voltage (brownout) when all three line voltages drop to 90% or less of setting. An indicator run light is ON when all phase voltages are within specified limits. The phase voltage monitor is located on the load side of the power block with a set of contacts wired to the 115-volt control circuit to shut the unit down whenever the phase voltages are outside the specified limits.

Start-Up, Checks, and Tests

⚠ DANGER

LOCKOUT/TAGOUT all power sources before servicing this equipment. More than one disconnect may be required to de-energize unit.

Electric shock and moving components such as, fans, dampers, energy recovery devices can cause serious injury, death, and property damage.

All start-up and service work must be performed only by trained, experienced technicians familiar with the hazards of working on this type of equipment.

Read and follow the all relevant manuals before operating or servicing.

Bond the equipment frame to the building electrical ground through grounding terminal or other approved means.

All units complete an end-of-line operation test at the factory to promote proper operation in the field. Nevertheless, the following check, test, and start procedures must be performed to properly start the unit. To obtain full warranty coverage, complete and sign the check, test, and start form supplied with the unit, or complete the "Warranty" on page 57 and return it to Daikin Applied.

A representative of the owner or the operator of the equipment should be present during start-up to receive instructions in the operation, care, and maintenance of the unit.

Servicing High Voltage Control Panel Components

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to servicing the unit. Hazardous voltage may cause serious injury, death, and property damage. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

Disconnect all electric power to the unit when servicing control panel components. Unless power is disconnected to the unit, the components remain energized. Always inspect units for multiple disconnects to ensure all power is removed from the control panel and its components before servicing.

Before Start-up

1. Verify that the unit is completely and properly installed.
2. Verify that all construction debris is removed.
3. Verify that all electrical work is complete and properly terminated.
4. Verify that all electrical connections in the unit control panel and compressor terminal box are tight, and that the proper voltage is connected.
5. Verify all nameplate electrical data is compatible with the power supply.
6. Verify the phase voltage imbalance is no greater than +/- 2%.
7. Review the equipment and service literature, the sequences of operation, and the wiring diagrams to become familiar with the functions and purposes of the controls and devices.
8. Verify that the crankcase heaters are operating.

NOTICE

Crankcase heaters should operate for at least 24 hours before starting the compressors.

9. Determine which optional controls are included with the unit.

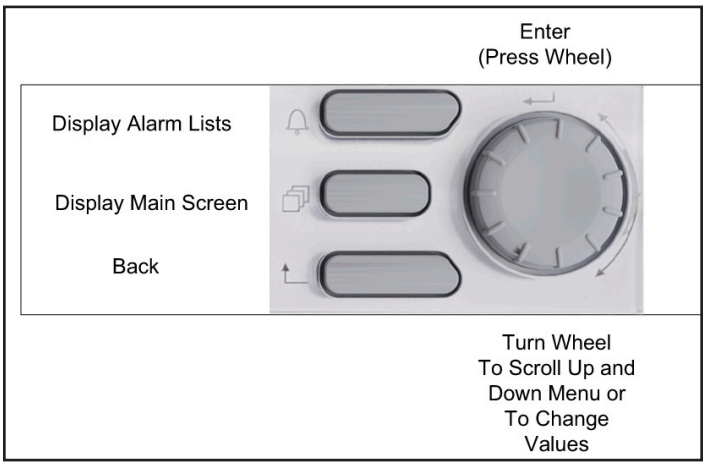
Using the Keypad/Display

The keypad/display consists of a 5-line by 22 character display, three keys and a “push and roll” navigation wheel. There is an Alarm Button, Menu (Home) Button, and a Back Button. The wheel is used to navigate between lines on a screen (page) and to increase and decrease changeable values when editing. Pushing the wheel acts as an Enter Button.

The first line on each page includes the page title and the line number to which the cursor is currently “pointing”. The line numbers are X/Y to indicate line number X of a total of Y lines for that page. The left most position of the title line includes an “up” arrow to indicate there are pages “above” the currently displayed items, a “down” arrow to indicate there are pages “below” the currently displayed items or an “up/down” arrow to indicate there are pages “above and below” the currently displayed page.

Each line on a page can contain status only information or include changeable data fields. When a line contains status only information and the cursor is on that line all but the value field of that line is highlighted meaning the text is white with a black box around it. When the line contains a changeable value and the cursor is at that line, the entire line is highlighted. Each line on a page may also be defined as a “jump” line, meaning pushing the navigation wheel will cause a “jump” to a new page. An arrow is displayed to the far right of the line to indicate it is a “jump” line and the entire line is highlighted when the cursor is on that line.

Figure 26: Keypad Controls



The keypad/display Information is organized into five main menus or menus groups; Alarm Lists Menu, Quick Menu, Main Menu, Advanced Menus and Advanced Menus.

Only menus and items that are applicable to the specific unit configuration are displayed.

The Alarm Lists Menu includes active alarm and alarm log information. The Quick Menu includes status information indicating the current operating condition of the unit. Standard Menus include basic menus and items required to setup the unit for general operation. These include such things are control mode, occupancy mode and heating and cooling setpoints. Advanced Menus include more advanced items for “tuning” unit operation such as PI loop parameters and time delays. Advanced Menus include the most advanced items such as “unit configuration” parameters and service related parameters. These generally do not need changing or accessing unless there is a fundamental change to or a problem with the unit operation.

NOTE: Refer to the DCSA unit controller operation manual (OM 1406) for more details.

Passwords

Various menu functions are made accessible based on the access level of the user. There are four access levels: Level 2, Level 4, Level 6, and no password. Level 2 has access to the most menu functions. Before entering a password, the user has access to basic status menu items.

The main password page is displayed when the keypad/display is first accessed, the Home Key is pressed, the Back Key is pressed multiple times, or if the keypad/display has been idle longer than the Password Timeout period (default 10 minutes). The main password page provides access to enter a password.

- A user can access the Quick Menu, access and acknowledge alarms in the alarm lists, and view information about the unit with no password.
- Entering the Level 6 password (5321) allows access to the Alarm Lists Menu, Quick Menu, View Status Menus group, System Mode, and compressor control mode.
- Entering the Level 4 password (2526) provides access to Level 6 items and the Commission Unit Menu, Local Control, Service Menu groups, and Unit Maintenance.

Entering the Level 2 password (6363) provides access to Level 4 items and the Trending Set-Up and Advanced Menus. To access the advanced menu, you need to enter a level 2 password and set the enable advanced menu flag to Yes in the service menu.

Continuing without entering one of these three levels allows access only to the Alarm Lists Menu and the Quick Menu.

NOTE: Alarms can be acknowledged without entering a password.

The password field initially has a value **** where each * represents an adjustable field. These values can be changed by entering the Edit Mode.

Entering an invalid password has the same effect as continuing without entering a password.

Once a valid password has been entered, the controller allows further changes and access without requiring the user to enter a password until either the password timer expires or a different password is entered. The default value for this password timer is 10 minutes. It is changeable from 3 to 720 minutes via the Timer Settings menu in the Advanced Menus.

Figure 27: Password Main Page

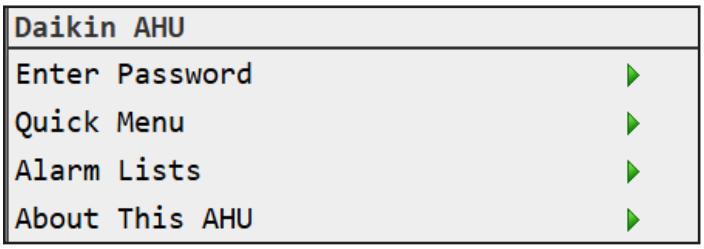
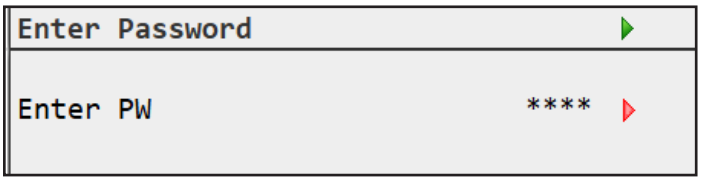


Figure 28: Password Entry Page



Navigation Mode

In the Navigation Mode, when a line on a page contains no editable fields all but the value field of that line is highlighted meaning the text is white with a black box around it. When the line contains an editable value field the entire line is inverted when the cursor is pointing to that line.

When the navigation wheel is turned clockwise, the cursor moves to the next line (down) on the page. When the wheel is turned counter-clockwise the cursor moves to the previous line (up) on the page. The faster the wheel is turned the faster the cursor moves.

When the Back Button is pressed the display reverts back to the previously displayed page. If the Back button is repeated pressed the display continues to revert one page back along the current navigation path until the “main menu” is reached.

When the Menu (Home) Button is pressed the display reverts to the “main page.”

When the Alarm Button is depressed, the Alarm Lists menu is displayed.

Edit Mode

The Editing Mode is entered by pressing the navigation wheel while the cursor is pointing to a line containing an editable field. Once in the edit mode pressing the wheel again causes the editable field to be highlighted. Turning the wheel clockwise while the editable field is highlighted causes the value to be increased. Turning the wheel counter-clockwise while the editable field is highlighted causes the value to be decreased.

The faster the wheel is turned the faster the value is increased or decreased. Pressing the wheel again cause the new value to be saved and the keypad/display to leave the edit mode and return to the navigation mode.

NOTE: If desired, you can significantly reduce all MicroTech internal control timers by changing the entry under keypad menu Main Menu\Commission Unit\ Timer Settings\Startup,Recirculate = (from 180s to 60s minimum where 60s is the number of seconds you want the unit to operate with fast timers).

Compressor Start-up

⚠ CAUTION

Low ambient temperature can cause compressor damage. Do not attempt to start up and check the refrigeration system when the outdoor air temperature is below 50°F (10°C) unless the unit is specially equipped for low ambient operation.

NOTICE

Venting refrigerant to atmosphere is not allowed per federal and state laws and local regulations and codes.

Make sure that there is airflow over the evaporator prior to turning on the compressors.

If the unit contains optional compressor isolation valves, Verify that valves are open. These are ball valves that can be opened with a quarter turn.

Verify that the crankcase heaters are energized.

NOTICE

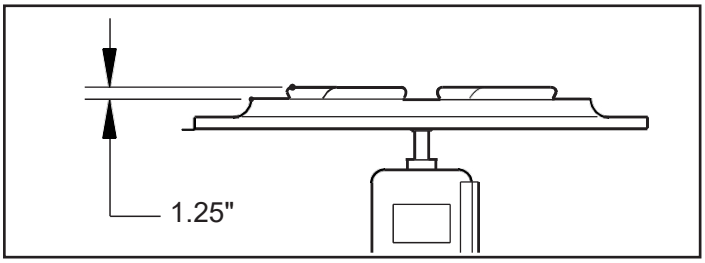
Crankcase heaters should operate for at least 24 hours before starting the compressors.

Verify that the condenser fan blades are positioned properly and that the screws are tight (Figure 29). The fan blade must be correctly positioned within its orifice for proper airflow across the condenser coils.

NOTICE

This applies to standard condenser fan, not quiet condenser fans.

Figure 29: Condenser Fan Blade Positioning



Scroll Compressor Rotational Direction

Scroll compressors only compress in one rotational direction. Three-phase compressors can rotate in either direction depending upon phasing of the power to L1, L2, and L3.

Since there is a 50/50 chance of connecting power to cause rotation in the reverse direction. Use a phase rotation meter to confirm phasing is clockwise. If the compressor is rotating properly when energized, the suction pressure will decrease and the discharge pressure will increase. If the compressor is rotating in reverse, the sound level is louder and current draw is reduced substantially. After several minutes of operation rotating in the incorrect direction, the compressor’s motor protector may trip. Tripping will not damage the compressor as long as it does not continue to repeat this cycle.

All three-phase compressors are wired the same internally. Therefore, once the correct phasing is determined for a specific

system or installation, connecting properly phased power leads to the same terminals should maintain proper rotational direction.

1. The compressor should operate continuously while there is a call for cooling. If the compressor cycles on its low pressure switch, due the following:
    a. Verify that the circuit is not low on refrigerant.
    b. Check for low supply airflow.
    c. Check for clogged filters.
    d. Check for restricted ductwork.
    e. Check for very low temperature return air entering the unit.
    f. Verify that the liquid line components, expansion valve, and distributor tubes are feeding the evaporator coil.
    g. Verify that all air handling section panels are closed.
2. If the refrigeration circuit has multiple compressors, verify that the compressors stage properly. As the circuit load increases the second compressor (if available) will be energized.
3. Verify that the condenser fans are cycling (ON/OFF) and rotating properly (blowing air upward). When a compressor starts, at least one condenser fan should also start. MT4 should control the remaining condenser fans based on ambient air conditions. Refer to the unit wiring diagrams for control wiring.
4. Verify that the condenser refrigerant subcooling for each refrigeration circuit at full capacity is between as shown in Table 9 on page 31.
5. Check refrigerant circuit #2 by repeating this procedure.

Maintaining Control Parameter Records

Daikin Applied recommends that the MicroTech controller's setpoints and parameters be recorded and saved for future reference. If the Main Control Board (MCB) requires replacement, this record facilitates entering the unit's proper data. A number of menus and menu items that appear on the unit keypad/display are conditional and may not apply to a specific unit, depending on the unit software configuration. The unit software configuration is defined by a "Software Configuration Code" shown on a label located near the keypad/display. The Software Configuration Code also can be displayed via the menu items in the About this AHU or Advanced Menus\Unit Configuration menus on the unit keypad/ display.

NOTE: Keep a record of any changes made to any of these items.

Unit Maintenance

Servicing Control Panel Components

⚠ WARNING

LOCKOUT/TAGOUT all power sources before servicing this equipment. More than one disconnect may be required to de-energize unit. Moving machinery such as fans, dampers and energy recovery devices may cause injury, death, and property damage.

⚠ WARNING

Exercise caution when servicing the unit. Sharp edges are inherent to sheet metal parts, screws, clips and similar items. Wear appropriate PPE such as eye protection, gloves, protective clothing, foot wear, etc., to prevent personal injury, severe personal injury, or death.

⚠ CAUTION

Sharp edges are inherent to sheet metal parts, screws, clips, and similar items. May cause personal injury. Exercise caution when servicing equipment.

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to servicing the unit. Hazardous voltage may cause serious injury or death.

Disconnect all electric power to the unit when servicing control panel components Always inspect the unit for multiple disconnects to ensure all power is removed from the control panel and its components. More than one disconnect may be required to de-energize the unit.

Example Wiring Diagram

Figure 30: Typical Rebel Applied DCSA Wiring Diagram (1)

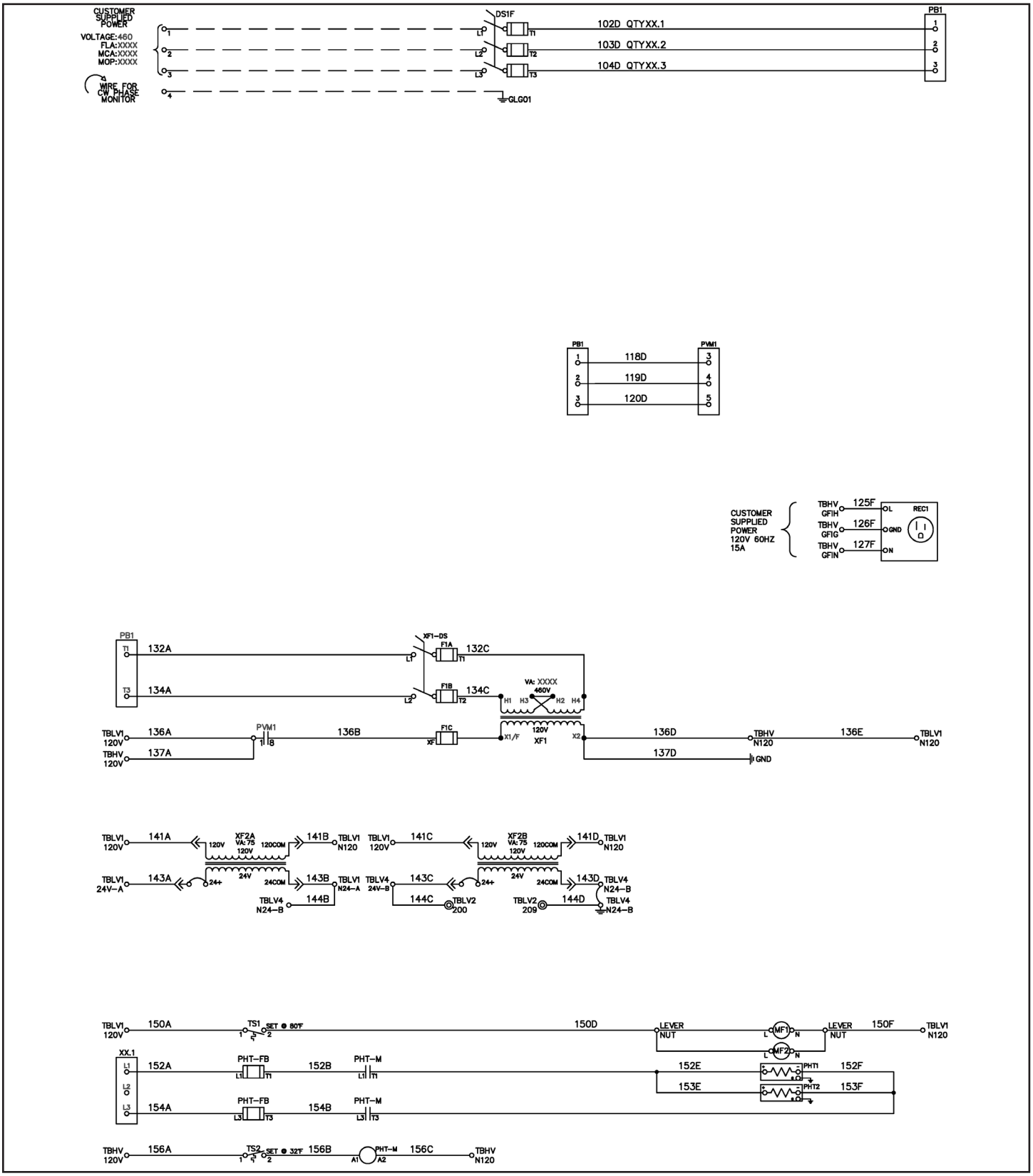


Figure 31: Typical Rebel Applied DCSA Wiring Diagram (2)

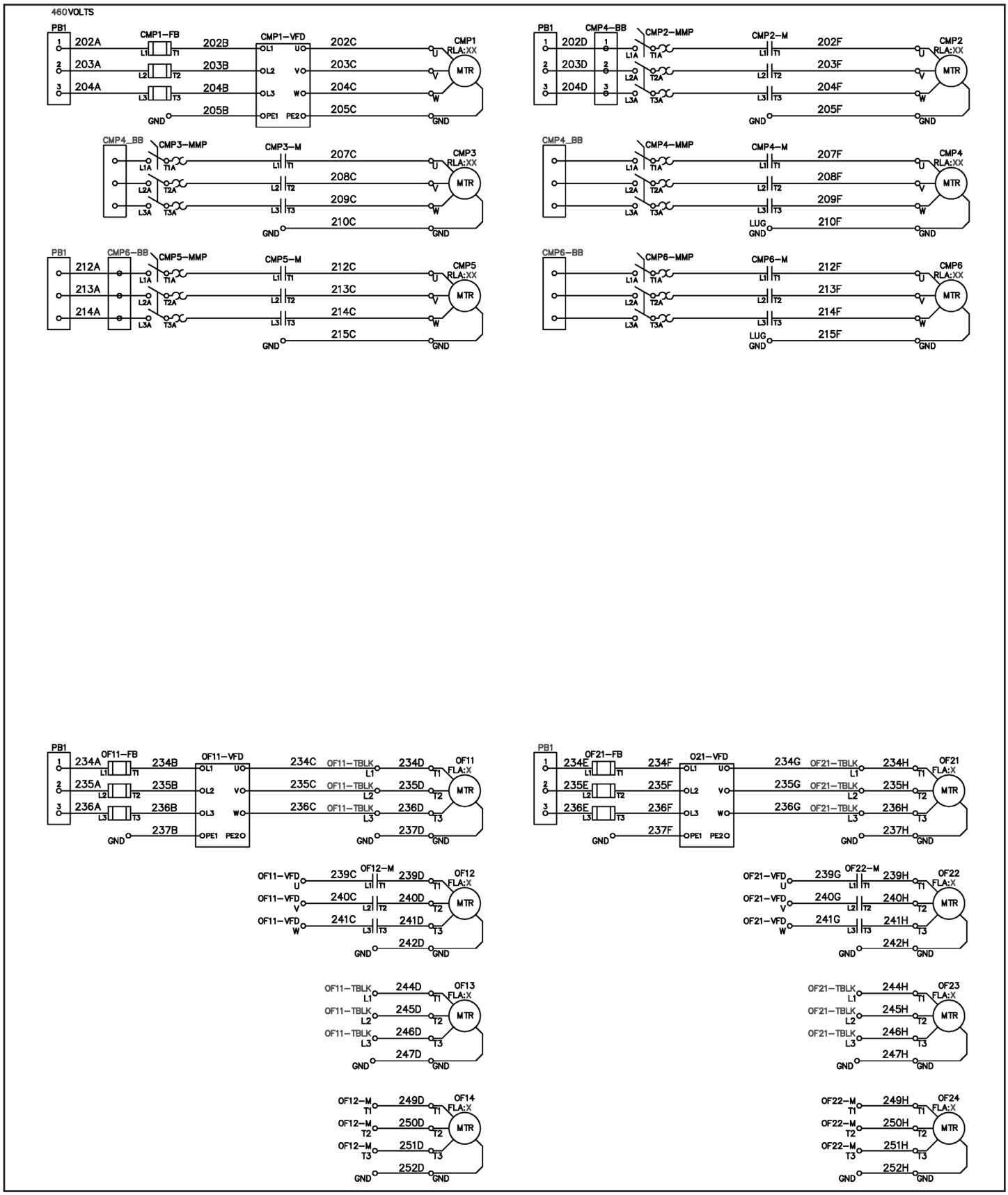


Figure 32: Typical Rebel Applied DCSA Wiring Diagram (3)

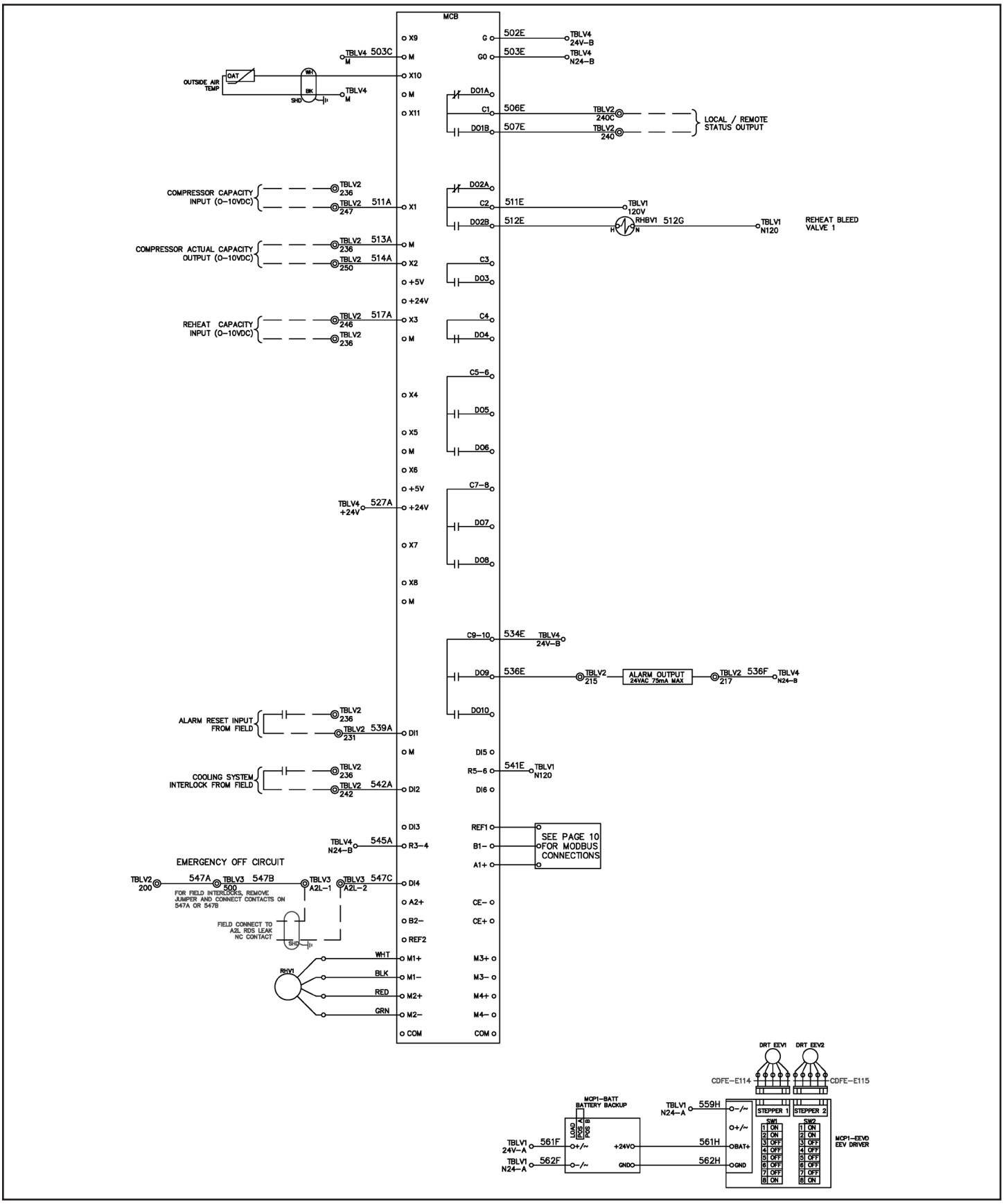


Figure 33: Typical Rebel Applied DCSA Wiring Diagram (4)

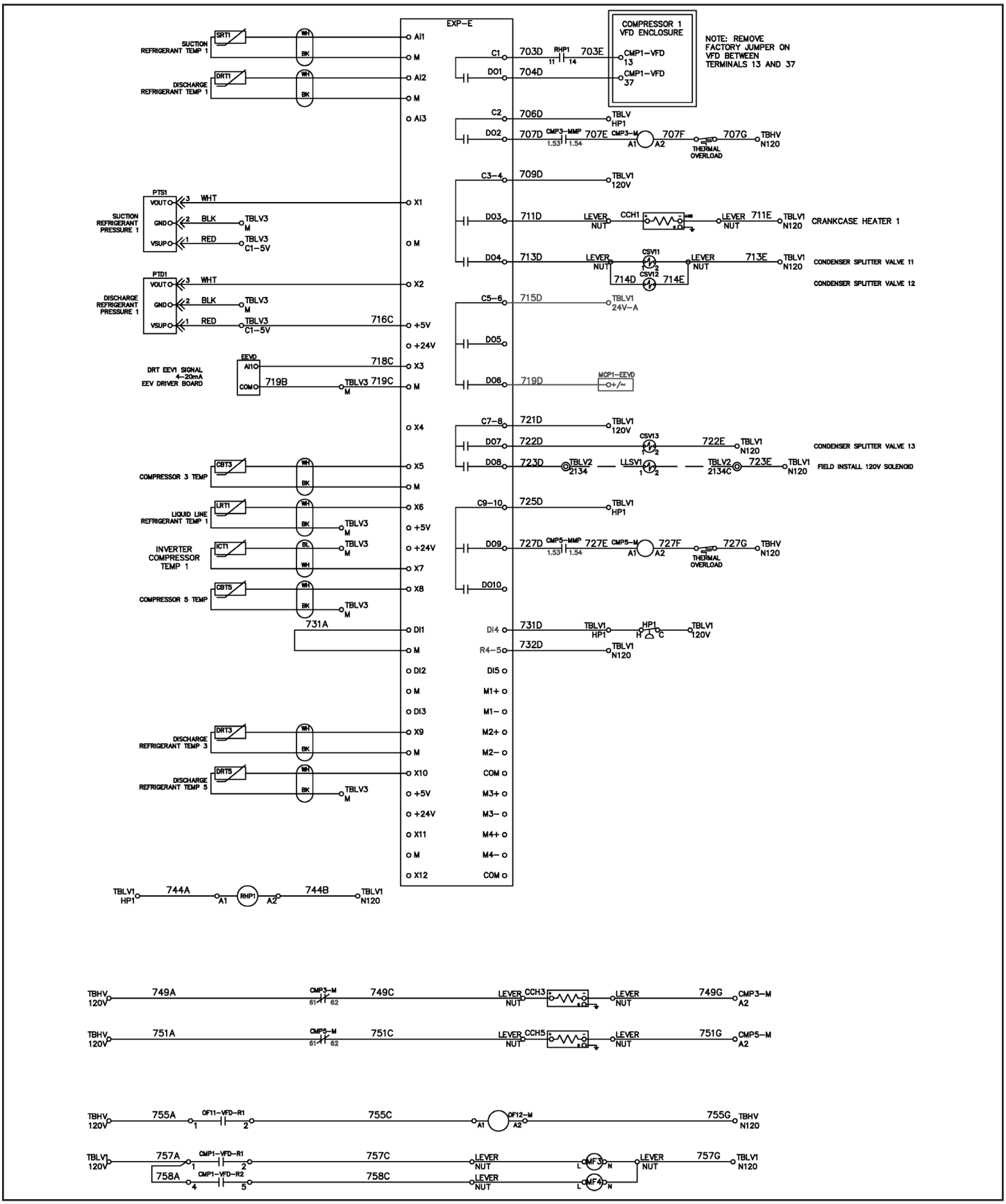


Figure 34: Typical Rebel Applied DCSA Wiring Diagram (5)

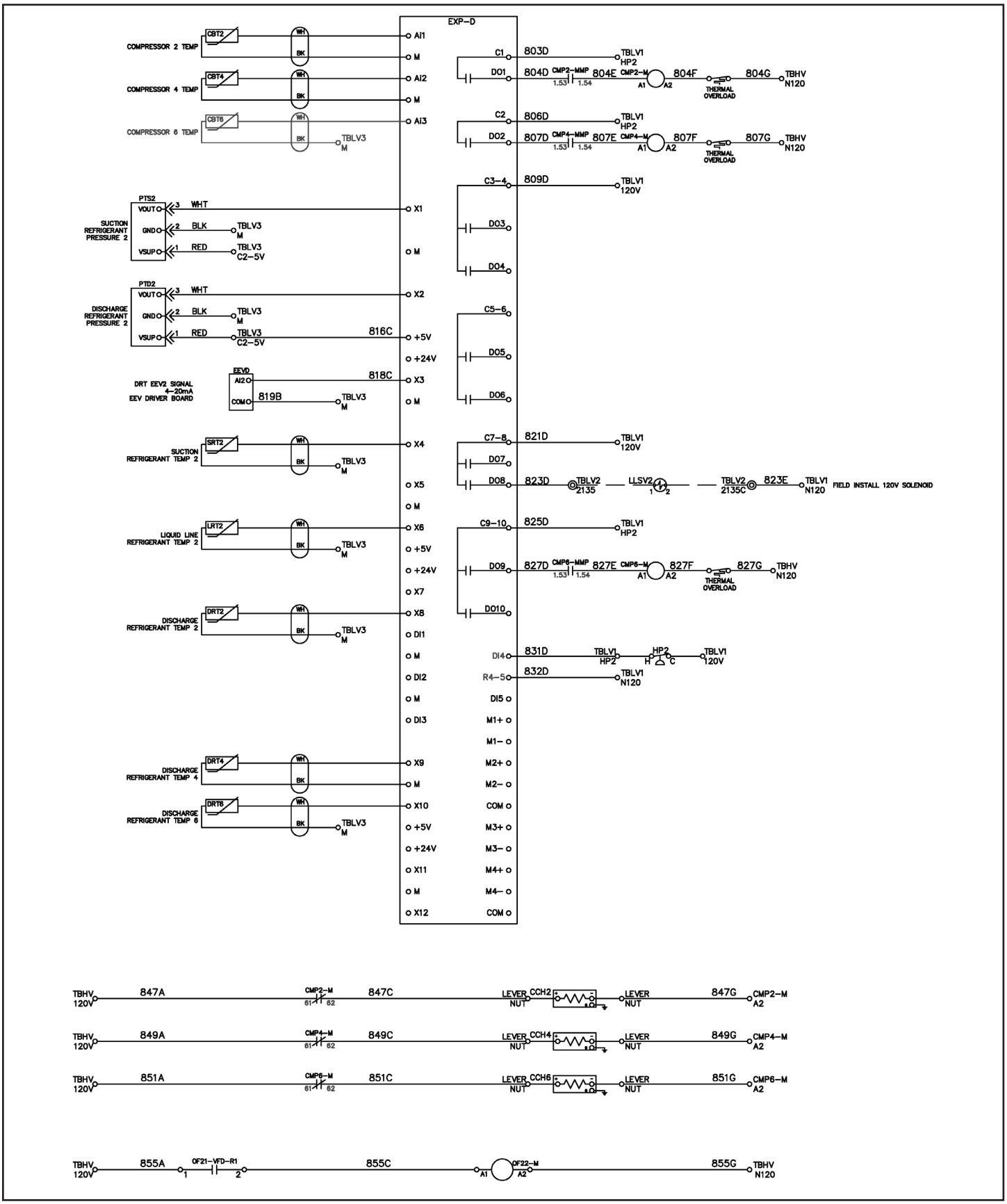
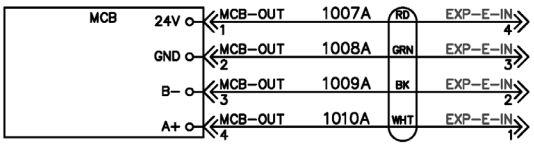
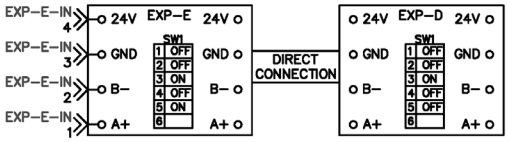


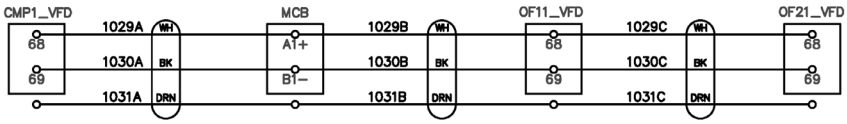
Figure 35: Typical Rebel Applied DCSA Wiring Diagram (6)

DIP SWITCHES: ON IS IN THE UP POSITION – THE LAST MODULE IN LINE MUST HAVE DIP SWITCH 6 IN THE ON POSITION





NOTE: SPLICE DRAINS TOGETHER BUT ONLY TERMINATE ON MCB



MODBUS DEVICE ADDRESSES

CMP1_VFD : 31
MCB : 01

OF11_VFD : 51
OF21_VFD : 52

Planned Maintenance

Planned maintenance is the best way to avoid unnecessary expense and inconvenience. Have this system inspected at regular intervals by a qualified service technician. The required frequency of inspections depends upon the total operating time and the indoor and outdoor environmental conditions. Routine maintenance should cover the following items:

- Check each circuit's refrigerant sightglass when the circuit is operating under steady-state, full load conditions. The sightglass should then be full and clear. If it is not, check for refrigerant leaks.

NOTE: A partially full sight glass is not uncommon at part load conditions.

- Check for proper superheat.
- Check for proper subcooling (see Table 9 on page 31).
- Check the power and control voltages.
- Check the running amperage of all motors.
- Check all operating temperatures and pressures.
- Check and adjust all temperature and pressure controls as needed.
- Check the operation of all safety controls.
- Check the condenser fans and tighten their setscrews.
- Lubricate the door latch mechanisms.

Unit Storage

Location

The Daikin Applied Air-Cooled Split Condensing unit is an outdoor unit. However, the schedule may dictate storage either on the ground or in its final position at the site. If the unit is stored on the ground, additional precautions should be taken as follows:

- Make sure that the unit is well supported along the length of the base rail.
- Make sure that the unit is level (no twists or uneven ground surface).
- Provide proper drainage around the unit to prevent flooding of the equipment.
- Provide adequate protection from vandalism, mechanical contact, etc. The condenser fins are particularly vulnerable to damage by even light contact with objects.
- Make sure all doors are securely closed.

Preparation

Refrigeration circuits

The steps below are necessary only if the unit has been started.

1. Turn the compressor manual motor protectors (MMP) to the OFF position.
2. Close the discharge and liquid line refrigerant service valves on each circuit.
3. Tag the valves as a warning for the technician who restarts the units.

Restart

After extended storage, perform a complete start up. Inevitable accumulations of dirt, insect nests, etc., can contribute to problems if not cleaned out thoroughly prior to start up. In addition, thermal cycling tends to loosen mechanical and electrical connections. Following the start-up procedure helps discover these and other issues that may have developed during the storage interval.

Sensor Calibration

The unit may be equipped with up to four types of sensors. Calibration scaling can be referenced on page 51 through page 56.

Table 15: Low Pressure Transducer Scaling Data

PSIG	VDC		PSIG	VDC
0	0.50		180	2.56
10	0.61		190	2.67
20	0.73		200	2.79
30	0.84		210	2.90
40	0.96		220	3.01
50	1.07		230	3.13
60	1.19		240	3.24
70	1.30		250	3.36
80	1.41		260	3.47
90	1.53		270	3.59
100	1.64		280	3.70
110	1.76		290	3.81
120	1.87		300	3.93
130	1.99		310	4.04
140	2.10		320	4.16
150	2.21		330	4.27
160	2.33		340	4.39
170	2.44		350	4.50

Figure 36: Low Pressure Transducer Scaling Graphic

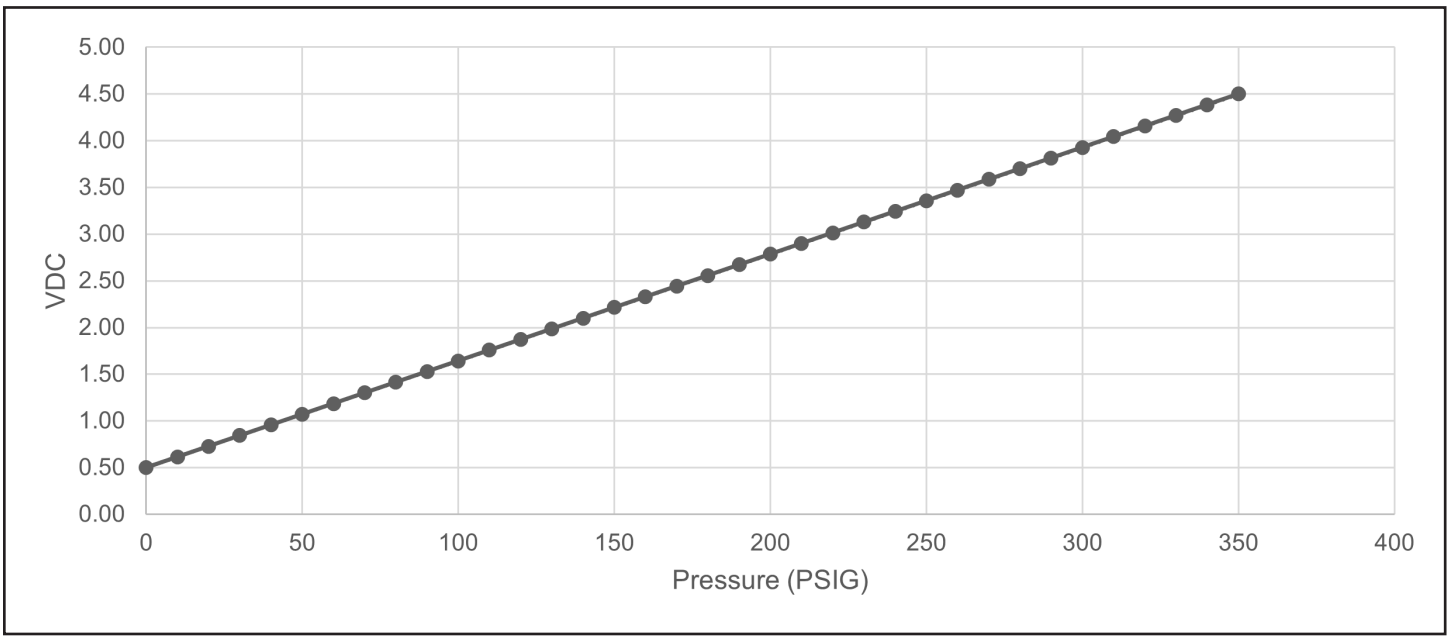


Table 16: High Pressure Sensor Scaling Data

PSIG	VDC		PSIG	VDC
0	0.50		360	2.56
10	0.56		370	2.61
20	0.61		380	2.67
30	0.67		390	2.73
40	0.73		400	2.79
50	0.79		410	2.84
60	0.84		420	2.90
70	0.90		430	2.96
80	0.96		440	3.01
90	1.01		450	3.07
100	1.07		460	3.13
110	1.13		470	3.19
120	1.19		480	3.24
130	1.24		490	3.30
140	1.30		500	3.36
150	1.36		510	3.41
160	1.41		520	3.47
170	1.47		530	3.53
180	1.53		540	3.59
190	1.59		550	3.64
200	1.64		560	3.70
210	1.70		570	3.76
220	1.76		580	3.81
230	1.81		590	3.87
240	1.87		600	3.93
250	1.93		610	3.99
260	1.99		620	4.04
270	2.04		630	4.10
280	2.10		640	4.16
290	2.16		650	4.21
300	2.21		660	4.27
310	2.27		670	4.33
320	2.33		680	4.39
330	2.39		690	4.44
340	2.44		700	4.50
350	2.50			

Figure 37: High Pressure Sensor Scaling Graphic

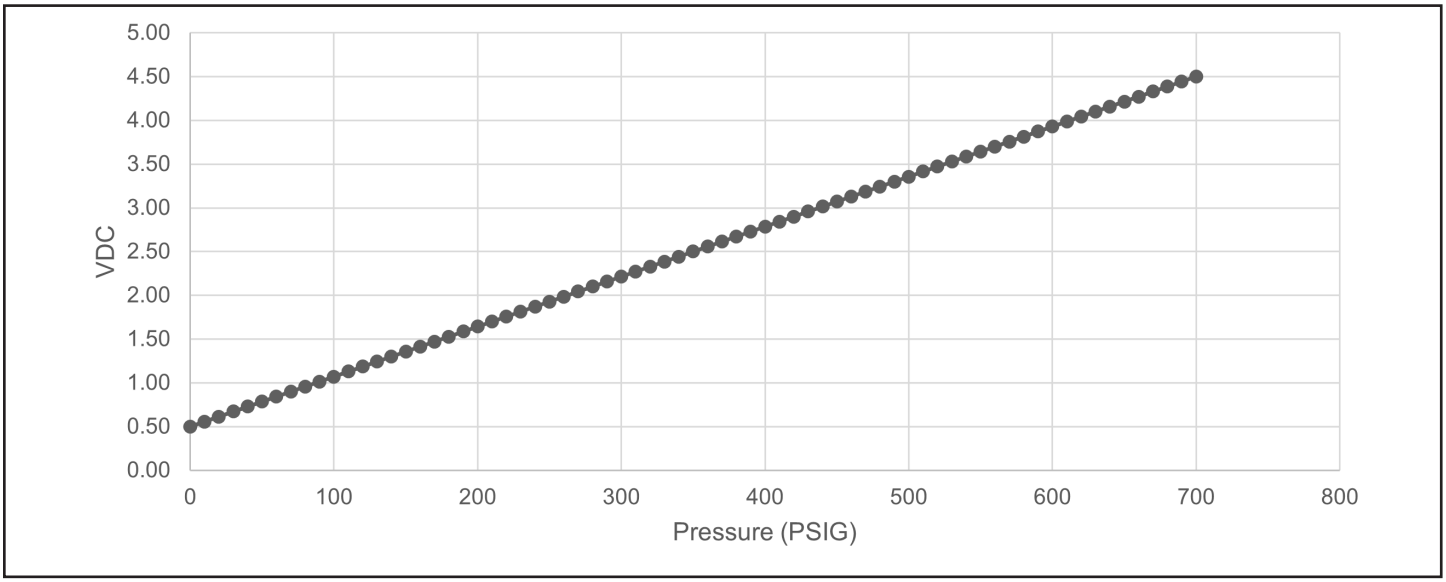


Table 17: 50K Thermistor Scaling Data

Resistance (Ω)	F (C)°	Resistance (KΩ)	F (C)°
1547.004	-40 (-40.0)	110.760	46 (7.8)
1493.674	-39 (-39.4)	107.844	47 (8.3)
1442.353	-38 (-38.9)	105.012	48 (8.9)
1392.959	-37 (-38.3)	102.264	49 (9.4)
1345.415	-36 (-37.8)	99.595	50 (10.0)
1299.644	-35 (-37.2)	97.003	51 (10.6)
1255.576	-34 (-36.7)	94.486	52 (11.1)
1213.142	-33 (-36.1)	92.042	53 (11.7)
1172.277	-32 (-35.6)	89.668	54 (12.2)
1132.918	-31 (-35.0)	87.362	55 (12.8)
1095.005	-30 (-34.4)	85.121	56 (13.3)
1058.480	-29 (-33.9)	82.945	57 (13.9)
1023.289	-28 (-33.3)	80.831	58 (14.4)
989.379	-27 (-32.8)	78.776	59 (15.0)
956.699	-26 (-32.2)	76.780	60 (15.6)
925.201	-25 (-31.7)	74.839	61 (16.1)
894.839	-24 (-31.1)	72.954	62 (16.7)
865.569	-23 (-30.6)	71.121	63 (17.2)
837.348	-22 (-30.0)	69.339	64 (17.8)
810.135	-21 (-29.4)	67.607	65 (18.3)
783.891	-20 (-28.9)	65.924	66 (18.9)
758.580	-19 (-28.3)	64.286	67 (19.4)
734.164	-18 (-27.8)	62.695	68 (20.0)
710.611	-17 (-27.2)	61.147	69 (20.6)
687.886	-16 (-26.7)	59.641	70 (21.1)
665.958	-15 (-26.1)	58.177	71 (21.7)
644.797	-14 (-25.6)	56.753	72 (22.2)
624.374	-13 (-25.0)	55.368	73 (22.8)
604.662	-12 (-24.4)	54.021	74 (23.3)
585.632	-11 (-23.9)	52.710	75 (23.9)
567.260	-10 (-23.3)	51.434	76 (24.4)
549.521	-9 (-22.8)	50.193	77 (25.0)
532.391	-8 (-22.2)	48.986	78 (25.6)
515.848	-7 (-21.7)	47.811	79 (26.1)
499.869	-6 (-21.1)	46.667	80 (26.7)
484.435	-5 (-20.6)	45.554	81 (27.2)
469.524	-4 (-20.0)	44.470	82 (27.8)
455.118	-3 (-19.4)	43.415	83 (28.3)
441.197	-2 (-18.9)	42.389	84 (28.9)
427.745	-1 (-18.3)	41.389	85 (29.4)
414.744	0 (-17.8)	40.416	86 (30.0)
402.178	1 (-17.2)	39.468	87 (30.6)
390.031	2 (-16.7)	38.545	88 (31.1)
378.287	3 (-16.1)	37.646	89 (31.7)
366.933	4 (-15.6)	36.771	90 (32.2)
355.954	5 (-15.0)	35.918	91 (32.8)
345.336	6 (-14.4)	35.088	92 (33.3)
335.068	7 (-13.9)	34.279	93 (33.9)
325.135	8 (-13.3)	33.491	94 (34.4)
315.527	9 (-12.8)	32.723	95 (35.0)
306.232	10 (-12.2)	31.975	96 (35.6)
297.238	11 (-11.7)	31.246	97 (36.1)
288.536	12 (-11.1)	30.535	98 (36.7)
280.115	13 (-10.6)	29.843	99 (37.2)
271.964	14 (-10.0)	29.168	100 (37.8)
264.075	15 (-9.4)	28.511	101 (38.3)
256.439	16 (-8.9)	27.870	102 (38.9)
249.046	17 (-8.3)	27.245	103 (39.4)

(continued)

Resistance (Ω)	F (C)°	Resistance (Ω)	F (C)°
241.888	18 (-7.8)	26.636	104 (40.0)
234.957	19 (-7.2)	26.042	105 (40.6)
228.246	20 (-6.7)	25.463	106 (41.1)
221.746	21 (-6.1)	24.898	107 (41.7)
215.451	22 (-5.6)	24.348	108 (42.2)
209.353	23 (-5.0)	23.811	109 (42.8)
203.445	24 (-4.4)	23.287	110 (43.3)
197.722	25 (-3.9)	22.777	111 (43.9)
192.176	26 (-3.3)	22.278	112 (44.4)
186.803	27 (-2.8)	21.793	113 (45.0)
181.596	28 (-2.2)	21.319	114 (45.6)
176.549	29 (-1.7)	20.856	115 (46.1)
171.657	30 (-1.1)	20.405	116 (46.7)
166.915	31 (-0.6)	19.965	117 (47.2)
162.318	32 (0.0)	19.536	118 (47.8)
157.861	33 (0.6)	19.116	119 (48.3)
153.540	34 (1.1)	18.708	120 (48.9)
149.349	35 (1.7)	18.308	121 (49.4)
145.285	36 (2.2)	17.919	122 (50.0)
141.344	37 (2.8)	17.539	123 (50.6)
137.520	38 (3.3)	17.167	124 (51.1)
133.812	39 (3.9)	16.805	125 (51.7)
130.214	40 (4.4)	16.452	126 (52.2)
126.723	41 (5.0)	16.106	127 (52.8)
123.337	42 (5.6)	15.769	128 (53.3)
120.050	43 (6.1)	15.440	129 (53.9)
116.861	44 (6.7)	15.118	130 (54.4)
113.765	45 (7.2)		

Table 18: 50K Thermistor Scaling Graphic

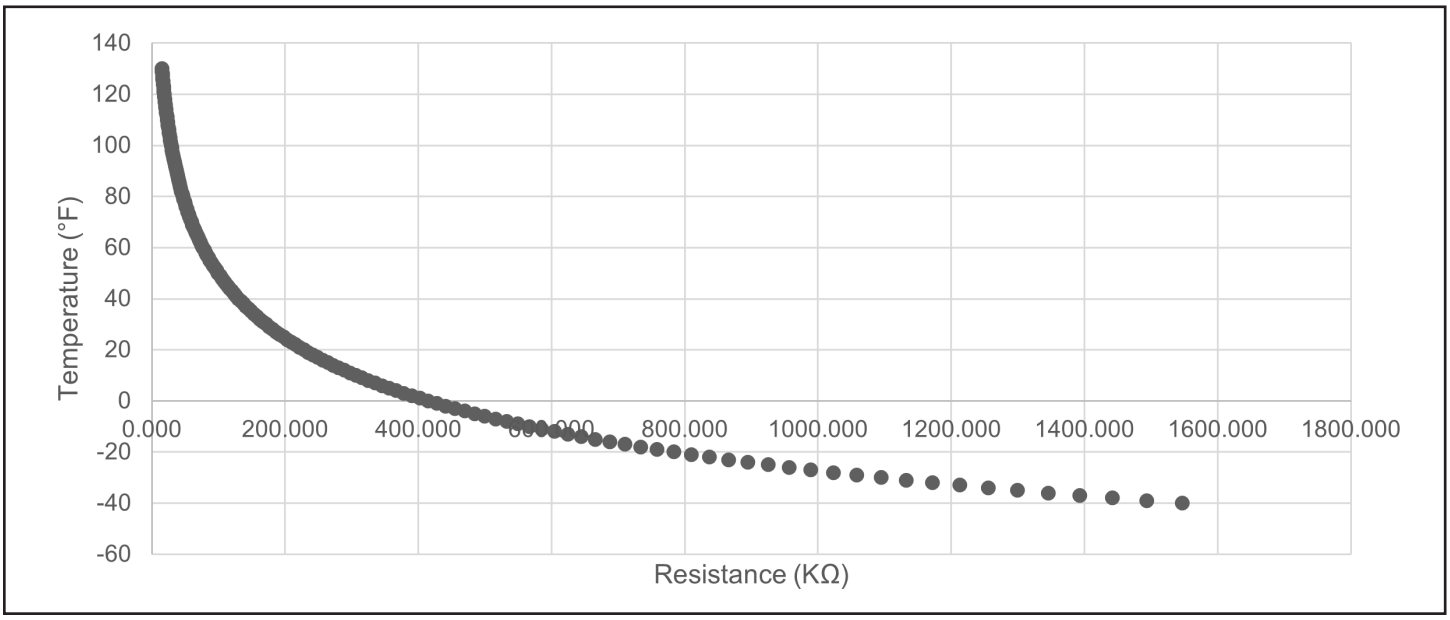


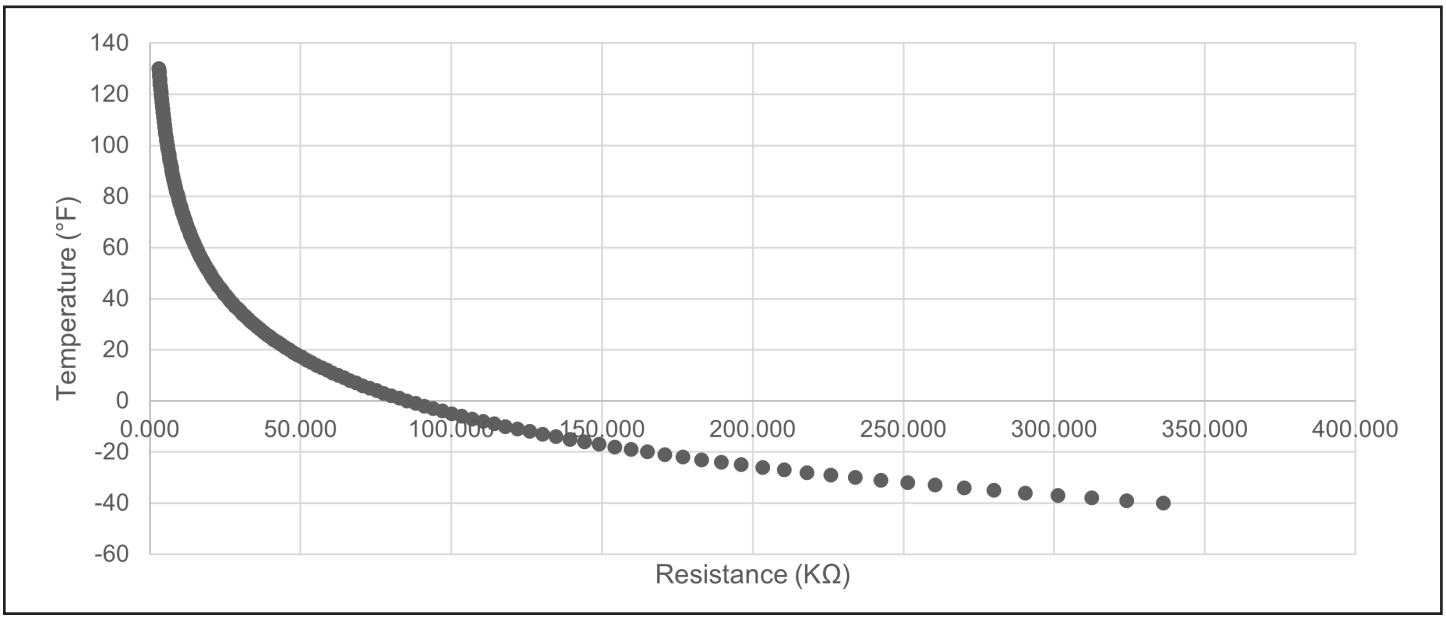
Table 19: 10K Thermistor Scaling Data

Resistance (Ω)	F (C)°	Resistance (KΩ)	F (C)°
336.277	-40	22.161	46
324.103	-39	21.571	47
312.415	-38	20.998	48
301.192	-37	20.443	49
290.412	-36	19.904	50
280.057	-35	19.381	51
270.109	-34	18.874	52
260.551	-33	18.381	53
251.365	-32	17.903	54
242.537	-31	17.439	55
234.050	-30	16.989	56
225.891	-29	16.551	57
218.046	-28	16.127	58
210.502	-27	15.714	59
203.245	-26	15.314	60
196.265	-25	14.924	61
189.550	-24	14.546	62
183.089	-23	14.179	63
176.870	-22	13.823	64
170.886	-21	13.476	65
165.125	-20	13.139	66
159.578	-19	12.812	67
154.238	-18	12.494	68
149.096	-17	12.184	69
144.143	-16	11.884	70
139.372	-15	11.591	71
134.776	-14	11.307	72
130.348	-13	11.031	73
126.081	-12	10.762	74
121.969	-11	10.501	75
118.005	-10	10.247	76
114.184	-9	10.000	77
110.500	-8	9.760	78
106.948	-7	9.526	79
103.522	-6	9.298	80
100.219	-5	9.077	81
97.032	-4	8.861	82
93.957	-3	8.652	83
90.991	-2	8.448	84
88.129	-1	8.249	85
85.366	0	8.056	86
82.700	1	7.868	87
80.127	2	7.685	88
77.642	3	7.506	89
75.243	4	7.333	90
72.926	5	7.164	91
70.689	6	6.999	92
68.528	7	6.839	93
66.441	8	6.682	94
64.424	9	6.530	95
62.475	10	6.382	96
60.592	11	6.238	97
58.772	12	6.097	98
57.013	13	5.960	99
55.313	14	5.826	100
53.669	15	5.696	101
52.080	16	5.569	102
50.543	17	5.445	103

(continued)

Resistance (Ω)	F (C)°	Resistance (Ω)	F (C)°
49.057	18	5.325	104
47.619	19	5.207	105
46.229	20	5.093	106
44.883	21	4.981	107
43.582	22	4.872	108
42.322	23	4.766	109
41.103	24	4.663	110
39.924	25	4.562	111
38.782	26	4.463	112
37.677	27	4.367	113
36.607	28	4.273	114
35.570	29	4.182	115
34.567	30	4.093	116
33.595	31	4.006	117
32.654	32	3.921	118
31.743	33	3.838	119
30.859	34	3.757	120
30.004	35	3.678	121
29.175	36	3.601	122
28.371	37	3.526	123
27.592	38	3.452	124
26.838	39	3.381	125
26.106	40	3.311	126
25.397	41	3.243	127
24.709	42	3.176	128
24.042	43	3.111	129
23.396	44	3.047	130
22.769	45		

Table 20: 10K Thermistor Scaling Graphic



Warranty

Warranty Registration Form

In-Warranty Return Material Procedure

Material other than compressors may not be returned except by permission of authorized factory service personnel of Daikin Applied at Minneapolis, Minnesota.

A “return goods” tag will be sent to be included with the returned material. Enter the information as called for on the tag in order to expedite handling at out factories and issuance of credits. All parts shall be returned to the factory designated on the return goods tag, transportation charges prepaid.

The return of the part does not constitute an order for replacement. A purchase order for the replacement part must be entered through your nearest Daikin Applied representative. The order should include the component’s part number and description and the model and serial numbers of the unit involved.

Limited Product Warranty

DAIKIN APPLIED AMERICAS INC.
LIMITED PRODUCT WARRANTY
(**United States and Canada**)

WARRANTY

Daikin Applied Americas Inc. dba Daikin Applied ("Company") warrants to contractor, purchaser and any owner of the product (collectively "Owner") that, subject to the exclusions set forth below Company, at its option, will repair or replace defective parts in the event any product manufactured by Company, including products sold under the brand name Daikin and used in the United States or Canada, proves defective in material or workmanship within twelve (12) months from initial startup or eighteen (18) months from the date shipped by Company, whichever occurs first. Authorized replacement parts are warranted for the remainder of the original warranty. All shipments of such parts will be made FOB factory, freight prepaid and allowed. Company reserves the right to select carrier and method of shipment. In addition, Company provides labor to repair or replace warranty parts during Company normal working hours on products with rotary screw compressors or centrifugal compressors. Warranty labor is not provided for any other products.

Company must receive the Registration and Startup Forms for products containing motor compressors and/or furnaces within ten (10) days of original product startup, or the ship date and the startup date will be deemed the same for determining the commencement of the warranty period and this warranty shall expire twelve (12) months from that date. For additional consideration, Company will provide an extended warranty(ies) on certain products or components thereof. The terms of the extended warranty(ies) are shown on a separate extended warranty statement.

No person (including any agent, sales representative, dealer or distributor) has the authority to expand the Company's obligation beyond the terms of this express warranty or to state that the performance of the product is other than that published by Company.

EXCLUSIONS

1. If free warranty labor is available as set forth above, such free labor does not include diagnostic visits, inspections, travel time and related expenses, or unusual access time or costs required by product location.
2. Refrigerants, fluids, oils and expendable items such as filters are not covered by this warranty.
3. This warranty shall not apply to products or parts : (a) that have been opened, disassembled, repaired, or altered, in each case by anyone other than Company or its authorized service representative; (b) that have been subjected to misuse, abuse, negligence, accidents, damage, or abnormal use or service; (c) that have not been properly maintained; (d) that have been operated or installed, or have had startup performed, in each case in a manner contrary to Company's printed instructions; (e) that have been exposed, directly or indirectly, to a corrosive atmosphere or material such as, but not limited to, chlorine, fluorine, fertilizers, waste water, urine, rust, salt, sulfur, ozone, or other chemicals, contaminants, minerals, or corrosive agents; (f) that were manufactured or furnished by others and/or are not an integral part of a product manufactured by Company; or (g) for which Company has not been paid in full.
4. This warranty shall not apply to products with rotary screw compressors or centrifugal compressors if such products have not been started, or if such startup has not been performed, by a Daikin Applied or Company authorized service representative.

SOLE REMEDY AND LIMITATION OF LIABILITY

THIS WARRANTY CONSTITUTES THE SOLE WARRANTY MADE BY COMPANY. COMPANY'S LIABILITY TO OWNER AND OWNER'S SOLE REMEDY UNDER THIS WARRANTY SHALL NOT EXCEED THE LESSER OF: (i) THE COST OF REPAIRING OR REPLACING DEFECTIVE PRODUCTS; AND (ii) THE ORIGINAL PURCHASE PRICE ACTUALLY PAID FOR THE PRODUCTS. COMPANY MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, REGARDING PREVENTION OF MOLD/MOULD, FUNGUS, BACTERIA, MICROBIAL GROWTH, OR ANY OTHER CONTAMINATES. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT AND UNDER NO CIRCUMSTANCE SHALL COMPANY BE LIABLE TO OWNER OR ANY THIRD PARTY FOR INCIDENTAL, INDIRECT, SPECIAL, CONTINGENT, CONSEQUENTIAL, DELAY OR LIQUIDATED DAMAGES FOR ANY REASON, ARISING FROM ANY CAUSE WHATSOEVER, WHETHER THE THEORY FOR RECOVERY IS BASED IN LAW OR IN EQUITY, OR IS UNDER A THEORY OF BREACH CONTRACT OR WARRANTY, NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE. THE TERM "CONSEQUENTIAL DAMAGE" INCLUDES, WITHOUT LIMITATION, THOSE DAMAGES ARISING FROM BUSINESS INTERRUPTION OR ECONOMIC LOSS, SUCH AS LOSS OF ANTICIPATED PROFITS, REVENUE, PRODUCTION, USE, REPUTATION, DATA OR CROPS.

ASSISTANCE

To obtain assistance or information regarding this warranty, please contact your local sales representative or a Daikin Applied office.

Form No. 933-430285Y-01-A (11/2023)
Part No. 043028500 Rev.0F

Warranty Start Up Form

DCSA Condensing Equipment Warranty Registration Form

To comply with the terms of Daikin Applied Warranty, complete and return this form within 10 days to the Warranty Department of Daikin Applied.

Check, test, and start procedure for condensing units.

GENERAL INFORMATION

Job Name: _____ **Unit No.:** _____

SOI No.: _____

Installation address: _____

City: _____ **State:** _____

Purchasing contractor: _____

City: _____ **State:** _____

Name of person doing start-up: _____

Company name: _____

Address: _____

City/State/Zip: _____

UNIT INFORMATION

Unit model number: _____ **Unit serial number:** _____

Compressor 1 model number: _____ **Serial number:** _____

Compressor 2 model number: _____ **Serial number:** _____

Compressor 3 model number: _____ **Serial number:** _____

Compressor 4 model number: _____ **Serial number:** _____

Compressor 5 model number: _____ **Serial number:** _____

Compressor 6 model number: _____ **Serial number:** _____

13F-4155 (07/2025)

DAIKIN

DCSA Equipment Warranty Registration Form

Select Yes or No. If not applicable to the type of unit, select N/A.

I. INITIAL CHECK

A. Is any shipping damage visible? . . . Yes No N/A

B. Tightened all setscrews? . . . Yes No N/A

C. Have the shipping spacers been removed from the compressor springs and have the neoprene spacers been installed on each compressor mounting bolt? . . . Yes No N/A

D. Electrical service corresponds to unit nameplate? . . . Yes No N/A

Volts _____ Hertz _____ Phase _____

E. Is the main disconnect adequately fused and are fuses installed? . . . Yes No N/A

F. Are crankcase heaters operating, and have they been operating 24 hours prior to start-up? . . . Yes No N/A

G. Are all electrical power connections tight? (Check compressor electrical box.) . . . Yes No N/A

H. Has the field piping been piped per ASHRAE recommendations? . . . Yes No N/A

II. START-UP COMPRESSOR OPERATION

A. Has each circuit been field leak tested?

Circuit #1 . . . Yes No N/A

Circuit #2 . . . Yes No N/A

B. Refrigerant charge per circuit: . . . Circuit 1 _____ Circuit 2 _____

C. Are compressors rotating in the right direction? . . . Yes No N/A

D. Do condenser fans rotate in the right direction? . . . Yes No N/A

E. Ambient temperature . . . _____°F

F. Does unit start up and perform per sequence of operation? . . . Yes No N/A

III. PERFORMANCE DATA

A. Compressor voltage across each phase: . . . L1–2_____ V L2–3 _____ V L1–3 _____ V

B. Compressor amperage of fully loaded compressor . Compressor #1 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #2 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #3 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #4 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #5 — Phase 1_____ Phase 2 _____ Phase 3 _____

Compressor #6 — Phase 1_____ Phase 2 _____ Phase 3 _____

C. High pressure cut-out: . . . Circuit 1 _____ psig Circuit 2 _____ psig

D. Discharge pressure, one compressor: . . . Circuit 1 _____ psig Circuit 2 _____ psig

Discharge pressure, fully loaded, 2–3 compressors: . . . Circuit 1 _____ psig Circuit 2 _____ psig

E. Suction pressure, one compressor: . . . Circuit 1 _____ psig Circuit 2 _____ psig

Suction pressure, fully loaded, 2–3 compressors: . . . Circuit 1 _____ psig Circuit 2 _____ psig

Liquid press, fully loaded, 2–3 compressors (at liquid line shutoff valve): . . . Circuit 1 _____ psig Circuit 2 _____ psig

Liquid temperature, fully loaded, 2–3 compressors: . . . Circuit 1 _____ psig Circuit 2 _____ psig

DAIKIN

DCSA Equipment Warranty Registration Form

Select Yes or No. If not applicable to the type of unit, select N/A.

		Circuit 1	Circuit 2
F.	Suction line temperature:	_____ °F	_____ °F
G.	Superheat:	_____ °F	_____ °F
H.	Subcooling:.	_____ °F	_____ °F
I.	Is the liquid in the line sightglass clear and dry?	Yes No N/A	
J.	Record discharge air temperature at discharge of unit:	_____ °F	
K.	Are all refrigeration lines secure to prevent excessive vibration and wear?	Yes No N/A	
L.	Are all gauges shut off and valve caps and packings tight after start-up?	Yes No N/A	

Thank you for completing this form. Please sign and date below.

Signature _____ **Startup date:** _____

Register equipment start date and upload form on the Daikin Applied FieldCare Portal at https://fieldcare.daikinapplied.com

Please fill out the Daikin Applied "Quality Assurance Survey Report" and list any additional comments that could affect the operation of this unit; e.g., shipping damage, failed components, adverse installation applications, etc. If additional comment space is needed, write the comment(s) on a separate sheet, attach it to the Survey Report and return it to the Warranty Department of Daikin Applied with the completed Equipment Warranty Registration form.

Quality Assurance Survey Report

To whom it may concern:
Please review the items below upon receiving and installing our product. Select N/A on any item that does not apply to the product.

Job Name: _____ **Daikin Applied S.O. No.**_____

Installation address:_____

City: _____ State: _____

Purchasing contractor:_____

City: _____ State: _____

Name of person doing start-up (print): _____

Company name:_____

Address:_____

City/State/Zip: _____

Unit model number: _____ **Unit serial number:** _____

1. Is there any shipping damage visible? . . . . . Yes No N/A
   Location on unit _____
2. How would you rate the overall appearance of the product; i.e., paint, fin damage, etc.?
   Excellent Good Fair Poor
3. Did all sections of the unit fit together properly? . . . . . Yes No N/A
4. Did the cabinet have any air leakage? . . . . . Yes No N/A
   Location on unit _____
5. Were there any refrigerant leaks? . . . . . Yes No N/A
   From where did it occur? . . . . . Shipping Workmanship Design
6. Does the refrigerant piping have excessive vibration? . . . . . Yes No N/A
   Location on unit _____
7. Did all of the electrical controls function at start-up? . . . . . Yes No N/A
   Comments _____
8. Did the labeling and schematics provide adequate information? . . . . . Yes No N/A
9. How would you rate the serviceability of the product?
   Excellent Good Fair Poor
10. How would you rate the overall quality of the product?
    Excellent Good Fair Poor
11. How does the quality of Daikin Applied products rank in relation to competitive products?
    Excellent Good Fair Poor

    Comments _____

Please list any additional comments which could affect the operation of this unit; i.e., shipping damage, failed components, adverse installation applications, etc. If additional comment space is needed, write the comment(s) on a separate sheet, attach the sheet to this completed Quality Assurance Survey Report, and return it to the Warranty Department with the completed preceding "Equipment Warranty Registration Form".

13F-4160 (02/16)

Notes / Comments

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