INSTALLATION & MAINTENANCE MANUAL

IM 1395

MARCH 2025

SELF-CONTAINED

AIR CONDITIONING SYSTEMS

- TYPE SWP - J VINTAGE
- R-32 REFRIGERANT
- MODELS 23 - 99

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General Description

Daikin Applied Self-Contained Air Conditioning units, model SWP, are factory assembled, refrigerant charged and tested, water-cooled packaged air conditioning units designed for ducted applications.

Each unit contains multiple hermetic compressors, water cooled condensers, multi-circuit evaporator, thermal expansion valves, interconnecting refrigerant piping, supply fan, EC fan array, pleated filters and all necessary operating and safety controls. Units ship fully charged with R-32 refrigerant unless indicated with the modular construction option. Units with the modular construction Option can be easily disassembled for access to mechanical room entries, freight elevators and other constrictions.

Pressure and Temperature Specifications

- Maximum waterside working pressure is 300 PSI.
- Minimum entering water temperature (EWT) with the optional water regulating valve (WRV) or waterside economizer coil (WSE) is 45°F (7.2°C).
- Minimum EWT without WRV or WSE Coil is 55°F (12.8°C).
- Maximum leaving water temperature is 120°F (48.9°C).

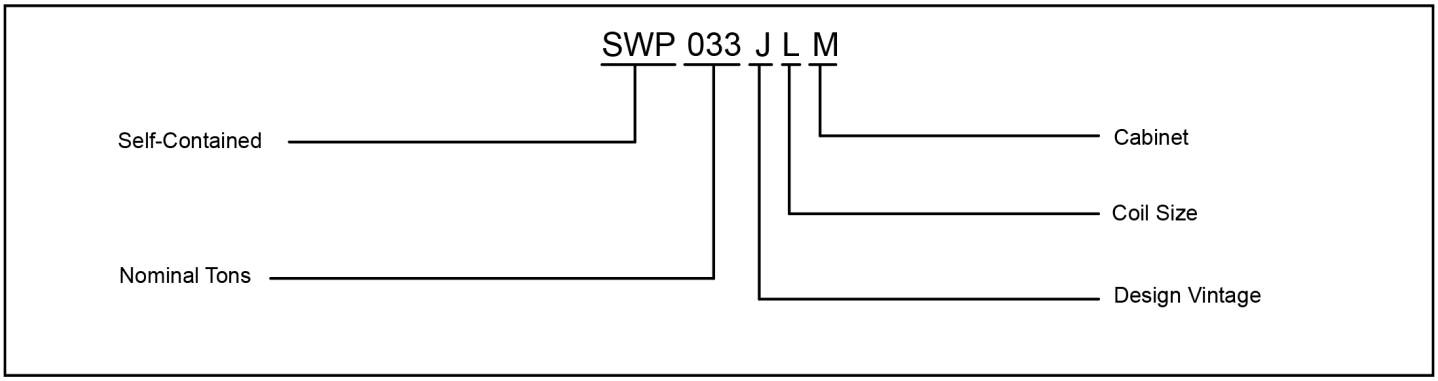
Table 1: Operation and Maintenance Literature

Literature	Literature Part Number
Unit Controller Operation Manual	OM 1388
Unit Controller Installation Manual	IM 919

All rigging, installation, power and control wiring external to the unit, and condenser water and condensate piping are the responsibility of the installer.

The MicroTech self-contained unit controller is standard equipment. For a detailed description of the MicroTech components, input/output configurations, field wiring options and requirements, and service procedures, refer to IM 919, “MicroTech Unit Controller” For a description of operation and information on using and programming the MicroTech unit controller, refer to OM 1388.

Figure 1: Nomenclature



R-32 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 45.

⚠ 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 halo-carbon 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.

Compliance Statements

Children should be supervised to ensure 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.

NOTICE

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

This appliance shall be installed in accordance with national wiring regulations.

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

Inspection

Inspection

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.

Handling

⚠ WARNING

Never allow any part of the unit to fall during unloading or moving as this can cause equipment damage, severe personal injury, or death.

⚠ CAUTION

Do not attempt to install dollies in the center of the unit. Units can become unstable and tip over, causing injury

⚠ CAUTION

Do not move units in an upended position. Internal components may tear away, causing injury.

Units ship with a protective covering that should remain in place while the unit is being moved to its final location.

Units are provided with integral lifting lugs in the base for rigging with a crane. If units are lifted by crane, use slings or cable to protect against chaffing damage and use spreader bars across the top of the cabinet to prevent any structural damage to the frame. The base also includes the ability to be moved with a forklift.

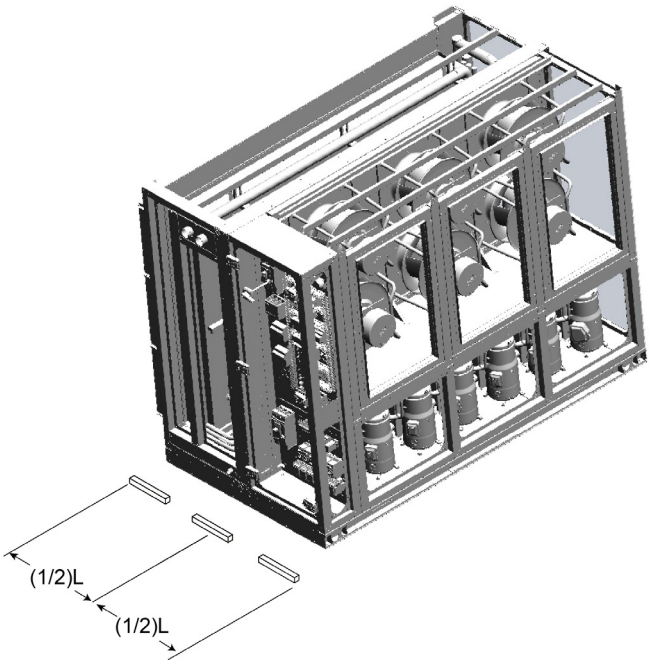
The unit base frame accepts dollies or Johnson bars for transporting the unit. Place furniture dollies at all lift point locations and use a Johnson bar at one end for maneuvering.

Vibration Isolators

All units are provided with 1" neoprene isolation pads, shipped separately. Using the instructions provided in the shipment, install pads beneath the unit, locating them at each corner and at 1/2 the length of each side base channel. Evenly space the additional pads under the remaining base channels.

NOTE: Only qualified personnel familiar with local codes and regulations and experienced with this type of equipment should perform installation and maintenance.

Figure 2: Isolation Pad Placement



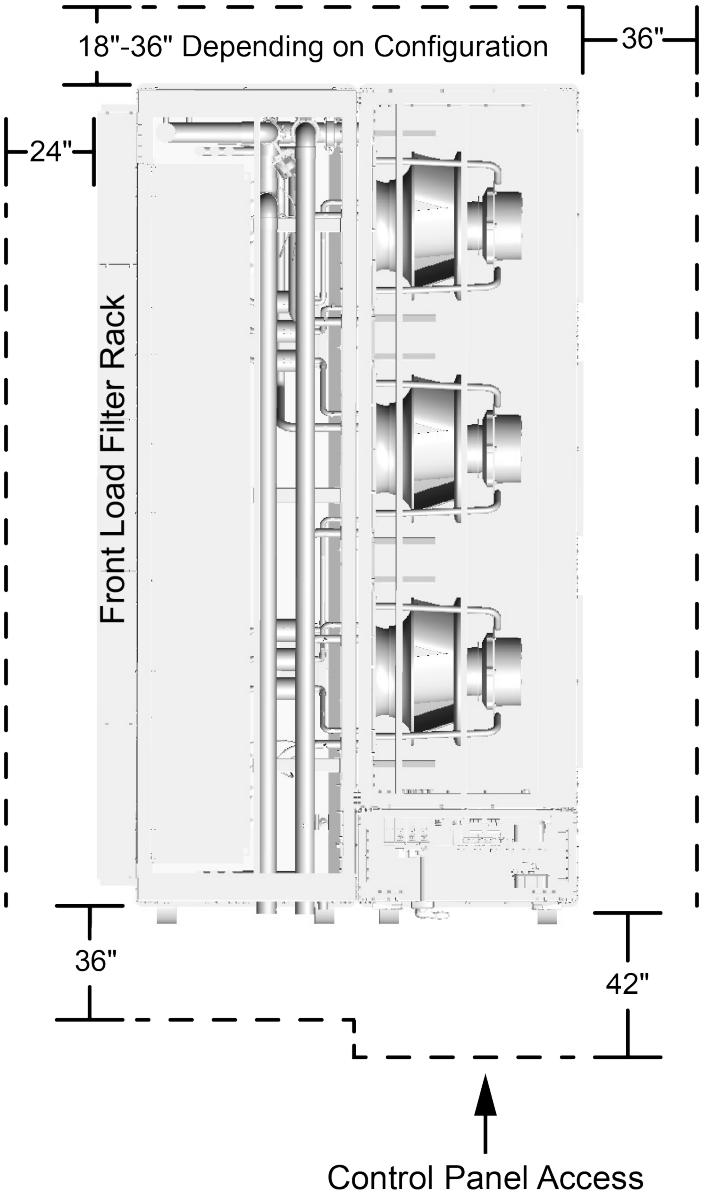
Location/Service Access

To facilitate installation and provide service and maintenance access, follow the recommended clearances in Table 2. Minimum clearances required by local, state, or federal codes such as the NEC take precedence over those listed below. Clearance is required to allow room for filter access, cleaning of the condenser and coils, access to expansion valves and other control components, and to allow for possible fan assembly or compressor removal.

Table 2: Recommended Clearances

Location	Clearance Length, inches (mm)
Control panel	42 (1067)
Unit rear, filter section	24 (610)
Access side	36 (914)
Unit front	36 (914)
Opposite access side	36 (914)

Figure 3: Recommended Service and Maintenance Clearance



Shipping and Installation

All units leave the factory assembled completely unless otherwise noted. The unit includes protective plastic wrap from the factory.

Arrival at Installation Site

The unit must be unloaded in accordance with the rigging instructions displayed on the outside of the unit. The lifting lugs or forklift pockets located inside the unit base rail are used for lifting the complete unit. Never use any individual section lifting lugs to lift the whole unit.

Some items are shipped loose inside units such rubber isolator pads. All units should be inspected before unloading and all loose items secured.

Disassembling and Reassembling Modular Units

To avoid injuries or damage to the equipment, please read the installation manual before rigging or disassembling the unit. Follow all the warning and caution labels placed on the unit.

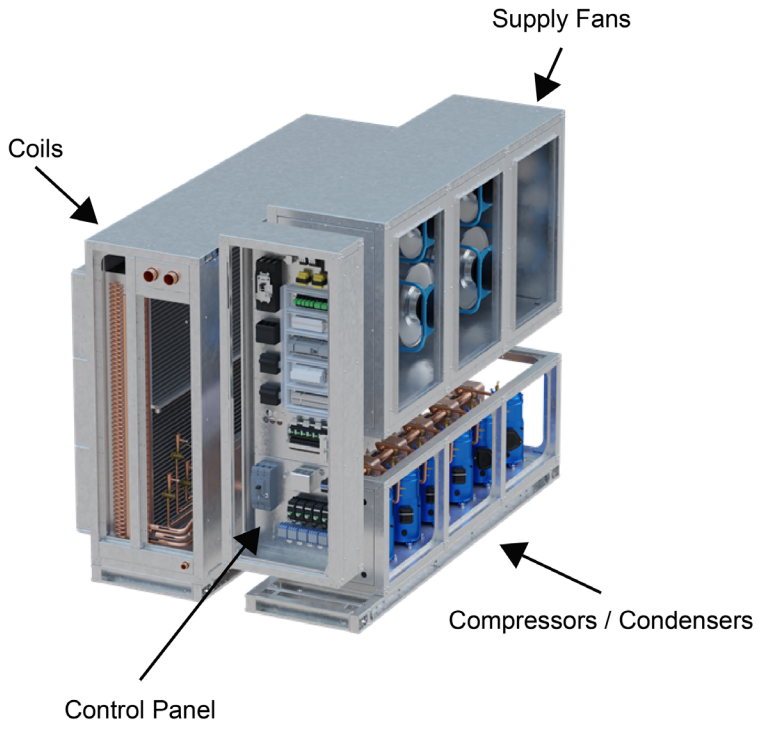
Disassembly of Sections

If the unit is ordered with the modular construction (Unit Configuration Code 43 = 1) option, it can be disassembled into modular sections.

Figure 4 illustrates the four distinct sections:

1. Coil/Access Section;
2. Supply Fan Section;
3. Compressor/Condenser Section; and
4. Control Panel.

Figure 4: Self-Contained Unit with Four Sections Separated



In addition to refrigerant and water piping, the unit has various standard and optional components that cross between sections which will require field disconnection and reconnecting or mounting:

Control Panel

- Return Air Temperature (RAT)
- Static Pressure Sensor(s) (SPSI)
- Clogged Filter (PC5)
- Duct High Limit (DHL)

Coil/Access Section

- Mixed air sensor (MAT)
- Freezstat (s) (FS*)
- Actuator (ACT3 & ACT4)
- Waterflow Switch (WFS)
- Entering Water Temperature (EWT)
- Leak Detector, Supply Fan (LD2)
- Drain Pan Switch (DP)
- A2L Damper, Actuator (ACT5)
- Pressure Transducer Harnesses (PSR1 & 2)

Supply Fan Section

- Discharge Air Temperature (DAT)

Compressor/Condenser Section

- Compressor High Pressure Switches (HP)
- Compressor Low Pressure Switches (LP)
- Leak Detector, Compressor (LD1)

External (Ship Loose Items)

- Outside Air Temperature (OAT)
- Zone or Space Temperature (ZNT1)
- Humidity Sensor (SHS1)
- Enthalpy Sensor, Return Air (RAE)
- Enthalpy Sensor, Outside Air (OAE)

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.

NOTICE

Lifting guidance is intended for installations of newly delivered equipment. If moving previously installed equipment for relocation 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.

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 or 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.

Disassembly

1. Open the fan section access doors to inspect and remove any items placed in the section during shipping.
2. Open the condenser/compressor section to inspect and remove any items placed in the section during shipping, such as isolation pads.
3. Open the coil section and inspect.
4. Review the wiring schematics and wiring connections inside the control box.
5. Remove the section plates that secure the modular sections together.
6. Disconnect control and power connections for the supply fan assemblies and all compressors. Fan and compressor power wiring will need to be disconnected from the contactors/overloads. Fan communication cable will need to be disconnected from the terminal block. The remaining control wiring will need to be disconnected from the plug panel.
7. To remove the control panel section, remove the hardware inside the panel that secures to the fan and compressor/condenser sections.
8. Separate the electrical section from the fan and condenser/compressor sections to allow the wiring to be pulled through the grommets.

NOTE: The wiring is not meant to be pulled inside the supply fan, condenser/compressor or evaporator sections.

9. The control panel section can now be removed.
10. To allow the fan section to be separated, remove the hardware securing it to the remaining sections.
11. With the fan section removed, the refrigerant lines that cross between the condenser/compressor and coil sections can be cut.

NOTE: It is recommended to cut lines inside the compressor/condenser section. Cap the refrigerant piping to minimize contamination.

12. The number of circuits ranges from three in the small cabinet, three or four in the medium, and four or six in the large cabinet. Mark the circuits to avoid confusion during reassembly.
13. Locate and remove the grooved couplings on the condenser water pipes that cross the section split.
14. Separate the remaining coil and condenser/compressor sections. The coil and condenser/compressor section base includes lifting lugs and fork pockets.
15. If necessary, remove the filter rack from the coil section.

Figure 5: Control Panel Section Removal

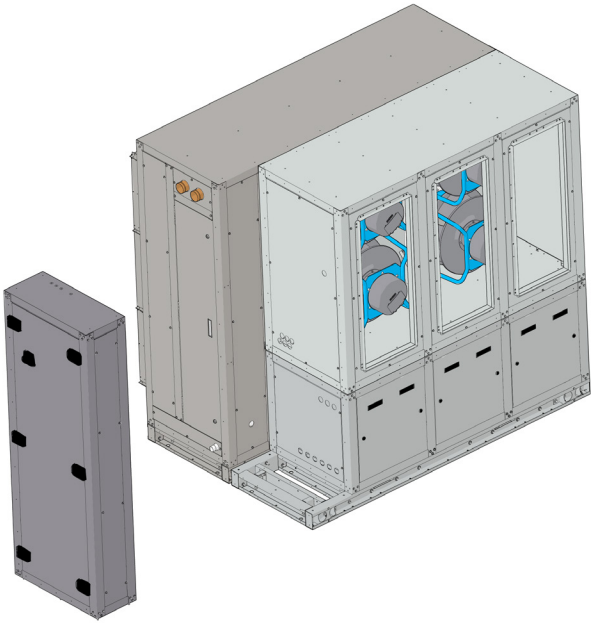


Figure 6: Fan Section Removal

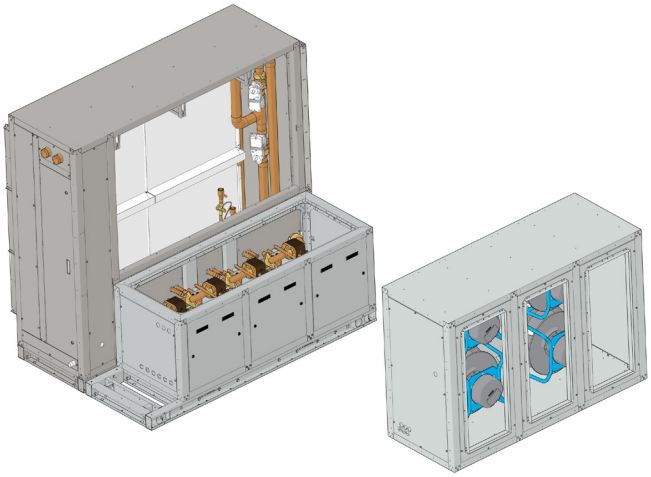
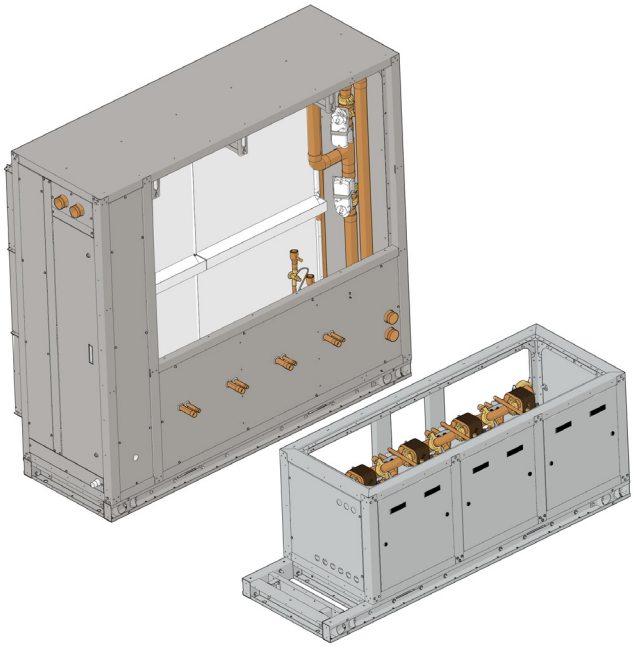


Figure 7: Coil and Condenser/Compressor Section Separation



Reassembly

1. Starting with the coil section in the desired location in the mechanical room, reinstall the steel plates to the base.
2. Line up the condenser/compressor section with the coil section. Slide the section towards the coil section. Attach the section with the steel plates.
3. Add refrigerant tube couplings and braze the refrigerant lines inside the condenser/compressor section.

NOTE: R-32 design working pressure is listed on the unit data label. Similar factory joints are brazed with Copper-Phosphoros-2% Silver brazing rods.

4. Each refrigerant circuit includes a Mueller A14024 or similar “fusible plug” factory installed in the coil section at the inlet of the liquid line filter dryer. This safety device includes a thermal plug that is designed to melt at temperatures equal to or greater than 168°F (76°C) to prevent catastrophic failure of the refrigeration system.

NOTE: If any brazing is performed at or near the fusible plug, it is recommended to remove it to prevent damage that would require replacement. After brazing is complete, re-install and check for leaks.

5. Connect water pipes by reinstalling the removed groove couplings.
6. Test water pipes for leaks before installing the fan section.
7. Test refrigerant circuits for leaks before installing the fan section.
8. Reinstall the supply fan section taking care to align and seat into the gasket to provide an airtight seal. All corners of the unit sections must line up before reinstalling the steel plates.
9. Evacuate, test, and charge the refrigerant circuits with R-32 refrigerant. See data plate for refrigerant charge amount per circuit.
10. Organize all wire harnesses, pull them back into the section, then terminate.
11. Install the Control Panel section. After the control box is secure, reconnect power wires, control plugs, and sensors.

Water Connections

The supply and return condenser piping connections are copper outside diameter (OD) with Victaulic grooves. Due to the variety of piping practices, follow the recommendations of local authorities. Local authorities can supply the installer with the proper building and safety codes required for proper installation.

For best performance, install the piping with a minimum number of bends and elevation changes. Size piping to minimize system pressure drop.

Piping should contain the following:

1. Vibration eliminators to reduce vibration and noise transmission to the building.
2. Shutoff valves to isolate the unit from the piping system during unit servicing.
3. Manual or automatic air vent valves at the high points of the system.
4. Some means of maintaining adequate system water pressure (e.g., expansion tank or regulating valve).
5. Temperature and pressure indicators located at the unit to aid in servicing.
6. Strainers or some means of removing foreign matter from the water before it enters the unit and pump. For the pump inlet, place it far enough upstream to prevent cavitation (consult pump manufacturer for recommendations). Using a strainer prolongs pump life and helps maintain system performance. Refer to inlet strainer guidelines on page 11.

Water System Quality

The cleaning, flushing and chemical treatment of a water source heat pump system is fundamental to efficient operation and the life expectancy of the system.

Potential system problems produced by the use of water fall into three general categories:

- **Scale Formation –** Mineral deposits which result from the crystallization and precipitation of dissolved salts in the water. The deposits form an insulating barrier, reducing the heat transfer rate and impeding the circulation of fluids due to increased pressure drop.
- **Corrosion –** Decomposition of the metal caused by absorption of gases from the air. Corrosion may occur in any metal component of the system.
- **Organic Growths –** Slime and algae which form under certain environmental conditions, and can reduce the heat transfer rate by forming an insulating coating or can promote corrosion by pitting.

The system water should be evaluated for degrees of impurity, with testing available from independent testing labs, health departments or state agencies.

Table 3 is a list of water characteristics, the potential impurities and their results.

Table 3: Water Quality Conditions & Applications

Potential Problem	Chemical(s) or Condition	Range for Copper Heat Exchangers	Range of Cupronickel Heat Exchanger
Scaling	Calcium & Magnesium Carbonate	Less than 350 ppm	Less than 350 ppm
Corrosion	pH Range	7 – 9	5 – 9
	Total Dissolved Solids	Less than 1000 ppm	Less than 1500 ppm
	Ammonia, Ammonium Hydroxide	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonium Chloride, Ammonium Nitrate	Less than 0.5 ppm	Less than 0.5 ppm
	Calcium Chloride/ Sodium Chloride	Less than 125 ppm	Less than 125 ppm - Note 4
	Chlorine	Less than 0.5 ppm	Less than 0.5 ppm
	Hydrogen Sulfide	None Allowed	None Allowed
Biological Growth	Iron Bacteria	None Allowed	None Allowed
	Iron Oxide	Less than 1 ppm	Less than 1 ppm
Erosion	Suspended Solids	Less than 10 ppm	Less than 10 ppm
	Water Velocity	Less than 8 ft./s	Less than 12 ft./s

NOTE 1: Water hardness in ppm is equivalent to hardness in mg/L.

NOTE 2: Grains/gallon = ppm divided by 17.1

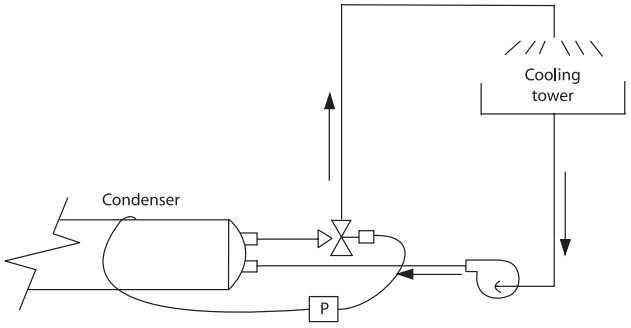
NOTE 3: Copper and cupronickel heat exchangers are not recommended for pool applications for water outside the range of the table. Secondary heat exchangers are required for applications not meeting the requirements shown above.

NOTE 4: Salt water applications (approx. 25,000 ppm) require secondary heat exchangers due to copper piping between the heat exchanger and the unit fittings.

Condenser Piping

1. Units can be specified with water and condensate connections on either the left or right side of the unit. The supply and return condenser piping connections are copper outside diameter (OD) with Victaulic grooves.
2. All condensers are factory piped for a common condenser water supply and a common condenser water return connection.
3. Make field piping connections to factory-provided piping, locating them as indicated on the unit submittal drawing.
4. Units with factory-mounted water side economizer do not require head pressure control. The economizer typically elevates the water temperature by 5°F (2.8°C) to 10°F (5.6°C) before entering the condenser, allowing suitable condenser water temperatures whenever the tower supply temperature is 50°F (10°C) or higher. Mechanical cooling is locked out below the minimum EWT (default 55°F (12.8°C)).
5. If entering condenser water temperatures will go below 55°F (12.8°C) without waterside economizer, provide head pressure control. Fan cycling and/or modulating discharge dampers on the cooling tower are often used, or a 3-way bypass around the tower is used to maintain condenser water temperature. If multiple units are in the loop, it is generally more cost effective to use cooling tower control to maintain the temperature at >55°F (>12.8°C).
6. If the piping, condensers, and optional waterside economizer are exposed to freezing temperatures, protection should be taken to prevent the water from freezing. Freezing will damage components and may allow water into the refrigerant circuit. Damage of components due to freeze will void the warranty.

Figure 8: Condenser Regulating Valve



Inlet Strainer Guidelines

A water strainer must be installed in the water piping before the unit's inlet condenser water connection.

A factory provided, shipped loose, and field-installed strainer is available for all unit sizes and includes a 304 stainless steel perforated basket, female threaded NPT pipe connections, and strainer cap.

NOTE: A field provided strainer that meets or exceeds the specifications of the factory option can also be installed.

Table 4: Inlet Strainer Sizing

MODEL RANGE	SWP023-033	SWP039-051	SWP056-099
DAIKIN APPLIED PN	206492301	206492302	206492303
WYE STRAINER SIZE	2	2.5	3
SCREEN SIZE	#20 MESH	#20 MESH	#20 MESH
Max Perforation Size	0.0331" (1/32", 0.841 mm)	0.0331" (1/32", 0.841 mm)	0.0331" (1/32", 0.841 mm)
WEIGHT (LBS)	2	4.4	6

Condensate Drain Connection

The condensate drain connection is 1.25” NPT and is generally located on the same end of the unit as the condenser water connections. The location of the condensate drain connection will be detailed on the submittal drawing. Run drain lines and traps full size from drain pan connection. The trap depth and the distance must be twice the static pressure in the drain pan section under normal operation to ensure the trap remains sealed. Pitch the condensate line away from the unit with a minimum slope of 1/8” per foot (3.2 mm/0.3 meters). Keep drain pans and the drain trap clean with periodic cleaning.

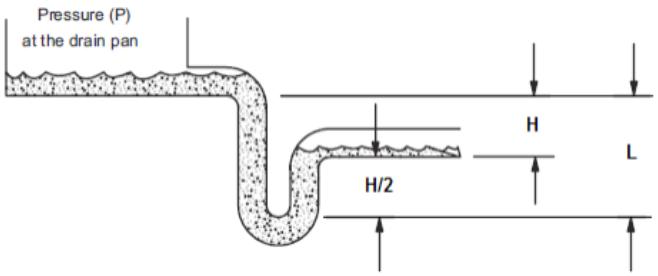
The trap depth and the distance must be twice the static pressure in the drain pan section plus 1.00” under normal operation to ensure the trap remains sealed.

H = draw-through static + 1.00”

L = H + H/2

It is recommended that H measurement be a minimum of 4.00”, which sets the L measurement at a minimum of 6.00”.

Figure 9: Condensate Drain Connection



Duct Connections

Refer to submittal drawings for duct connection dimensions.

Supply Air

To connect supply ductwork directly to the unit, first mount a duct collar at the fan outlet. Fan discharge opening sizes are indicated on the unit dimensional drawings. Daikin Applied recommends a canvas type connecting collar.

⚠ WARNING

Unit cannot be started until the ductwork is installed to avoid injury.

Return Air

Return air to the unit can be ducted or free, as follows.

Ducted return

Attach return ductwork to the 2" flange around the perimeter of the unit’s return air opening. Use a canvas-type duct connecting collar. All ductwork connected to the unit must be of adequate size and construction for the application. Also use a canvas-type connector where the duct penetrates the machine room wall(s). This helps prevent vibration generated by air movement in the duct from being transmitted out to the occupied spaces.

Free return

Use the mechanical equipment room as a return plenum with no hard connection at the unit.

NOTE: Some building codes do not allow using the mechanical room as a return plenum. Check applicable local codes for each installation.

Service Connections

Left-Hand—Right-Hand

Service connections are determined when facing the back of the unit. Right-hand connections are standard; left-hand connections are optional.

Long-term Storage

Project delays or site conditions can require the storage of Daikin Applied Self-Contained Air Conditioning Units for an extended period of time.

Location

The Daikin Applied Self-Contained Air Conditioning Unit is an indoor unit. Care must be taken to store the unit indoors away from weather conditions. While the area does not need to be air conditioned, Daikin Applied recommends that the electronic control equipment in the unit be stored in a 5% to 95% RH (non-condensing) environment.

Plastic Wrap

Do not allow the shrink wrap to trap moisture on the outside or inside surfaces of the unit. Shrink wrap must be removed immediately after installation. Once the shrink wrap is removed the unit(s) cannot be stored outdoors.

Preparation

Check that unit is set on a level surface and access panels are properly secured.

Supply Fans

NOTE: The supply fan motors are permanently lubricated and require no periodic lubrication.

1. Isolate unit from shock and vibration.
2. A descant bag may be hung in the interior of the unit to minimize corrosion in humid storage environments.
3. Do not clean galvanized steel surfaces with oil dissolving chemicals. This may remove the protective coating and accelerate corrosion.

Cooling circuits

1. Tag the valves as a warning for the technician who will be restarting the units.
2. If the unit has already been filled with cooling tower water, drain the unit completely.
3. Flush the internal condensate trap with antifreeze solution if the unit will be subjected to freezing temperatures.
4. Once a month, manually stroke the control valves to prevent seizing.

Restart

After extended storage, a very complete start up must be performed. Inevitable accumulations of dirt, insect nests, etc. can contribute to problems if not cleaned out thoroughly prior to start up. In addition, thermal cycling will have tended to loosen mechanical and electrical connections. The following start up procedure will help discover these and other issues that may have developed during the storage interval.

Unit Physical Data

Table 5: Physical Data for SWP 023 - 099

Unit Details																
Model Size		023	028	033	039	044	050	044	051	056	062	065	065	073	080	088	099
Cabinet Size		Small						Medium					Large				
Compressor	Quantity	3						4					6				
	Size	See unit data plate															
Evaporator Coil	Face area (ft^2)	29.3						44.3					53.0				
	Rows	5											6				
Waterside Economizer Coil	Face area (ft^2)	29.2						44.1					52.4				
	Rows	4															
Evaporator Fan (SAF)	Quantity	2						2 or 4					4 or 6				
	Size	355mm, 450mm, or 500mm															

Table 6: Single Compressor Circuit Charge, R-32

Compressor (HP)	Refrigerant charge per circuit (R-32)	Oil charge per circuit (oz)	Oil Charge (L)	Model
7.5	15 lbs	101.4	3	DSF90
10	15 lbs	111.6	3.3	DSF115
13	15 lbs	111.6	3.3	DSF155
16.5	15 lbs	121.7	3.6	DSF200

Note:
Actual refrigerant charge is calculated for each unit and is listed on the unit data plate. When possible, always use the unit data plate for refrigerant charge quantity.

Field Wiring

General

Wiring must comply with all applicable codes and ordinances. Daikin Applied's product warranty does not cover equipment failures caused or contributed to by wiring not in accordance with specifications. A tripped manual motor protector (MMP) or open fuse indicates a short, ground or overload. Before replacing a fuse or restarting a compressor or fan motor, locate the trouble and correct. Use copper wire for all power lead terminations. Contact the factory for information concerning aluminum wire power lead terminations.

A single power terminal block is provided as standard, and wiring within the unit is done in accordance with the National Electric Code (NEC). Each branch circuit within the control panel is individually protected by fuse or MMP. A single field-supplied disconnect is required or a unit-mounted, non-fused disconnect can be ordered with the unit.

A knockout is located on the right or left front unit upright for locating unit power entry. 24 V field connections are suitable for Class II wiring.

Unit Disconnect

Disconnecting means are addressed by Article 440 of the NEC, which requires "disconnecting means capable of disconnecting air conditioning and refrigerant equipment including motor-compressors, and controllers, from the circuit feeder." Select and locate the disconnect switch within the NEC guidelines. Location requirements per NEC are that the disconnect is located in a readily accessible position within sight (50 feet) of the unit. A factory-mounted, non-fused disconnect is available.

Return Air and Outside Air Sensors

All units are provided with a return air sensor. It is connected to the patch panel and is coiled and placed in the control box of the unit for shipment. Field-installation is required to put it in the return air stream for proper unit operation. The return air sensor is connected to the unit's patch panel at location PL1 (see IM 919).

The outside air sensor is optional and can be ordered with the unit. The outside air sensor is field wired to terminal strip TB2. It is connected at terminals 122, 123, and 123G.

The mixed air temperature sensor is already installed at the air inlet.

Mount the sensors in areas that are exposed to representative temperature conditions. Mount them at a position that has good air mixing and does not have stratification. Sensors can be mounted in the ductwork using a grommet (see Figure 10).

Figure 10: Return/Outside Air Sensor Mounting

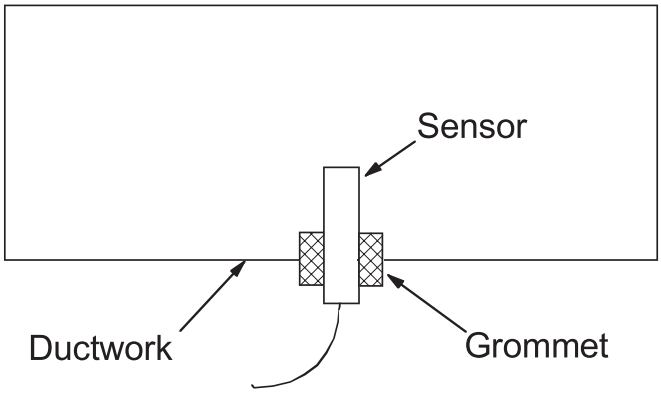


Table 7: Compressor Motors

Compressor (hp)	Refrigerant	Condensing Temperature	208V/60Hz/3Ø		230V/60Hz/3Ø		460V/60Hz/3Ø		575V/60Hz/3Ø	
			RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
7.5	R-32	Standard	24.0	203.0	21.7	203.0	11.2	98.0	8.7	84.0
10	R-32	Standard	30.3	267.0	27.4	267.0	13.8	142.0	10.8	103.0
13	R-32	Standard	36.9	304.0	33.4	304.0	16.7	147.0	13.6	122.0
16.5	R-32	Standard	48.3	351.0	43.7	351.0	21.2	197.0	17.0	135.0
7.5	R-32	High	30.2	203.0	27.3	203.0	14.1	98.0	10.9	84.0
10	R-32	High	38.2	267.0	34.6	267.0	17.4	142.0	13.7	103.0
13	R-32	High	47.2	304.0	42.7	304.0	21.3	147.0	17.5	122.0
16.5	R-32	High	61.9	351.0	56.0	351.0	27.2	197.0	21.8	135.0

Supply Power Wiring

1. Units require three-phase power supply.
2. Allowable voltage tolerances:
   a. **60 Hertz**
   Nameplate 208 V: Min. 187 V, Max. 229 V
   Nameplate 230 V: Min. 207 V, Max. 253 V
   Nameplate 460 V: Min. 414 V, Max. 506 V
   Nameplate 575 V: Min. 518 V, Max. 632 V
3. Power lead wire sizing:
   a. For units with cooling capability (all concurrent loads) with or without hot water heating and circuits with motor loads only: MCA = 1.25 (largest motor RLA or FLA) + other loads
4. Size wires in accordance with Table 310-16 or Table 310-19 of the National Electrical Code.
5. Size wires for a maximum of 3% voltage drop.

Table 8: SAF Motor Nameplate Amperage (208V and 230V)

Fan Type	Max RPM	Motor kW	Motor HP	208v/60/3	230v/30/3
				FLA	FLA
355C	3230	2.85	3.8	9.7	8.8
450D	2600	5.45	7.3	16.1	15.0
500B	2250	6.40	8.6	18.9	17.6

Table 9: SAF Motor Nameplate Amperage (460V)

Fan Type	Max RPM	Motor kW	Motor HP	460v/60/3
				FLA
355C	3230	2.68	3.6	4.7
450D	2600	5.25	7.0	7.2
500B	2250	5.70	7.6	8.1

Lug Size

Table 10: Lug sizes for single disconnect

Disconnect size	Lug size
100	#12-3
150	#8-2/0
250	#1/0-300 MCM
400	(1) #1/0-600 MCM
600	(2) #2/0-350 MCM

Table 11: Lug sizes for power block

Power block size	Lug size
175	(1) 2/0 - #14 AWG
335	(1) 400 kcmil - #6 AWG
420	(1) 600 kcmil - #2 AWG
510	(2) 250 kcmil - #6 AWG

Note:
Use copper wire only. 760 (2) #6-500 MCM

Replacement Fuses

The control power transformer (CPT) is protected from overcurrent by fuses.

The primary and secondary fuses are UL-rated for short circuit current ratings in excess of 10,000 amperes. Refer to Table 12 when replacing fuses for the control transformer.

Table 12: Control Power Transformer (CPT) Fuse Replacements

CPT VA	Primary Fuses F1A, F1B Use 600V, Class CC Fuses Only				Secondary Fuses F1C, Use 500V Midget Fuses Only	
	208V	230V	460V	575V	120V	24V
100 VA	1.125	1.0	0.5	0.4	1.25	6.25
250 VA	3.0	2.5	1.25	1.0	3.2	15.0
300 VA	3.5	3.2	1.6	1.25	4.0	17.5
350 VA	4.0	3.5	1.8	1.5	4.5	20.0
500 VA	6.0	5.0	2.5	2.0	6.25	30.0
750 VA	9.0	8.0	4.0	3.0	10.0	N/A

Control Center

All electrical controls are enclosed in a central control center located at the side of the unit. The control center is divided into two separate compartments, one for high voltage and one for low voltage. The lower compartment houses the high voltage components and can be accessed through the “Electrical Access” panels indicated on the dimensional drawing. High voltage components include:

- Fan motor contactor, M10, M20, M30, M40, M50, M60
- Fan motor protector, MMP10, MMP20, MMP30, MMP40, MMP50, MMP60
- Compressor contactors, M1–M6
- Compressor motor protector, MMP1–MMP6
- Transformer, T1, T2, T3
- Disconnect switch, DS1–DS2
- Power block, PB1–PB2

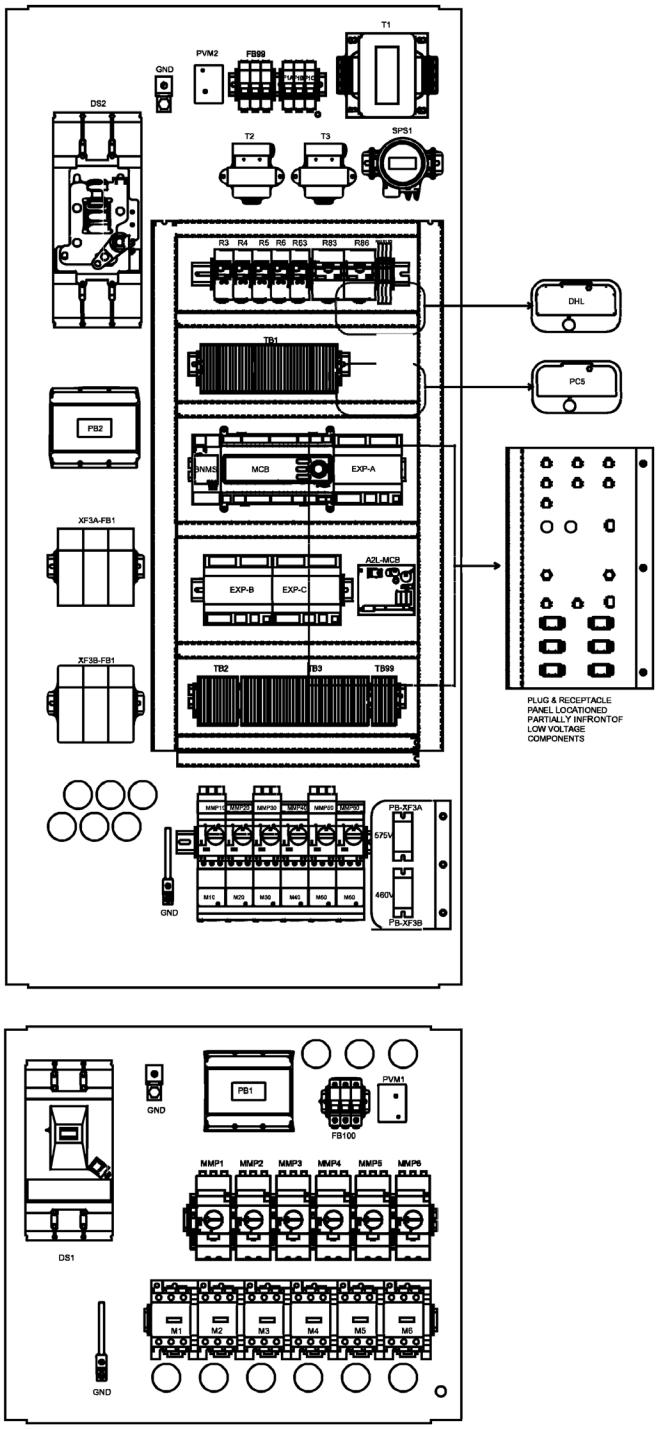
If the optional disconnect switch is provided, the switch handle is visible and accessible without removing any safety or access panels.

Low voltage components are located in the upper right compartment and include:

- MicroTech main control board, MCB
- I/O Expansion Module A, B, and C optional
- Duct static pressure sensor, SPS1
- Optional BACnet®/IP communication module
- Optional BACnet MS/TP communication module
- Optional LONWORKS® communication module

NOTE: Consult the unit controller manual for additional layouts of the control center.

Figure 11: Typical 460 Volt, 6-Compressor Control Center Layout, High and Low Voltage Compartments (ETL Only)



Control Panel Components

Manual Motor Protector (MMP)

The manual motor protector (MMP) provides coordinated branch circuit, short circuit protection, a disconnecting means, a motor controller, and coordinated motor overload protection.

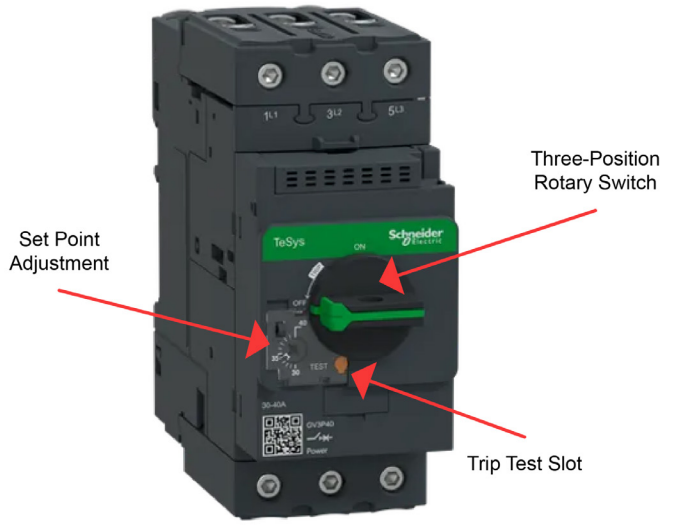
The MMP trip points are factory set and locked, see Figure 12. Do not change unless the motor ampacity changes or the MMP is replaced with a new device with incorrect set point adjustment. Any other non-authorized trip point or set point adjustment voids all or portions of the unit's warranty. Setpoint values are published on the schematic, near the MMP for each MMP. The MMP should be set to the value published on the schematic and locked by the factory.

To reset a tripped MMP, clear the trip by rotating the knob counterclockwise to the OFF position; then rotate the knob clockwise to the ON position. See Figure 12.

⚠ WARNING

If an overload or a fault current interruption occurs, check circuits to determine the cause of the interruption. If a fault condition exits, examine the controller. If damaged, replace it to reduce the risk of fire or electrical shock.

Figure 12: Manual Motor Protector



Circuit Breaker

Circuit breakers are optional and installed upstream of the Power Block to provide short circuit protection (Figure 13).

To reset a tripped circuit breaker: Clear the trip by rotating the lever down to the OFF position. Then rotate lever up to the ON position.

Other MMP features:

- Three-position rotary operator: OFF-TRIP-ON. See "2" in Figure 13.
- Lockout—tagoutable rotary operator: turn the rotary operator to OFF, slide out the extension arm, and insert a lockout pin.
- Ambient compensated –20°F to +60°F
- Single-phase sensitivity: if one phase exceeds set point, all three phases open.
- Trip test: insert a 9/64" screw driver in the slot to simulate a trip. See "3" in Figure 13.

Figure 13: Circuit Breaker

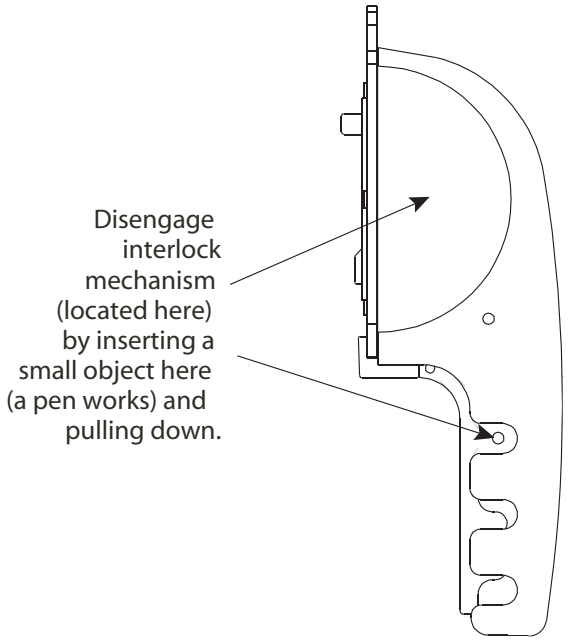
Disconnect

The optional disconnect is a molded case switch with many of the same features of the circuit breaker. The disconnect comes standard with a through-the-door handle and mechanism (Figure 14) to disconnect power to the unit prior to opening the door. The handle can be padlocked in the OFF position while performing maintenance to the unit.

⚠ CAUTION

Molded case switches do not provide over-current protection. This device may automatically open the circuit at levels above the ampere rating of the switch.

Figure 14: Through-the-Door Handle Disconnect



⚠ WARNING

Disengaging interlock exposes high voltage that can cause severe personal injury or death. Do not touch exposed components. Wear dry clothes and stand on a dry,nonconducting surface. Do not wear jewelry. Work with another trained, experienced technician nearby.

Terminals

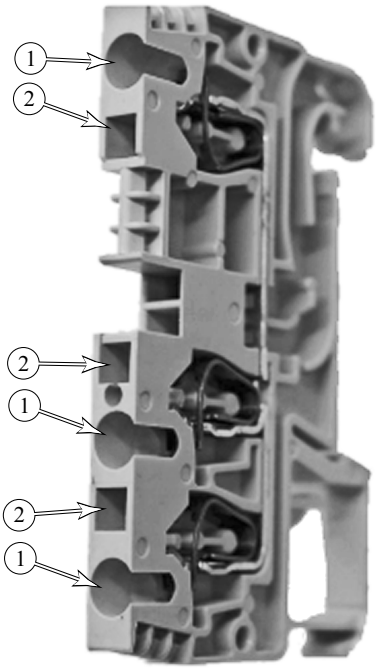
All field wiring terminals are spring clamp type, which offer several advantages over traditional screw-type terminals:

- Spring connections do not require torquing
- Spring connections resist failure due to vibration
- Easily identifiable terminal markers
- Combination spring release and square test ports

To insert a wire to the terminal connector:

1. Insert a small flat-blade screwdriver into the square hole (“1” in Figure 15) to open the spring clamp (“2” in Figure 15) adjacent to the desired wire location.
2. Strip approximately 1/2" of insulation from the wire.
3. Insert the stripped wire into the wire terminal (“1” in Figure 15).
4. Remove the screwdriver to close the spring clamp.

Figure 15: Terminal Connectors



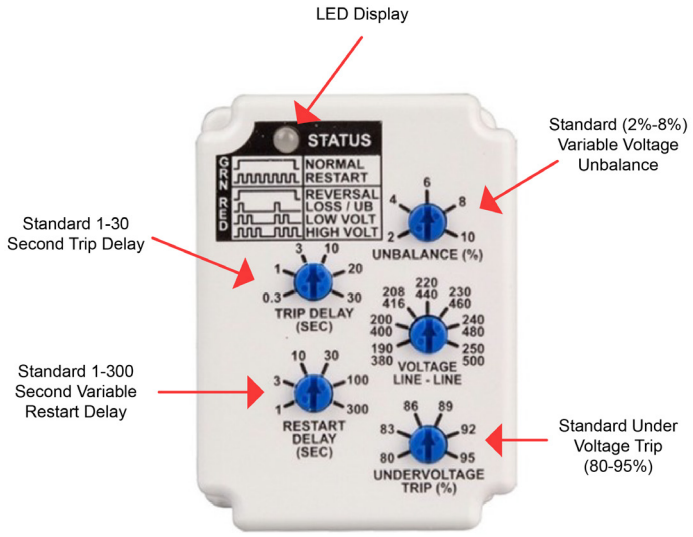
Phase Voltage Monitor (PVM)

The phase voltage monitor is designed to help protect three-phase loads from damaging power conditions. A microprocessor-based voltage and phase-sensing circuit constantly monitor the three-phase voltages to detect harmful power line conditions. When a harmful condition is detected, its output relay is deactivated after a specified amount of time (Trip Delay). The output relay reactivates after power line conditions return to an acceptable level for a specified amount of time (Restart Delay). The trip and restart delays prevent nuisance tripping due to rapidly fluctuating power line conditions.

Other features (see Figure 16):

- LED display to indicate status
- Loss of phase
- High or low voltage
- Voltage imbalance
- Phase reversal
- Rapid cycling
- Standard 1 to 500 second variable restart delay
- Standard 2% to 8% variable voltage imbalance
- Standard 1 to 30 second trip delay

Figure 16: Phase Voltage Monitor



High Pressure Switches

The high pressure switch (HP1-HP6) is a single pole pressure activated device that opens on a pressure rise. When the switch opens, it de-energizes the compressor circuit, shutting down the compressor. The MicroTech controller displays an alarm condition. Once the cause of the fault is identified and corrected, manually reset the unit at the switch and through the MicroTech keypad/display interface. The control is attached to a Shrader fitting and is located at the compressor. To check the control, shut off water flow to the condensers and observe the cutout point on a high pressure gauge. The high pressure control should open at 610 psig and close at 380 psig. After testing the high pressure control, check the pressure relief device for leaks.

Low Pressure Switches

The low pressure switch (LP1-LP6) is a single pole, pressure activated device that closes on a pressure rise. It senses evaporator pressure and is factory set to close at 90 psig and open at 50 psig. Compressor operation is not allowed until the switch closes. The low pressure switch is an automatic reset control. If the condition occurs on any one compressor three times in a 24-hour period, the alarm has to be reset manually through the MicroTech keypad/display interface to restart the compressor. The low pressure switch is attached to a Shrader® fitting and is located at the compressor.

Compressor Motor Protector

All compressors are provided with internal overload motor protection to prevent against excessive current and temperature caused by overloading, low refrigerant flow, or phase loss. The protector is located in the star point of the motor and, should it be activated, will cut out all three phases. It will be reset automatically.

- When the motor temperature is too high, then the internal protector will trip.
- When the current is too high, the thermal magnetic motor circuit breaker (MM1-MMP6) will trip before the internal overload protection. The thermal magnetic motor circuit breaker can be manually reset.

Whenever the protection system opens, the compressor shuts down for 30 minutes and the MicroTech unit controller displays an alarm indication. If the condition occurs on any one compressor three times in a 24-hour period, the alarm has to be manually reset through the MicroTech keypad/display interface to restart the compressor.

Clogged Filter Switch

A clogged filter switch (PC5) is provided to indicate when the unit filters are to be changed. The switch is factory set to close at 1.0 inches of H_2O. The switch has a field-adjustable set point range of 0.00 to 5.0 inches of H_2O. Turn the adjustment screw clockwise to decrease differential pressure setting. Turn the adjustment screw counterclockwise to increase differential pressure setting. When the filter pressure differential exceeds the switch setpoint, MicroTech controller displays a clogged filter indication. The unit is allowed to continue operation. PC5 is located in the main control panel.

Phase Fail/Under Voltage Protection

The phase voltage monitor (page 20) 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 protects against 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 down the unit whenever phase voltages are outside the specified limits.

Duct High Limit

A duct high limit (DHL) pressure control is provided as standard with all units with variable air volume control. The duct high limit is intended to protect the ductwork, etc. from over pressurization caused by tripped fire dampers or a control failure. When the duct pressure exceeds the setting of the control, the unit de-energizes via the MicroTech controller, which displays an alarm condition. After the reason for trip is identified and corrected, reset the control via the MicroTech keypad/display interface.

The duct high limit control is factory installed, including sensing tubing, and preset for a 3.0" inches of H2O trip point. The control can be readjusted in the field to match the specific ductwork of a project. The switch has a field-adjustable set point range of 0.00 to 5.0 inches of H_2O. Turn the adjustment screw clockwise to decrease differential pressure setting. Turn the adjustment screw counterclockwise to increase differential pressure setting. The DHL is located in the main control panel.

Table 13: Electrical Legend

LABEL	DESCRIPTION	LOCATION
A2L-MCB	A2L MITIGATION CONTROL BOARD	MAIN CONTROL BOX
ACT3	ACTUATOR MOTOR, ECONO-MIZER	COIL SECTION
ACT4	ACTUATOR MOTOR, WATER REGULATING/BYPASS VALVE	COIL SECTION
DAT	DISCHARGE AIR TEMPERA-TURE SENSOR	SUPPLY FAN SECTION
DHL	DUCT HI-LIMIT	SUPPLY FAN SECTION
DP	DRAIN PAN SWITCH	COIL SECTION
EWT	ENTERING WATER TEMP. SENSOR	COIL SECTION
EXP A,B,C	MTIII EXPANSION MODULES	MAIN CONTROL BOX
F1A,B	FUSE, CONTROL CIRCUIT TRANSFORMER (T1), PRI-MARY	MAIN CONTROL BOX
F1C	FUSE, CONTROL CIRCUIT TRANSFORMER (T1), SEC-ONDARY	MAIN CONTROL BOX
FE	FUNCTIONAL EARTH GROUND	MAIN CONTROL BOX
FS1,FS2	FREEZESTAT CONTROL	COIL SECTION, HEAT/ COOL
GRD/PE	GROUND	MAIN CONTROL BOX
HP1-6	HI-PRESSURE CONTROLS, REFRIG.	ON COMPRESSORS
HTR1-6	CRANKCASE HEATERS	ON COMPRESSORS
ID	DESCRIPTION	STANDARD LOCATION
LD1	A2L LEAK DETECTOR, COM-PRESSOR	ON COMPRESSORS
LD2	A2L LEAK DETECTOR, SUP-PLY FAN	SUPPLY FAN SECTION
LP1-8	LOW-PRESSURE CONTROLS, REFRIGERATION	ON COMPRESSORS
M10-60	CONTACTOR, SUPPLY FAN	MAIN CONTROL BOX
M1-6	CONTACTOR, COMPRES-SORS 1-6	MAIN CONTROL BOX
MAT	MIXED AIR TEMP. SENSOR	FILTER SECTION
MCB	MICROTECH IV CONTROL BOARD	MAIN CONTROL BOX
MJ	MECHANICAL JUMPER	MAIN CONTROL BOX
MMP10-60	MANUAL MOTOR PROTEC-TOR, SUPPLY FAN	MAIN CONTROL BOX
MMP1-6	MANUAL MOTOR PROTEC-TOR, COMPRESSORS 1-6	MAIN CONTROL BOX
OAE	OUTSIDE AIR ENTHALPY SENSOR	FIELD INSTALLED IN OUTSIDE DUCT
OAT	OUTSIDE AIR TEMPERATURE SENSOR	FIELD INSTALLED IN OUTSIDE DUCT
PB, XF3A	POWER BLOCK, FIELD WIR-ING, STEP DOWN TRANS, 575V	MAIN CONTROL BOX
PB, XF3B	POWER BLOCK, FIELD WIR-ING, STEP DOWN TRANS, 460V	MAIN CONTROL BOX
PB1	POWER BLOCK, TOTAL UNIT OR COMP/ ELECTRIC HEAT	MAIN CONTROL BOX
PB2	POWER BLOCK, SAF/CON-TROLS	MAIN CONTROL BOX
PC5	PRESSURE CONTROL, CLOGGED FILTER	MAIN CONTROL BOX
PVM1,2	PHASE VOLTAGE MONITOR	MAIN CONTROL BOX
R11	RELAY, WATER FLOW SWITCH	MAIN CONTROL BOX
R1-A2L	A2L LEAK DETECTED RELAY	MAIN CONTROL BOX
R2-A2L	A2L SENSOR FAULT RELAY	MAIN CONTROL BOX
R3-6	RELAY, HI-PRESSURE	MAIN CONTROL BOX
R63	RELAY, DUCT HIGH LIMIT	MAIN CONTROL BOX

LABEL	DESCRIPTION	LOCATION
R83	RELAY, SMOKE SHUTDOWN	MAIN CONTROL BOX
R86	RELAY, SMOKE PRESSURIZE	MAIN CONTROL BOX
RAT	RETURN AIR TEMPERATURE SENSOR	FIELD INSTALLED IN RETURN DUCT
RAE	RETURN AIR ENTHALPY SENSOR	FIELD INSTALLED IN RETURN DUCT
RES 1	RESISTOR, 1500 OHMS	MAIN CONTROL BOX
RES 2	RESISTOR, 1000 OHMS	MAIN CONTROL BOX
RES 3	RESISTOR, 1000 OHMS	MAIN CONTROL BOX
S1	CONTROLS POWER	MAIN CONTROL BOX
S7	CONTROLS/ON/AUTO	MAIN CONTROL BOX
SD1	SMOKE DETECTOR, SUPPLY	SUPPLY FAN SECTION
SHS1	SPACE HUMIDITY SENSOR	FIELD INSTALLED
SPS1	STATIC PRESSURE SENSORS, DUCT/BUILDING	MAIN CONTROL BOX
T1	TRANSFORMER, MAIN CONTROL AND UV LIGHTS (LINE/115 VAC)	MAIN CONTROL BOX
T2	TRANSFORMER, CONTROL INPUT (115/24 VAC)	MAIN CONTROL BOX
T3	TRANSFORMER, CONTROL INPUT (115/24 VAC)	MAIN CONTROL BOX
TB1	TERMINAL BLOCK, INTERNAL	MAIN CONTROL BOX
TB2	TERMINAL BLOCK, FIELD, CLASS 2	MAIN CONTROL BOX
TB3	TERMINAL BLOCKS, FACTORY	MAIN CONTROL BOX
TB4	TERMINAL BLOCK, FIELD, 115 VAC	MAIN CONTROL BOX
TB99	TERMINAL BLOCK, HEAT	MAIN CONTROL BOX
WFS	WATER FLOW SWITCH	COIL SECTION
XF3A, XF3B	STEP DOWN TRANSFORMER, 575V/460V	FIELD INSTALLED
XF3A-F1-3	FUSES, STEP DOWN TRANS (575V/460V), PRIMARY	MAIN CONTROL BOX
XF3A-FB1	FUSE BLOCK, STEP DOWN TRANS (575V/460V), PRIMARY	MAIN CONTROL BOX
XF3B-F1-3	FUSES, STEP DOWN TRANS (575V/460V), SECONDARY	MAIN CONTROL BOX
XF3B-FB1	FUSE BLOCK, STEP DOWN TRANS (575V/460V), SECONDARY	MAIN CONTROL BOX
ZNT1	ZONE TEMP. SENSOR, SETBACK	FIELD INSTALLED IN ZONE

Table 14: Wiring Diagram Symbols

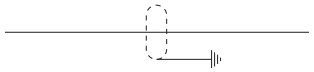
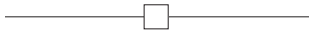
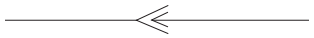
Wiring Symbols		
1.		Field wiring
2.		Factory wiring
3.		Shielded wire/cable
4.		Main control box terminals
5.		Auxiliary box terminals
6.		Field terminals
7.		Plug connector
8.		Wire/harness number
9.		Wire nut/ID

Figure 17: Control Wiring

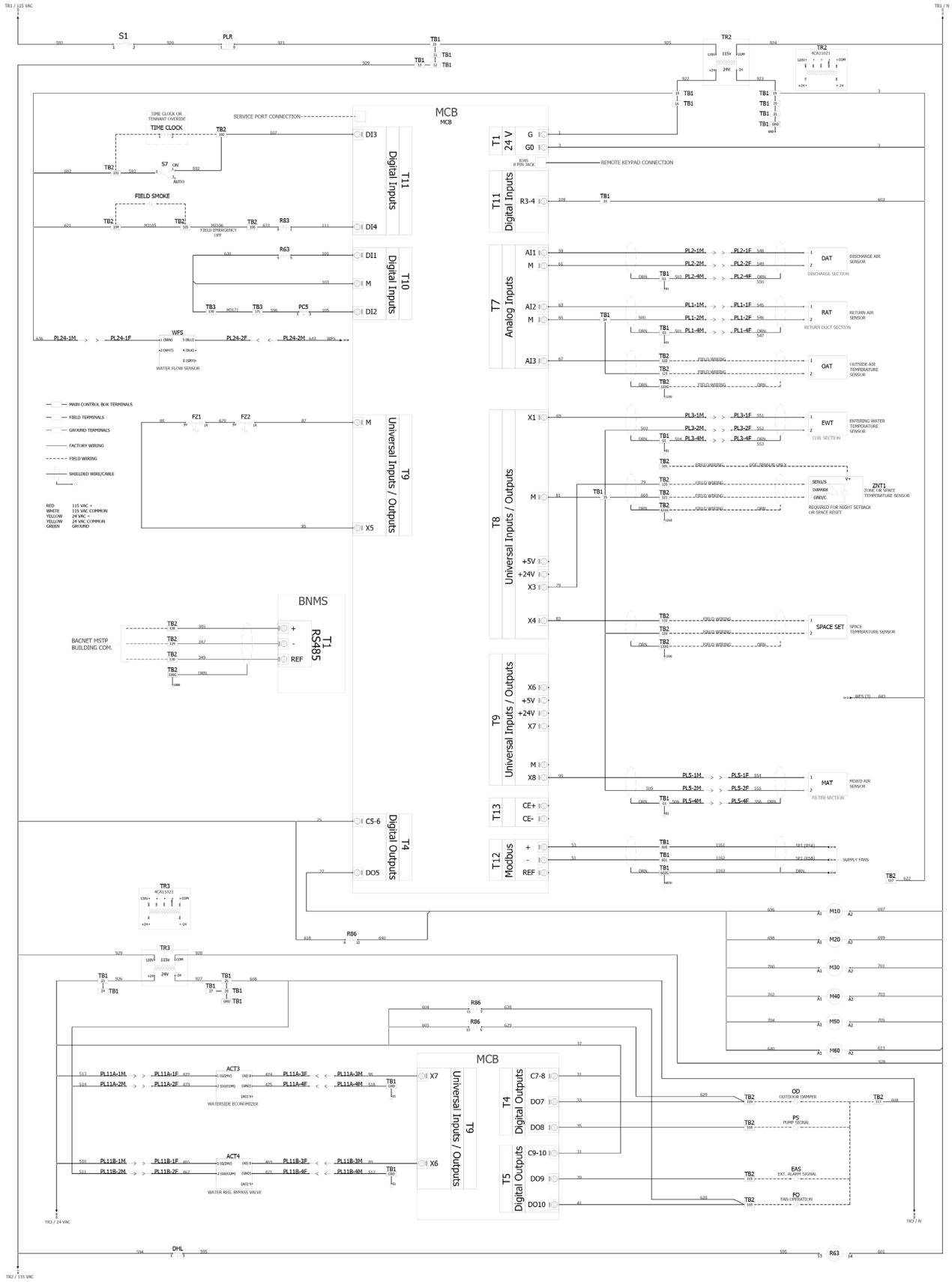


Figure 18: Supply Fan Power Wiring

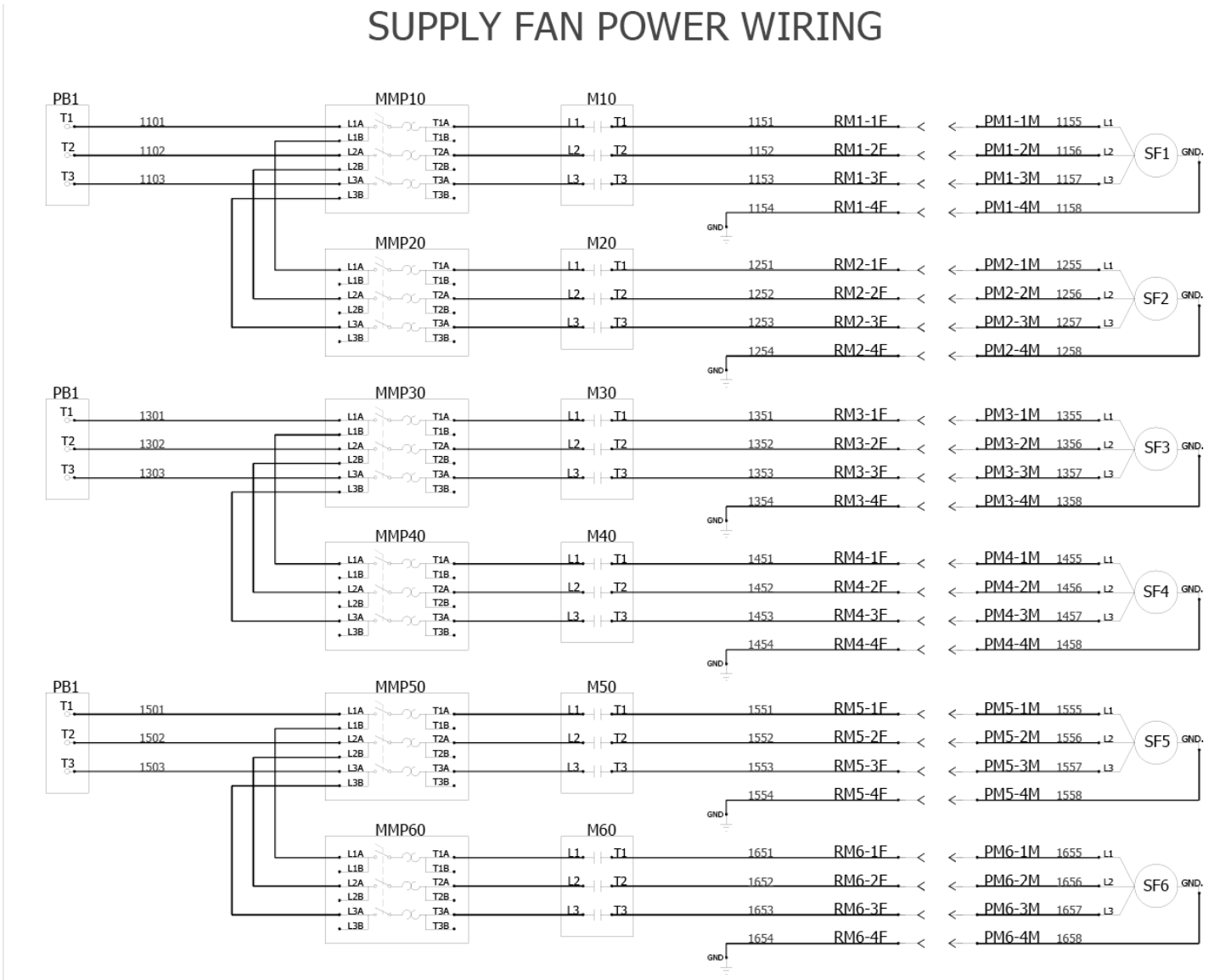


Figure 19: Compressor Power Wiring

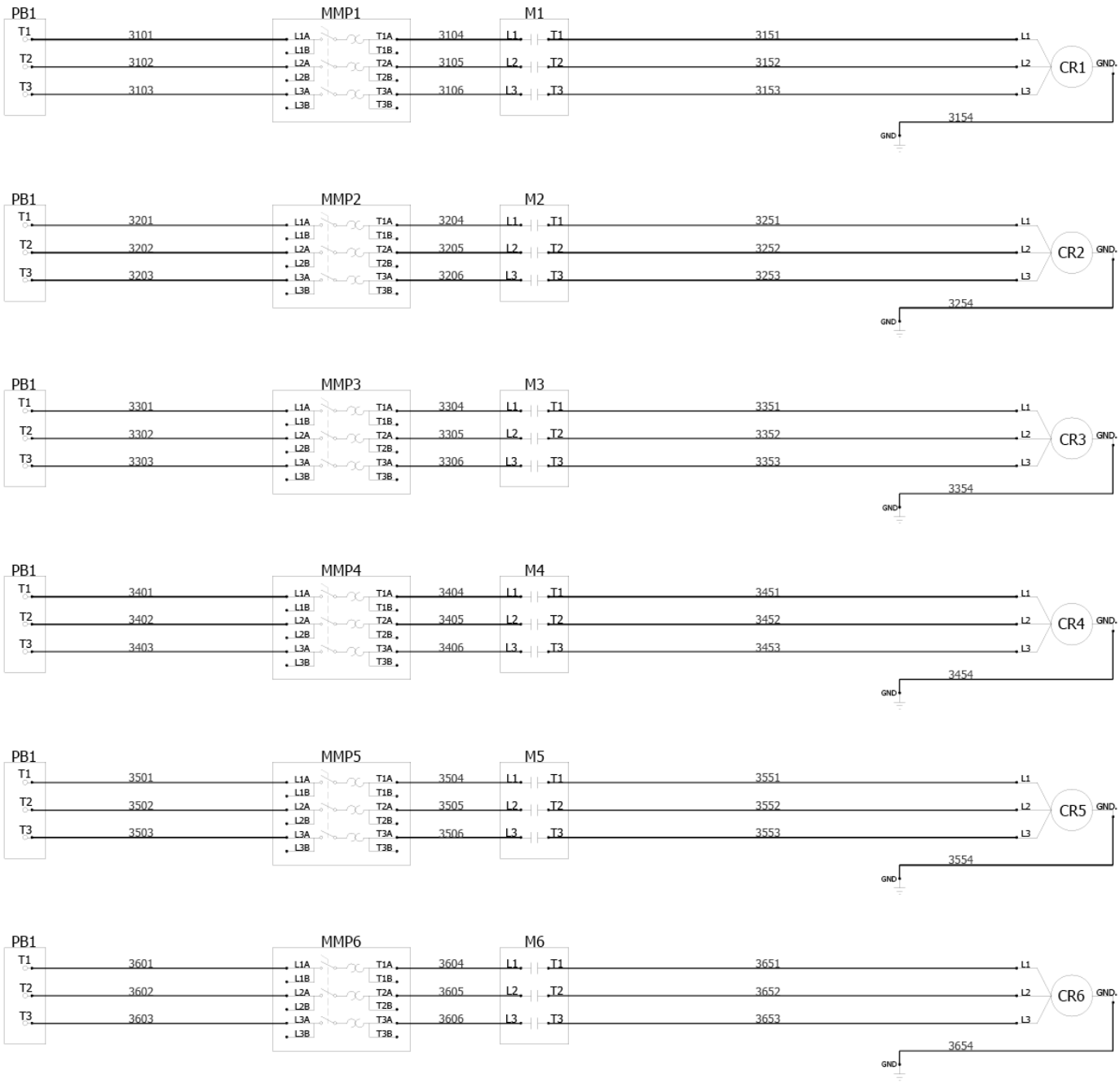


Figure 20: Supply Fan Communication Wiring

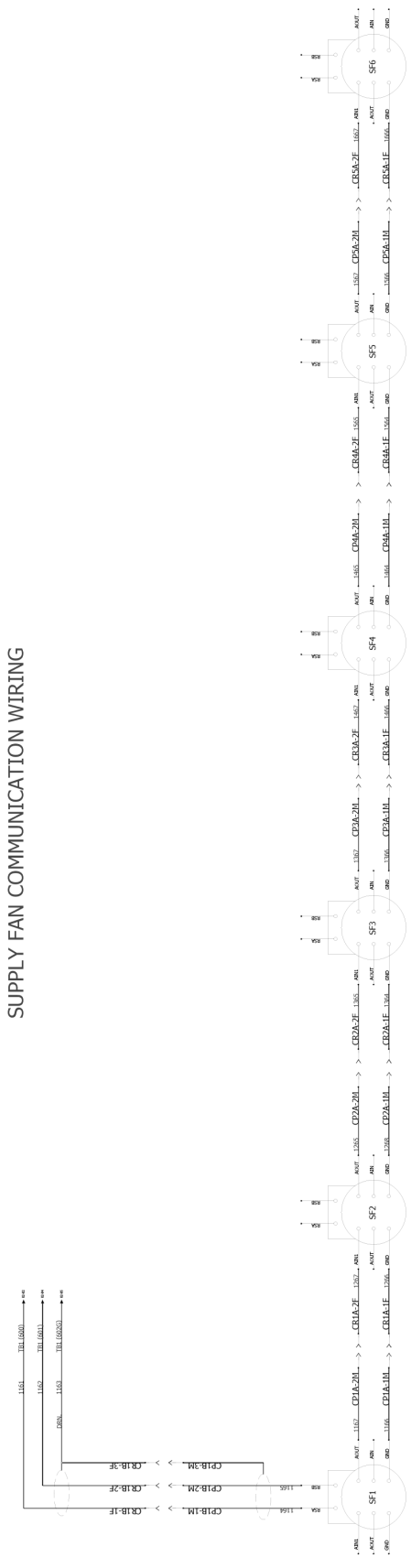


Figure 21: Customer Supplied Power Wiring

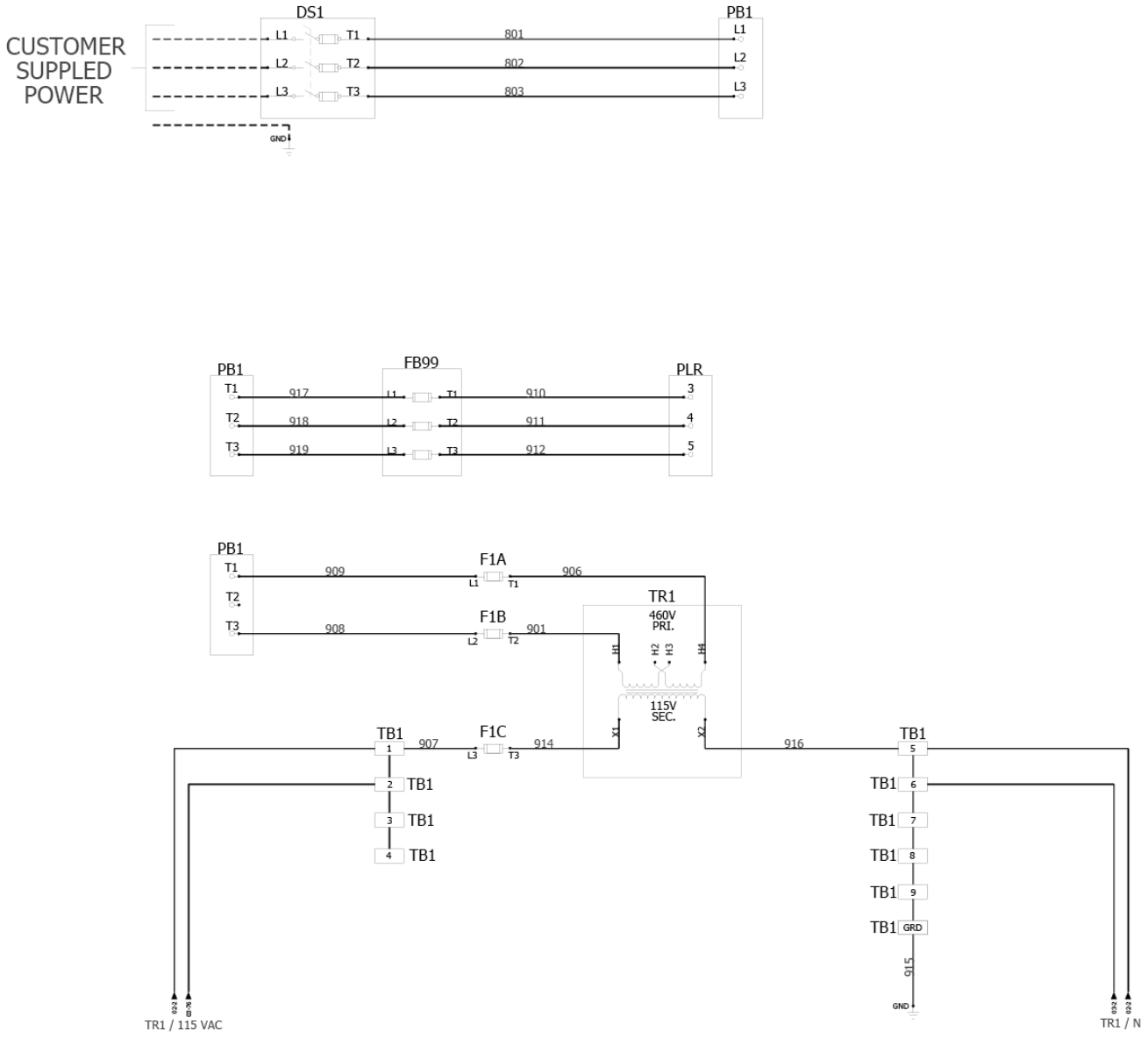


Figure 22: Refrigeration Circuit Wiring

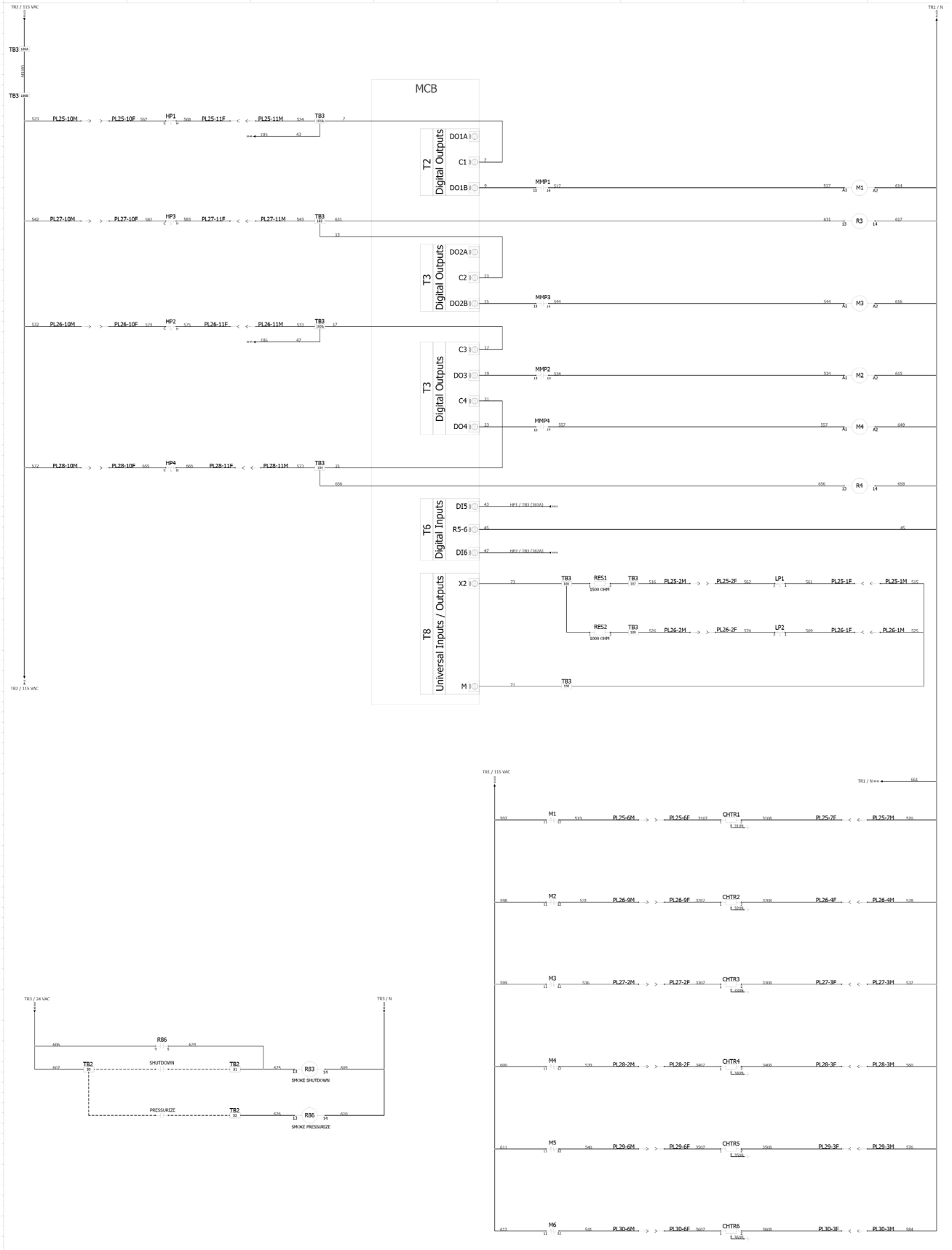


Figure 23: Expansion Board 'A' Wiring

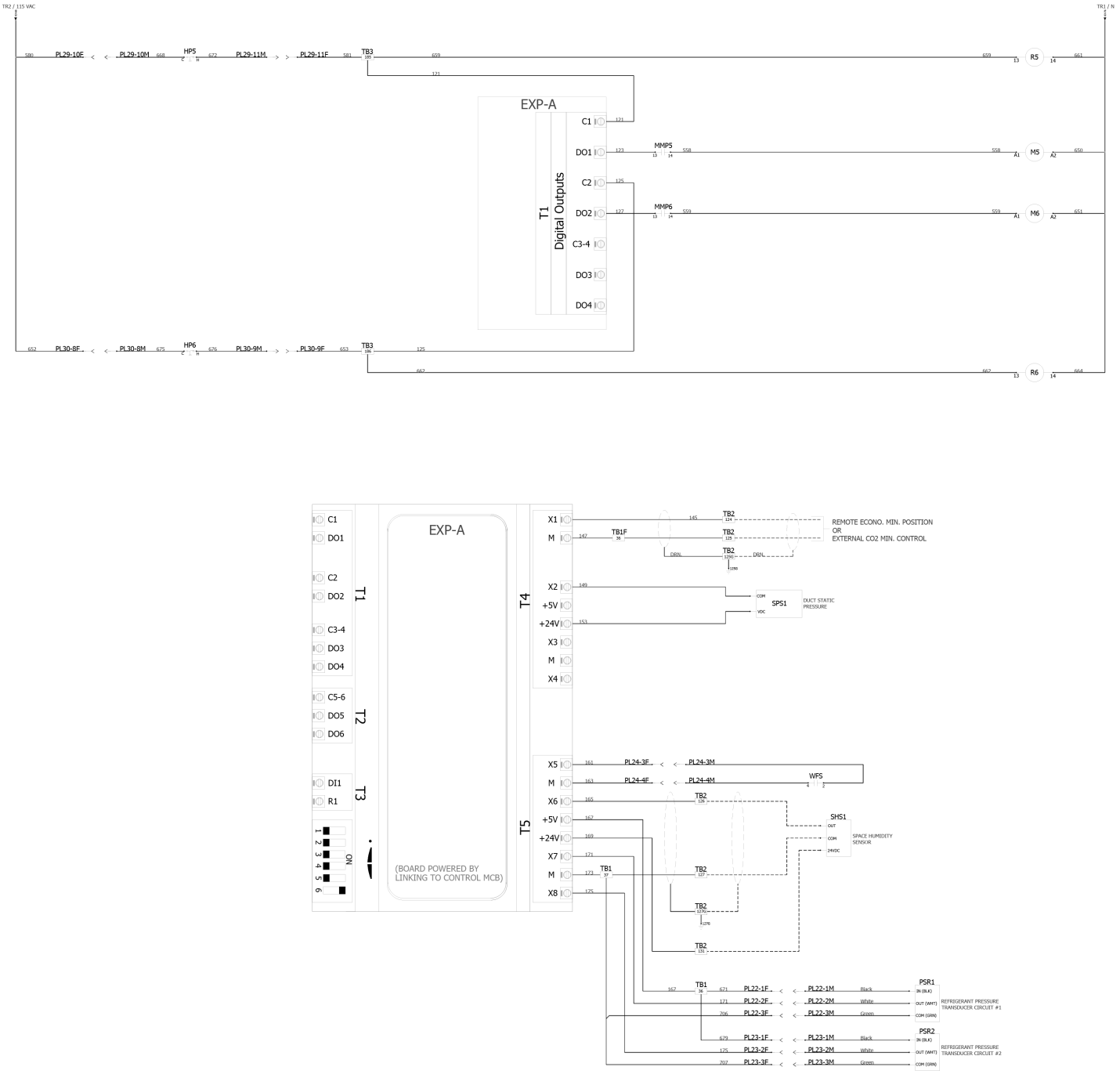


Figure 24: Expansion Boards 'B' and 'C' Wiring

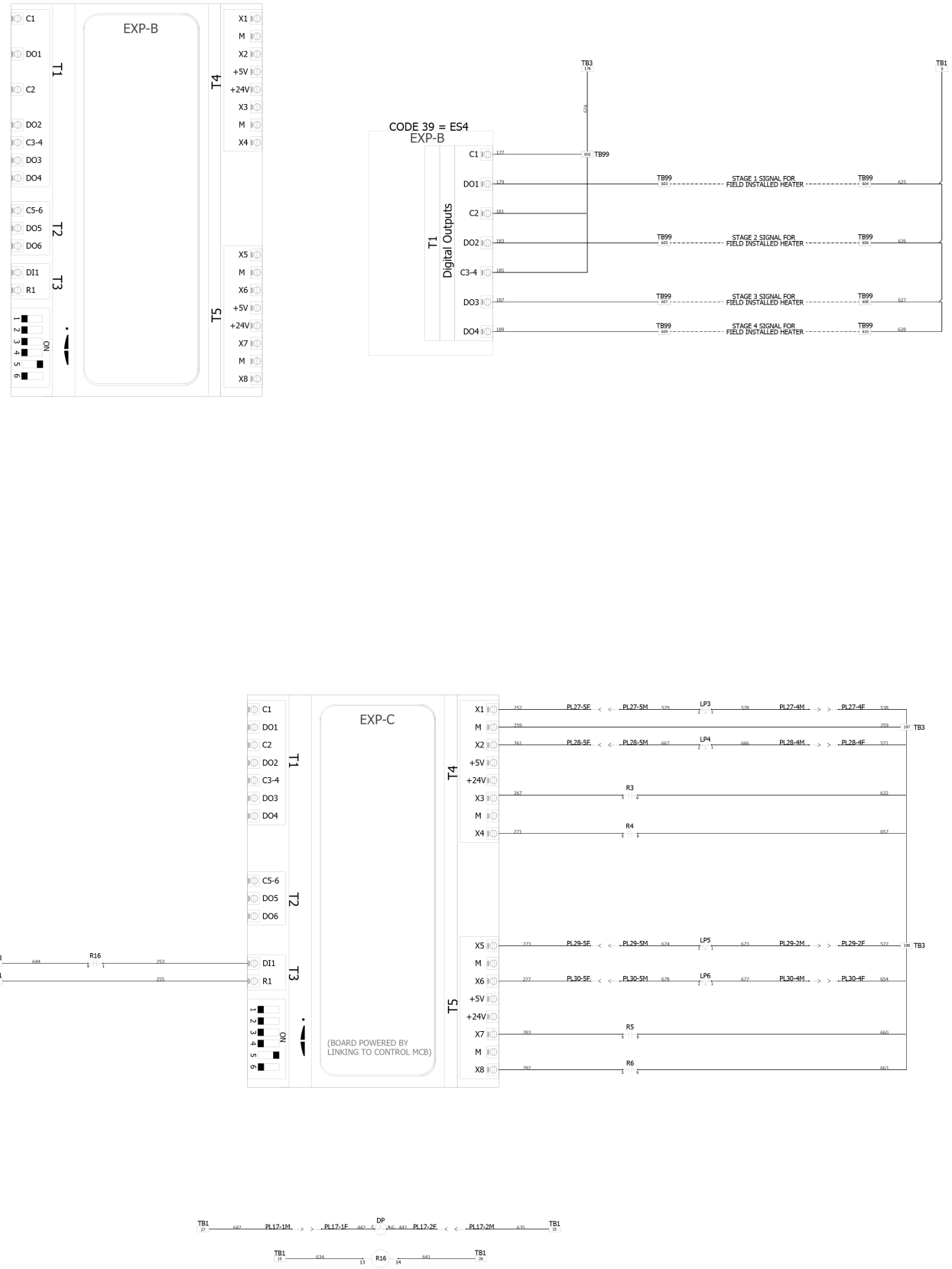
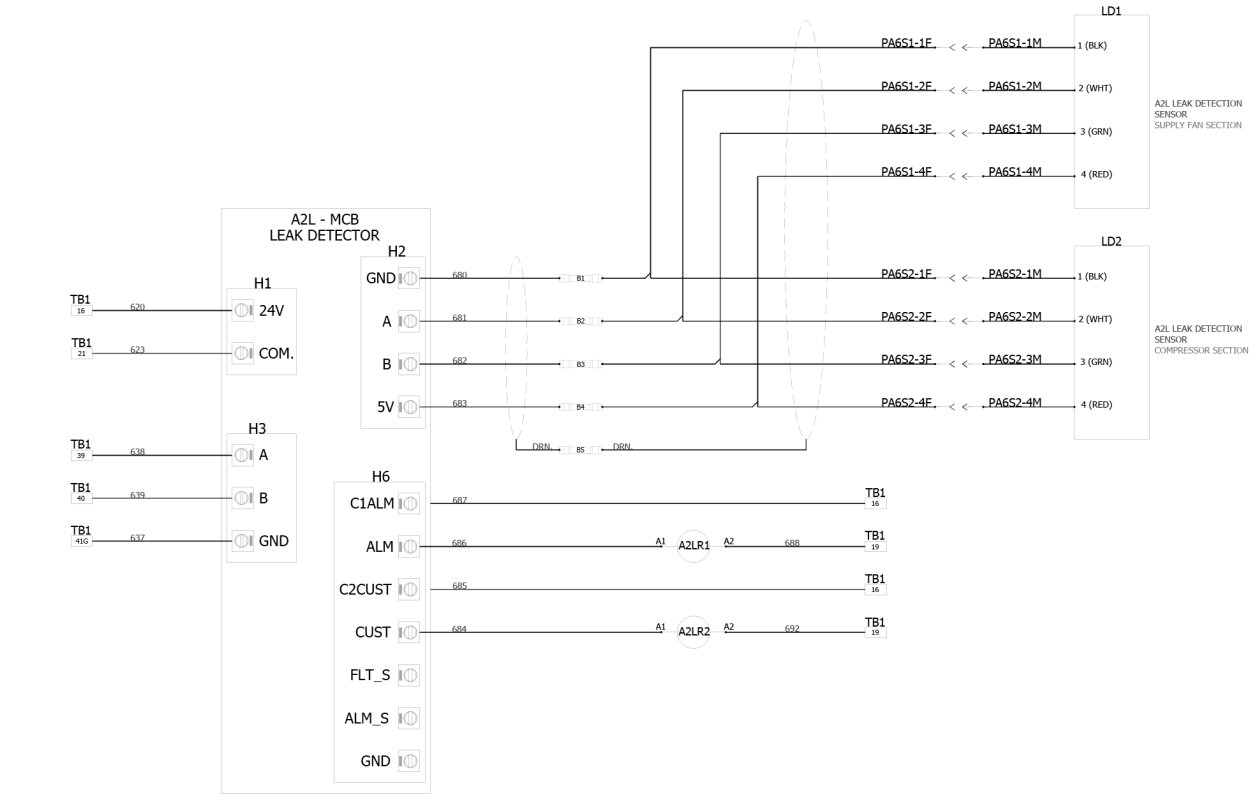
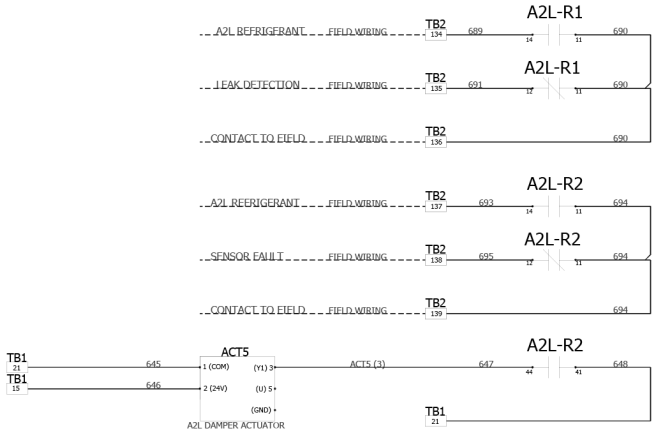


Figure 25: A2L Wiring





Duct Static Pressure Sensor

All units provided with variable air volume control include a factory-mounted static pressure sensor (SPS1). The sensor is factory wired and requires field installation of 1/8" I.D. sensor tubing to the selected duct location.

NOTE: Be sure that tubing complies with local code requirements. Flame retardant plastic or metal tubing may be required. Carefully select the ductwork sensing point for the pressure sensor. Improper location of the sensing point results in unsatisfactory operation of the entire variable air volume system.

Adhere to the following guidelines:

1. Position sensors near the end of long duct runs so all terminal box take-offs along the run have adequate static pressure to operate.
2. Position the end of the sensing tube perpendicular to the airflow to sense only static pressure.
3. Locate the sensing tube in a non-turbulent flow area of the duct. Keep several duct widths away from take-off points, bends, or neck downs.

Mounting Instructions

1. Drill a hole in the duct at the remote sensing point and install a rubber grommet (Figure 26).
2. Insert the sensing tube 1/8" into the duct and securely clamp tubing to the duct, being sure not to stress or kink the tubing.

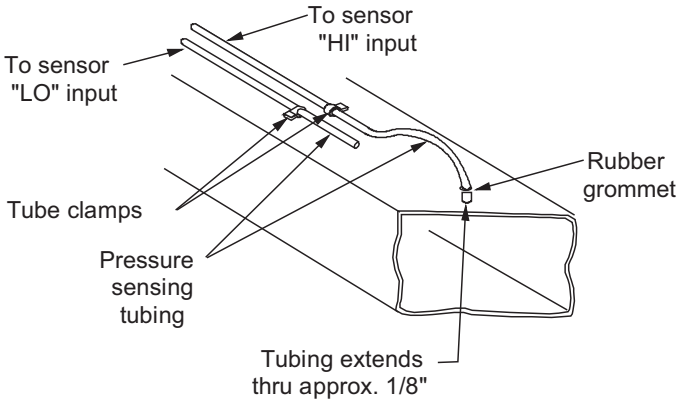
NOTE: The end of the sensing tube must be smooth and cut straight across. An angle cut affects operation.

3. Clamp a second tube to the outside of the duct at the location of the sensing point.
4. Run both tubes along the ductwork and back to the unit.
5. Route the tubing to the pressure sensor (SPS1) by drilling two holes through the unit upright post.
6. Use a grommet at each hole to protect the tubing and seal the cabinet.

NOTE: To avoid confusion between “high” and “low” tubing, use two different tubing colors and record this information along with the sensing point location on the master building blueprints.

7. Connect tubing to the high and low ports at the patch panel in the main control section.

Figure 26: Sensor Mounting



Freezestat

A non-averaging type freezestat (FS1) is provided to protect hydronic coils from subfreezing temperatures. If the unit has an economizer coil, the control is mounted on the entering face of the economizer coil. If the unit does not have an economizer coil, the control is mounted on the leaving face of the hot water coil. Upon sensing a temperature above specification, the unit shuts down, opens the hydronic control valves, and sends an alarm indication via the MicroTech controller. The freezestat has a field-adjustable set point range of 35°F to 45°F. To change the set point, turn the adjustment screw until the pointer lines up with the desired cutout point. The adjustment screw is accessible at the bottom of the control or at the top when the cover is removed.

Condenser Water Flow Switch

The Water Flow sensor (WF1) is available to verify flow to the unit condenser before compressor operation is allowed. The flow sensor is factory installed in the unit on the entering water condenser pipe. If the unit senses a loss of condenser water, cooling is locked out via the MicroTech controller. When flow is restored, the unit automatically resets. The Water Flow sensor operates on the calorimetric principle using the cooling effect of the flowing condenser water around its stainless steel tip to provide flow detection.

Water Side Economizer

A completely factory-installed, factory-piped, and factory-controlled water side economizer system is available on any constant or variable air volume system. Whenever the entering water temperature is more than 5°F to 7°F below the mixed air temperature to the unit, the control valves modulate to provide cooling directly from the tower water (adjustable at the MicroTech keypad/display). The economizer system can be used to provide 100% of the cooling demand or supplement mechanical cooling by precooling the return air. The economizer system consists of a water coil and two, two-way, control valves. The unit's MicroTech controller modulates the control valves to satisfy the cooling demand whenever the entering water is suitable. When the control valves are in the 90% open position, the unit's compressors are allowed to stage on to satisfy the cooling load. When the entering water temperature is no longer suitable, the economizer control valve closes and the unit is on 100% mechanical cooling.

Two valve control arrangements are available from the factory. The first maintains full flow through the unit condensers at all times. This control arrangement is used for systems with constant pumping systems. For installations with a variable pumping system, the control valves are sequenced so flow is removed from the unit whenever cooling is not required.

The economizer system is factory piped and the coil takes advantage of the same drain pan and condensate connection. To vent air from the economizer coil, use the uppermost clean out plug or vent plug on top of the header. The torque requirement for the clean out plugs is 10 inch-lb (1,13 N-M).

Condenser Water Head Pressure Control

An optional condenser head pressure control valve is available on units without water side economizer. This option permits operation with entering water temperatures as low as 40°F. The valve is a two-way regulating valve controlled via MicroTech to maintain refrigerant head pressure.

Variable Air Volume

Static pressure is controlled by the unit-mounted MicroTech unit controller where status of current airflow can be monitored. Static pressure is sensed by one or two factory-mounted duct sensors. The installer provides and installs the sensor tubing from unit mounted sensor(s) to duct location(s). The static pressure set point is keypad adjustable through the MicroTech unit controller.

All variable air volume units include a field-adjustable duct high limit safety control to protect ductwork from excessive duct pressure.

Disconnect Switch

For field power connection, there are two options:

- Unit Mounted Disconnect (Rotary Handle)
- Unit Mounted Power Block

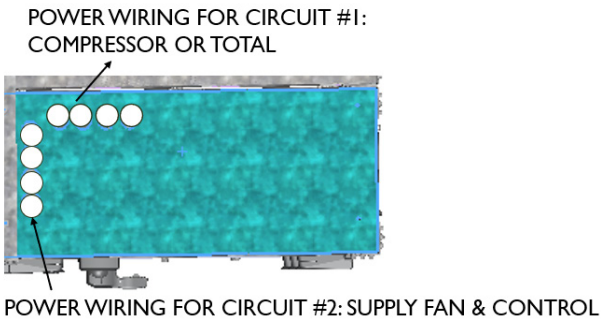
With a unit mounted disconnect, a door-mounted mechanism makes it possible to operate a circuit breaker installed in an enclosure with the door closed. The disconnect provides ON (I) and OFF (O) indications on the handle.

Lug size information for the disconnect options can be found on page 16.

Dual Power Supply

A dual power block is an option for the power supply, which allows the fan motor and control circuit to be isolated from the compressor circuit.

Table 15: Wiring Circuit Locations



Heating Coil Control

A factory-mounted, heating water coil is available, without a factory-mounted control valve. The field-provided and installed heating control valve is controlled by the unit's MicroTech controller. Refer to "as built" schematics for field terminals.

Spring Return Actuators

24 VAC powered actuators are used to automatically control the water valves. The MicroTech controller unit monitors conditions and controls the actuators accordingly, using a 2 to 10 VDC analog signal to close and open the valves respectively.

Start-Up

⚠ WARNING

ELECTRIC SHOCK HAZARD

The equipment frame must be bonded to the building electrical ground with the grounding terminal provided or other acceptable means. Failure to properly ground can result in electric shock, equipment damage, severe personal injury, or death. Lock out and tag out all power sources to equipment before servicing.

⚠ WARNING

Always open the power disconnect switch before opening service panels. Failure to do so can result in electric shock, equipment damage, severe personal injury, or death.

Start Up and service of this equipment must be performed only by trained, experienced personnel. A representative of the owner or the operator should be present during Start Up to receive instruction in unit operation, care, and adjustment.

Complete a check, test, and start up procedure. The completed check test and start form (supplied with each unit) must be signed and returned to Daikin Applied.

NOTE: Before opening service panels, always lock out and tag out the power disconnect switch.

Pre-Start Up

⚠ WARNING

Unit cannot be started until the ductwork is installed to avoid injury.

1. Check that the unit is completely and properly installed with ductwork connected.
2. Check that all construction debris is removed and filters are clean.
3. With all electrical disconnects open, check all electrical connections to be sure they are tight. Although all factory connections are tight before shipment, shipping vibration can cause loosening.
4. Check all factory and field-installed Victaulic coupling connections for tightness to avoid water leaks. Although all factory connections are tight before shipment, shipping vibration can cause loosening.
5. Check that the unit condensate drains were completed. Before attempting to operate the unit, review the control layout description to become familiar with the control locations.
6. Review all equipment service literature and the unit wiring diagrams supplied with each unit.
7. Review optional controls to determine which are included in the unit.
8. Check that the return air temperature sensor and optional space temperature sensor, if used, are installed in the return air duct and that the wiring terminations were made at the unit input board.
9. Check that the entering water temperature sensor is mounted.
10. Check that the optional duct static pressure sensor is connected to the duct with appropriate tubing. The unit may have one optional static pressure sensor, SPS1, or two, SPS1 and SPS2.
11. Check the voltage of the unit power supply and see that it is within the allowed ±10% tolerance. Phase voltage unbalance must be within ±2%.
12. Check the unit power supply wiring for adequate ampacity and a minimum insulation rating of 75°C.
13. Verify that all mechanical and electrical inspections were completed per local codes.
14. Make sure the unit switch S7 is in the OFF position. Then throw the main power disconnect to ON. This energizes the crankcase heaters. Wait a minimum of 24 hours before starting the unit.

General

All units are factory tested for proper field operation.

1. Verify that the close disconnect switch with switch S7 is in the Auto position and that the crankcase heaters have operated for 24 hours.
2. Supply power to the MicroTech controller; the LEDs on MCB1 should follow the normal startup sequence.
3. Set the internal MicroTech time clock or the external time clock, if used.
4. Set the cooling set point to a value that provides a full call for cooling.
5. Start the auxiliary equipment for the installation such as water pumps, cooling towers, etc.

Fan Start Up

1. Place the unit into the FAN ONLY mode, using the following keypad sequence.

   System
   – Control Mod:
   – Off
   – Auto
   – Heat/Cool
   – Heat only
   – Cool only
   – Fan only
2. Turn switch S7 to ON. The supply air fan should start and run.
3. Observe the fan rotation. If the fan rotates backward, reverse the two legs of the main unit supply power. Unit compressors are factory “phased” to match the supply fan. Do not reverse internal fan motor power leads since this results in the compressor being out of phase.
4. If the fan does not run:
   a. Check the control circuit fuses F1A, F1B, F1C.
   b. Verify that the fan overload is not tripped.
   c. Check the fan motor power fuses or manual motor protector (MMP).
   d. Trace the circuits.

Compressor Start Up

With the supply air fan operational, prepare for compressor operation.

Connect service gauges. Verify that the unit has not lost its refrigerant charge due to shipping damage or leaks. Verify that the compressor crankcase heaters are operating. **These should operate at least 24 hours before starting compressors.**

1. Set Cooling Control Setpoint, MicroTech, to a value that provides a call for full cooling.
2. Place the unit into the COOL ONLY mode through the keypad/display.
3. If desired, the MicroTech internal control timers can be reduced to 20 seconds. Enter the amount of time it operates in this “Fast” mode through the keypad as follows:

   Extended Menus
   • Timer Settings
   – Service Time

NOTE: Use “Fast” timers only to verify the sequencing of compressors during Start Up. For proper unit operation, return the timer to “Normal.”

Do not allow compressors to come on repeatedly in the “Fast” timer mode since this can damage compressors and/or indicates “Motor Protector Failure” under compressor alarms.

4. If the compressor motor hums but does not run, verify that the unit is getting three-phase power.

The compressors should run continuously. If a compressor cycles on the low pressure switch:

1. Verify that the circuit is not low on charge.
2. Check for low airflow.
3. Check for clogged filters.
4. Check for restricted ductwork.
5. Check for very low mixed air temperatures to the unit.
6. Verify that all the distributor tubes, the expansion valve and the liquid line components are feeding the evaporator coil.
7. Verify that all fan section access panels are in place.
8. Verify that the suction service valves and the liquid line service valves are completely open.
9. Verify that all sensor inputs are connected.

Economizer Start Up

The economizer modulates to maintain the cooling discharge set point whenever the entering water temperature is below the mixed air temperature to the unit by an adjustable differential (0–10°F) and the unit is calling for cooling.

To verify operation of the economizer when entering water is unsuitable, place the entering water temperature (EWT) sensor in a cold water bath. Once the sensor is in the bath, observe that the economizer control valve is open. Readjust the control setting or remove the sensor from the bath and observe that the economizer control valve drives close.

Expansion Valve Superheat Adjustment

It is very important that superheat is set properly. Under full load conditions it should be between 10°F and 12°F. Lower entering air conditions, lower airflow rates, and higher condensing temperatures reduce the load on the expansion valve. Under reduced load conditions, the superheat could be as low as 6°F to 8°F. Insufficient superheat causes liquid floodback to the compressor and possible liquid slugging. Excessive superheat reduces system performance and shortens compressor life. Verify that the sensing bulb is properly located and securely strapped to the refrigerant line. See Figure 27. Turn the adjusting stem clockwise to increase superheat. Adjust the stem (one turn at a time, maximum) and observe the superheat. Allow up to 30 minutes for the system to rebalance at the final setting.

⚠ WARNING

The supply fan inlet is located near the expansion valves.

Refrigerant Charge

Each unit is designed for use with R-32.

⚠ CAUTION

Field mixing or changing of refrigerants can compromise performance and damage equipment. Improper refrigerant addition can cause equipment damage and severe personal injury.

Units ship with a full operating charge of refrigerant and oil. However, in the event of a leak in the system, some added charge may be required. In an undercharged situation, any of the following may occur:

- If a circuit is slightly undercharged, bubbles appear in the sightglass.
- If the circuit is severely undercharged, it may trip on its low pressure safety.

If any of these conditions occur, first identify and correct the source of the leak and then follow the charging procedure described below.

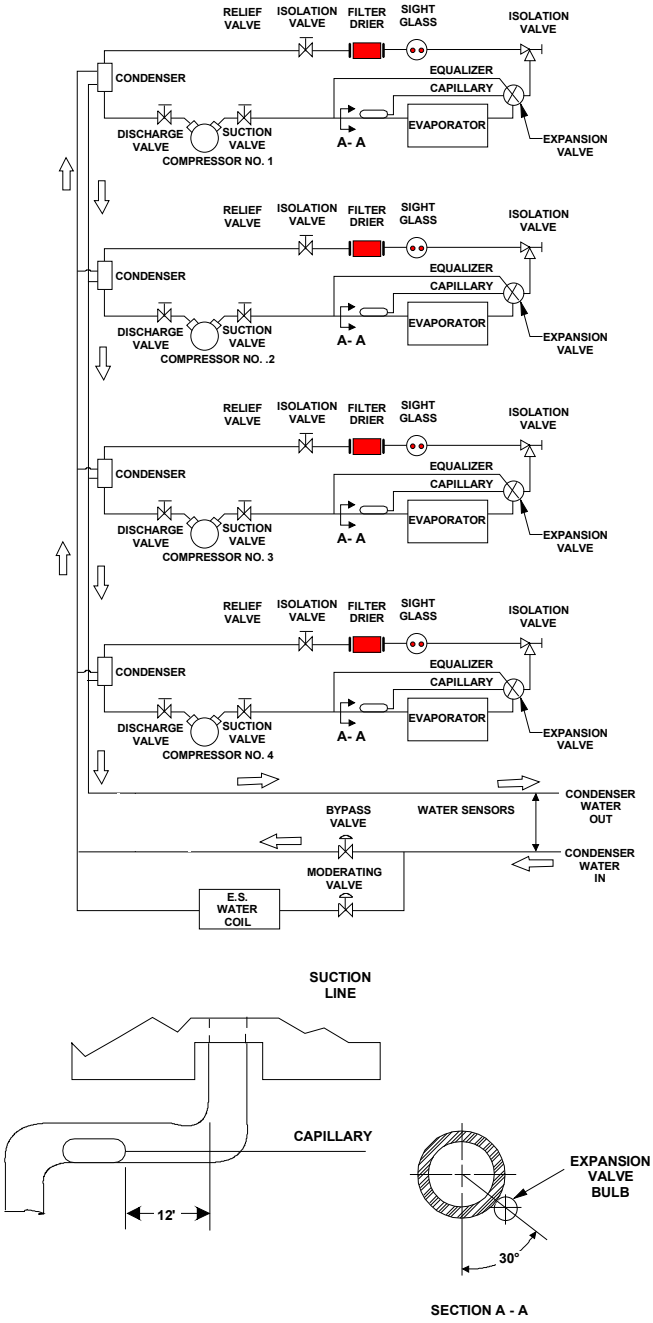
Using the liquid line sight-glass as the sole means of metering additional refrigerant charge into a self-contained unit, or any AC unit, does not always provide the desired result. Depending on the load conditions experienced by the equipment during the charging process, adding refrigerant until the sight-glass is clear of all bubbles may overcharge the system and cause future operating issues. The better way to charge a circuit is to use liquid subcooling and suction line superheat as indicators, using the following procedure, which should prevent overcharging of the circuit:

1. Verify that superheat is set per the Expansion Valve Superheat Adjustment section.
2. Measure the discharge pressure reading and convert it to a discharge temperature.
3. Measure and record the circuit's liquid line temperature.
4. Measure and record the entering condenser water temperature using the MicroTech display.
5. Calculate liquid subcooling: subcooling = discharge temperature – liquid line temperature
6. If the calculated subcooling value is less than 8ºF, add refrigerant.
7. Monitoring discharge pressure and liquid line temperature, add refrigerant until the discharge temperature minus the liquid line temperature is equal to 8ºF ± 2ºF. If the system is running at light load conditions, subcooling should be at the low end of the range. If the system is running near design conditions, subcooling should be near the upper end of the range.
8. Verify that superheat is still in the prescribed range.

Refrigerant Oil

All units should utilize Danfoss Polyolester 185SL lubricant.

Figure 27: Water and Refrigerant Piping Schematic



NOTE: Depending on the configuration, some components may either be optional or not available.

Variable Air Volume (VAV) Start-Up

Enter the duct static pressure set point value and parameters through the keypad:

Supply Fan Menu > SAF Spd Control > DuctSPs Spt

Variable air volume, ranging from minimum to maximum, is obtained by using an EC fan array. The fan speed increases from 0 rpm to the fan's design rpm to provide 100% air volume.

MicroTech will control the master EC fan and any remaining EC fans in the array will follow.

Final Control Settings

When all of the Start Up procedures are completed, set the individual control parameters for operation, as follows:

- Unit switch S7 to AUTO
- Heating/Cooling control parameters, as required
- Alarm limits, as required
- Night setback parameters, as required
- Duct static pressure and building static pressure, as required
- Economizer control parameters, as required
- Control timers. as required
- Date and time, as required
- Operating schedule, as required
- Holiday schedule, as required

Maintaining Control Parameter Records

After the unit is checked, tested, and started and the final control parameters are set, record the final settings and keep them on file. Update this file whenever changes are made to the control parameters. This facilitates any required analysis and troubleshooting of the system operation.

Planned Maintenance

⚠ WARNING

Improper maintenance can cause equipment damage, severe personal injury, or death. Installation and maintenance must be performed only by trained, experienced personnel who are familiar with local code and regulations and are experienced with this type of equipment.

⚠ WARNING

Moving machinery and electrical power hazards. Can cause severe personal injury death. Disconnect and lock off power before servicing equipment.

⚠ WARNING

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

Planned maintenance is the best way to help avoid unnecessary expense and inconvenience. At regular intervals have a qualified service technician inspect this system. The required frequency of inspections depends on installation and operating duty. Routine maintenance should cover the following items:

1. Tighten all wire connections. Retighten all power connections every six months.
2. Clean the evaporator or economizer coils mechanically or with cold water, if necessary. Usually any fouling is only matted on the entering air face of the coil and can be removed by brushing.
3. Clean the condenser and economizer tubes periodically. Clean condenser and economizer coils chemically. Keep tubing clean to maintain system performance. (Condenser head removal instructions follow).
4. Check filters periodically and replace as needed.
5. Check refrigerant sightglass. If sightglass is not solid with steady-state full load operation of unit, check for refrigerant leaks.

NOTE: A partially full sightglass is not uncommon at part load conditions. Check for proper superheat.

6. Check for condensate drain blockage. Clean condensate pan as needed.
7. Check power and control voltages.
8. Check running amperage.
9. Check operating temperatures and pressures.
10. Check and adjust temperature and pressure controls.
11. Check and adjust linkages.
12. Check operation of all safety controls.
13. Lubricate door latch mechanisms, if necessary.

Periodic Obligatory Checks and Start Ups for Appliances under Pressure

The units are included in a Category II classification established by the European Directive PED 97/23/EC. For equipment belonging to this category, some local regulations require a periodic inspection by an authorized agency. Check with your local requirements.

Table 16: Routine Maintenance Program

List of Activities	Weekly	Monthly[1]	Yearly[2]
General			
Reading of operating data[3]	X		
Visual inspection of machine for any damage and/or loosening		X	
Verification of thermal insulation integrity			X
Clean and paint where necessary			X
Analysis of water[5]			X
Check of flow switch operation		X	
Electrical			
Verification of control sequence			X
Verify contactor wear – Replace if necessary			X
Verify that all electrical terminals are tight – Tighten if necessary			X
Clean inside the electrical control board			X
Visual inspection of components for any signs of overheating		X	
Verify operation of compressor and electrical resistance		X	
Measure compressor motor insulation using a Megger Insulation Resistance Tester			X
Refrigeration circuit			
Check for any refrigerant leakage		X	
Verify refrigerant flow using the liquid sight glass – Sight glass full	X		
Verify filter dryer pressure drop		X	
Analyze compressor vibrations			X
Analyze compressor oil acidity[6]			X
Condenser section			
Clean condenser banks[4]			X
Verify that fans are well tightened			X
Verify condenser bank fins – Comb if necessary			X

Notes:

1. Monthly activities include all the weekly ones.
2. The annual (or early season) activities include all weekly and monthly activities.
3. Unit operating values should be read on a daily basis thus keeping high observation standards.
4. In environments with a high concentration of air-borne particles, it may be necessary to clean the condenser bank more often.
5. Check for any dissolved metals.
6. TAN (Total Acid Number): ≤ 0, 10 — No action
   Between 0.10 and 0.19 — Replace anti-acid filters and recheck after 1,000 running hours. Continue to replace filters until the TAN is lower than 0.1.
   > 0, 19 — Replace oil, oil filter and filter dryer. Verify at regular intervals.

Important Information Regarding the Refrigerant Used

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol. Do not vent gases into the atmosphere.

The refrigerant quantity necessary for standard operation is indicated on the unit name plate.

Real refrigerant quantity charged in the unit is listed on a silver sticker inside the electrical panel.

Periodical inspections for refrigerant leaks may be required depending on European or local legislation.

Please contact your local dealer for more information.

Disposal

The unit is made of metal, plastic and electronic parts. All these parts must be disposed of in accordance with the local regulations in terms of disposal.

Lead batteries must be collected and sent to specific refuse collection centers.

Oil must be collected and sent to specific refuse collection centers.

Winterizing Water Coils

Coil freeze-up can be caused by such things as air stratification and failure of outdoor dampers and/or preheat coils. Do not depend on routine draining of water cooling coils for winter shutdown or to protect against freeze-up. Severe coil damage can result. Drain all coils as thoroughly as possible and then treat each of them in the following manner:

- Fill each coil independently with an antifreeze solution using a small circulating pump and thoroughly drain again.
- Check the freezing point of the antifreeze before proceeding to the next coil. Due to a small amount of water always remaining in each coil, there is a diluting effect. The small amount of antifreeze solution remaining in the coil must always be concentrated enough to prevent freeze-up.

Carefully read instructions for mixing antifreeze solution. Some products have a higher freezing point in their natural state than when mixed with water.

Brazed Plate Heat Exchanger (BPHE)

The typical high degree of turbulence in brazed plate heat exchangers (BPHE) produces a self-cleaning effect in the channels. However, the performance of a plate heat exchanger may decline due to scale accumulation especially in hard water applications.

NOTICE

Under no circumstances should one attempt to disassemble the BPHE – it is a solid structure that does not permit disassembly.

The BPHE can be chemically cleaned by circulating a cleaning liquid via a Cleaning In Place (CIP) system. For a suitable chemical solution, consult a water treatment specialist. The condenser water circuit is primarily composed of copper, stainless steel, steel and brass. All materials used in the chemical cleaning, along with the quantity of cleaning material, duration of cleaning time and safety precautions necessary for handling the cleaning agent, should be provided, or approved by the chemical supply house.

NOTICE

Under no circumstances should solutions containing chlorine, ammonia, hydrochloric acid, sulfuric acid, or nitric acid be used. These solutions are highly corrosive to the materials used in the BPHE and will result in failure.

Table 17: Cleaning In Place (CIP) Information

COMPRESSOR OR SWP MODEL	CONDENSER MODEL	CIP LOCATION (INLET/OUTLET)	VICTAULIC SIZE
DSF090	ACK74-36AH-F	CONDENSER	2.0”
DSF115	ACK74-54AH-F	CONDENSER	2.0”
DSF155	ACK74-54AH-F	CONDENSER	2.0”
DSF200	ACK74-84AH-F	CONDENSER	2.0”
023-033J	-	UNIT	2.0”
039-051J	-	UNIT	2.5”
056-099J	-	UNIT	3.0”

When writing to Daikin Applied for service or replacement parts, provide the model number, serial number, and unit part number of the unit as stamped on the serial plate attached to the unit. For questions regarding wiring diagrams, it will be necessary to provide the number on the specific diagram. If replacement parts are required, include the date of unit installation, the date of failure, an explanation of the malfunction, and a description of the replacement parts required.

Table 18: Replacement Parts List

Description	Daikin Applied Part Number	
MicroTech Main Control Board	910243812	MCB
Expansion Module	193407501	EXP (A, B, C, D or E)
Communication Card, BACnet-MSTP, MT	193408302	
Communication Card, BACnet-IP, MT30	193408102	
LON Communication Card	193408202	
Temperature sensors	193414603	DAT, RAT, MAT, EWT, OAT
Sensor, Duct, Averaging, 10K OHM 6-FT	113167904	DAT
Sensor, Duct, Averaging, 10K OHM 12-FT	113167906	DAT
Waterflow Sensor	910103980	WFS
Refrigerant Pressure Transducer	910153045	PSR1,2
Duct Static Pressure Sensor	910117462	SPS1
Building Static Pressure Sensor	910117463	BPS1
Phase Voltage Monitor (socket 70169-D required)	193599301	PVM1
Outside AIr Enthalpy	113103601	OAE
Return Air Enthalpy	113103701	RAE

Compressors

All Daikin Applied Self-Contained products include a first-year parts only warranty. The warranty period extends 12 months from start up or 18 months from date of shipment, whichever comes first. Labor to install these parts is not included with this warranty. Compressors are considered a part and are included in this standard warranty. See Daikin Applied's published Limited Product Warranty for exclusive details.

Scroll Compressors

Scroll service replacement compressors for Daikin Applied Self-Contained units can be obtained from the following sources:

- Daikin Applied Service Parts maintains a stock of replacement compressors.
- Copeland Refrigeration has stocking wholesalers throughout the U.S. who maintain a limited stock of replacement scroll compressors. The stock of single compressors is much better than the stock of tandems "tandem ready," single compressors.

All Compressors

The decision to replace the failed portion of the tandem (or one of the two compressors on a circuit), as opposed to replacing the entire tandem or trio, must be decided based on the following.

1. **In warranty:** Warranty only covers replacement of the failed portion of the tandem.
2. **Out of warranty:** The customer decides whether to replace the entire tandem.

When replacing an "in warranty" compressor through a Copeland wholesaler, take the failed compressor to the wholesaler for an over-the-counter or an advanced replacement exchange. Credit is issued by Copeland on the returned motor compressor upon receipt and factory inspection of the inoperative motor compressor. In this transaction, be certain that the motor compressor is definitely defective. If a motor compressor is received from the field that tests satisfactorily, a service charge plus a transportation charge will be charged against its original credit value.

If there was a delay in the start up of the equipment and the first-year warranty (Copeland) has expired on the compressor within the 18-month-from-shipment warranty, order the replacement compressor through the Daikin Applied Parts Department (Minneapolis, MN).

To order:

1. Contact the Daikin Applied Parts Department for compressor availability.
2. Send a completed parts order form to the Daikin Applied Parts Department.
3. The Parts Department processes the order and the compressors ship via ground transportation. If next-day air is required, indicate this on the parts order form and a freight charge will be billed to your account. Air freight costs are not covered under the Daikin Applied warranty.
4. After the failed compressor is replaced, return it to Daikin Applied with a Return Goods Tag attached. You will receive the tag in the mail. It must be attached to the compressor. The Return Goods Tag has instructions on where to send the compressor. If the compressor is not returned, you will be billed for the replacement compressor.
5. Consideration may be given at this time to a compressor teardown analysis, depending on the history of failures.

On Daikin Applied equipment that includes the extended 2nd–5th year compressor warranty option, the replacement compressor must be ordered through the Daikin Applied Parts Department (Minneapolis, MN).

To order:

1. Contact the Daikin Applied Parts Department for compressor availability.
2. Send the Daikin Applied Parts Department a completed parts order form.
3. The Parts Department processes the order and the compressors ship via ground transportation. If next-day air is required, indicate this on the parts order form and a freight charge will be billed to your account. Air freight costs are not covered under the Daikin Applied warranty.
4. After the failed compressor is replaced, return it to Daikin Applied with a Return Goods Tag attached. You will receive the tag in the mail. It must be attached to the compressor. The Return Goods Tag will have instructions on where to send the compressor. If the compressor is not returned, you will be billed for the replacement compressor.
5. Consideration may be given at this time to a compressor teardown analysis, depending on the history of failures.

Condenser Water

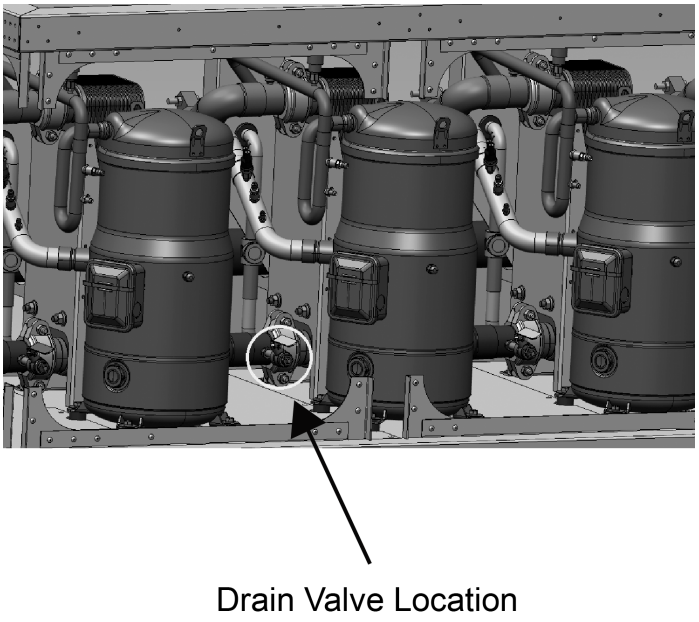
⚠ CAUTION

To prevent damage to the brazed plate heat exchangers, a supply strainer is required in the inlet water piping. This strainer must be installed prior to operation of the pumps.

Water in some areas can foul the heat exchangers to the point where cleaning is necessary. The fouled vessel will be indicated by an abnormally high condensing pressure and can result in nuisance trips. To clean the brazed plate heat exchangers (BPHE), a chemical descaling solution should be used according to the manufacturer's directions. An inlet water strainer is required as detailed in Inlet Strainer Guidelines. Heat exchanger cleaning should typically be performed during an annual inspection. However, more frequent cleaning may be required depending on the conditions of the jobsite. Clean the strainer at every inspection.

Each condenser includes a ¼" full port ball valve at the bottom of the condenser water supply pipe to facilitate a controlled draining of the water. The unit should be externally isolated from the building condenser water loop before opening the drain valves.

Figure 28: Condenser Water Supply Drain Valve



Supply Fan Array

The electronically commutated motor (ECM) fan assembly is made of an impeller, an ECM motor, and an inverter. It is installed as an assembly, and in the event of failure, the entire assembly must be replaced.

The supply fan assemblies are direct drive and do not have belts or pulleys to maintain.

The supply fan motors are permanently lubricated and require no periodic lubrication.

Each supply fan assembly is trim balanced to operate smoothly. To provide satisfactory operation after shipping and installation, use accepted industry guidelines for field balancing fans.

NOTE: Excessive vibration from any cause contributes to premature fan and motor bearing failure. Monitor overall vibration levels every six months of operation. An increase in vibration levels may indicate fan and motor bearing failure.

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

This unit is equipped with an A2L (R32) refrigerant and a Refrigerant Leak Detection and Mitigation system. In the unlikely event of a refrigerant leak the unit may take mitigation actions such as activating dilution airflow or disabling certain unit functions. For full details on the mitigation modes and sequence of operation please refer to the literature for the unit controller and A2L mitigation control board. For connection to customer control systems or a Building Management System a field connection is provided with the unit controls. Please refer to the unit specific electrical schematic for the connection details.

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.

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 contains an A2L refrigerant (R-32). The served indoor space must be larger than or equal to the Minimum Room Area as shown in Figure 29 on page 47. 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.

The Refrigerant Charge of each unit is stated on the Unit Dataplate and should be used to confirm the Minimum Room Area prior to installation.

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:

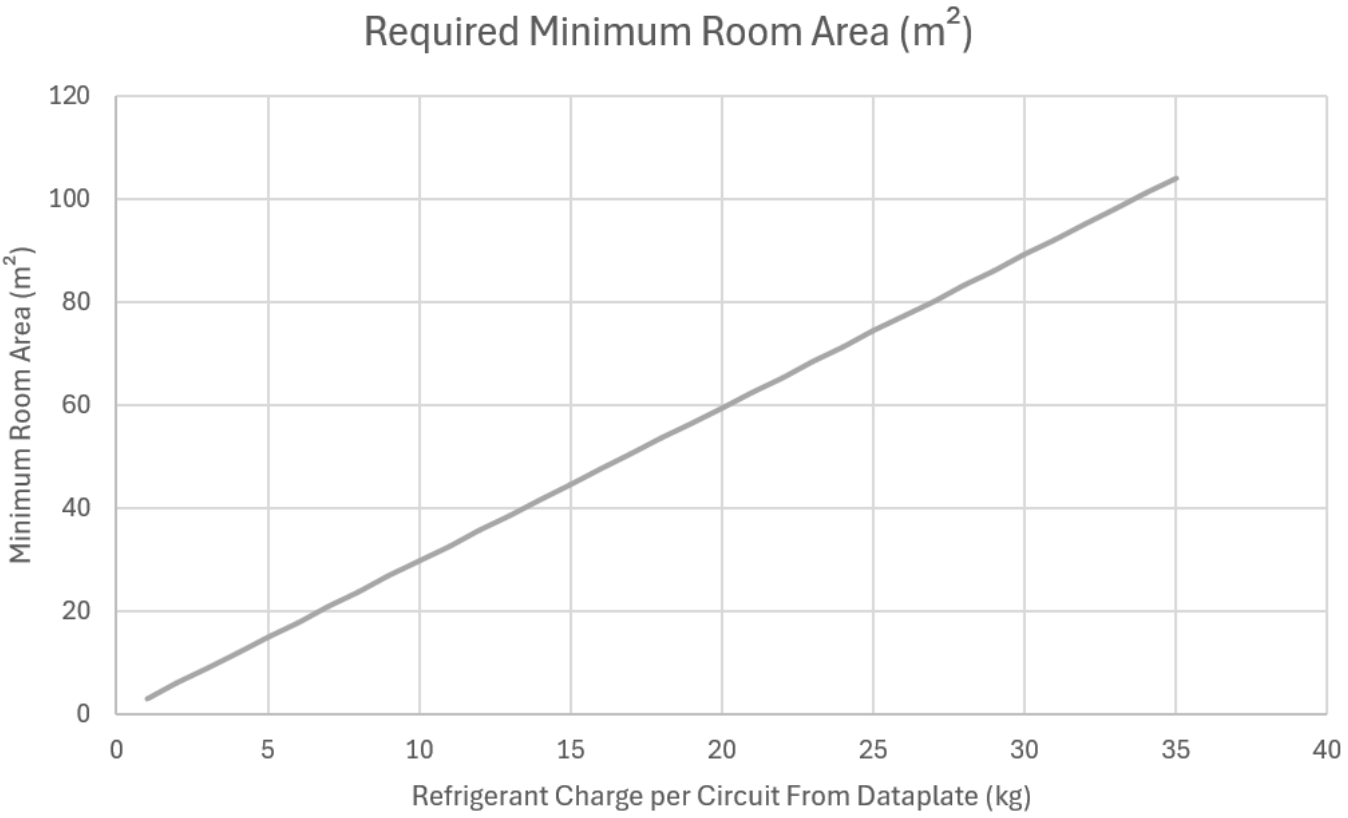
- The minimum opening area connecting the spaces/rooms shall not be less than 0.0123 m^2.
- The area of any openings above 300 mm from the floor shall not be considered part of the minimum opening area.
- At least 50 % of the minimum opening area shall be below 200 mm from the floor.
- Openings are permanent 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.

Table 19: 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 29: Required Minimum Room Area Chart



Leak Mitigation System and Sensors

For Additional Instructions on how to operate the Leak Mitigation System including how to activate a manual test of the Leak Mitigation System, refer to the unit controller manual

⚠ WARNING

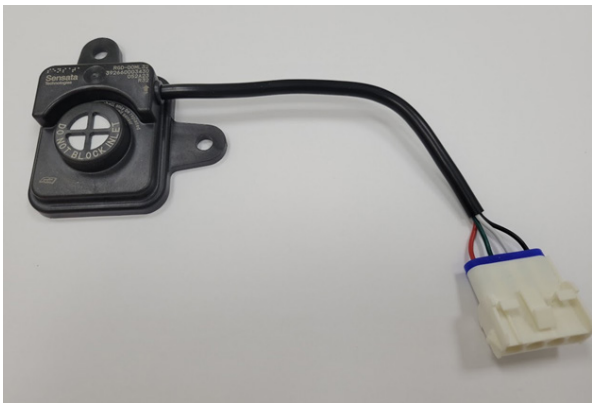
This equipment is equipped with a Refrigerant Leak Detection System. Only components and Refrigerant Detection Sensors specified by Daikin Applied may be used for replacement and maintenance.

Continuous air circulation is required for proper operation of the Refrigerant Leak Detection System. All components of the detection system are electrically powered. Do not disrupt or halt power to the unit except when performing service.

⚠ WARNING

Always ensure the Refrigerant Detection Sensors installed in the equipment are free of debris and the inlet is not blocked. If replacing a Refrigerant Detection Sensor always install in the identical orientation as the original sensor.

Figure 30: Sample Refrigerant Detection Sensor



NOTE: Identify the sensor inlet marked “Do Not Block Inlet”.

⚠ WARNING

Auxiliary devices which may be a Potential Ignition Source shall not be installed in the duct work. Examples of such Potential Ignition Sources are hot surfaces with a temperature exceeding 700°C and electric switching devices.

⚠ WARNING

The unit must be stored and/or located to prevent mechanical damage of the refrigeration system. Do not store the unit near sources of open flame, electrical switching devices, or hot surfaces above 700°C. If the unit is stored indoors the storage area should be larger than the Minimum Room Area specified in this manual. The storage space should be well ventilated and not allow for the stagnation of leaked refrigerant. Failure to do so may result in a fire or explosion hazard.

⚠ WARNING

Only auxiliary devices approved by Daikin Applied or declared suitable for installation with R-32 shall be installed in the connecting ductwork.

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 to hand. Have a dry powder or CO2 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

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that the apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

Repair to intrinsically safe components

- Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.
- Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.
- Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

NOTE: The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

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

- 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. purge the circuit with inert gas
    c. evacuate
    d. purge with inert gas
    e. 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, the following requirements shall be followed.

- 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 (if not already).
- 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:
  - 40°C

Disposal

- Waste treatment method reccomendation:
  - Must be specially treated adhering to official regulations.
  - Incineration in an adequate incinerator is reccomended.
  - 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:
- 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.
    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 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.

Disposal of Material

This unit is made of metal and plastic parts. For its protection during transportation to the installation site, it also contains various packing and wrapping materials, not used in normal operations. All parts and material must be disposed of in accordance with local regulations of waste or recycled material. Lead batteries must be collected disposed of at specific refuse collection centers.

Warranty

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 required on the tag to expedite handling at our factories and to expedite 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.

Warranty Return Material Procedure

Defective material may not be returned without permission of authorized factory service personnel of Daikin Applied (Minneapolis, Minnesota, 763-553-5330). A “Return Goods” tag must be included with the returned material. Enter the required information to expedite handling and prompt issuance of credits. All parts must be returned to the appropriate Daikin Applied facility, designated on the “Return Goods” tag. Transportation charges must be prepaid.

The return of the part does not constitute an order for replacement. Therefore, a purchase order must be entered through the nearest Daikin Applied representative. The order should include part number, model number, and serial number of the unit involved.

Credit will be issued on customer’s purchase order following an inspection of the return part and upon determination that the failure is due to faulty material or workmanship during the warranty period.

Air Handling
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 air handling units with or without heat recovery and roof mounted air handlers.

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:** _____

SF VFD model number: _____ **Serial number:** _____

RF VFD model number: _____ **Serial number:** _____

DAIKIN

AHU Equipment Warranty Registration Form (continued)

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. Are fan drives properly aligned and belts properly adjusted? . . . ☐ Yes ☐ No ☐ N/A

C. Tightened all setscrews on pulleys, bearings and fans? . . . ☐ Yes ☐ No ☐ N/A

D. Have the hold-down bolts been backed off on spring mounted fan isolators? . . . ☐ Yes ☐ No ☐ N/A

E. With the power off, do fans turn freely by hand? . . . ☐ Yes ☐ No ☐ N/A

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

Volts _____ Hertz _____ Phase _____

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

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

I. Is the condensate drain trapped? . . . ☐ Yes ☐ No ☐ N/A

J. Fill the drain pan. Does water drain freely? . . . ☐ Yes ☐ No ☐ N/A

K. Is the unit mounted level? . . . ☐ Yes ☐ No ☐ N/A

II. FAN DATA

A. Check rotation of supply fan(s)? . . . ☐ Yes ☐ No ☐ N/A

B. Voltage at supply fan motor(s): . . . 1–2_____ V 2–3 _____ V 1–3 _____ V

*Fan array units only . . . 1–2_____ V 2–3 _____ V 1–3 _____ V

1–2_____ V 2–3 _____ V 1–3 _____ V

1–2_____ V 2–3 _____ V 1–3 _____ V

1–2_____ V 2–3 _____ V 1–3 _____ V

1–2_____ V 2–3 _____ V 1–3 _____ V

C. Supply fan motor amp draw(s) per phase: . . . L1 _____ L2 _____ L3 _____

*Fan array units only . . . L1 _____ L2 _____ L3 _____

L1 _____ L2 _____ L3 _____

L1 _____ L2 _____ L3 _____

L1 _____ L2 _____ L3 _____

L1 _____ L2 _____ L3 _____

D. Overload amp setting: . . . _____

E. What is the supply fan rpm? . . . _____

F. Check rotation of return fan(s)? . . . ☐ Yes ☐ No ☐ N/A

DAIKIN

AHU Equipment Warranty Registration Form (continued)

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

G. Voltage at return fan motor(s): . . . . . 1–2_____ V 2–3 _____ V 1–3 _____ V
*Fan array units only . . . . . 1–2_____ V 2–3 _____ V 1–3 _____ V
1–2_____ V 2–3 _____ V 1–3 _____ V
1–2_____ V 2–3 _____ V 1–3 _____ V
1–2_____ V 2–3 _____ V 1–3 _____ V
1–2_____ V 2–3 _____ V 1–3 _____ V

H. Return fan motor amp draw(s) per phase: . . . . . L1 _____ L2 _____ L3 _____
*Fan array units only . . . . . L1 _____ L2 _____ L3 _____
L1 _____ L2 _____ L3 _____
L1 _____ L2 _____ L3 _____
L1 _____ L2 _____ L3 _____
L1 _____ L2 _____ L3 _____

I. Overload amp setting: . . . . . _____

J. What is the return fan rpm? . . . . . _____

K. Record supply static pressure at unit in inches of H_20: . . . . . _____

L. Record return static pressure at unit (with outside air dampers closed) in inches of H_20: . . . . . _____

* If additional fans are on the unit, please add them to the space below.

III. DAMPERS

A. Are blades and seals present? . . . . . ☐ Yes ☐ No ☐ N/A

B. Do damper open smoothly and shut tight? . . . . . ☐ Yes ☐ No ☐ N/A

DAIKIN

AHU Equipment Warranty Registration Form (continued)

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

IV. ELECTRIC HEAT

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

Volts _____ Hertz _____ Phase _____

B. Are there any signs of physical damage to the electric heat coils? . . . . . ☐ Yes ☐ No ☐ N/A

C. Have all electrical terminals been tightened? . . . . . ☐ Yes ☐ No ☐ N/A

D. Does sequence controller stage contactors properly? . . . . . ☐ Yes ☐ No ☐ N/A

E. Electric heater voltage across each phase: . . . . . _____ L1 _____ L2 _____ L3

F. Amp draw across each phase at each heating stage:

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Phase L1:						
Phase L2:						
Phase L3						

G. FLA: L1 _____ L2_____ L3 _____

H. Operate electric heat with fans off. Electric heat must cycle on high limit control . . . . . ☐ Yes ☐ No ☐ N/A

V. CHILLED WATER COIL

A. Pressure test OK? . . . . . ☐ Yes ☐ No ☐ N/A

B. Drain pan draining OK? . . . . . ☐ Yes ☐ No ☐ N/A

VI. HOT WATER COIL

A. Pressure test OK? . . . . . ☐ Yes ☐ No ☐ N/A

VII. HEAT RECOVERY

A. Heat wheel rotates freely? . . . . . ☐ Yes ☐ No ☐ N/A

B. Heat wheel VFD operates properly? . . . . . ☐ Yes ☐ No ☐ N/A

C. Heat wheel VFD: . . . . . .Model # _____ Serial # _____

D. Check for air bypass around heat wheel. . . . . ☐ Yes ☐ No ☐ N/A

DAIKIN

AHU Equipment Warranty Registration Form (continued)

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

VIII. Design Flow calibration

A. Verify power is supplied to the MicroTech III unit controller . . . . . ☐ Yes ☐ No ☐ N/A

B. Verify that the shipping screws have been removed from the measuring station vane . . . . . ☐ Yes ☐ No ☐ N/A

C. Examine station for damage . . . . . ☐ Yes ☐ No ☐ N/A

D. Record Level Position after calibration

- LH Level Position . . . . . _____
- RH Level Position . . . . . _____

NOTE: This is viewed in the MicroTech III controller, in the Min OA setup menu.

IX. GAS BURNER CHECK, TEST, & START

Specifications:
For gas, see Forced Draft Gas Burner Installation and Maintenance Bulletin. (IM 684 and IM 685)

A. Gas Furnace:. . . . . Model no. _____

B. Gas Burner: . . . . . .Model no._____ Serial no. _____

C. Gas Type firing: . . . . . .Single Stage _____ Modulation _____

D. Gas Rated firing rate (MBH input): . . . . . _____

E. Gas Altitude (ft. above sea level): . . . . . _____

F. Is there a circulating tank? . . . . . ☐ Yes ☐ No ☐ N/A

G. Input (CFH): . . . . . _____

H. Gas pressure at burner (inches w.c.): . . . . . _____

I. CO_2 (%) . . . . . _____

J. CO_2 (%): . . . . . _____

K. Pilot flame only in microamps (steady at low fire): . . . . . _____

L. Pilot Tap-gas pressure (inches w.c.): . . . . . _____

M. Motor only/burner FLA running amps: . . . . . _____

N. High limit control OK? . . . . . ☐ Yes ☐ No ☐ N/A

O. Flame safeguard (microamps): . . . . . _____

P. Flame failure shutoff (seconds): . . . . . _____

DAIKIN

AHU Equipment Warranty Registration Form (continued)

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

Q. Airswitch OK? . . . . . ☐ Yes ☐ No ☐ N/A

R. High Gas Pressure Switch OK? . . . . . ☐ Yes ☐ No ☐ N/A

S. Low Gas Pressure Switch OK? . . . . . ☐ Yes ☐ No ☐ N/A

T. Main Gas Valve Close-off OK?. . . . . ☐ Yes ☐ No ☐ N/A

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

Signature _____ **Startup date:** _____

Return completed form by mail to:

Daikin Warranty Department, 13600 Industrial Park Boulevard, Minneapolis, MN 55441

or by email to: AAHWarrantyStartup@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.

Submit Form

Clear Form

Limited 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

Notes / Comments

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