Installation and Maintenance Manual

IM 791-5

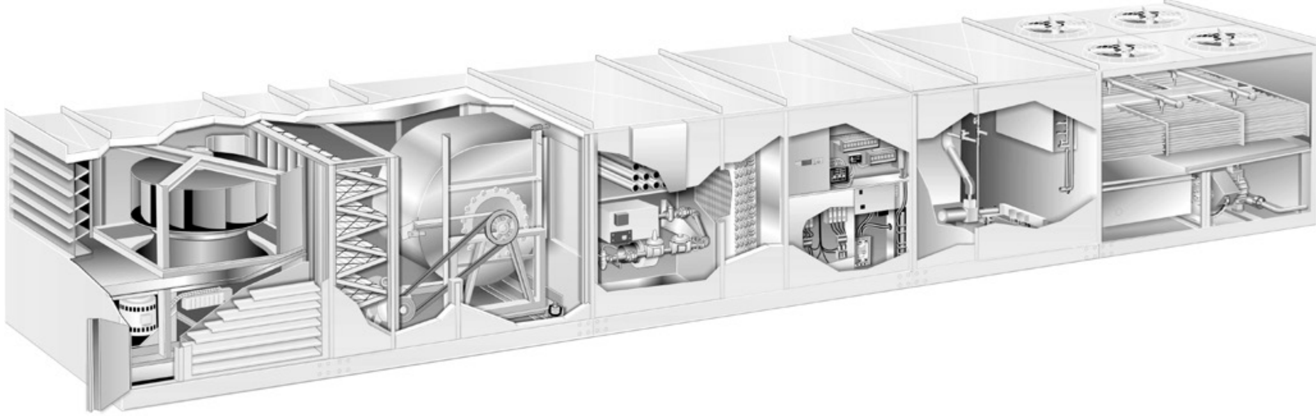
Group: **Applied Air Systems**

Part Number: **IM 791**

Date: **October 2018**

Applied Packaged Rooftop System Heating and Cooling with Evaporative Condenser

Models RDE/RPE 076C–150C
Gas/Electric
76 to 150 Tons



This manual provides general information about the "C" vintage Daikin RoofPak applied rooftop unit, models RDE and RPE. In addition to an overall description of the unit, it includes mechanical and electrical installation procedures, commissioning procedures, sequence of operation information, and maintenance instructions. For further information on the optional forced draft gas-fired furnace, refer to IM 684 or IM 685.

The MicroTech III applied rooftop unit controller is available on "C" vintage applied rooftop units. For a detailed description of the MicroTech III components, input / output configurations, field wiring and information on using and programming the MicroTech III unit controller, refer to OM 920.

For a description of operation and information on using the optional VFD keypad to view data and set parameters, refer to the appropriate program-specific operation manual (see Table 1).

Table 1: Operation Manuals

Unit	Manual
Daikin MD4 VFD	OM 1190
Daikin MD5 VFD	OM 1191
Other VFDs	See Vendor Manuals
Non-Chemical Water Treatment Option	IM 827

Unit Nameplate

The unit nameplate is located on the outside lower right corner on the main control box door. It includes the unit model number, serial number, unit part number, electrical characteristics, and refrigerant charge.

Gas Burner Nameplate

On units which include gas heat, the nameplate is located on the lower right corner on the main control box door. It includes the burner model number, minimum / maximum input, maximum temperature rise and minimum CFM.

Hazard Identification Information

⚠ WARNING

Warnings are provided throughout this manual to indicate to installing contractors, operators, and service personnel potentially hazardous situations which, if not avoided, can result in severe personal injury or property damage.

⚠ CAUTION

Cautions are provided throughout this manual to indicate to installing contractors, operators, and service personnel potentially hazardous situations which, if not avoided, can result in personal injury or equipment damage.

Nomenclature

R P E - 150 C S E

RoofPak

Unit Configuration
P = Blow through Cooling
D = Draw through Cooling

Evaporative Condensers

Nominal Capacity (Tons)
RPE, RDE: 076, 089, 100, 110, 130, 140, 150

Heat Medium
A = Natural Gas
E = Electric
S = Steam
W = Hot Water
Y = None (Cooling Only)

Cooling Coil Size
S = Standard (Low Airflow)
L = Large (High Airflow)

Design Vintage

Unit Description

Typical Component Locations

Figure 1 shows a typical RPE unit with the locations of the major components. Figure 2 shows a typical RDE unit with the locations of the major components. These figures are for reference only. See the certified submittals for actual specific dimensions.

Figure 1: Typical Component Locations—RPE Units

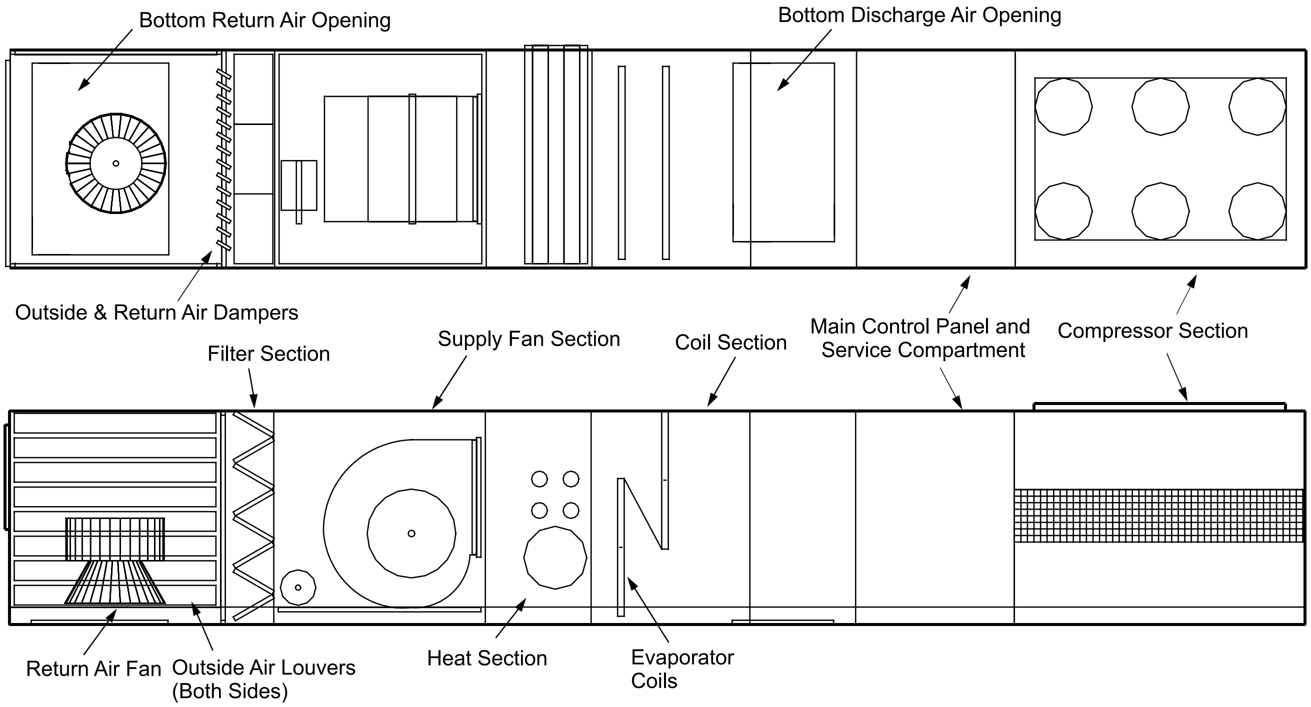
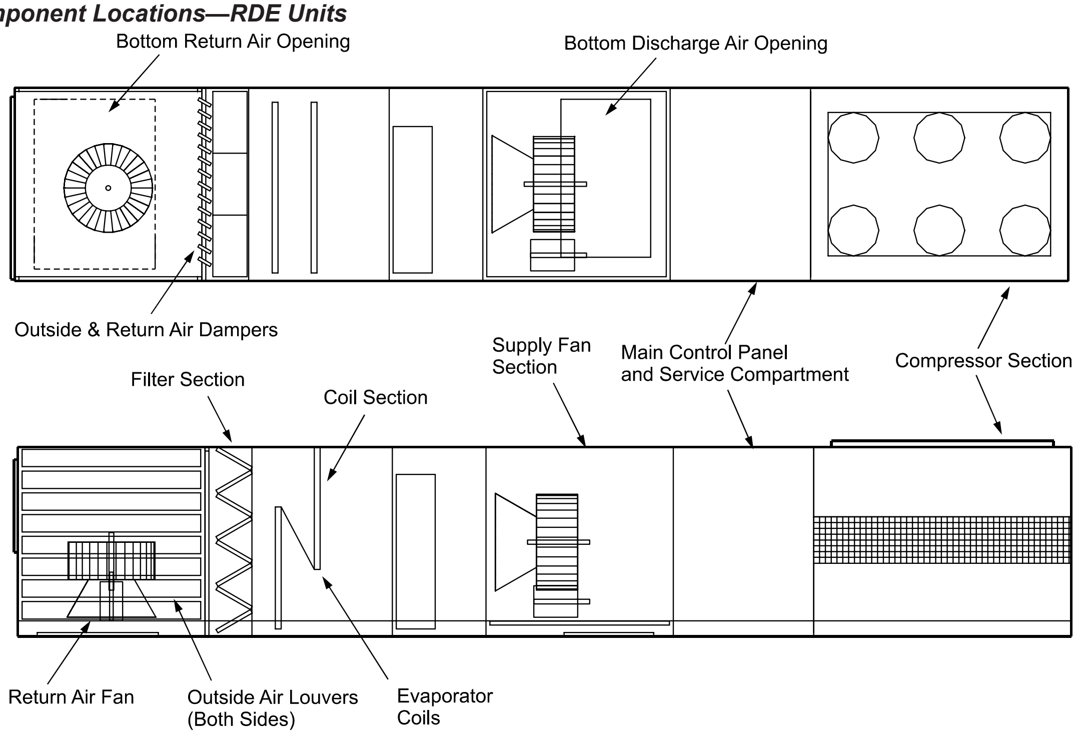


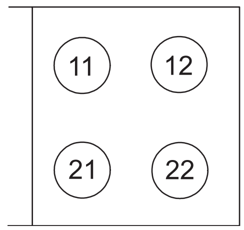
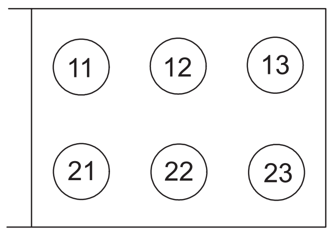
Figure 2: Component Locations—RDE Units



Condenser Fan Arrangement

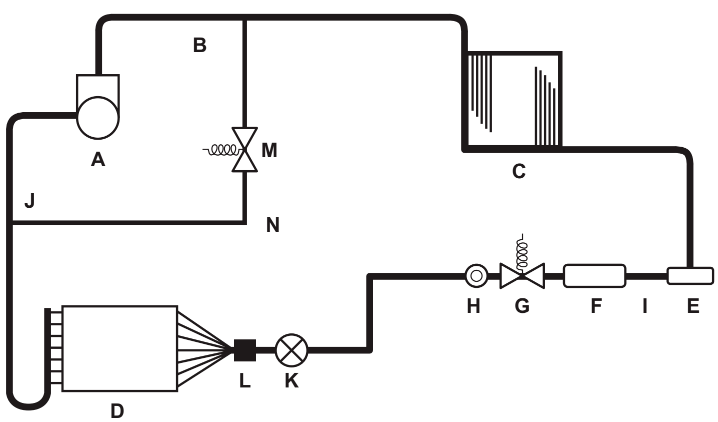
Table 2 shows the condenser fan numbering conventions and locations for each unit size.

Table 2: Condenser Fan Arrangement

Unit Size	Refrigerant Circuit	Arrangement	Fan Control	
			With VFD	Without VFD
076C 089C 100C	1 2		11, 21 – Digital	11, 21 – Digital
			12 – CCB1 – B06	21 – CCB2 – B05
			22 – CCB2 – B06	12 – CCB1 – B06
				22 – CCB2 – B06
110C 130C 140C 150C	1 2		11, 21 – Digital	11 – CCB1 – B05
			12 – CCB1 – B06	21 – CCB2 – B05
			22 – CCB2 – B06	12 – CCB1 – B06
			31 – CCB1 – B07	22 – CCB2 – B06
			32 – CCB1 – B07	13 – CCB1 – B07
				23 – CCB2 – B07

Refrigerant Circuit Schematic

Figure 3: Circuit Schematic



Legend

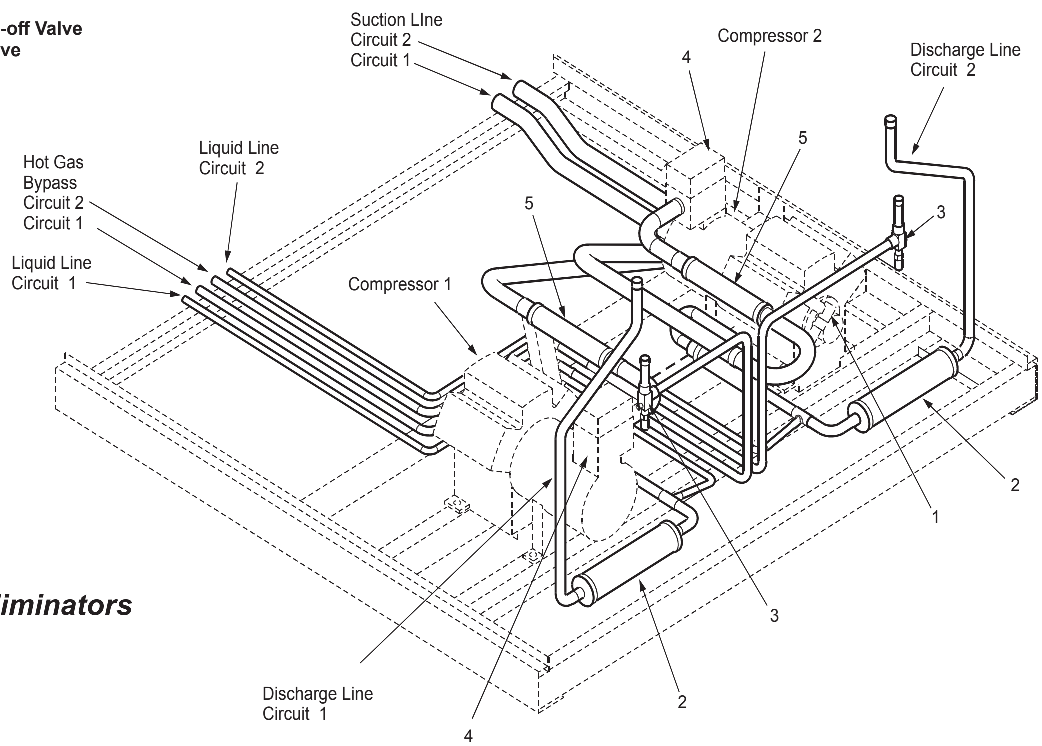
A – Compressor (1 or 2 Compressor per Circuit)
B – Discharge Line
C – Condenser Coil
D – Evaporator Coil
E – Manual Shut-off Valve
F – Filter-Drier
G – Liquid Line Solenoid Valve
H – Sightglass
I – Liquid Line
J – Suction Line
K – Thermostatic Expansion Valve
L – Distributor
M – Combination Hot Gas Bypass Control and Solenoid Valve
N – Hot Gas Bypass Lines (Optional)

Refrigeration Piping

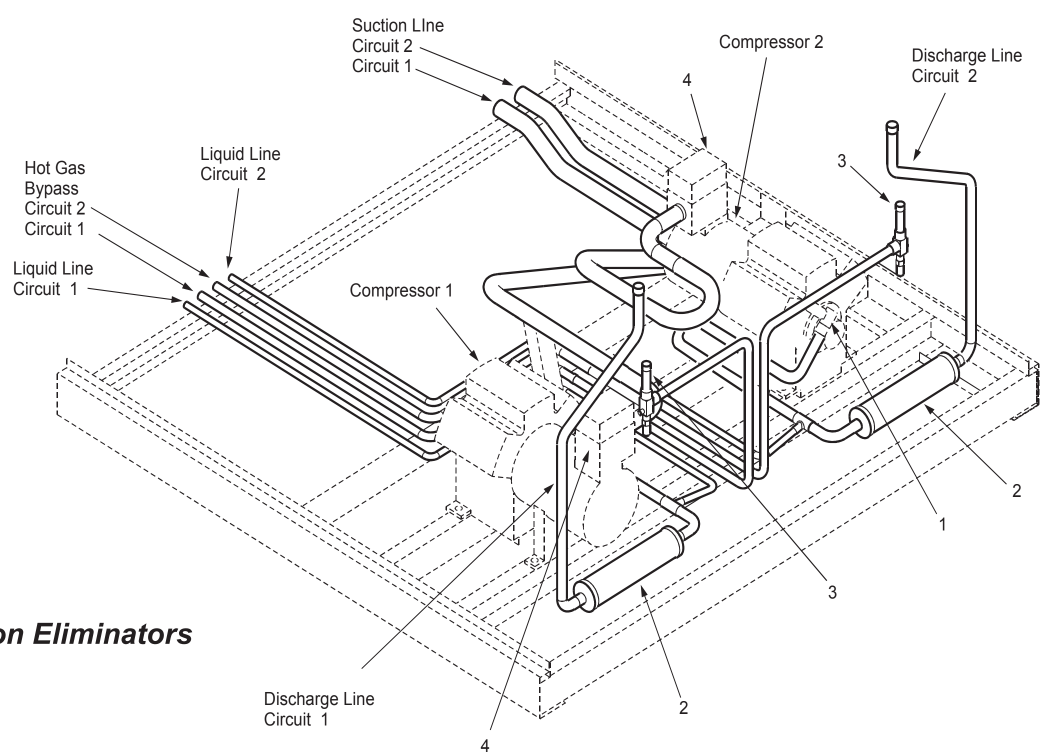
This section presents the unit refrigeration piping diagrams for the various available configurations. Component numbering conventions are also shown.

Figure 4: Condenser Piping - 2 Compressors - 2 Circuits (076C - 100C)

1. Discharge Line Service Valve
2. Discharge Muffler
3. Liquid Line Manual Shut-off Valve
4. Suction Line Service Valve
5. Vibration Eliminator



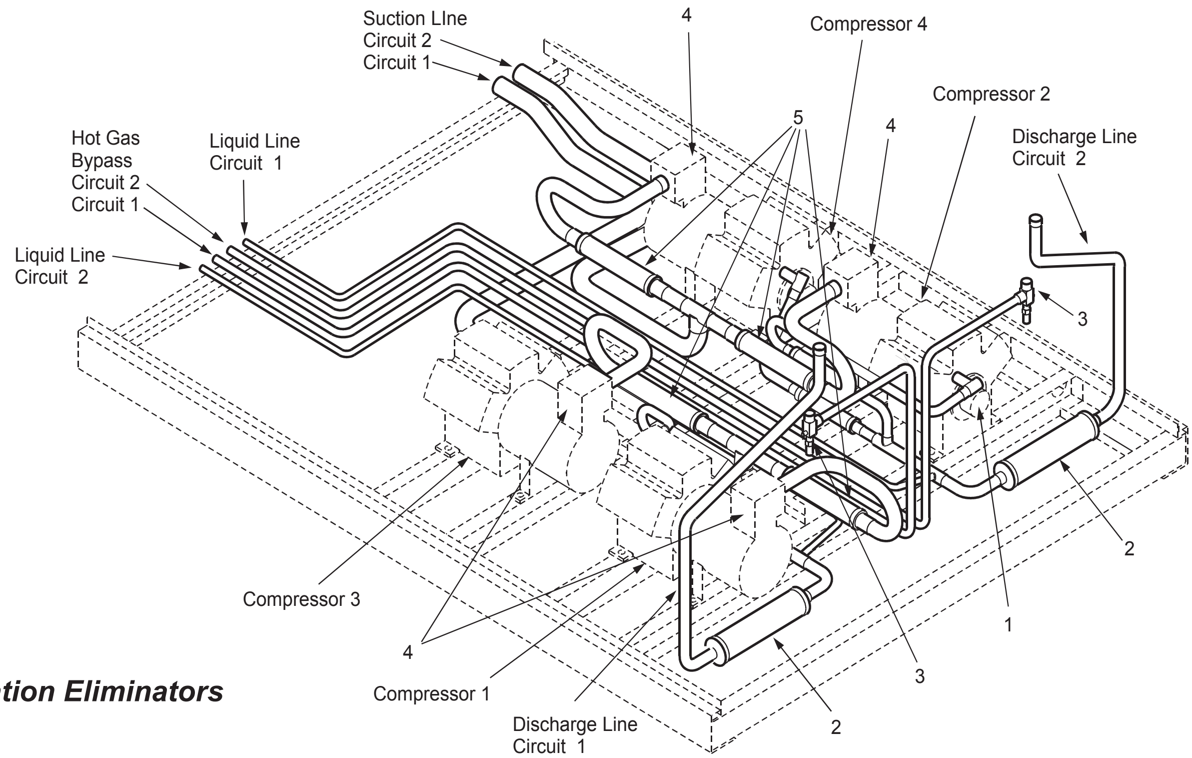
With Vibration Eliminators



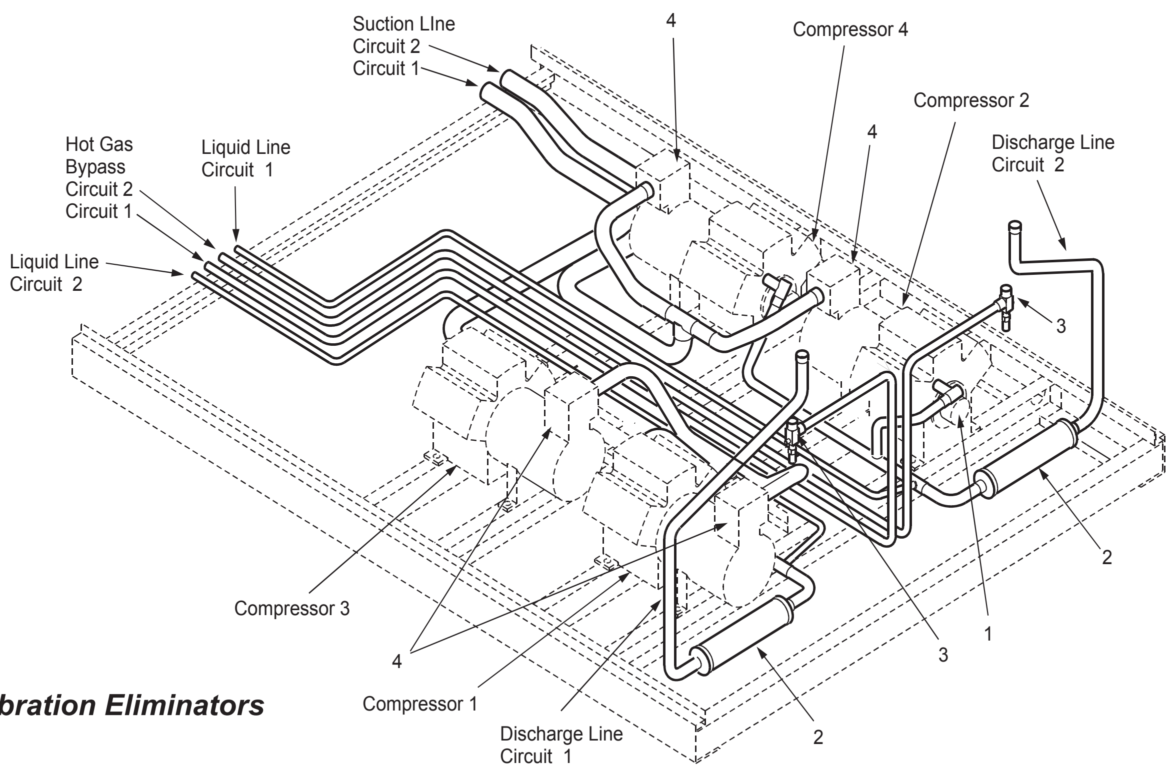
Without Vibration Eliminators

Figure 5: Condenser Piping - 4 Compressors - 4 Circuits (110C - 150C)

1. Discharge Line Service Valve
2. Discharge Muffler
3. Liquid Line Manual Shut-off Valve
4. Suction Line Service Valve
5. Vibration Eliminator



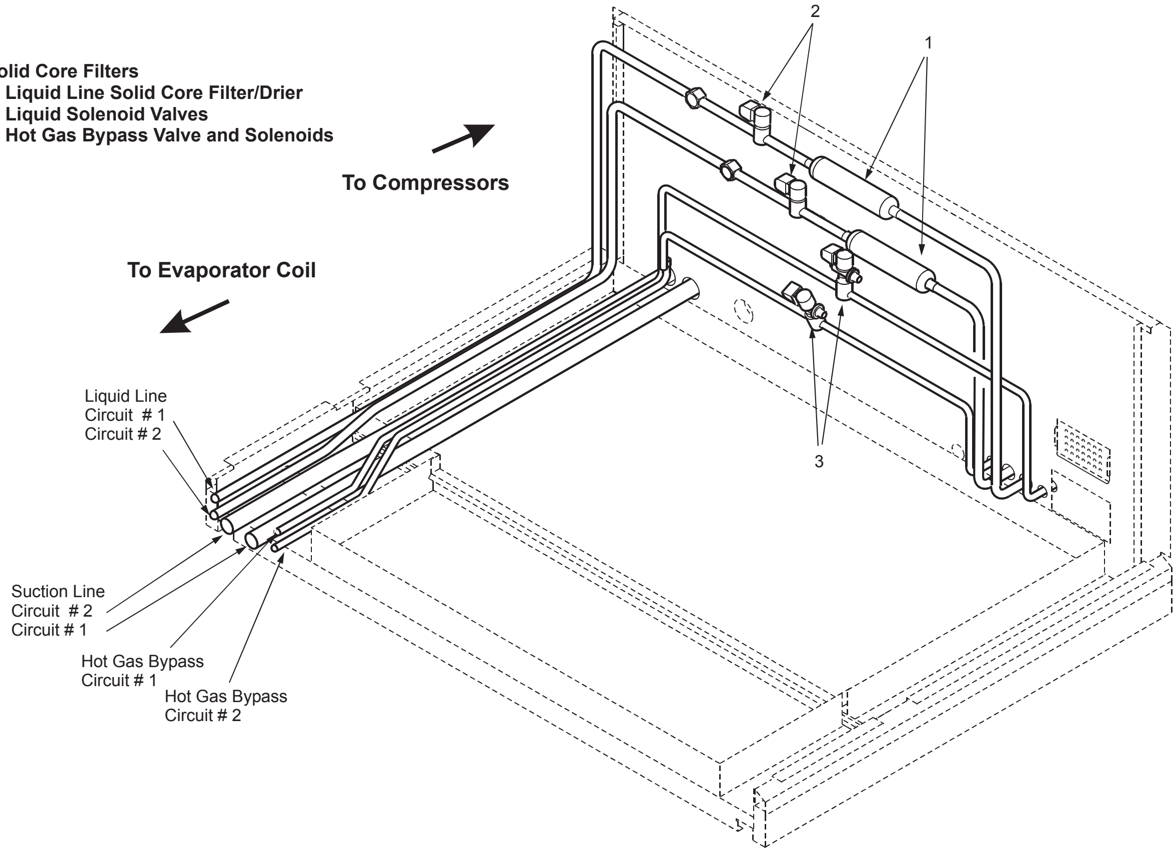
With Vibration Eliminators



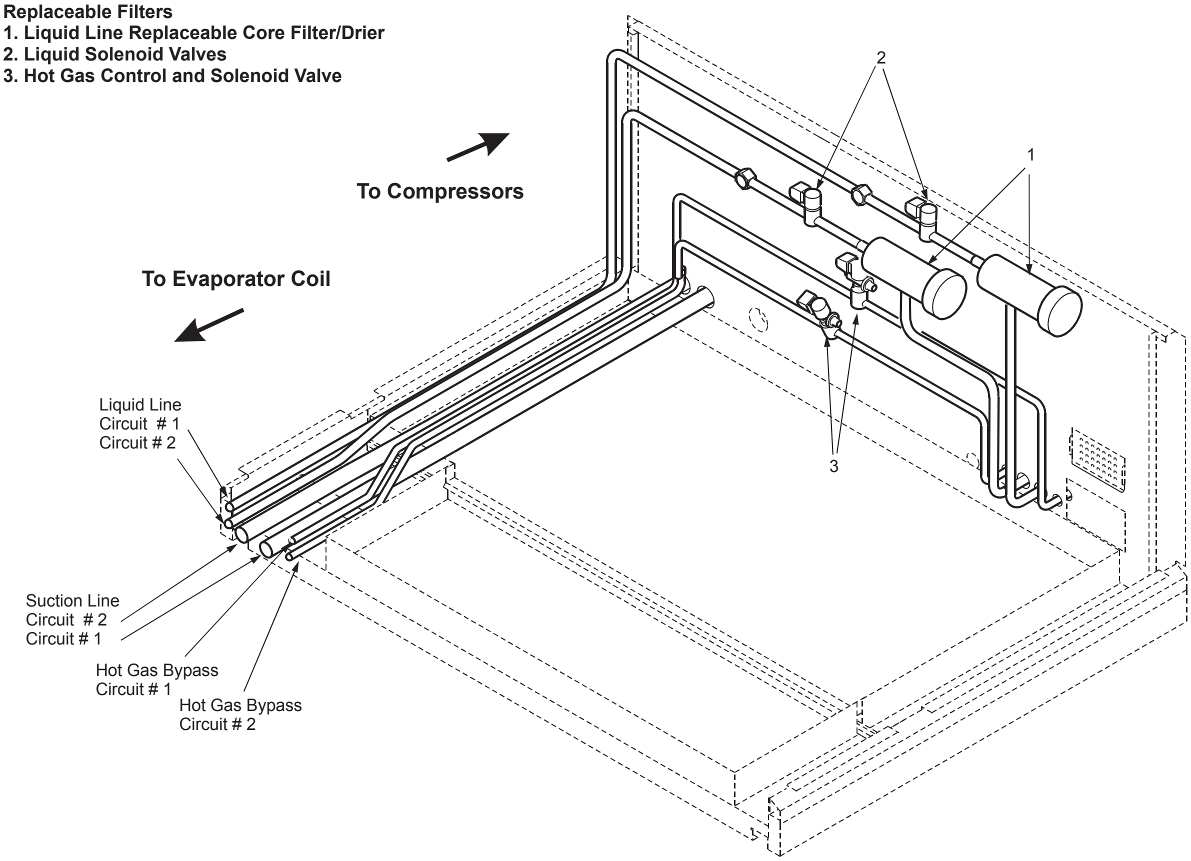
Without Vibration Eliminators

Figure 6: Service Compartment Piping

Solid Core Filters
1. Liquid Line Solid Core Filter/Drier
2. Liquid Solenoid Valves
3. Hot Gas Bypass Valve and Solenoids



Replaceable Filters
1. Liquid Line Replaceable Core Filter/Drier
2. Liquid Solenoid Valves
3. Hot Gas Control and Solenoid Valve



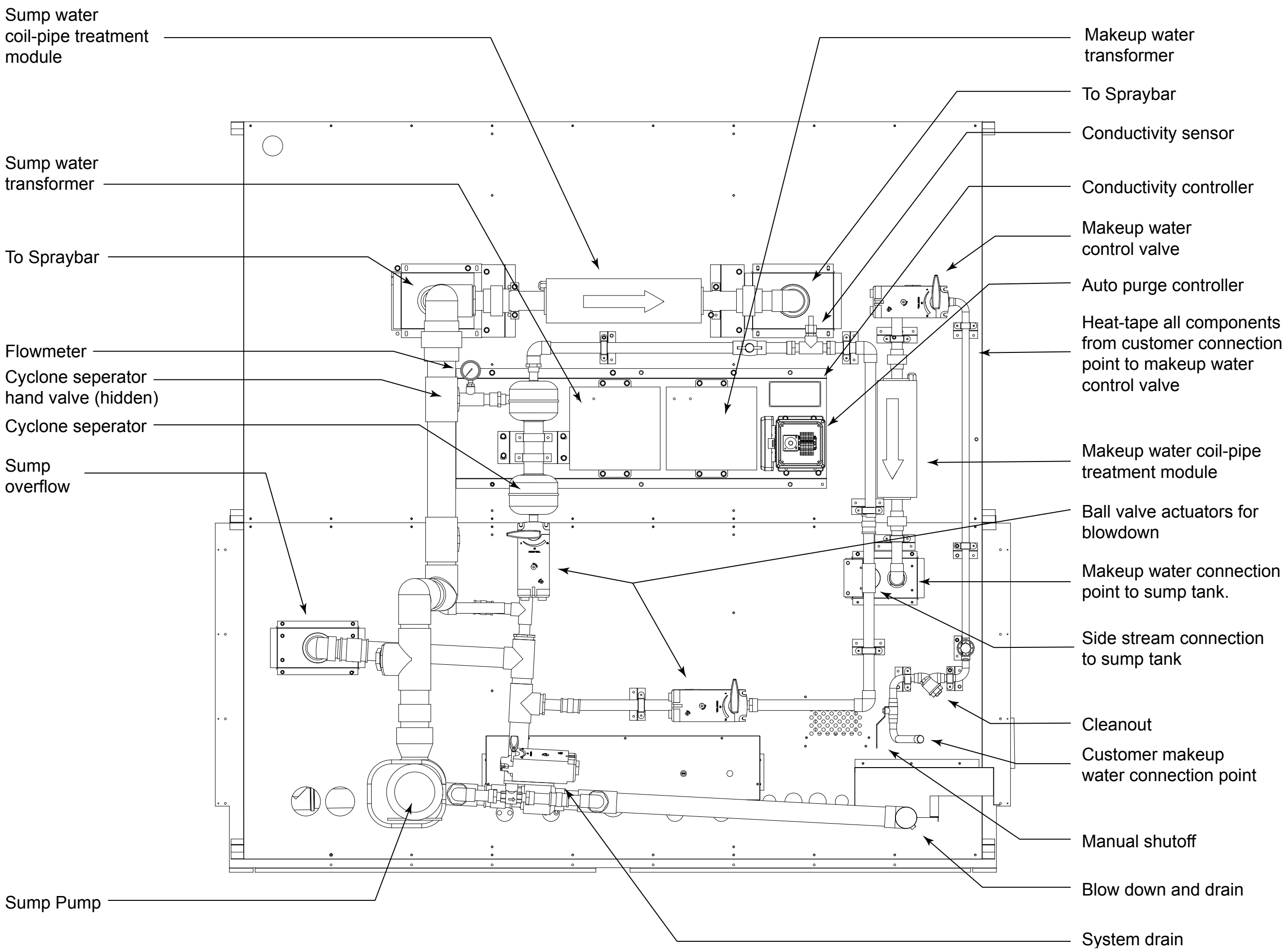
Spray System Plumbing with Optional Non-Chemical Water Treatment

⚠ WARNING

Failure to maintain and continually provide water treatment may result in severe equipment damage and may create biologically hazardous conditions. See Figure 27 for water connection sizes and locations.

NOTE: The cyclone separator is on a side stream. A hand valve controls water flow. The hand valve should be opened until the inlet pressure to the separator is about 12 psi as determined by the factory-installed gauge. This will yield about 20 gpm of blowdown whenever the blowdown solenoid opens.

Figure 7: Spray System Piping



Bleed Off and Water Consumption

Controlled bleed off [or blow down] is required on Daikin RPE / RDE units as it should be with all evaporative condensing products. It involves draining off a portion of the highly concentrated water from the bottom of the sump and replacing it with lower concentration make-up water to inhibit scale. Scale protection is required because the evaporation process leaves behind solids (scale) that will coat the heat exchanger surfaces and sump. This reduces the capacity, efficiency, and life expectancy of the equipment.

Manual bleed off occurs whenever the spray pump operates. A manual valve at the outlet of the cyclone separator adjusts flow and is provided as standard. Refer to Figure 7 This inevitably bleeds off too much [increased water costs] or too little [risking scale build up] water. Automatic bleed off control is superior and usually is provided with the water treatment system.

Theoretical water consumption required for proper heat rejection is 1.8 gallons per ton hour. All of this water evaporates and none goes into the sewer. An additional 0.6 to 0.9 gallons per ton hour (0.03 to 0.05 with Daikin nonchemical water treatment) is also required for make up and bleed off. The exact amount should be determined by water analysis. The RPE / RDE includes a float valve and solenoid that automatically refills the sump as required.

Bleed off must be handled in accordance with local codes and normally is drained into the sanitary sewer. Normally, this water should not be drained onto the roof or into a storm drain. One possible exception to this is with the Daikin nonchemical water treatment option (consult local codes carefully). Because most water utilities charge for both intake and sewer water flows based on intake meter readings, sewer charges may be reduced if sewer flow is proven to be less than water intake. Daikin offers both intake and bleed off water meters to document reduced sewer flow [confirm details with your local utility]. These meters are not included in the basic water treatment option.

Control Locations

Figure 8 (RPE Units) and Figure 9 (RDE Units) show the locations of the various control components mounted throughout the units. See Figure 12 on page 13 for the locations of control components mounted in control panels. Additional information is included in Table 3 on page 15 and the Legend, page 45.

Figure 8: Control Locations - RPE Units

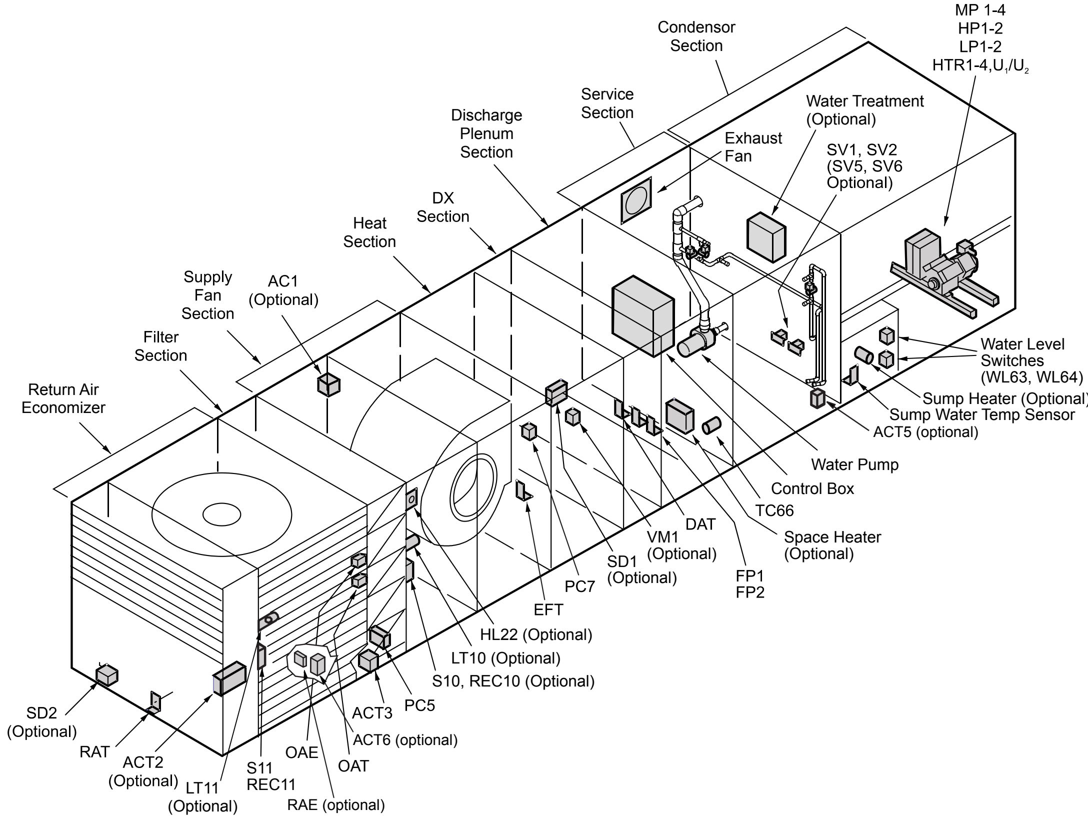
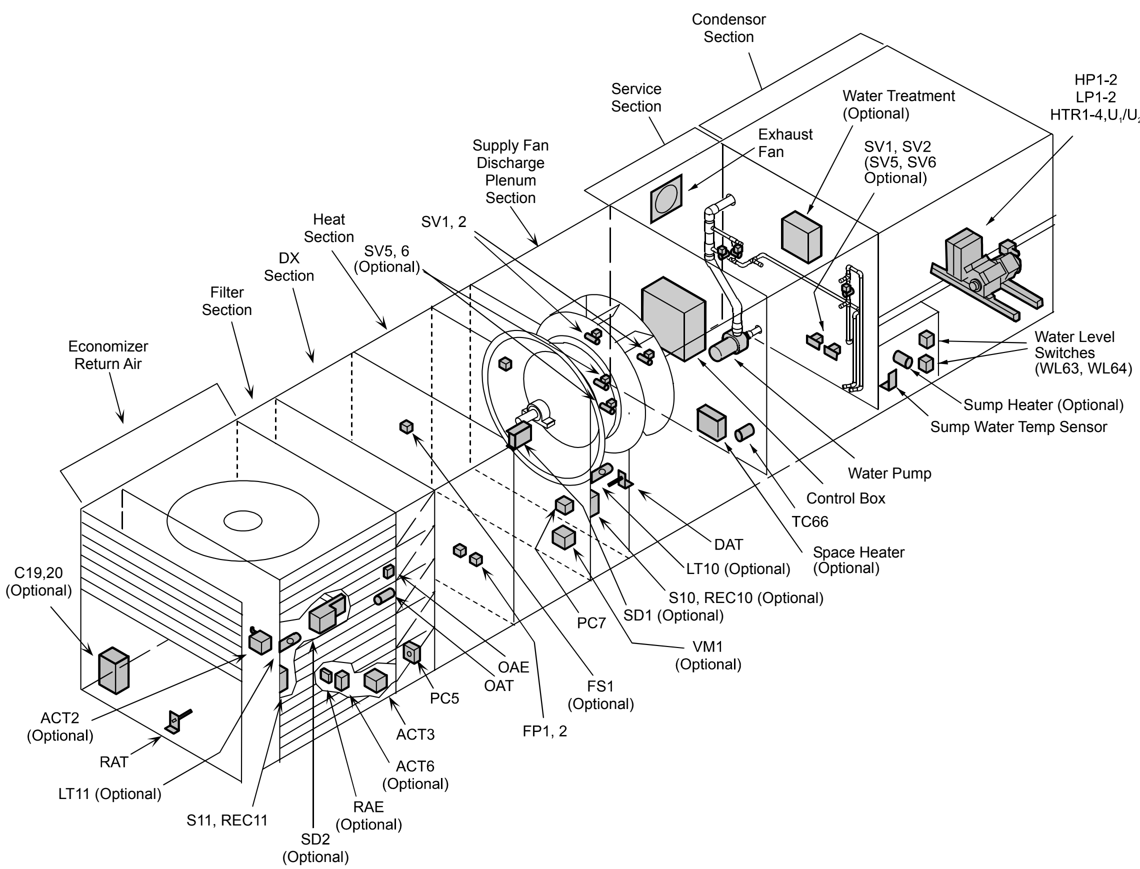


Figure 9: Control Locations - RDE Units



Control Panel Locations

The unit control panels and their locations are shown in the following figures. These figures show a typical unit configuration. Specific unit configurations may differ slightly from these figures depending on the particular unit options. See Wiring Diagrams, page 45 for the Legend and component description.

> **⚠ WARNING**
>
> **Electrical shock can cause severe personal injury or death.**
>
> The control panel must be serviced by trained, experienced technicians.

Figure 10: Control Panel Locations - Service Compartment

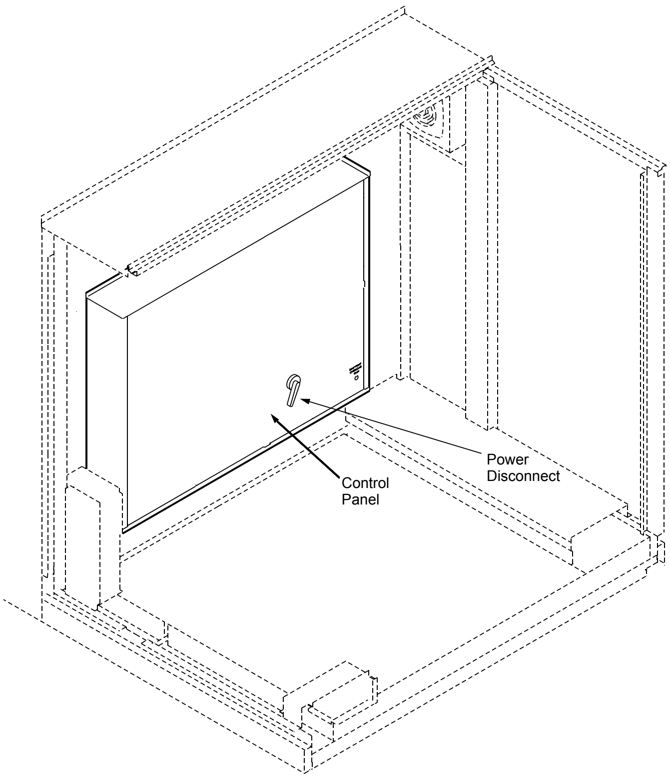


Figure 11: Electric Heat Control Panel - Sizes 075C- 135C

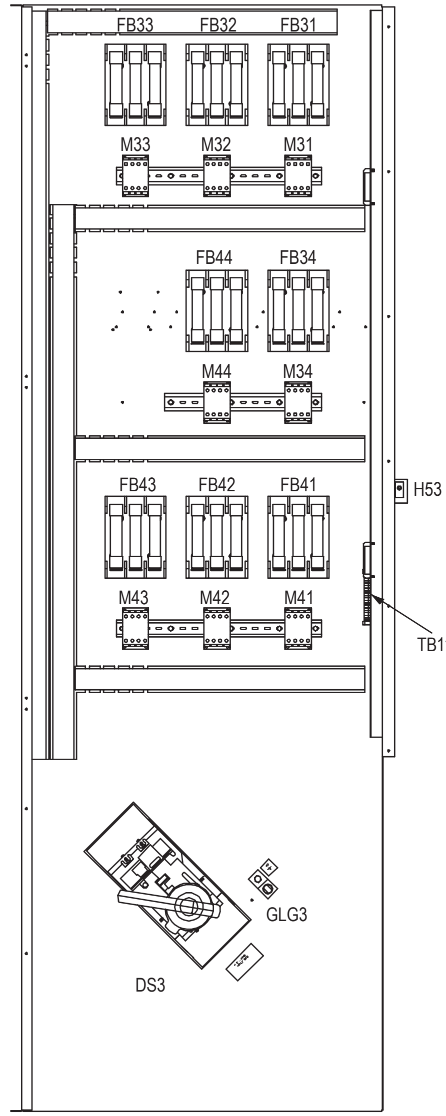
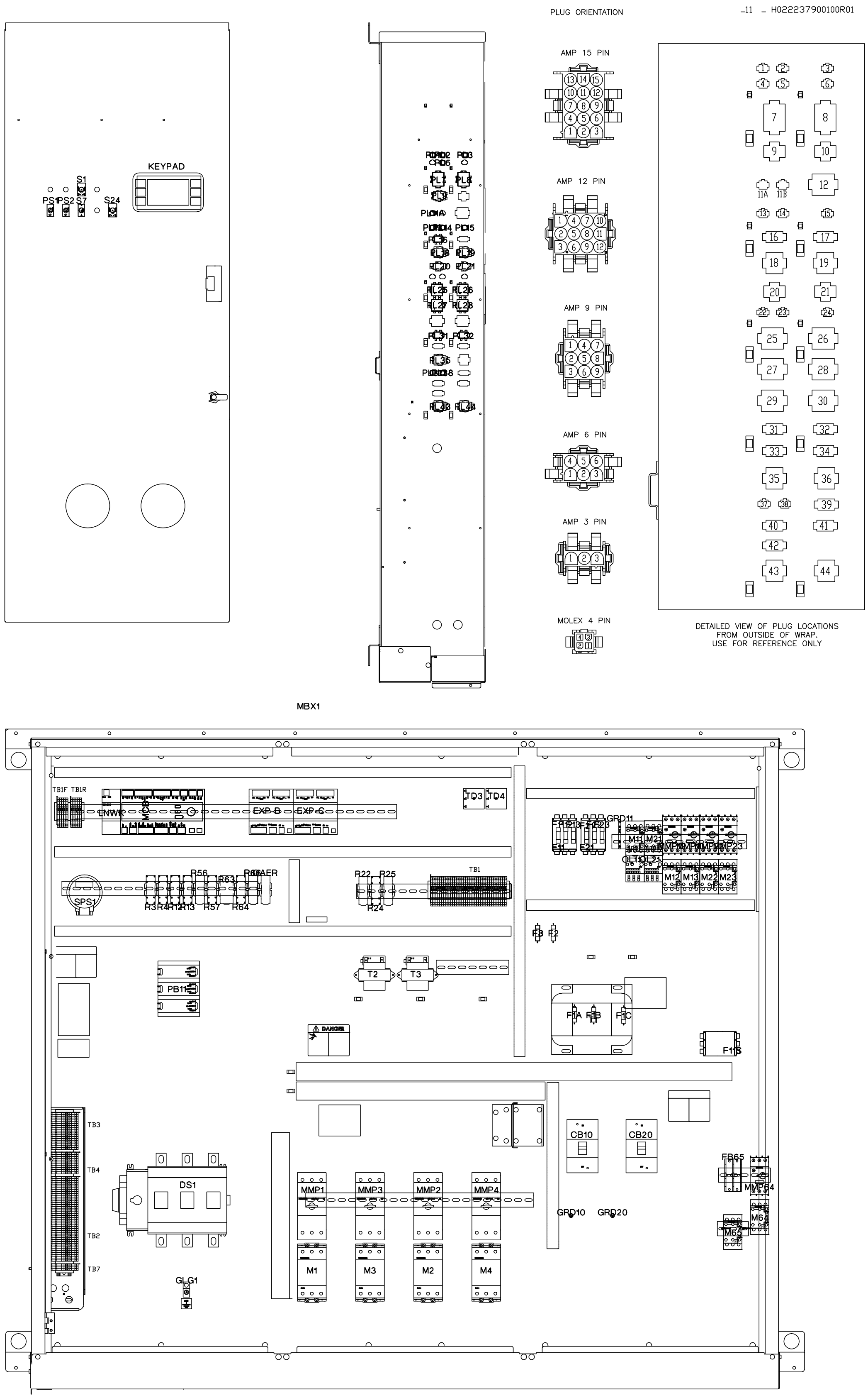


Figure 12: Main Control Panel - 076C - 150C



Walk-In Service Compartment

Each unit includes a walk-in service compartment containing the following:

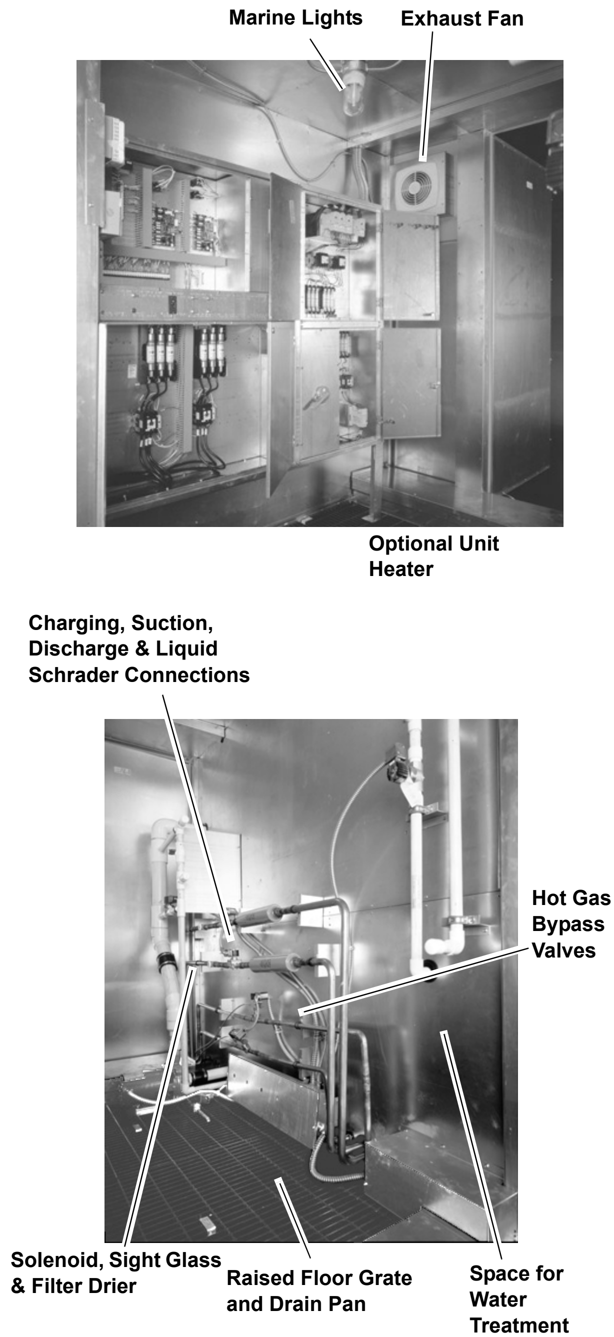
- Main control panel. See Figure 10 on page 12.
- Liquid Line components except the expansion valve.
- Spray pumps, water control valves (except float valves in the sump) and water supply and sanitary connections. See Figure 7 on page 9.
- Water treatment system (optional).
- Main access door opened from the inside and outside.
- Raised service grate to help protect service personnel against water and chemical spills.
- Refrigerant Schrader ports are provided on the liquid and suction lines to allow for easy refrigerant pressure readings, however, discharge pressure at the compressor must be measured outside the enclosure.
- Refrigerant charge can be added at the Schrader connections in the compartment.
- Lights, ventilation fans, manual shutter that can be opened to allow conditioned air into the plenum and optional unit heater provide more comfortable servicing.
- An adjustable TC66 thermostat turns on the ventilation fan when the compartment temperature exceeds 75°F.
- An adjustable integral thermostat runs the unit heater when the compartment temperature drops to 35°F.
- The manual shutter is normally closed but can be opened to condition the compartment when service is needed.

⚠ WARNING

Moving parts and electrical connections in the service compartment can cause severe personal injury or death. Cabinet access must be limited to trained, experienced technicians only.

Figure 13: Walk-In Service Compartment

Perform most refrigerant service in comfort, away from compressor noise.



Controls, Settings, and Functions

Table 3 presents a listing of all the unit control devices. Included in the table are the device symbol, a description of the device, its function, and any reset information, its location, any device setting, any setting ranges, differentials, and the device part number.

Table 3: Controls, Settings, and Functions

Symbol	Description	Function	Reset	Location	Setting	Range	Differential	Part No.
CS1 & 2	Switch (toggle), refrigerant circuit	Shuts off compressor control circuits manually	N/A	Main control panel	N/A	N/A	N/A	01355000
DAT	Discharge air temperature sensor	Senses discharge air temperature	N/A	Discharge air section	N/A	—	N/A	060004705
DHL	Duct high limit switch	Prevents excessive VAV duct pressures; shuts off fan	Auto	Main control panel	3.5" w.c (871.8 Pa)	0.05–5.0" wc (12.5–1245.4 Pa)	0.05" wc (12.5 Pa), fixed	065493801
EFT	Entering fan air temperature sensor	Senses entering fan air temperature	N/A	Inlet of supply fan	N/A	—	N/A	060004705
FP1, 2	Evaporator frost protection	Senses low refrigerant temperature	N/A	Return bends of evaporative coil	Opens at 30°F, Closes at 45°F	N/A	N/A	072501901
FS1	Freezestat	Shuts off fans, opens heating valve, and closes outdoor damper if low air temperature at coil is detected	Auto	Heating section	38°F (3°C) or as required	35°F–45°F (2°C–7°C)	12°F (7°C), fixed	065830001
HP1, 2, 3 & 4	High pressure control	Stops compressor when refrigerant discharge pressure is too high	Manual (relay latched)	Compressor	See page 105	N/A	100 psi (689 kPa)	047356120
LP1, 2	Low pressure control	Stops compressor when suction pressure is too low (used for pumpdown)	Auto	Compressor	See page 105	N/A	25 psi (172 kPa)	047356111
MCB	Main control board	Processes input information	N/A	Main control box	N/A	N/A	N/A	—
MP1–6	Compressor motor protector	Senses motor winding temperature, shuts off compressor on high temperature. Notes: 1.Unit size 018C compressors include internal motor protector. 2.Unit sizes 020C–036C, circuit #1 compressors include internal motor protector (refer to unit wiring diagram).	Auto at 3400 ohms	Compressor junction box	9 K–18 K ohms	700 ohms cold	N/A	044691509

Table 3 continued: Controls, Settings, and Functions

Symbol	Description	Function	Reset	Location	Setting	Range	Differential	Part No.
OAE	Enthalpy control (electro-mechanical)	Returns outside air dampers to minimum position when enthalpy is too high	Auto	Economizer section	“B” or as required	A–D	Temperature: 3.5°F (2°C) Humidity: 5% fixed	030706702
	Enthalpy control (electronic)	Returns outside air dampers to minimum position when outside air enthalpy is higher than return air empalthy (use RAE)	Auto	Economizer section	Fully CW past “D” (when used with RAE)	A–D	N/A	049262201
OAT	Outside air temperature sensor	Senses outside air temperature	N/A	—	N/A	—	N/A	060004705
PC5	Dirty filter switch	Senses filter pressure drop	Auto	First filter section	As required	0.05-5" wc (12.5–1245.4 Pa)	0.05" wc (12.5 Pa)	065493801
PC6	Dirty filter switch	Senses filter pressure drop	Auto	Final filter section	As required	0.05-5" wc (12.5–1245.4 Pa)	0.05" wc (12.5 Pa)	065493801
PC7	Airflow proving switch	Senses supply fan pressure to prove airflow	Auto	Supply fan section	0.10" wc (25 Pa)	0.05-5" wc (12.5–1245.4 Pa)	0.05" wc (12.5 Pa), fixed	060015801
PS1, 2	Pumpdown switch	Used to manually pump down compressor	N/A	Condenser control box	N/A	N/A	N/A	01355000
RAE	Return air enthalpy sensor	Used to compare return air enthalpy to outside air enthalpy (used with OAE)	N/A	Economizer section	N/A	N/A	N/A	049262202
RAT	Return air temperature sensor	Senses return air temperature	N/A	Return air section	N/A	—	N/A	060004705
SD1	Smoke detector, supply air	Initiates unit shutdown if smoke is detected	Manual	Discharge air section	N/A	N/A	N/A	04925001
SD2	Smoke detector, return air	Initiates unit shutdown if smoke is detected	Manual	Return air section	N/A	N/A	N/A	04925001
SPS1	Static pressure sensor duct #1	Converts static pressure signals to voltage signals	N/A	Main control box	N/A	0–5" wc (0–1245.4 Pa) 1–6 VDC out	N/A	049545007
SPS2	Static pressure sensor duct #2	Converts static pressure signals to voltage signals and sends them to MicroTech III controller	N/A	Main control box	N/A	0–5" wc (0–1245.4 Pa) 1–6 VDC out	N/A	049545007
	Static pressure sensor: building (space) pressure	Converts static pressure signals to voltage signals	N/A	Main control box	N/A	-025–0.25" wc (-62.3–62.3 Pa) 1–5 VDC out	N/A	049545006
SUMP HTR	Sump Water Heater, Evap Condenser	Controls Water Temp in the Evap Condenser Sump	—	Sump Holding Tank	—	—	—	See parts catalog
SV1, 2	Solenoid valve (liquid line)	Closes liquid line for pumpdown	N/A	Condenser section	N/A	N/A	N/A	See parts catalog
SV5, 6	Solenoid valve (hot gas bypass)	Closes hot gas bypass line for pump-down	N/A	Condenser section	N/A	N/A	N/A	111011001

Table 3 continued: Controls, Settings, and Functions

Symbol	Description	Function	Reset	Location	Setting	Range	Differential	Part No.
SV61, 62	Solenoid Valve (Water Fill - Evap Cond)	Open when sump water level is low to add water	N/A	Service Compartment	N/A	N/A	N/A	See parts catalog
SV63	Solenoid Valve (Sump Drain - Evap Cond)	Opens to drain sump	N/A	Service Compartment	N/A	N/A	N/A	See parts catalog
SWT	Sump Water Temp Sensor	Sensor for freeze and head pressure control	N/A	Sump Holding Tank	N/A	N/A	N/A	See parts catalog
S1	System switch	Shuts off entire control circuit (except crankcase heaters)	N/A	Main control box	N/A	N/A	N/A	001355000
S7	ON-OFF-AUTO switch	Used to manually switch unit	N/A	Main control box	N/A	N/A	N/A	See parts catalog
TC66	Temperature Control - Evap Cond Exhaust Fan	Sequences the vestibule exhaust fan	N/A	Service Compartment	N/A	N/A	N/A	See parts catalog
WL63	Switch, Water Level Sump Fill	Maintains proper water level	N/A	Sump Holding Tank	N/A	N/A	N/A	See parts catalog
WL64	Switch, Low Water	Maintains proper water level	N/A	Sump Holding Tank	N/A	N/A	N/A	See parts catalog

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

⚠ WARNING

Improper installation, adjustment, alteration service or maintenance can cause personal injury or death. Read and understand this Installation and Maintenance manual thoroughly before installing or servicing this equipment.

NOTE: Low head pressure may lead to poor, erratic refrigerant feed control at the thermostatic expansion valve. The units have automatic control of the condenser fans which should provide adequate head pressure control down to 50°F (10°C). The system designer is responsible for assuring the condensing section is not exposed to excessive wind or air recirculation.

⚠ WARNING

Sharp edges and coil surfaces can cause personal injury. Avoid contact with them. Installation and maintenance must be performed only by trained and experienced personnel familiar with local codes and regulations.

⚠ WARNING

Sharp edges on sheet metal, screws and clips can cause personal injury. This equipment must be installed and operated only by experienced trained personnel.

Receiving Inspection

When the equipment is received, check all items against the bill of lading to be sure all crates and cartons have been received. **If the unit has become dirty during shipment (winter road chemicals are of particular concern), clean it when received.**

Inspect all units for damage when received. Report all shipping damage to the carrier and file a claim. In most cases, equipment is shipped F.O.B. factory and claims for freight damage should be filed by the receiver.

The unit nameplate should be checked before unloading the unit to make sure the voltage complies with the power supply available.

Unit Clearances

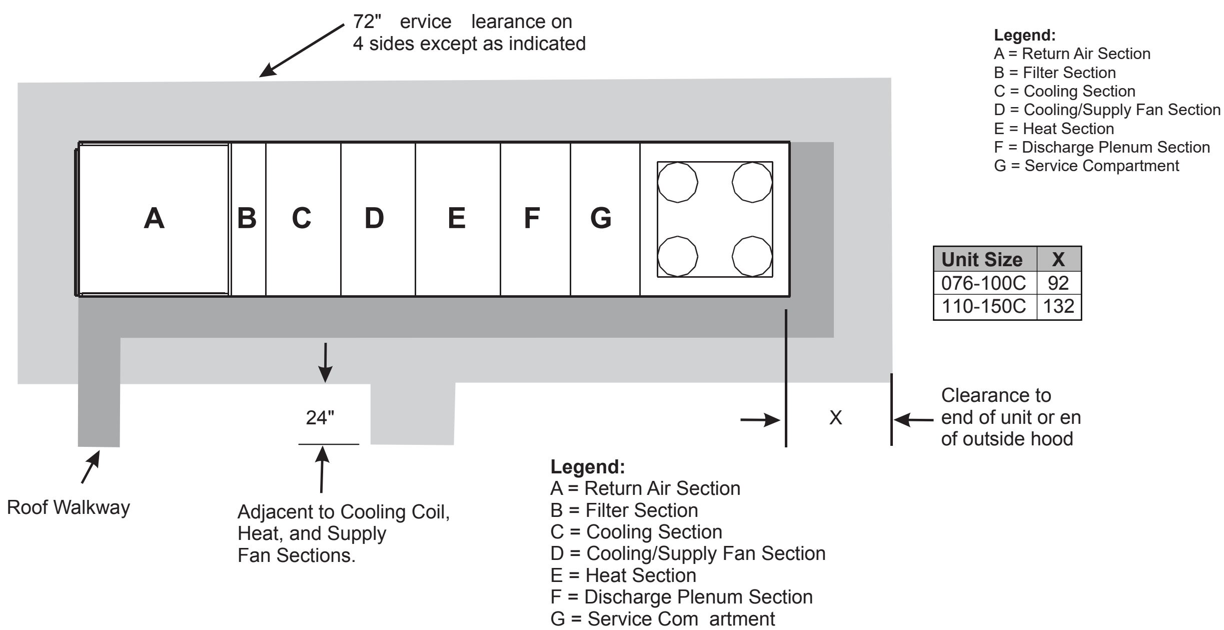
Service Clearance

Allow service clearance approximately as indicated in Figure 14. Also, a roof walkway should be provided to the rooftop unit and along at least the two sides of the unit that provide access to most controls and serviceable components.

⚠ NOTICE

On units with side discharge, access to plenum mounted components becomes difficult once ductwork is installed. Installer must provide access in the ductwork for plenum mounted controls.

Figure 14: Service Clearances Side Discharge



Unit Size	X
076-100C	92
110-150C	132

Ventilation Clearance

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

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

1. The bottom of the screen or fence should be at least 1 ft. (305 mm) above the roof surface.
2. The distance between the unit and a screen or fence should be as described in Service Clearance. See also Figure 14.
3. The distance between any two units within a screen or fence should be at least 120" (3048 mm).

Unit(s) surrounded by solid walls:

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

If the unit is installed where windy conditions are common, wind screens should be installed around the unit, maintaining the clearances specified (see Figure 16). This is particularly important to prevent blowing snow from entering outside air intakes, and to maintain adequate head pressure control when mechanical cooling is required at low outdoor air temperatures.

Figure 15: Side Discharge

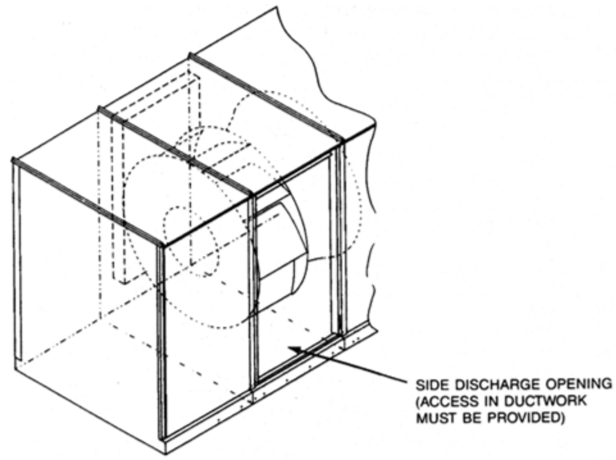
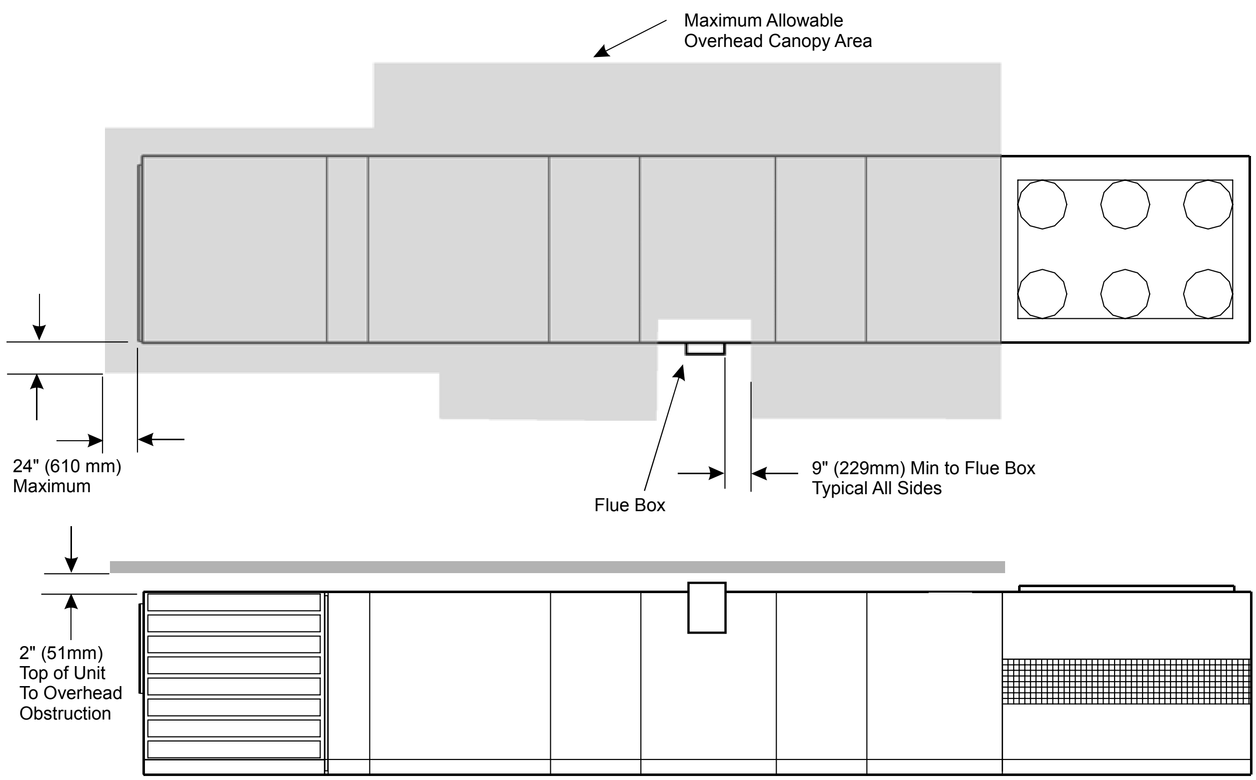


Figure 16: Overhead Clearance



Overhead Clearance

1. Unit(s) surrounded by screens or solid walls must have no overhead obstructions over any part of the unit.
2. The area above the condenser must be unobstructed in all installations to allow vertical air discharge.
3. The following restrictions must be observed for overhead obstructions above the air handler section (see Figure 16):
    a. There must be no overhead obstructions above the furnace flue, or within 9" (229 mm) of the flue box.
    b. Overhead obstructions must be no less than 2" (51 mm) above the top of the unit.
    c. There must be no overhead obstructions in the areas above the outside air and exhaust dampers that are farther than 24" (610 mm) from the side of the unit.

Roof Curb Assembly and Installation

The roof curb and unit must be located on a portion of the roof that can support the weight of the unit. The unit must be supported to prevent bending or twisting of the machine.

If building construction could allow the transmission of sound and vibration into the occupied space, t**he unit should be located over a non-critical area. It is the responsibility of the system designer to make adequate provisions for noise and vibration in the occupied space.**

The curb and unit must be installed level to allow the condensate drain to flow properly.

Integral supply and return air duct flanges are provided with the RPE/RDE roof curb, allowing connection of ductwork to the curb before the unit is set. The gasketed top surface of the duct flanges seals against the unit when it is set on the curb. These flanges must not support the total weight of the ductwork. Refer to Installing Ductwork, page 32 for details on duct connections. It is critical that the condensate drain side of the unit be no higher than the opposite side.

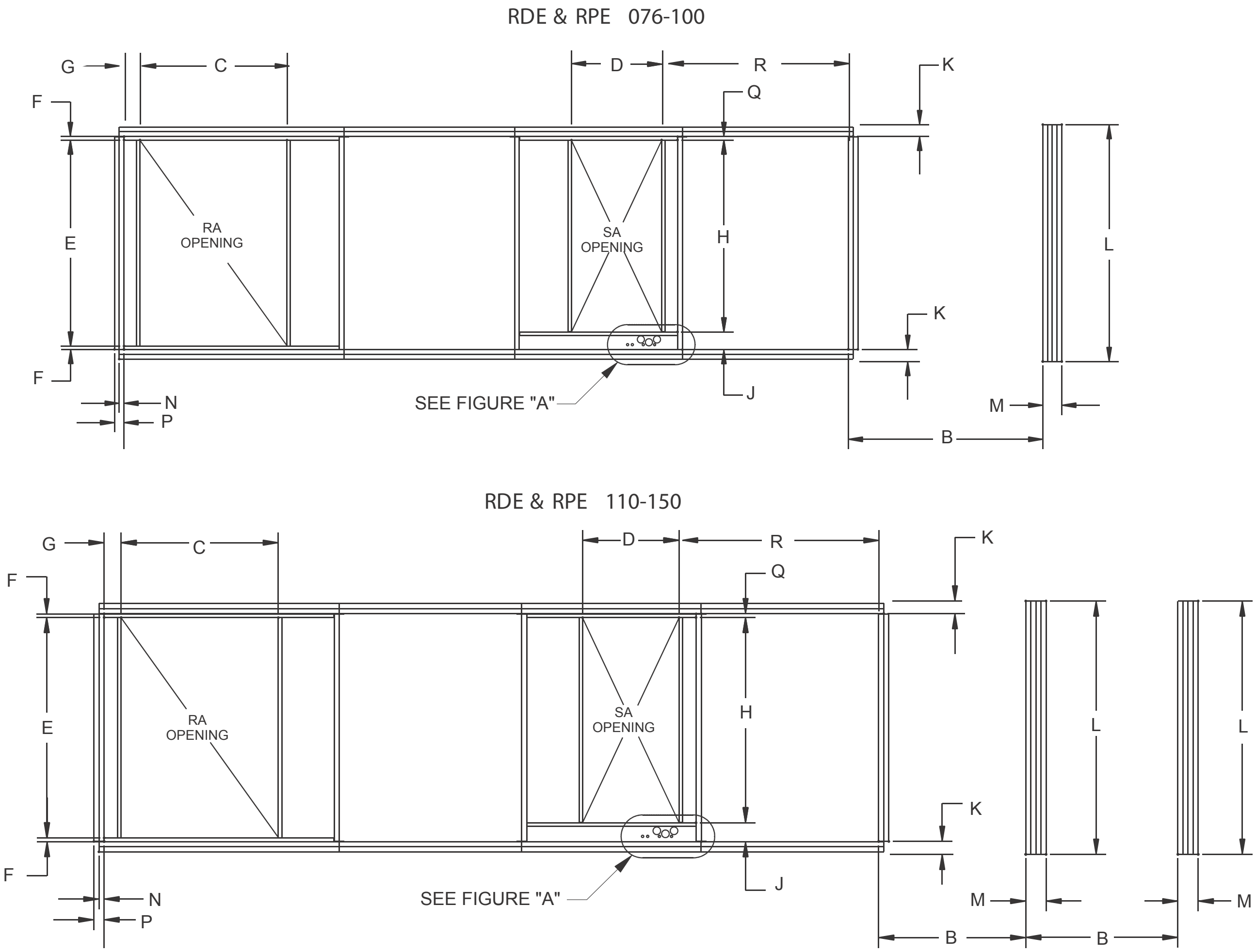
Assembly of a typical RPE/RDE roof curb is shown in Figure 17. Parts A through K are common to all units having bottom return openings. Depending on the unit length, Parts L and M may be included with the roof curb kit to create the correct overall curb length.

RPE/RDE Assembly instructions

Refer to Figure 17.

1. Set curbing parts A through K per dimensions shown over roof opening or on a level surface. Note location of return and supply air openings.
2. If applicable, set other curbing parts (D, L, M, etc.) in place making sure that the orientation complies with the assembly instructions. Check alignment of all mating bolt holes.
3. Bolt curbing parts together using fasteners provided. Tighten all bolts finger tight.
4. Square entire curbing assembly and securely tighten all bolts.
5. Position curb assembly over roof openings. Curb must be level from side to side and over its length. Check that top surface of the curb is flat with no bowing or sagging.
6. Weld curbing in place. Caulk all seams watertight. Remove backing from 0.25" (6 mm) thick × 1.50" (38 mm) wide gasketing and apply to surfaces shown by notes.
7. Flash curbing into roof as shown in Detail “B”.
8. Parts E and F are not required on units with no return shaft within the curb perimeter.
9. Parts G and H are not required on units with no supply shaft within the curb perimeter.

Figure 17: RPE/RDE Roof Curb Assembly



DIM	076–100C	110–150C
B	84.0	60.0
C	62.0	62.0
D	38.0	46.0
E	87.0	87.0
F	1.5	1.5
G	6.8	6.8
H	81.0	81.0
J	7.5	7.5
K	5.0	5.0
L	100.0	100.0
M	8.0	8.0
N	2.0	2.0
P	4.0	4.0
Q	1.5	1.5
R	78.8	78.8

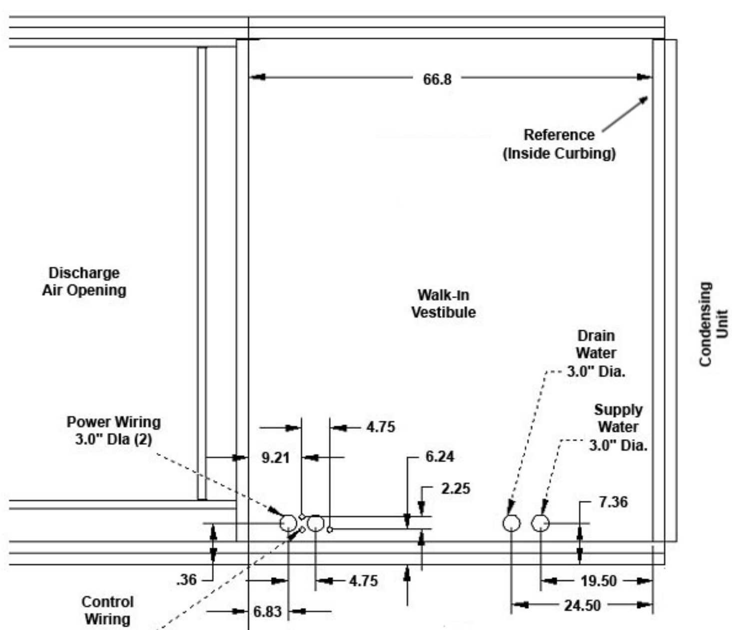
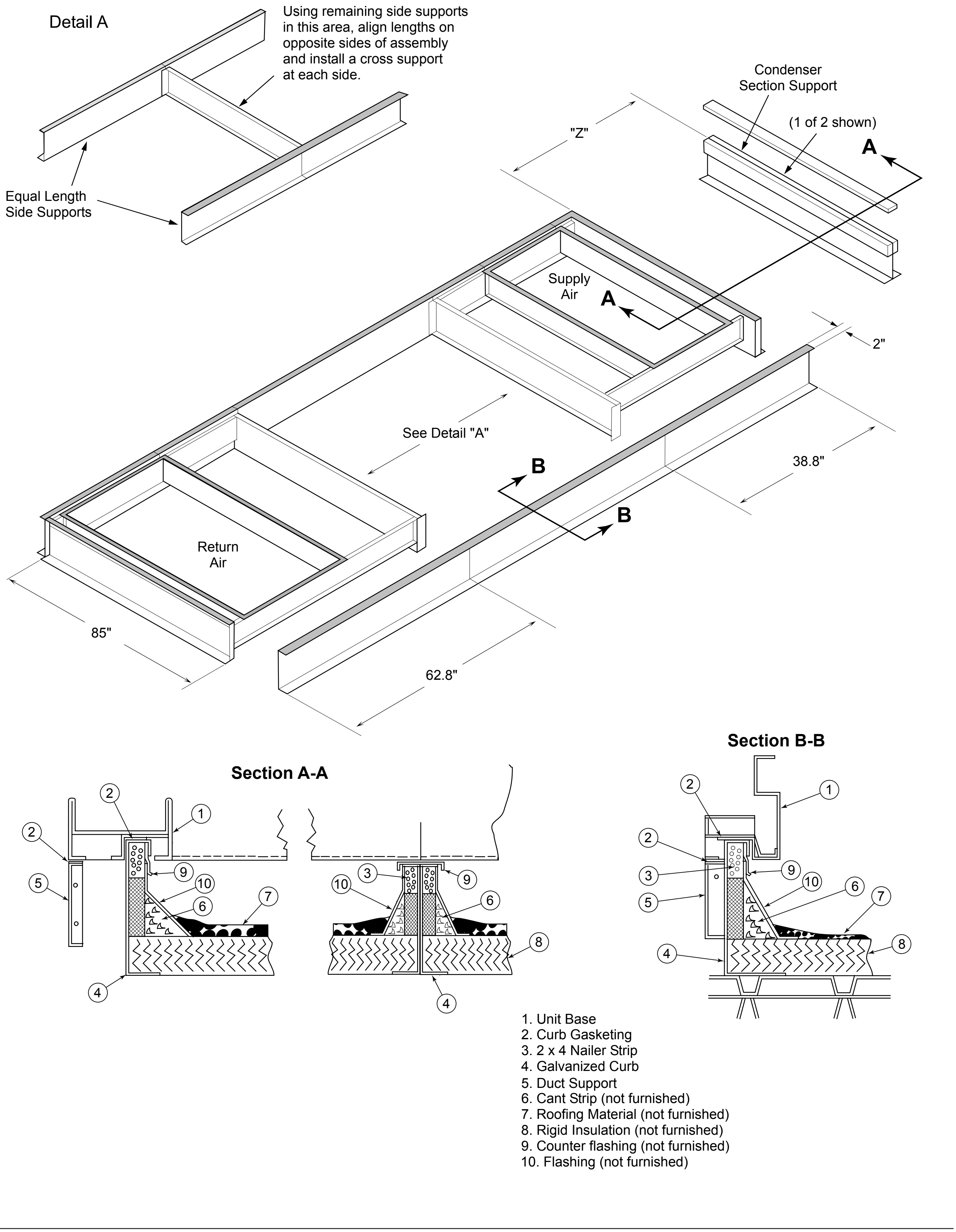


Figure A

Figure 18: RPE/RDE Roof Curb Assembly



Post and Rail Mounting

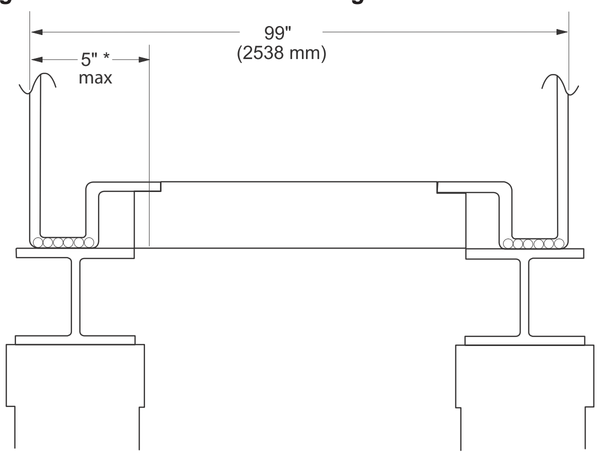
When mounting by post and rail, the structural support should be run the full length of the unit. Locate the structural member at the base of the unit as shown in Figure 18 assuring the shaded area is well supported by the structural member.

⚠ CAUTION

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

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

Figure 19: Post and Rail Mounting



* Rail cannot extend beneath the unit more than 5" (127 mm) or it will interfere with duct and electrical connections.

Rigging and Handling

Lifting brackets with 2" (51 mm) diameter holes are provided on the sides of the unit.

Use spreader bars, 96" to 100" (2438 to 2540 mm) wide to prevent damage to the unit cabinet. Avoid twisting or uneven lifting of the unit. The cable length from the bracket to the hook should always be longer than the distance between the outer lifting points.

⚠ WARNING

Use all lifting points. Severe personal injury and property damage can result from improper lifting adjustment.

If the unit must be stored at the construction site for an intermediate period, these additional precautions should be taken:

1. Make sure to support the unit well along the length of the base rail.
2. Make sure to level the unit (no twists or uneven ground surface).
3. Provide proper drainage around the unit to prevent flooding of the equipment.
4. Provide adequate protection from vandalism, mechanical contact, etc.
5. Securely close the doors.
6. If there are isolation dampers, make sure they are properly installed and fully closed to prevent the entry of animals and debris through the supply and return air openings.
7. Cover the supply and return air openings on units without isolation dampers.

Figure 20 shows an example of the rigging instruction label shipped with each unit.

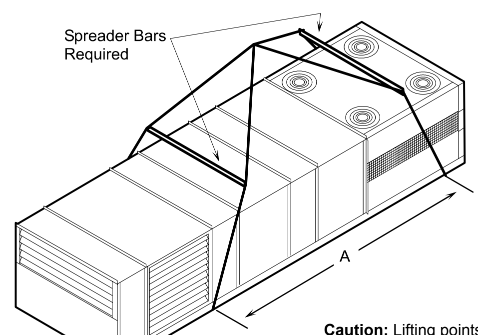
Figure 20: Rigging and Handling Instruction Label

Rigging and Handling Instructions

Unit has either four or six lifting points (four-point shown below).

Caution: All lifting points must be used.

Note: Rigging cables must be at least as long as distance "A".



Lift Only As Indicated

Caution: Lifting points may not be symmetrical to center of gravity of unit. Balast or unequal cable lengths may be required

Lifting Points

Refer to Figure 21 and Figure 22. The following calculations determine whether a four or six point lift is required.

X = Distance from the entering air end of the unit (or shipping section) to the first lifting lug in the direction of air flow.

For all units or shipping sections with outdoor air / return air options, **X = 48"**

For shipping sections without outdoor air / return air options, **X = 0**

Y = distance from condenser or leaving air end of unit to the last lifting lug.

For all units or shipping sections with condensers, **Y = 21.5 (sizes 76-100)** or **Y = 60.2 (sizes 110-150)**.

For all units or shipping sections without condensers, **Y = 0**

Z = Total base rail length of the unit. **Note:** Z excludes hoods and overhung parts extending past base rails of the unit.

A = Z-X-Y

If A< 288", 4-point lift is sufficient

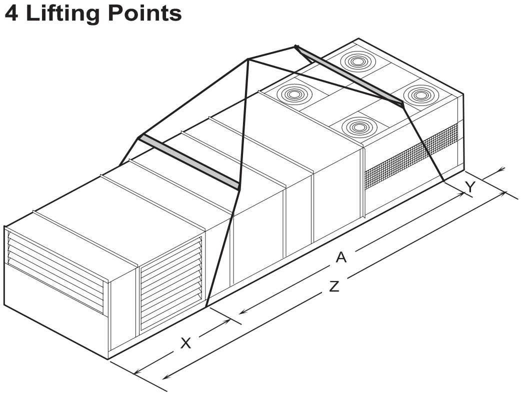
If A> 288", 6-point lift is required

B = Distance from first lifting lug to middle lifting lug on units with 6-point lift.

B = A/2 +/- 48" Note: Middle lifting lug may be installed on either side of the midpoint to avoid interference with condensate drains.

Figure 21: Unit Type RPE / RDE Lifting Points

4 Lifting Points



6 Lifting Points

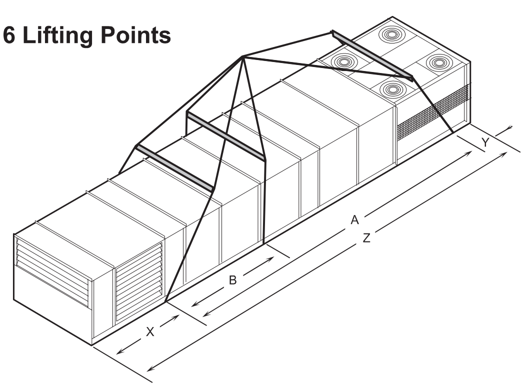
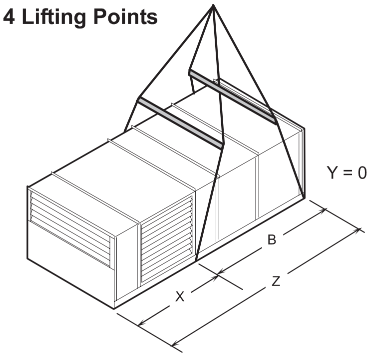
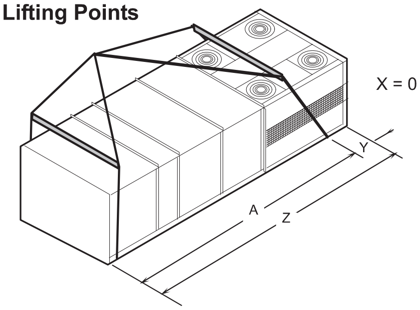


Figure 22: RPE / RDE Factory Split at Supply Fan Section

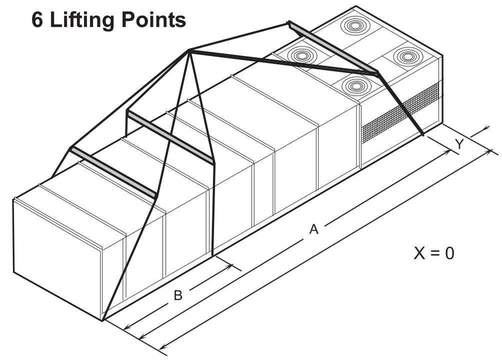
4 Lifting Points



4 Lifting Points



6 Lifting Points



076C — 100C: B Min. = 72" (1829 mm)
110C — 130C: B Min. = 96" (2438 mm)
140C — 150C: B Min. = 120" (3048 mm)

Reassembly of Split Units

Although RoofPak units typically ship from the factory as complete units, they may be split at the factory.

The RPE / RDE unit may ship from the factory as two pieces, split at the supply fan bulkhead, to be recoupled together on the roof. This configuration would be ordered if shipping length or weight limitation prevented a packaged RPE / RDE from being ordered. Splitting at the fan has the advantage of leaving all factory refrigerant piping intact so field evacuation and charging is not required.

A single nameplate is attached to the air handler section and power is fed to both sections through the main control box, as it would be in a non-split RPE / RDE unit.

RPE / RDE Factory Split at Fan

Field reassembly of an RPE / RDE unit that has shipped split at the fan takes place in two phases:

Phase 1 - Setting the Sections and CabinetReassembly

The steps required to set the unit and reassemble the cabinet are shown in Figure 23, Figure 24, and Figure 25. The following items should be noted:

1. Top cap and plywood covers must be removed before the sections are set together, but the steel retainer clips must be left in place to secure the bulkhead. Refer to Step 1 and Figure 23.
2. Both sections must be carefully lowered into place to make sure that the roof curb engages the recesses in the unit base.
3. All seams at the split must be caulked watertight after recoupling the sections, as shown in Step 3 and Figure 25.

Phase 2 - Reconnecting Power and Control Wiring

The DX coil / condenser section contains power and control harnesses which have their excess length in the blank or heat section that is normally immediately downstream of the fan. Once the sections are physically reconnected, the ends of the power harness are fed back through the unit base into the junction box, per the unit's electrical schematics.

⚠ WARNING

Improper installation can cause severe equipment damage, personal injury or death. Connect the power block correctly and maintain proper phasing.

When reconnection of the power wires is complete, the inner raceway cover in the blank or heat section must be reinstalled. Figure 39 on page 35 shows a typical installation of the raceway cover. If the unit is equipped with a fan diffuser, install as shown in Figure 25.

Control harnesses will not be split. They will be coiled in the fan end of the unit. Route the harnesses along the raceway and into the main box. Terminate the plugs in the patch panel.

1. Prepare the units for reassembly as shown in Figure 23.
2. Set fan end of unit and discharge end of unit in place.
3. Caulk and install parts as shown in Figure 24.
4. Make electrical connections and reinstall Inner Raceway Cover as shown in Figure 25.

Figure 23: RPE / RDE Split at Fan Reassembly - Step 1

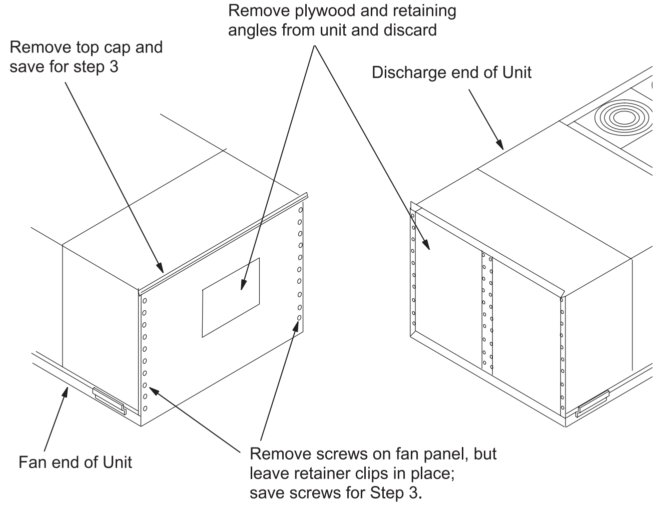


Figure 24: Split at Fan Reassembly - Step 3

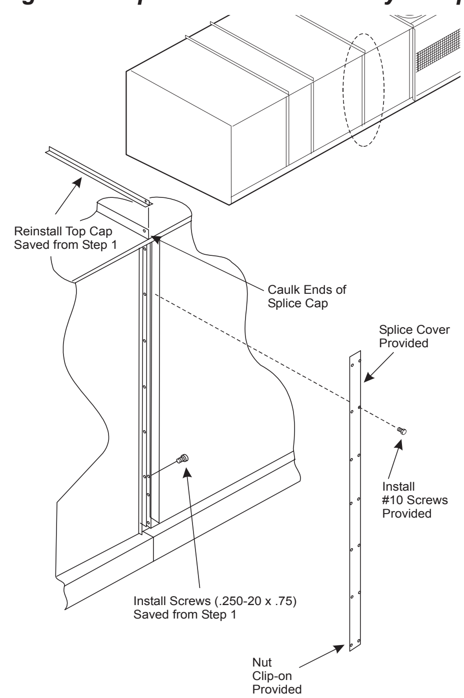
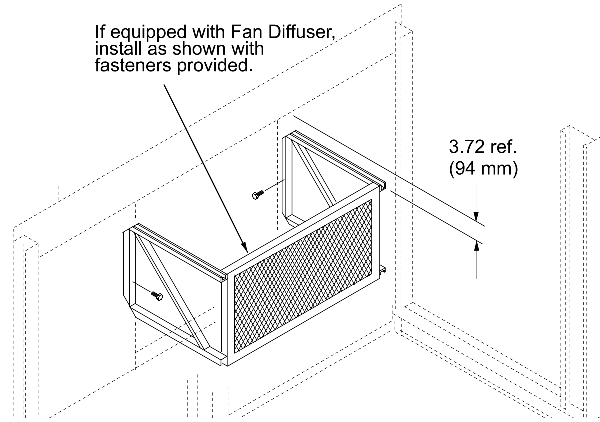


Figure 25: RPE Split at Fan Reassembly - Step 4



Condensate Drain Connection

The unit is provided with a 1.5" male NPT condensate drain connection. Refer to certified drawings for the exact location. The unit and drain pan must be level side to side and a P-trap must be installed for proper drainage.

RPE units may have positive or negative pressure sections. Traps should be used in both cases, with care given to negative pressure sections. In Figure 26, dimension “A” should be a minimum of 8" (203 mm). So the cabinet static pressure does not blow or draw the water out of the trap and cause air leakage, dimension A should be two times the maximum static pressure encountered in the coil section in inches w.c.

Drainage of condensate directly onto the roof may be acceptable; refer to local codes. A small drip pad of stone, mortar, wood or metal be should be provided to protect the roof against possible damage.

If condensate is to be piped into the building drainage system, the drain line should be pitched away from the unit at a minimum of 1/8" per foot. The drain line must penetrate the roof external to the unit. Refer to local codes for additional requirements. Sealed drain lines require venting to provide proper condensate flow.

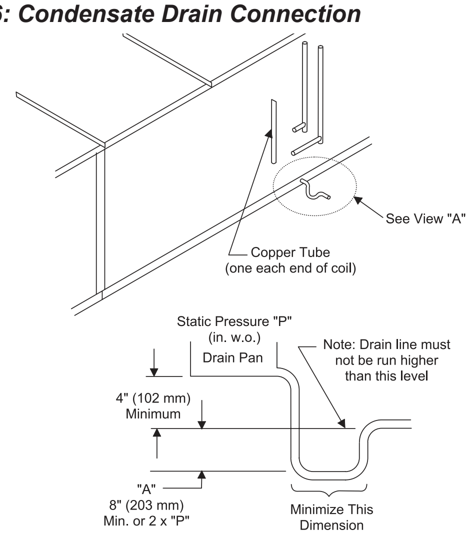
Where the cooling coils have intermediate condensate pans on the face of the evaporator coil, copper tubes near both ends of the coil provide drainage to the main drain pan. Check that the copper tubes are in place and open before the unit is put into operation.

Because drain pans in any air conditioning unit will have some moisture in them, algae, etc. will grow. Periodic cleaning is necessary to prevent this buildup from plugging the drain and causing the drain pan to overflow. Also, the drain pans should be kept clean to prevent the spread of disease. Cleaning must be performed by qualified personnel.

⚠ WARNING

Clean drain pans regularly. Growth in uncleaned drain pans can cause disease. Cleaning must be done by trained, experienced personnel.

Figure 26: Condensate Drain Connection



Unit Piping

Gas Piping

See the “Installation” section of the gas-fired furnace installation manual IM 684 or IM 685.

Supply Water

City water must be piped into the service section of the unit. Install a manual shutoff valve to facilitate service of the unit. Provisions have been made to pipe through the floor of the service section within the curb. If the unit will be exposed to low outdoor air conditions, care must be taken to prevent freeze damage to this piping.

The service section has an optional heater to minimize freeze problems during cold weather. Verify that this heater functions before filling the unit. A sump heater option is also offered that includes heat tape on the pressure side of the float controlled fill valve, plus an extra 8 feet of heat tape to protect field connections inside the service compartment.

If the unit is mounted on post and rail structure, pipe will be exposed to outdoor conditions and will need to be heat taped or drained manually during the winter season.

Drain Water

A drain and bleed off connection is also located in the service section of the unit. Since this water will contain water. treatment chemicals, local codes may require connection to the sanitary sewer. The freeze warning for supply water also applies to drain water piping.

NOTE: Make sure that a service compartment heater and especially a sump heater or some type of freeze protection have been provided if freezing conditions are expected

Water Treatment

Water treatment, whether ordered as an option on the unit or purchased separately, must be properly installed and started before starting the unit. Failure to do so will result in scale build up on the condenser tubes with a resulting loss in heat rejection capacity. In severe cases, it may become impossible to operate the compressors. In addition, untreated cooling tower water can be a source for airborne disease.

Proper water treatment must include the following minimum features:

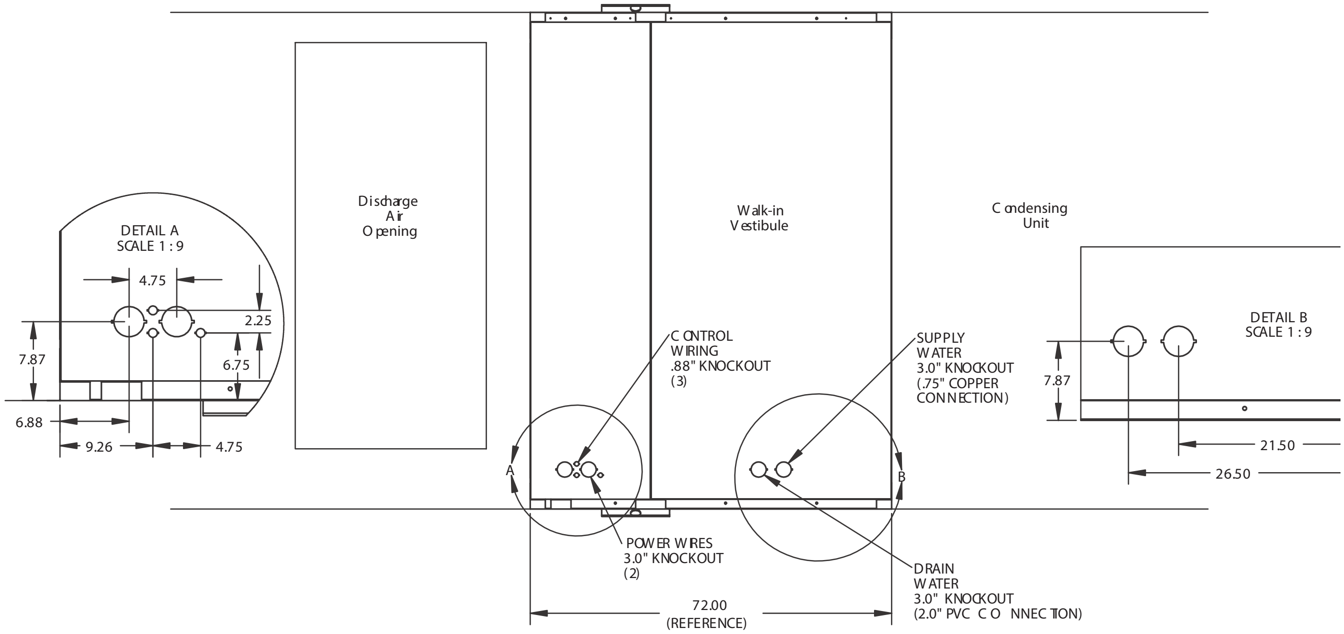
- Bleed Off
- Scale and corrosion inhibitor chemical treatment
- Biocide chemical treatment

See Catalog 219 for information on the optional Daikin supplied water treatment systems.

⚠ WARNING

Failure to maintain and continually provide water treatment will result in severe equipment damage and may create biologically hazardous conditions.

Figure 27: Unit Piping Knockout Locations



Hot Water Coil Piping

Hot water coils either are provided without valves for field piping or are piped with three-way valves and actuator motors. Note: If the unit is equipped with an iron valve, connecting to a copper piping system will likely cause galvanic corrosion to occur and the valve will not last. All coils have vents and drains factory installed.

Hot water coils are not normally recommended for use with entering air temperatures below 40°F (4°C). No control system can guarantee a 100% safeguard against coil freeze-up. Glycol solutions or brines are the only freeze-safe media for operation of water coils at low entering air temperature conditions.

When no factory piping or valve is included, the coil connections are 2-1/8" copper (two supply and two return). With the factory piping and valve package, field piping connections are the same NPT size as the valve with female threading (see Figure 28).

Refer to the certified drawings for the recommended piping entrance locations. All piping penetrations must be sealed to prevent air and water leakage. Note: The valve actuator spring returns to a stem down position upon power failure. This allows full flow through the coil.

⚠ WARNING

Coil freeze possible. Possible equipment damage. Carefully read and follow instructions for mixing antifreeze solution. Some products will have higher freezing points in their natural state than when mixed with water. The freezing of coils is not the responsibility of Daikin.

Figure 28: Hot Water Valve Package

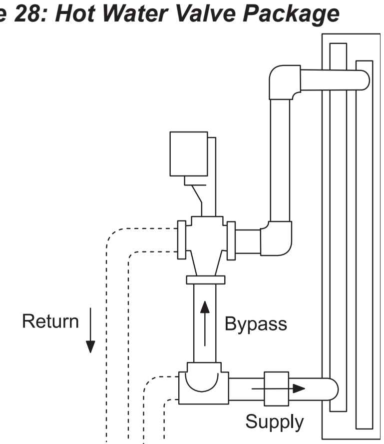
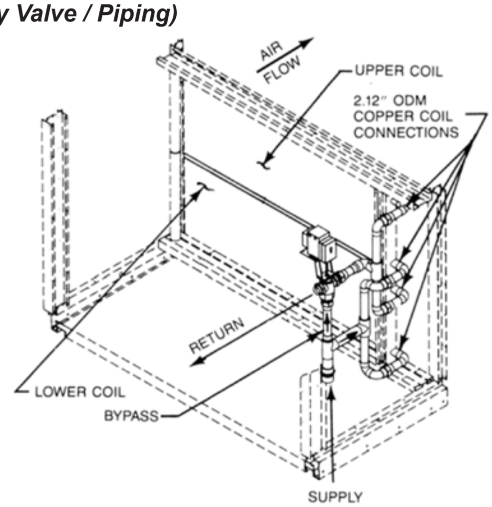


Figure 29: Hot Water Heat Section (Factory Valve / Piping)



Steam Coil Piping

Steam coils either are provided without valves for field piping or are piped with two-way valves and actuator motors.

The steam coil is pitched at 1/8" (3 mm) per foot (305 mm) to provide positive condensate removal. When no factory piping or valve is included, the coil connections are 2.5" male NPT iron pipe.

With the factory piping and valve package, the field supply connection is the same NPT size as the valve with female threading (see Figure 31).

Refer to the certified drawings for the recommended piping entrance locations. All piping penetrations must be sealed to prevent air and water leakage.

NOTE: The valve actuator spring returns to a stem up position upon power failure. This allows full flow through the coil.

Steam Piping Recommendations

1. Be certain that adequate piping flexibility is provided. Stresses resulting from expansion of closely coupled piping and coil arrangement can cause serious damage.
2. Do not reduce pipe size at the coil return connection. Carry return connection size through the dirt pocket, making the reduction at the branch leading to the trap.
3. Install vacuum breakers on all applications to prevent retaining condensate in the coil. Generally, connect the vacuum breaker between the coil inlet and the return main. However, if the system has a flooded return main, the vacuum breaker should be open to the atmosphere and the trap design should allow venting of large quantities of air.
4. Do not drain steam mains or takeoffs through coils. Drain mains ahead of coils through a steam trap to the return line.
5. Do not attempt to lift condensate.
6. Pitch all supply and return steam piping down a minimum of 1" (25 mm) per 10 feet (3 m) of direction of flow.

Steam Trap Recommendations

1. Size traps in accordance with manufacturers' recommendations. Be certain that the required pressure differential will always be available. Do not undersize.
2. Float and thermostatic or bucket traps are recommended for low pressure steam. Use bucket traps on systems with on-off control only.
3. Locate traps at least 12" (305 mm) below the coil return connection.
4. Always install strainers as closely as possible to the inlet side of the trap.
5. A single tap may generally be used for coils piped in parallel, but an individual trap for each coil is preferred.

Steam Coil Freeze Conditions

If the air entering the steam coil is below 35°F (2°C), note the following recommendations:

1. 1.5 psi (34.5 kPa) steam must be supplied to coils at all times.
2. Do not use modulating valves. Control should be by means of face and bypass dampers.
3. As additional protection against freeze-up, the tap should be installed sufficiently far below the coil to provide an adequate hydrostatic head to provide removal of condensate during an interruption on the steam pressure. Estimate 3 ft. (914 mm) for each 1 psi (7 kPa) of trap differential required.
4. If the unit is to be operated in environments with possible freezing temperatures, an optional freezestat is recommended. See Freeze Protection on page 64 for additional information.

Figure 30: Steam Valve Assembly

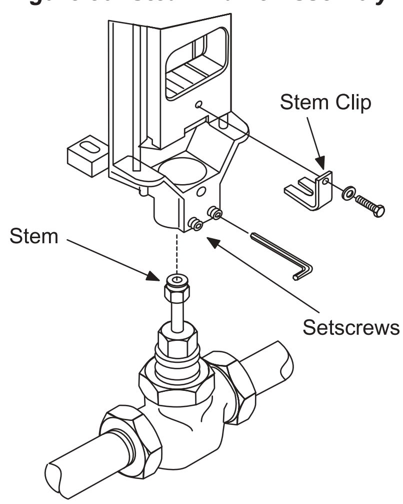


Figure 31: Steam Valve Package

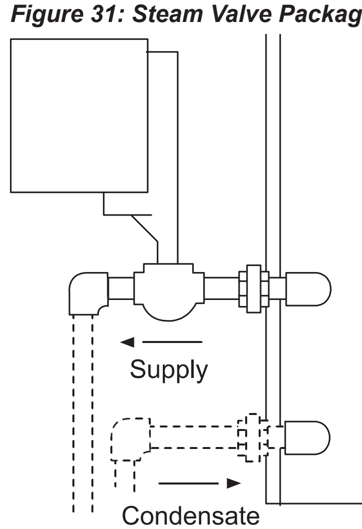
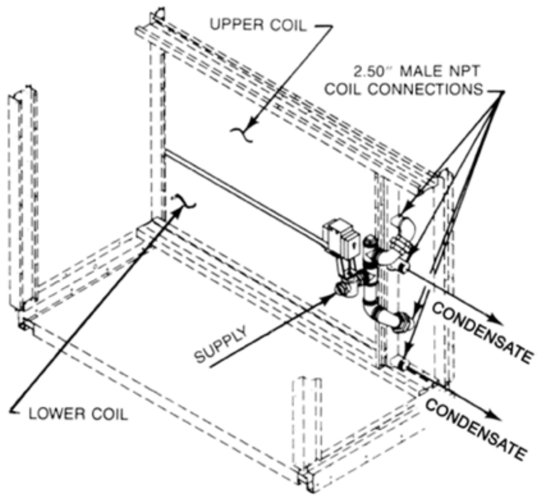


Figure 32: Steam Heat Section (Factory Valve / Piping)



Damper Assemblies

The optional damper assemblies described in this section are provided with manually adjustable linkages, or may be shipped with factory installed actuators and linkages.

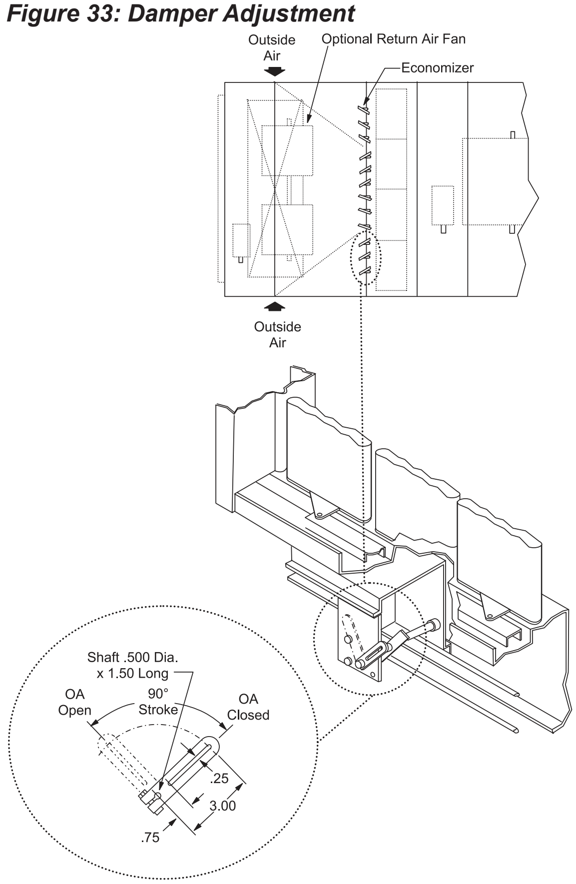
Economizer Dampers

Outside air intake is provided on both sides of the unit, and the return air path is at the center of the damper set. As the single actuator modulates the outside air dampers open, the return air dampers close. Exhaust air exits the unit through the gravity relief dampers provided at the end of the economizer section.

The outside air return air damper assembly (economizer) comes with manually adjustable linkage. This adjustable linkage can also be used for connection of a damper operator.

The damper is set so that the crankarm moves through a 90° angle to bring the economizer dampers from full open to full close. Mechanical stops have been placed in the crankarm mounting bracket. Do not remove stops. If the crankarm is driven past the stops, damage to the linkage or damper will result. The unit will ship with a shipping bolt securing the linkage crankarm. Remove shipping bolt before use.

Figure 33: Damper Adjustment



NOTE: For good airflow control, adjust linkages so damper blades do not open beyond 70 degrees. Opening a damper blade beyond 70 degrees has little effect on its airflow. Do not "overclose" low leak damper blades. The edge seal should just lightly contact the adjoining blade. The blades will lock up if they are closed so far the seal goes over center.

Intake Hood Damper (0 to 100% outside air)

Units requiring 100% outside air are provided with a rain hood and dampers which may be controlled by a single actuator. The actuator provides two-position control for opening the dampers fully during unit operation and closing the dampers during the off cycle. No unit mounted exhaust dampers are provided.

Intake Hood Damper (0 to 30% outside air)

These dampers are intended to remain at a fixed position during unit operation, providing fresh air quantities from 0 to 30% of the total system airflow, depending on the damper setting. This setting is made at the linkage rod on units with manually adjustable linkages.

On units provided with MicroTech III controls, the damper position may be set at the controller keypad. During unit operation, the two-position actuator drives the damper to the position set on the keypad. During the off cycle, the damper is automatically closed.

No unit mounted exhaust dampers are provided with this option.

Figure 34: Intake Hood Damper Adjustment

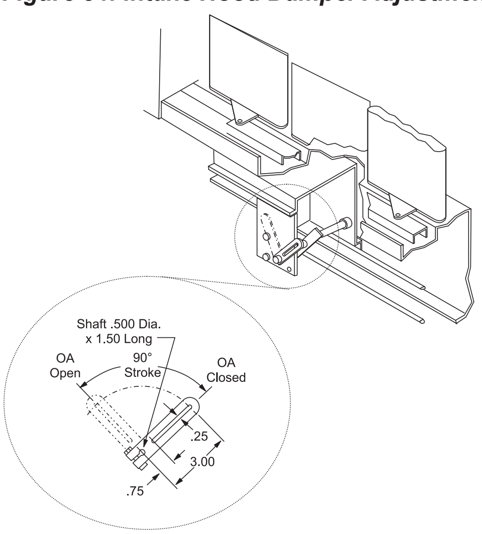
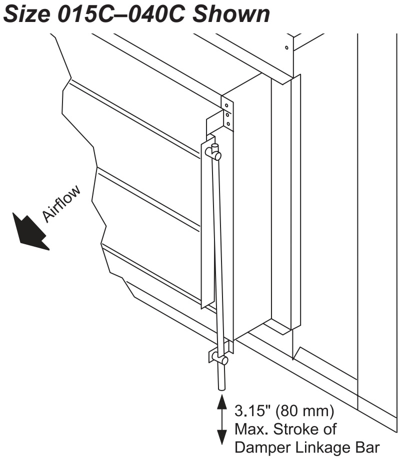


Figure 35: Typical Damper Linkage Bar, Size 015C–040C Shown



Cabinet Weatherproofing

This unit ships from the factory with fully gasketed access doors and cabinet caulking to provide weather resistant operation. After the unit has been set in place, all door gaskets should be inspected for shipping damage and replaced if necessary.

The unit should be protected from overhead runoff from overhangs or other such structures.

Field assembled options such as external piping or vestibules must be recaulked per the installation instructions provided with the option.

Installing Ductwork

On bottom-supply / bottom-return units, the installing contractor should make an airtight connection by attaching field fabricated duct collars to the bottom surface of either the roof curb's duct flange or the unit's duct opening if a Daikin roof curb is not used. Do not support the total weight of the ductwork from the unit or these duct flanges. Refer to Figure 36.

Units with optional back return or side discharge have duct collars provided. The discharge duct collars on a side discharge unit are exposed by removing the plenum section access door and the door gasketing.

Use flexible connections between the unit and ductwork to avoid transmission of vibration from the unit to the structure.

Design ductwork per ASHRAE and SMACNA recommendations to minimize losses and sound transmission.

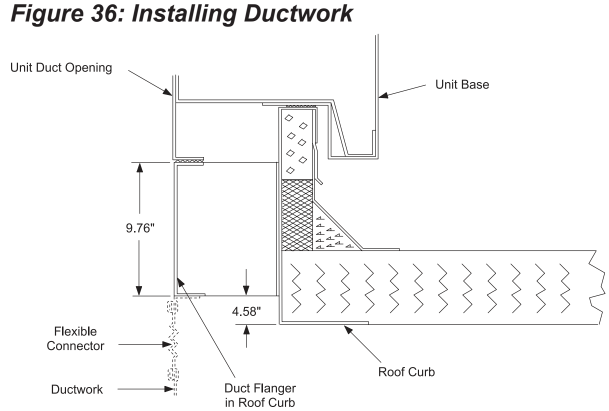
Where return air ducts are not required, connect a sound absorbing T or L to the unit return to reduce noise transmission to the occupied space.

Ductwork exposed to outdoor conditions must be built in accordance with ASHRAE and SMACNA recommendations and local building codes.

NOTICE

Installer must provide access in the ductwork for plenum mounted controls. On units with side discharge, access to plenum mounted components becomes difficult once ductwork is installed.

Figure 36: Installing Ductwork



Installing Duct Static Pressure Sensor Taps

For all Variable Air Volume (VAV) units, duct static pressure taps must be field installed and connected to the pressure sensors in the unit. Sensor SPS1 is standard; additional sensor SPS2 is optional. These sensors are located at the bottom of the main control panel next to terminal block TB2 (see Control Panel Locations on page 12).

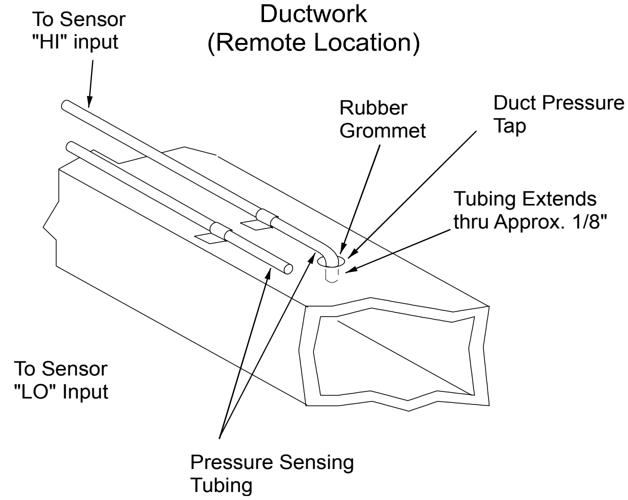
The duct static pressure sensing tap must be carefully located and installed. Improper location or installation of the sensing tap will cause unsatisfactory operation of the entire variable air volume system. Following are pressure tap location and installation recommendations. The installation must comply with local code requirements.

CAUTION

Sensor fittings are fragile. Damage to pressure sensor can occur during removal. If tubing must be removed from a pressure sensor fitting, use care. Do not wrench the tubing back and forth to remove or the fitting may break off.

1. Install a tee fitting with a leak-tight removable cap in each tube near the sensor. This will facilitate connecting a manometer or pressure gauge if testing is required.
2. Use different colored tubing for the duct pressure (HI) and reference pressure (LO) taps, or tag the tubes.
3. Locate the duct pressure (HI) tap near the end of a long duct to ensure that all terminal box take-offs along the run will have adequate static pressure.
4. Locate the duct tap in a nonturbulent flow area of the duct. Keep it several duct diameters away from take-off points, bends, neckdowns, attenuators, vanes, or other irregularities.
5. Use a static pressure tip (Dwyer A302 or equivalent) or the bare end of the plastic tubing for the duct tap. (If the duct is lined inside, use a static pressure tip device.)
6. Install the duct tap so that it senses only static pressure (not velocity pressure). If an L-shaped pressure tip device is used, the point must face the airstream. If a bare tube end is used, it must be smooth, square (not cut at an angle), and perpendicular to the airstream. (see Figure 37).
7. Locate the reference pressure (LO) tap somewhere near the duct pressure tap within the building (see Figure 37). If the reference tap is not connected to the sensor, unsatisfactory operation will result.
8. Route the tubes between the curb and the supply duct, and feed them into the unit through the knockout in the bottom of the control panel (see Figure 12). Connect the tubes to the appropriate 1/8" fittings on the sensors. Make sure that the sensors do not support the weight of the tubing; use tube clamps or some other means.

Figure 37: Pressure Sensing Tubing Installation



Lab Pressurization Applications

1. Install a “T” fitting with a leak-tight removable cap in each tube near the sensor. This will facilitate connecting a manometer or pressure gauge if testing is required.
2. Use different colored tubing for the controlled space pressure (HI) and reference pressure (LO) taps, or tag the tubes.
3. Regardless of whether the controlled space is positive or negative with respect to its reference, locate the HI pressure tap in the controlled space. (The setpoint can be set between -0.2 and 0.2" W.C.)
4. Locate the reference pressure (LO) tap in the area surrounding the controlled space. If the reference tap is not connected to the sensor, unsatisfactory operation will result.
5. Locate both taps so that they are not influenced by any source of moving air (velocity pressure). These sources may include air diffusers or doors between the high and low pressure areas.
6. Route the tap tubes between the curb and the supply duct, and feed them into the unit through the knockout in the bottom of the control panel (see Figure 36).
7. Connect the tubes to the appropriate 1/4" fittings on sensor SPS2. Assure that the sensor does not support the weight of the tubing; use tube clamps or some other means.

Installing Building Static Pressure Sensor Taps

If a unit has direct building static pressure control capability, static pressure taps must be field installed and connected to pressure sensor SPS2 in the unit. This sensor is located at the bottom of the main control panel next to terminal block TB2 (see Control Locations on page 10).

The two static pressure sensing taps must be carefully located and installed. Improper location or installation of the sensing taps will cause unsatisfactory operation. Following are pressure tap location and installation recommendations for both building envelope and lab, or “space within a space” pressure control applications. The installation must comply with local code requirements.

⚠ CAUTION

Fragile sensor fittings. May damage pressure sensor. If tubing must be removed from a pressure sensor fitting, use care. Do not wrench the tubing back and forth to remove or the fitting may break off.

Building Pressurization Applications

1. Install a tee fitting with a leak-tight removable cap in each tube near the sensor. This will facilitate connecting a manometer or pressure gauge if testing is required.
2. Locate the building pressure (Hi) tap in the area that requires the closest control. Typically, this is a ground level floor that has doors to the outside.
3. Locate the building tap so that it is not influenced by any source of moving air (velocity pressure). These sources may include air diffusers or outside doors.
4. Route the building tap tube between the curb and the supply duct, and feed it into the unit through the knockout in the bottom of the control panel.
5. Connect the tube to the 1/4" HI fitting on sensor SPS2. Assure that the sensor does not support the weight of the tubing; use tube clamps or some other means.
6. Locate the reference pressure (LO) tap on the roof. Keep it away from the condenser fans, walls, or anything else that may cause air turbulence. Mount it high enough above the roof so that it is not affected by snow, If the reference tap is not connected to the sensor, unsatisfactory operation will result.
7. Use an outdoor static pressure tip (Dwyer A306 or equivalent) to minimize the adverse effects of wind. Place some type of screen over the sensor to keep out insects. Loosely packed cotton works well.
8. Route the outdoor tap tube out of the main control panel through a small field-cut opening in the edge of the control wiring raceway cover. Cut this “mouse hole” in the vertical portion of the edge. Seal the penetration to prevent water from entering. Connect the tube to the 1/4" LO fitting on sensor SPS2.

Table 4: Multiple Point Power Connection Options

Number of Electrical Circuits	Disconnect Designation	Load	Location (see Figure 1)
2	DS2	Supply & return fan motors, controls	Main control panel
	DS1	Balance of unit	Main control panel
2	DS3	Electric heat	Electric heat control panel
	DS1	Balance of unit	Main control panel
3	DS3	Electric heat	Electric heat control panel
	DS2	Supply & return fan motors, controls	Main control panel
	DS1	Balance of unit	Main control panel

NOTE: Refer to the certified drawings for the dimensions to the wire entry points.

Electrical Installation

Field Power Wiring

Wiring must comply with all applicable codes and ordinances and these specifications or in the absence of local codes, with the National Electrical Code ANSI/NFPA 70 and/or Canadian Electrical Code CSA C22.1. Defects caused by incorrect wiring are not covered by the warranty. An open fuse or motor protector indicates a short, ground, or overload. Before replacing a fuse or restarting a compressor or fan motor, the trouble must be found and corrected.

According to the National Electrical Code, a disconnecting means must be located within sight of and readily accessible from the air conditioning equipment. The unit may be ordered with an optional factory mounted disconnect switch. This switch is not fused. Power leads must be over-current protected at the point of distribution. The maximum allowable overcurrent protection is shown on the unit nameplate.

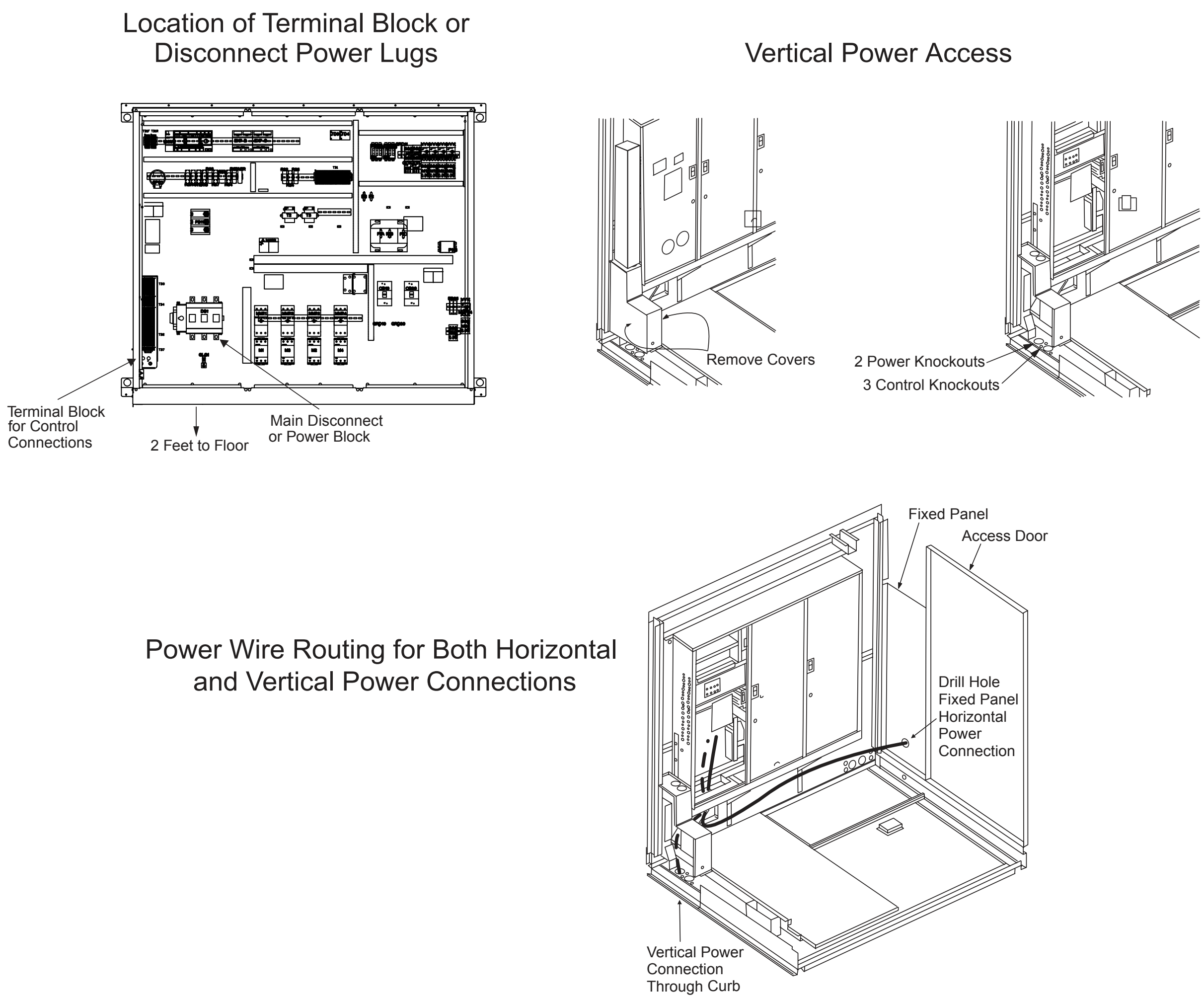
RPE and RDE units are provided with internal power wiring (see A, B, and C in Figure 38) for single or dual point power connection. The power block or an optional disconnect switch (see D in Figure 38) is located per Table 4. Field power leads are brought into the unit through 3" knockouts in the bottom of the main control panel. Refer to the unit nameplate to determine the number of power connections.

Units ordered with multiple point power connections are provided with non-fused, factory mounted disconnect switches. Several multiple point power options are available, as shown in Table 4.

⚠ WARNING

Hazardous voltage. Can cause severe injury or death. Lock and tag out all electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

Figure 38: RPE and RDE Power Wiring



The minimum circuit ampacity (wire sizing amps) is shown on the unit nameplate. Refer to Table 5 for the recommended number of power wires.

Copper wire is required for all conductors. Size wires in accordance with the ampacity tables in Article 310 of the National Electrical Code. If long wires are required, it may be necessary to increase the wire size to prevent excessive voltage drop. Wires should be sized for a maximum of 3% voltage drop. Supply voltage must not vary by more than 10% of nameplate. Phase voltage imbalance must not exceed 2%. (Calculate the average voltage of the three legs. The leg with voltage deviating the farthest from the average value must not be more than 2% away.) Contact the local power company for correction of improper voltage or phase imbalance.

CAUTION

Provide proper line voltage and phase balance. Improper line voltage or excessive phase imbalance can cause severe damage to the unit's electrical components.

A ground lug is provided in the control panel for each power conduit. Size grounding conductor in accordance with Table 250-95 of the National Electrical Code.

In compliance with the National Electrical Code, an electrically isolated 115V circuit is provided in the unit to supply the factory mounted service receptacle outlet and optional unit lights. This circuit is powered by a field connected 15A, 115V power supply. Leads are brought into the RFS and RPS units through a 7/8" knockout in the bottom of the main control panel, near the power wire entry point.

NOTE: The National Electrical Code requires that this 115V circuit be protected by a ground fault circuit interrupter (GFI) device (field supplied).

WARNING

Electrical shock hazard. Can cause severe injury or death. All protective deadfront panels must be reinstalled and secured when power wiring is complete.

Table 5: Recommended 3-Phase Power Wiring*

Wire Gauge	Qty/Pole	Insulation Rating (°C)	No. of Conduits	Conduit (Trade Size, In.)	For MCA Up To (Amps)
1	1	75	1	1-1/4	130
1/0	1	75	1	1-1/2	150
2/0	1	75	1	2	175
3/0	1	75	1	2	200
4/0	1	75	1	2	230
250	1	75	1	2-1/2	255
300	1	75	1	2-1/2	285
350	1	75	1	3	310
400	1	75	1	3	335
500	1	75	1	3	380
3/0	2	75	2	2	400
4/0	2	75	2	2	460
250	2	75	2	2-1/2	510
300	2	75	2	2-1/2	570
350	2	75	2	3	620
400	2	75	2	3	670
500	2	75	2	3	760
250	3	75	3	2-1/2	765
300	3	75	3	2-1/2	855
350	3	75	3	3	930

Note:
1. All wire sizes assume separate conduit for each set ofparallel conductors.
2. All wire sizes based on NEC Table 310-16 for THW wire (copper). Canadian electrical code wire ampacities may vary.
3. All wire sizes assume no voltage drop for short power leads.

* To provide that disconnects and power blocks mate with power wiring.

Condenser Fan Cycling

FanTrol is provided on all units and is a method of head pressure control which automatically cycles the condenser fans in response to sump water temperature. This feature maintains head pressure and allows the unit to operate down to 45°F ambient.

RDE and RPE units have two independent refrigerant circuits with two to three condenser fans being controlled independently by the sump water temperature.

Condenser Fan Wiring

A standard temperature sensor connects to EXP-C-X3AI to measure the temperature in the sump of the condensing unit.

All condenser fans on each compressor circuit turn on and off using the same outputs as the Compressor Circuit Board that control the fans. Condenser Fan #1 for each circuit turns on and off through BO #5 on the compressor board for that circuit. Condenser Fan #2 for each circuit turns on and off through BO #6 on the compressor board for that circuit. Condenser Fan #3 for each circuit turns on and off through BO #7 on the compressor board for that circuit. If the unit has an optional VFD for condenser fans 11 and 21, the VFD is turned on digitally from the MCB.Keypad Display

Table 6: Evap Condensing Menu Items

Evap Condensing	
VFD Speed = XXX % Rounded to the nearest percentage instead of being truncated	
Sump Temp= xxx°F	
Min Fan Speed= 25%	0% to99%
Min SumpT= 80°F	0° to 99°F
Max SumpT= 90°F	0° to 99°F
Stage Time+ 10 Min	0 Min to 99 Min

Field Control Wiring

RoofPak applied rooftop units are available with several control arrangements which may require low voltage field wiring. Detailed descriptions of various field control wiring options and requirements are included in the "Field Wiring" section of IM 919, MicroTech III Applied Rooftop Unit Controller. Refer to the unit wiring diagrams for additional installation information.

Wiring must comply with applicable codes and ordinances. and these specifications. Defects caused by incorrect wiring are not covered by the warranty.

⚠ WARNING

Electrical shock hazard. Can cause severe injury or death.

Connect only low voltage NEC Class II circuits to terminal blocks TB2 and TB7.

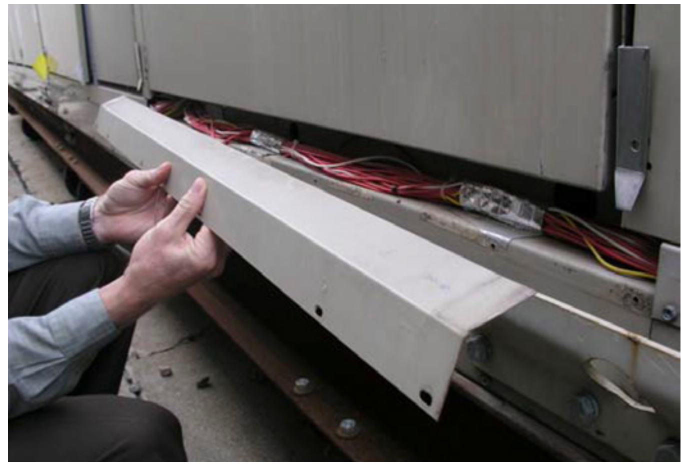
Reinstall and secure all protective deadfront panels when the wiring installation is complete.

Most field control wiring connections are made at terminal block TB2, which is located in the main control panel. Some control options require field wiring connections to terminal block TB7, which is also located in the main control panel.

Refer to Figure 38 and see Field Power Wiring on page 33. Two 7/8" knockouts are provided for wire entry. A 7/8" knockout is also available in the end of the unit base.

NOTE: If a single conduit containing 24V and 115V wiring is run above the roofline between the RFS and RCS units, the 24V wiring must be reinstalled as an NEC Class I wiring system.

Figure 39: RDE and RPE Control Wiring Raceway



Relief Damper Tie-Down

⚠ WARNING

Moving machinery hazard. Can cause severe injury or death. Lock out and tag out all power before servicing equipment. More than one disconnect may be required to de-energize unit.

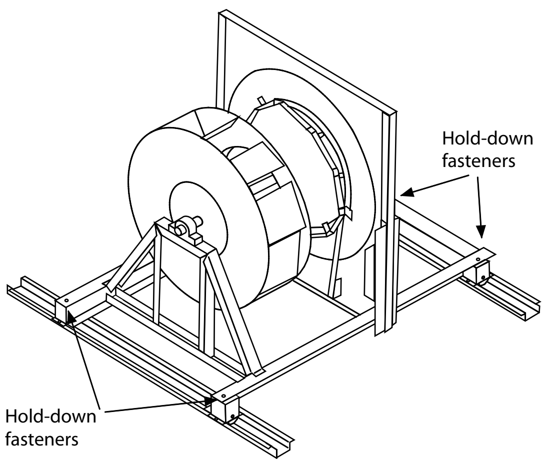
Economizer sections with a 30" or 40" return fan have a relief damper that is tied down for shipping. Two brackets and two screws must be removed before operation to allow free movement of dampers. Access is from inside the economizer section.

Spring Isolated Fans

⚠ CAUTION

Do no use impact tools for field spring mount adjustments as damage to bits or to the bolt slot may occur.

Figure 40: RDT Spring Mount Hold Down Fasteners

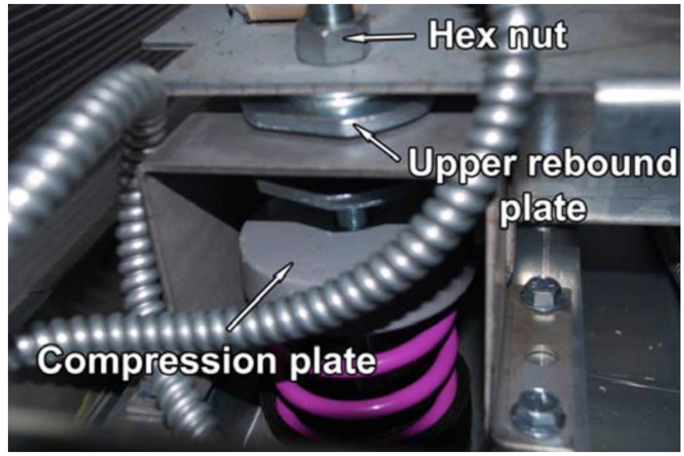


Releasing Spring Mounts

The optional spring-mounted supply and return fans are locked down for shipment. Hold-down fasteners are located at each spring mount. Remove these fasteners before operating the fans. Figure 41 shows a typical spring mount. Note that the 3/8" hold-down bolt securing the fan base to the unit cross channel must be removed.

After removing the hold-down fasteners, rock the fan assembly by hand to check for freedom of movement.

Figure 41: Spring Mount



Adjusting Spring Mounts

To adjust spring mount compression, perform the following:

1. Loosen the 0.625-18 UNF hex nut (Figure 42).
2. Place additional weight on the fan sled frame and use a lever to slightly compress the spring or raise the sled. This will allow the bolt to turn freely.
3. Place one or two drops of oil on the threads if needed.

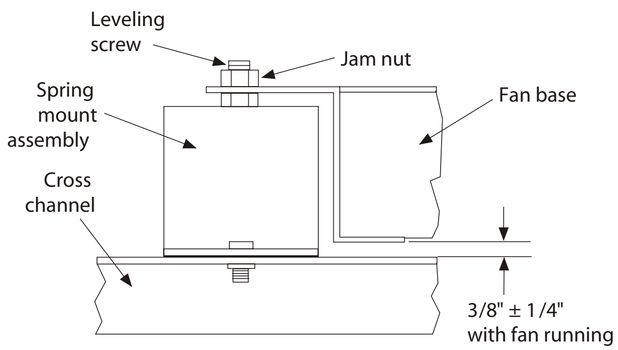
NOTE: The greatest friction that makes adjustment difficult, comes from the surfaces of the top of the upper rebound plate (Figure 41), both sides of the 0.615" washer, and the underside of the sled. If friction is occurring at these point, relieve the weight and oil the friction surfaces.

4. Use a flat blade socket drive bit (1/2" drive handle recommended) and make sure that when adjusting the slotted bolt, that the upper-rebound plate also turns. The slot is located just above the hex nut. This action allows the bolt to push the compression plate (Figure 41) up or down with the lease friction occurring between the 0.625" washer and the underside of the channel.

NOTE: If the spring compresses to far, lift the sled before turning. If the spring does not compress enough, place weight on the sled corner, forcing it down before turning.

5. Re-adjust the position of the lower-rebound plate so that the sled has at least 3/4" travel and not more than 1.25" of travel.

Figure 42: Fan Spring Mount Adjustment



* Grossly out-of-adjustment thrust restraints can affect this dimension. Recheck after thrust restraints are adjusted.

⚠ WARNING

Moving machinery hazard. Can cause severe injury or death. Start the fans for the first time according to the Check, Test, and Start Procedures on page 74. If this is not done, equipment damage, severe personal injury, or death can occur.

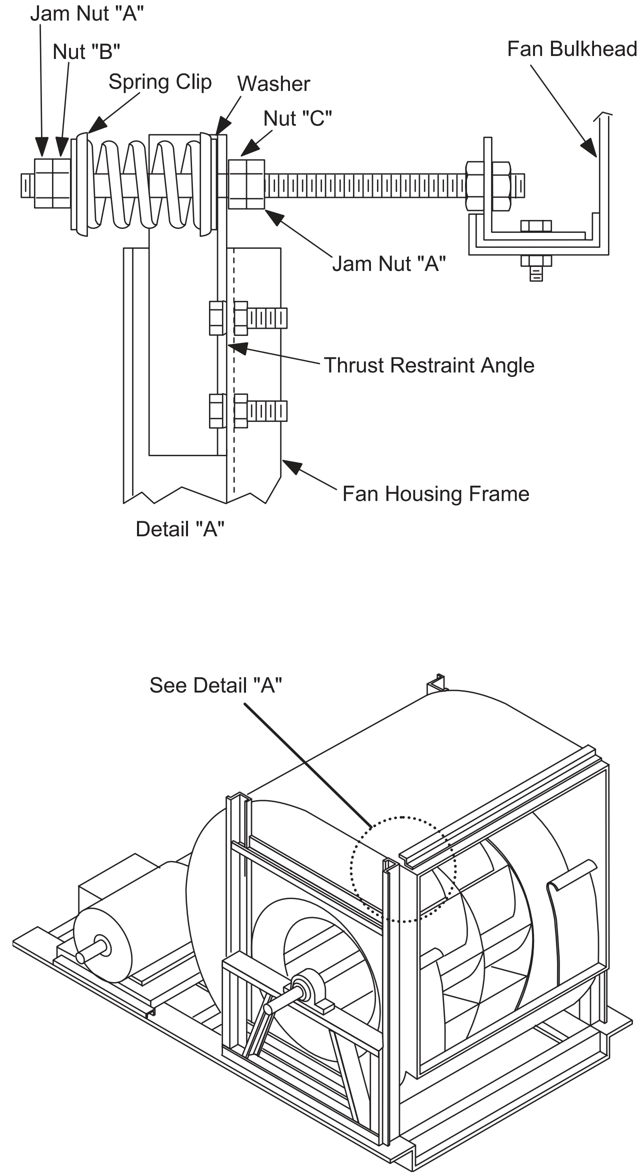
⚠ WARNING

Follow proper procedures. Severe fan damage can occur otherwise. The fans must be started for the first time in accordance with the Check, Test, and Start Procedures on page 74. If this is not done, personal injury and severe fan damage can occur.

Adjustment of Supply Fan Thrust Restraints

Thrust restraints are provided when housed double-width fans are mounted on springs. After the spring mounts have been adjusted for level operation when the fan is running, the thrust restraints should be checked. With the fan off, the adjustment nuts should be set so the spring is slightly compressed against the angle bolted to the fan housing frame. Refer to Figure 43. When the fan is turned on, the fan will move back to a level position and the thrust restraint springs will compress

Figure 43: Thrust Restraint Adjustment



Thrust Restraint Adjustment (With Fan Off)
1.Loosen jam nuts “A”.
2.Turn nut “C” until spring cup and washer contact thrust restraint angle.
3.Turn nut “B” until spring is compressed by two turns of nut “B”.
4.Tighten jam nuts “A”.

Adjustment of Seismic Restraints

Spring mounted supply air and return air fans may be ordered with factory installed seismic restraints. Refer to Figure 44. The system consists of four snubbers, one located next to each spring isolator. These snubbers will allow free movement of the fan assemblies during normal operation because normal operation will not cause fan movements that exceed 0.25" (6 mm). However, they will restrain the fan assembly and limit movement to 0.25" (6 mm) in any direction if an abnormal condition were to occur.

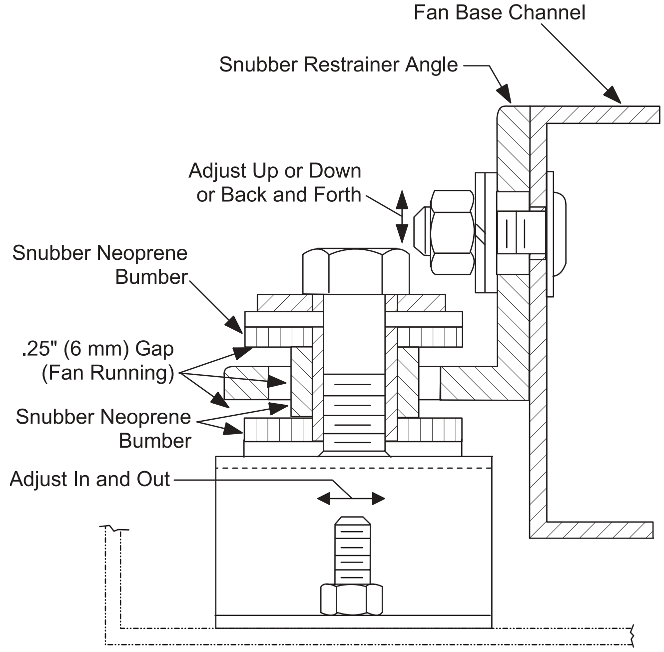
The position the fan will assume during normal operation will be determined by actual job site airflow and static pressure. Therefore, for proper operation, the seismic restraints must be field adjusted as part of the normal "Check, Test and Start" procedure. When the fan is operating in a normal manner there should be no contact between the snubber restrainer angle and the snubber neoprene bumper. However, in a "seismic event," the snubber will limit movement of the spring mounted fan assembly to 0.25" (6 mm) in any direction, thereby helping to prevent the fan from being tossed about and damaged, or causing damage.

When a seismic restraint is properly adjusted and the fan is operating normally, the neoprene center bumper will be centered within the 2" (51 mm) diameter hole in the restrainer angle, and the restrainer angle will be centered vertically between the flanges of the neoprene center bumper. This results in 0.25" (6 mm) clearance in all directions. When the fan is turned off the restrainer angle may come to rest on the neoprene center bumper.

The seismic restraint is adjustable in all directions. Vertical slots in the restrainer angle and horizontal slots in the blower base allow the restrainer angle to be adjusted up and down and back and forth. The neoprene center bumper is mounted on a slotted hole allowing its adjustment in and out.

Removing the neoprene center bumper bolt allows removal, disassembly, and replacement of the neoprene components.

Figure 44: Cross Section of Seismic Restraint

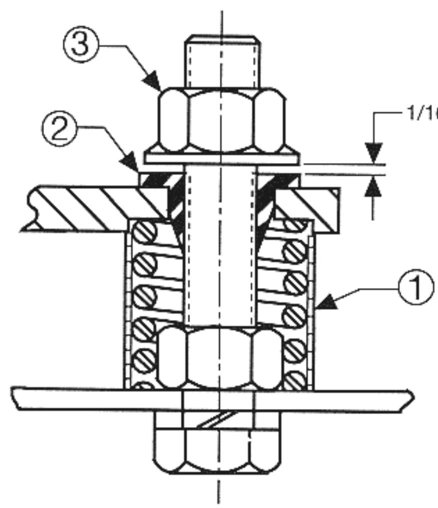


Spring Isolated Compressors

Units that have been ordered with optional compressor mounting springs must have the rigid shipping spacers removed before operating the units. Refer to Figure 45. Before operating the unit, remove and discard the shipping spacers (1) and install the neoprene spacers (2). Remove the top mounting nuts (3). Install one neoprene spacer on each of the four mounting bolts.

Replace the mounting nuts, leaving 1/16" (2mm) space between the mounting nut and the neoprene spacer.

Figure 45: Compressor Mounting Springs



The following sequences of operation are for a typical "C" vintage applied rooftop unit that is equipped with MicroTech III, an economizer, 4 compressor / 8stage cooling, 3-1 and 20-1 turn down burner, variable frequency drives (VFD), a return air fan and an external time clock. These sequences describe the ladder wiring diagram logic in detail; refer to Wiring Diagrams starting on page 45 as you read them. Note that your unit's sequences of operation may vary from those described here. Refer to the wiring diagrams supplied with the unit for exact information.

For detailed description of operation information relating to the MicroTech III controller's software, refer to the appropriate operation manual (see Table 3 on page 15). These manuals describe the various setpoints, parameters, operating states, and control algorithms that affect rooftop unit operation.

Power-up

When primary power is connected to the unit, 115 V (ac) power is fed through control circuit transformer T1 and control circuit fuse F1C (line 166) to compressor crankcase heaters HTR-1, HTR-2, HTR-3 and HTR-4 (lines 836 - 848).

When system switch S1 (line 203) is closed, low voltage transformers T2 (line 203), T3 (line 251) and T9 (line 802, not shown) energize, and 115 V (ac) power is supplied to the following:

- The supply fan VFD (line 135-137)
- M40A to energize the return fan VFD (line 147-149)
- Heating control panel (line 603)
- Economizer actuator (lines 256-257)

  Transformer T2 supplies 24 V (ac) power to terminals 24V and COM on the main control board MCB (lines 207 and 208). Transformer T2 supplies 24 V (ac) power to the following:

- Switch S7 On-Auto-Off (line 217)
- Enthalpy sensor OAE (line 247)
- External time clock contacts (line 215)
- Airflow interlock switch PC7 (line 228)
- Dirty filter switches PC5 and PC6 (lines 242 and 247, not shown)
- Gas furnace alarm relay R24 (line 225, not shown)
- Freezestat switch FS1 (line 244, hot water or steam heat only, not shown)
- Smoke detectors SD1 and SD2 (line 237)

  The time clock, S7 switch, and emergency shutdown terminals (lines 217-222) control fan operation.

NOTE: Unit ships with factory installed jumpers between TB2 101 and 105 and between 101 and 106.

When the field supplied Cool Enable switch is in the "OFF" position, field wiring terminal 105 is de-energized (line 220). Binary input MCB-BI3 will be de-energized and the cooling will be disabled. When the field supplied Heat Enable switch is in the "OFF" position, field wiring terminal 106 is deenergized (line 223). Binary input MCB-BI4 will be deenergized and the heating will be disabled. Note: Unit ships with factory installed jumpers between 101 and 105 and between 101 and 106.

Fan Operation

A supply fan is provided on every unit.That may be the only fan, but either a return fan or an exhaust fan, or fans, can be provided also.The start/stop signal and the speed signal for fans that are controlled by variable frequency drives are provided via an internal ModBus network.Constant volume supply and return fans are started and stopped through digital outputs.

Supply Fan

The supply fan is turned ON when the unit enters the Recirculation state.The supply fan is turned OFF when the unit transitions to the OFF state, but it stays on for a OffHtClDelayTime (Default- 120 seconds) if the unit is turned OFF while DX cooling or staged heating is active.The OffHtClDelayTime function is overridden when and Emergency Off or Duct High Limit fault is active.

Return Fan

A return fan driven by a variable frequency drive is started four seconds after the supply fan is started to reduce the amp draw peak on startup.A constant volume return fan is turned ON through the same output as the supply fan. An external Fan Delay Relay is used to provide a delay between startups if required.

Supply Fan Capacity Control (VAV)

The speed of a modulating supply fan is controlled by a 0-100% signal provided to the VFD via an internal Modbus network.Supply Fan Capacity Control for a modulating fan is controlled to either maintain the duct static pressure at a desired value or maintain a fixed speed based on a signal provided via a network.

The choice of control method, SF Cap Ctrl, may be set to Duct Pressure or Speed via the keypad.After the supply fan is started, a speed signal of 33% is sent to the variable frequency drive for the DSPCtrlDelay (Default=30 seconds).Control reverts to either duct pressure or speed after the fan has been on for the duration of the DSPCtrlDelay time.The VFD speed is not controlled below the minimum SAF speed setting (default 33%) while the fan is operating.

Units supplied with Daikin MD2, MD3, and MD6 drives will have a user editable maximum supply fan hertz setpoint (default 60 Hz) located in the SAF Set Up menu. This parameter can be changed when job site conditions require the speed of the drive to be above 60 Hz.

Duct Static Pressure Control

The supply air fan speed is controlled by a VFD.The control parameter for the fan speed is the duct static pressure setpoint. If the duct static pressure is below the duct static pressure setpoint by more than ½ the deadband, the fan speed will increase.Likewise if the duct static pressure is above the duct static pressure setpoint by more than ½ the deadband the fan speed will decrease.Example - if the duct static pressure setpoint is 1.2” and the deadband is 0.1”,the duct static pressure must reach 1.14 before the fan will increase in speed.The Duct Static Pressure setpoint may be set through the keypad or via a network signal.The active setpoint is changed whenever either of these values changes so it equals whichever value was changed most recently.

Speed/Network

When speed control is selected, the fan operates at the larger of its minimum speed or a value provided via a connected network or the keypad/display.

Single Zone VAV Control (1ZnVAV)

When space temperature control is selected, the supply fan VFD is controlled with a PI_Loop to maintain the Control Temperature input at the Occupied or Unoccupied Cooling Setpoint or Occupied or Unoccupied Heating Setpoint.This control choice is designed for DAC control type and will be used in applications where the unit will act as a single VAV box to control space temperature.Cooling and heating discharge air temperature control and outside air damper control will function in the normal manner as with VAV units.

Economizer Operation

Refer to Figure 47 on page 50. When the outdoor air is suitable for free cooling, the switch in enthalpy sensor OAE is in position "3" (line 248, Figure 47) energizinganalog input AIX5. When AIX5 energizes, the economizer is enabled. (Note: If selected from the keypad, the enthalpy decision can be made based on outdoor temperature. In that condition, if the outdoor air temperature is less than or equal to the changeover set point, the economizer is enabled.) If cooling is required, the economizer dampers (ACT3) are modulated to maintain the discharge air temperature setpoint.Analog input AIX5 drives the outdoor air dampers toward the open and closed (line 256) position. If the outdoor air dampers are wide open and more cooling is required, the dampers hold their positions and mechanical cooling is activated (see below).

When the outdoor air is not suitable for free cooling, the switch in enthalpy sensor OAE is in position "1," de-energizing analog input AIX5. (Alternatively, the outdoor air temperature is above the changeover setpoint plus the economizer changeover differential). When the economizer is disabled, the dampers are held at their minimum position.

General Cooling Control

The evaporative condensing option for rooftop units uses the heat absorbed by evaporating water as well as air drawn across a bank of tubes with refrigerant flowing through them to condense hot refrigerant to a liquid. Water is pumped from a sump beneath the condenser tubes to nozzles above the coil that spray water onto the bank of tubes. The refrigerant in the tubes is cooled and condensed as some of this water is evaporated when it strikes the hot tubes and is carried away by condenser fans. Using this method, the refrigerant can be cooled to a lower temperature than is the case with a normal finned condenser that transfers heat directly to the air.

A unit equipped with evaporative condensers can not operate in the cooling state with the outdoor air temperature below 40°F. If the OAT Compressor Lockout Temperature on units with evaporative condensing is lowered below 40°F, it will immediately be set back up to 40°F.

The first condenser fan on each circuit is turned on and off via ModBus communications with a single VFD. The speed of these two fans is controlled via ModBus communications with the VFD. These two fans always operate at the same speed.

The second and third condenser fans on each compressor circuit are turned on and off using the two outputs on the Main Board that are used for standard condenser fans. Relays are driven by each of these outputs so that fans associated with a circuit that is not operating will not be turned on.

Evaporative Condenser Compressor Staging Sequences

There are two cooling staging configurations available for evaporative condenser units. Both employ reciprocating compressors and so require pumpdown operation. When there is a first call for cooling on a circuit, the liquid line solenoid valve output is first energized and then as soon as the low pressure switch for that circuit closes the first compressor in the sequence is turned on. If the low pressure switch fails to close within the LPCmpDlyTime of energizing the liquid line solenoid valve the low pressure alarm for that circuit is generated.

The two configurations have unloaders so each circuit is always controlled the same way. The sequence for controlling each circuit is shown in Table 7 and Table 8. The number of stages equals the sum of the operating stages for the two circuits.

The circuit that has the fewer run hours is the lead circuit if Lead Circuit is set to Auto. In this case the run hours for circuit # 1 equals the run hours for compressor # 1, and the run hours for circuit # 2 equals the run hours for compressor # 2. The lead circuit is changed only when all compressors are off or at the maximum stages for the unit. If Lead Circuit is set to #1 then circuit #1 always leads if it is available. If Lead Circuit is set to #2 then circuit #2 always leads if it is available

The Staging Type can be set to either Standard or Alternate.

Standard

The two circuits are loaded up and unloaded as evenly as possible. When a stage up is required, the circuit operating at the lower stage is staged up. If both circuits are operating at the same stage, the lead circuit is staged up if it is not at its maximum stage.

When a stage down is required, the circuit operating at the higher stage is staged down if it is not at stage zero. If both circuits are operating at the same stage, the lag circuit is staged down if it is not at stage zero.

Alternate

One circuit is loaded completely before the first compressor in the other circuit is turned on, and one circuit is unloaded completely before the other circuit begins to be unloaded. When a stage up is required and the lead circuit is not at its maximum stage, the lead circuit is staged up.

When a stage up is required and the lead circuit is already at its maximum stage, the lag circuit is staged up. When a stage down is required and the Lag circuit is at a stage greater than zero, the lag circuit is staged down. When a stage down is required and the lag compressor is at stage zero, the lead compressor is staged down if it is not at stage zero.

A disabled circuit remains at stage zero. If the other circuit is enabled, it is staged up whenever a stage up is required, and down whenever a stage down is required. If a previously disabled circuit becomes enabled, the staging is re-aligned according to the staging tables upon the next call for stage increase or decrease. Note: During this re-alignment, the cooling stage time guaranteed on and off times must be observed as well as a minimum of 10 seconds between starting more than one compressor

When dehumidification is active staging reverts to Alternate regardless of the normal Staging Type setting. When dehumidification is not active staging is according to the Staging Type setting.

Table 7: Two Compressors and Six Stages (CompCfg=4 & Cond Ctrl=2 or 3)

	Circuit # 1				Circuit # 2			
Stage	Comp # 1	Liq Line Valve # 1	Comp # 1 Unl # 2	Comp # 1 Unl # 1	Comp # 2	Liq Line Valve # 2	Comp # 2 Unl # 2	Comp # 2 Unl # 1
0	Off	Off	Off	Off	Off	Off	Off	Off
1	On	On	On	On	On	On	On	On
2	On	On	On	Off	On	On	On	Off
3	On	On	Off	Off	On	On	Off	Off

Table 8: Four Compressors and Eight Stages (CompCfg=E & Cond Ctrl=2 or 3)

	Circuit # 1				Circuit # 2			
Stage	Comp # 1	Liq Line Valve # 1	Comp # 3	Comp # 1 Unl # 1	Comp # 2	Liq Line Valve # 2	Comp # 4	Comp # 2 Unl # 1
0	Off	Off	Off	Off	Off	Off	Off	Off
1	On	On	Off	On	On	On	Off	On
2	On	On	Off	Off	On	On	Off	Off
3	On	On	On*	On	On	On	On*	On
4	On	On	On	Off	On	On	On	Off

* Note: A 20 second delay will be provided after unloading compressor #1 or #2 prior to starting Compressor #3 or Compressor #4.

Pumpdown

Pumpdown is accomplished by closing the liquid line solenoid valve on a circuit and operating a compressor on that circuit until the circuit low pressure switch opens. The compressor pumps most of the refrigerant into the condenser and then shuts OFF. This allows the compressor to pump vapor instead of liquid when it starts the next time which should result in longer compressor life.

When pumpdown is required for a circuit, the liquid line solenoid valve for that circuit is closed (its output is off) and a compressor operates until the low pressure switch opens at which time the compressor is turned OFF. If the low pressure switch does not open in 180 seconds, pumpdown is terminated by turning off the compressor and its unloaders.

If a compressor in a circuit is operating, the circuit is pumped down when the last compressor is to shut off due to normal staging, or when the pumpdown switch for that circuit is placed in the Pumpdown (Open) position, or when the circuit or entire unit is shutdown due to any alarm other than the High Pressure Alarm. Of course, the conditions for completing pumpdown are met if the low pressure alarm shuts down the circuit so no pumpdown occurs as a result of this alarm.

Pumpdown is also initiated if no compressors are operating in a circuit, and the Pumpdown Switch is moved from the On (Auto) position to the OFF (PumpDown) position twice in less than 20 seconds, and the low pressure switch is closed. In this case the first compressor on the circuit is used to pumpdown the circuit.

If two compressors on one circuit are operating when pumpdown is required for that circuit, the lag compressor in that circuit is turned off immediately and the circuit is pumped down using the lead compressor.

If any unloaders on a reciprocating compressor are de-energized when that compressor is required for pumpdown, they are energized and the circuit is pumped down using one completely unloaded compressor.

NOTE: A reciprocating compressor is mechanically prevented from pumping down the circuit if the oil pressure switch is open.

Sump Pump Control

The Sump Pump Output is turned on whenever the unit is in the Cooling state and the Sump Water Level Input is present (ON). The Sump Pump Output is turned on before any compressor or condenser fan is turned ON. The Sump Pump Output remains on for 10 minutes (adjustable) after unit leaves the Cooling operating state before turning off as long as the Sump Water Level Input is present (ON).

A manual Sump Wtr Lvl: Problem alarm is generated if the unit has been in the Clg operation state for 5 minutes and the Sump Water Level Input is not present (OFF). If this occurs, the Sump Pump output is turned off and mechanical cooling is disabled.

To prevent problems related to Sump Water Level Switch fluxuations, there will be a 5 second "to OFF" time on the switch.

If the non-chemical water treatment option is provided (Dolphin= Yes), the sump pump is run every day to reduce scaling. The Sump Pump Output is turned on for one hour if all of the following are true:

- Sump Pump Output has been off for more than 24 hours but less than 120 hours.
- The OAT is greater than 35°F.
- The Sump Drain Valve is closed.

Sump Drain Valve Control

When the sump temperature gets too cold, the sump needs to be emptied to prevent freezing. The Sump Drain Valve Output is used to control a sump drain valve. This output is turned ON if the sump temperature drops below the Sump Dump Setpoint, default = 35°F for more than 30 seconds.

This output is turned back off if the sump temperature rises above this setpoint by more than the Sump Dump Differential, 2°C (hardcoded), and the unit is in the Cooling state. The requirement for for the Cooling state prevents the unit from continuously being emptied and filled as the ambient temperature as measured by the sump temperature sensor varies below 35°F and above 38°F even when cooling was not required.

If the non-chemical water treatment option is provided (Dolphin= Yes) and the pump does not run for five days, the sump needs to be emptied because organic growth is excessive. This would occur when cooling is not required and the OAT remains below 35°F. Sump heaters are used to keep the sump temperature above 35°F when the OAT drops below that value so an additional means of turning on the Sump Drain Valve is required. In addition to the requirement that the Sump Drain Valve Output be turned on to open the valve when the sump temperature drops below 35°F, the Sump Drain Valve Output is also turned on if the Sump Pump Output has been OFF for 120 hours or more.

Separator Flush Valve Control

On units equipped with a Dolphin System (Dolphin System=Yes) the system Separator needs to be flushed of its collected solids every so often. An ON / OFF flush valve actuator is used to flush the separator. Every 8 hours the Purge Valve Binary Output is turned on for the SepFlshTime (default 1 minute).

Sump Temperature Control

Two configurations of evaporative condensing units are provided. One will have two condenser fan outputs per circuit (Unit Size<110), and one will have three condenser fan outputs per circuit (Unit Size>110). The two lead condenser fans are controlled through a single VFD. The type of VFD is defined by the Condenser Control configuration code parameter as follows:

0 – Standard Condenser Fan Control Method 1 – with up to 3 condenser fan outputs per circuit – No Evaporative Condenser Control – Default Value

1 – Standard Condenser Fan Control Method 2 – with 1 condenser fan outputs per circuit – No Evaporative Condenser Control

2 – ABB VFD – With Evaporative Condenser Control

3 – Daikin MD4 VFD – With Evaporative Condenser Control

4 – Daikin MD5 VFD – With Evaporative Condenser Control

5 – Danfoss VFD – With Evaporative Condenser Control

All condenser fans are OFF when all compressors are OFF. Whenever any compressor is turned ON, the lead condenser fan on both circuits is turned by sending a signal to the VFD via the ModBus network internal to the unit. The lead condenser fans on both circuits are turned OFF when all compressors are OFF or they are turned OFF as described in paragraphs that follow when the sump temperature gets low.

The VFD is controlled and monitored by the main controller via ModBus network internal to the unit. Whenever any condenser fan is on, a signal is sent to the VFD to control connected fans to a setpoint. The speed setpoint is calculated based on the sump temperature per the formula below. The speed setpoint will not be set above 100% or below the Min Fan Speed.

VFDSpeed = Min Fan Speed+[(Sump Temp–Min Sump T) × (100%-Min Fan Speed)/ (Max SumpT – Min SumpT)]

A single Condenser Fan Output A is controlled to turn ON the second condenser fan on both circuits. A single Condenser Fan Output B is controlled to turn ON the second condenser fan on both circuits. The second and third fans on the circuits are mechanically prevented from operating when no compressor on that circuit is operating. When compressors are operating on both circuits, the number of fans operating on the two circuits is the same.

The number of fans operating per circuit will increase if the time since the last change in the number of operating fans exceeds the Evap Condensing Stage Time and the sump temperature exceeds the Max Sump T. This condenser fan stage increase may occur as soon as the temperature rises above the Maximum Sump Temperature. The temperature does not have to remain above the Maximum Sump Temperature for longer than the stage timer.

The number of fans operating per circuit will decrease if the time since the last change in the number of operating fans exceeds the Evap Condensing Stage Time, and the sump temperature drops below the Min Sump T setting. This condenser fan stage decrease may occur as soon as the temperature drops below the Minimum Sump T setting. The temperature does not have to remain below the Minimum Sump T setting for longer than the stage timer.

After the two lead condenser fans are turned OFF via the VFD, they are turned back on as soon as the sump temperature rises above the Maximum Sump T setting. This transition from stage zero to stage one is the only transition that does not require the Stage Timer to expire.

All of the condenser fans need to be run periodically when evaporative condensing is used to prevent damage to the motors due to their high humidity environment. As indicated above, the condensing fans controlled by the VFD always run when evaporative operation is in effect so no special control of these fans is required. The fan motors controlled directly through the Condenser Fan A and Condenser Fan B outputs are turned ON and OFF based on time ON and time OFF. When a condenser fan output must be turned on for normal operation, the output that has been off for the longest period of time is started. When a condenser fan must be turned OFF for normal operation, the output that has been on for the longest period of time is turned OFF.

Legend

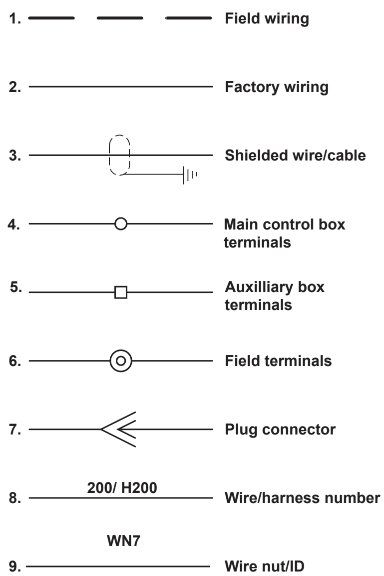


Table 9: Wiring Diagram Abbreviations

ID	Description	Standard location
ACT3, 4	Actuator motor, economizer	Economizer section
ACT5	Actuator motor, discharge isolation damper	Discharge section
ACT6	Actuator motor, return air isolation damper	Return section
ACT7	Actuator motor, heat face/ bypass	Coil section, heat
ACT8	Actuator motor, cool face/ bypass	Coil section, cool
ACT10, 11	Actuator motor, exhaust dampers	Return section
ACT12	Actuator motor, enthalpy wheel bypass damper	Energy recovery section
AFD10	Adjustable frequency drive, supply fan	AFD/supply fan section
AFD11	Adjustable frequency drive, evap cond. fans	Main/RCE control box
AFD20	Adjustable frequency drive, return/exhaust fan	AFD/ret. ex. fan section
AFD60	Adjust. freq. drive, energy recovery wheel(s)	Energy recovery section
AS	Airflow switch, burner blower	Gas heat box
BM	Burner blower motor	Heat section, gas
C1–8	Power factor capacitors, compressors	Condenser section
C10	Power factor capacitors, supply fan	Supply Fan section
C11	Capacitors, Speedtrol, circuit #1	Condenser bulkhead
C20	Power factor capacitors, return fan	Return section
C21	Capacitors, Speedtrol, circuit #2	Condenser bulkhead
CB10	Circuit breaker, supply fan	Main control box
CB11	Circuit breaker, evaporative condenser fan(s)	Main/cond. control box
CB20	Circuit breaker, return/ exhaust fan	Main control box
CB60	Circuit breaker, energy recovery wheel	Main control box
CCB1, 2	Compressor control boards, refrig. circuits	Main control box

Table 9 continued: Wiring Diagram Abbreviations

ID	Description	Standard location
CPC	Circuit board, main, micro controller	Main control box
CPR	Circuit board, expansion, micro controller	Main control box
CS1, 2	Control switches, refrig. circuits	Main/cond. control box
DAT	Discharge air temperature sensor	Discharge section
DFLH	Design flow lefthand sensor	Return section
DFRH	Design flow righthand sensor	Return section
DHL	Duct hi-limit	Main control box
DS1	Disconnect, total unit or cond/heat	Main control box
DS2	Disconnect, SAF/RAF/ controls	Main control box
DS3	Disconnect, electric heat	Electric heat box
DS4	Disconnect, condenser (RCS Only)	RCS control box
EAT	Exhaust air temperature sensor	Energy recovery section
EFT	Entering fan air temperature sensor	Supply fan section
ERM1	Energy recovery wheel motor #1	Energy recovery section
ERM2	Energy recovery wheel motor #2	Energy recovery section
F1A, B	Fuse, control circuit transformer (T1), primary	Main control box
F1C	Fuse, control circuit transformer (T1), secondary	Main control box
F2	Fuse, control circuit transformer (T2), primary	Main control box
F3	Fuse, burner blower motor	Main control box
FB11, 12	Fuseblock, Speedtrol	Main/cond. control box
FB31–40	Fuseblock, electric heat (top bank)	Electric heat box
FB41–50	Fuseblock, electric heat (bot. bank)	Electric heat box
FB65	Fuseblock, evap. cond. sump heater	Main/cond. control box
FD	Flame detector	Heat section, gas
FLC	Fan limit control	Heat section, gas
FP1, 2	Frost protection, refrig. circuits	Coil section, cool
FS1, 2	Freezestat control	Coil section, heat/cool
FSG	Flame safeguard	Gas heat box
GCB1	Generic condenser board, refrig. circ.	Main control box
GFR1, 2	Ground fault relay	Main control box
GFS1, 2	Ground fault sensor	Main control box
GFR4	Ground fault relay, condenser	Condenser control box
GFS4	Ground fault sensor, condenser	Condenser control box
GRD	Ground	All control boxes
GV1	Gas valve, pilot	Heat section, gas
GV2	Gas valve, main/safety	Heat section, gas
GV3	Gas valve, redundant/safety	Heat section, gas
GV4–8	Gas valve, main, hi turn down	Heat section, gas
HL1–10	Hi-limits, pwr, elec heaters (top bank)	Heat section, electric
HL11–20	Hi-limits, pwr, elec heaters (bot. bank)	Heat section, electric

Table 9 continued: Wiring Diagram Abbreviations

ID	Description	Standard location
HL22	Hi-limits, gas heat (pre-filters	Supply fan section
HL23	Hi-limits, gas heat (final filters)	Final filter section
HL31–40	Hi-limits, ctl. elec heaters (top bank)	Heat section, electric
HL41–50	Hi-limits, ctl. elec heaters (bot. bank)	Heat section, electric
HP1–4	Hi-pressure controls, refrig	On compressors
HP5	Hi-pressure controls, gas	Heat section, gas
HS1	Heat switch, electric heat shutdown	Main control box
HS3	Heat switch, electric heat deadfront interlock	Electric heat box
HTR1–6	Crankcase heaters	On compressors
HTR65	Heater, sump	Evap. condenser section
HTR66	Heater, vestibule	Evap. condenser vestibule
HUM1	Humidstat sensor	Energy recovery section
IT	Ignition transformer	Gas heat box
LAT	Leaving air temperature sensor	Energy recovery section
LP1, 2	Low-pressure controls, refrigeration	On compressors
LP5	Low-pressure control, gas	Heat section, gas
LR10	Line Reactor, supply fan	Inverter bypass box
LR20	Line reactor, return/exhaust fan	Inv. bypass/main cont. box
LS1, 2	Limit switch, low fire, high fire	Gas heat box
LT10–23	Light, cabinet sections	Supply fan section
M1–8	Contactor, compressor	Main/cond. control box
M10	Contactor, supply fan	Main control box
M11–18	Contactor, condenser fans, circuit #1	Main/cond. control box
M20	Contactor, return fan	Main control box
M21–28	Contactor, Condenser fans, circuit #2	Main/cond. control box
M29	Contactor, burner motor	Gas heat box
M30	Contactor, reversing, invertor bypass, supply fan	Inverter bypass box
M31–39	Contactor, electric heat (top bank)	Electric heat box
M40	Contactor, reversing, Inverter Bypass, Return Fan	Inverter bypass box
M41–50	Contactor, electric heat (bot. bank)	Electric heat box
M60	Contactor, energy recovery wheel	Main control box
M64	Contactor, sump pump	Main/cond. control box
M65	Contactor, sump heater	Main/cond. control box
MCB	Microprocessor circuit board	Main control box
MJ	Mechanical Jumper	All control boxes
MMP1–8	Manual motor protector, compressors	Main/cond. control box
MMP10	Manual motor protector, supply fan	Main control box
MMP11–18	Manual motor protector, cond. fans, ckt#1	Main/cond. control box
MMP20	Manual motor protector, return fan	Main control box
MMP21–28	Manual motor protector, cond. fans, ckt#2	Main/cond. control box
MMP30	Manual motor protector, invrtr. bypass, sup. fan	Inverter bypass box
MMP40	Manual motor protector, invrtr. bypass, ret. fan	Inverter bypass box
MMP51, 52, 53	Manual motor protector, exhaust fan(s)	Prop exhaust box

Table 9 continued: Wiring Diagram Abbreviations

ID	Description	Standard location
MMP60	Manual motor protector, energy recovery wheel	Main control box
MMP64	Manual motor protector, sump pump	Main/RCE control box
MP1–6	Motor protector, compr.#1-6	On compressors
OAE	Outside air enthalpy sensor	Economizer section
OAT	Outside air temperature sensor	Economizer section
PB1, 2	Power block, power distribution	Main control box
PB3	Power block, power distribution, electric heat	Electric heat box
PB4	Power block, power distribution, condenser	Condenser control box
PB9, 10	Power block, supply fan	Junction box, split unit
PB11, 12	Power block, power distribution	Main control box
PB19, 20	Power block, return/exhaust fan	Junction box, split unit
PC5	Pressure control, clogged filter	Pre filter section
PC6	Pressure control, clogged final filter	Final filter section
PC7	Pressure control, proof airflow	Supply fan section
PC8	Pressure control, minimum airflow	Coil section, cool
PC12, 22	Pressure control, Fantrol	Condenser section
PM1	Phone modem	Main control box
PS1, 2	Pumpdown switches, refrig circuits	Main/cond. control box
PS3	Pumpdown switch, RFS only	Main control box
PVM1, 2	Phase voltage monitor	Main control box
PVM4	Phase voltage monitor, condenser	Condenser control box
R1, 2	Relay, hi pressure reset	Main/cond. control box
R3, 4	Relay, hi pressure delay	Main/cond. control box
R5–8	Relay, safety, cool fail	Main/cond. control box
R9, 10	Relay, compressor lockout	Main/cond. control box
R11, 12	Relay, Speedtrol fan cycling	Main/cond. control box
R20	Relay, Heat, gas/ steam/ hot water	Gas heat/main cont. box
R21, 22	Relay, heat, gas (hi-turn down)	Gas heat box
R23	Relay, heat, gas & electric	Gas/electric heat box
R24	Relay, heat alarm, gas	Main control box
R25	Relay, heat, gas, start supply fan inverter	Main control box
R26	Relay, isol/exh. dampers, open/close	Main control box
R28	Relay, isolation damper, safety	Main control box
R29	Relay, remote fire alarm	Main control box
R30	Relay, cool valve with face bypass	Main control box
R45	Relay, UV lights	Main control box
R46, 47	Relay, supply fan inverter, incr/decr	Main control box
R48, 49	Relay, return fan inverter, incr/decr	Main control box
R56	Relay, heater, water pipe	Main/RCE control box
R58,59	Relay, heat wheel inverter, incr/decr	Main control box
R60	Relay, energy recovery wheel, enable	Main control box

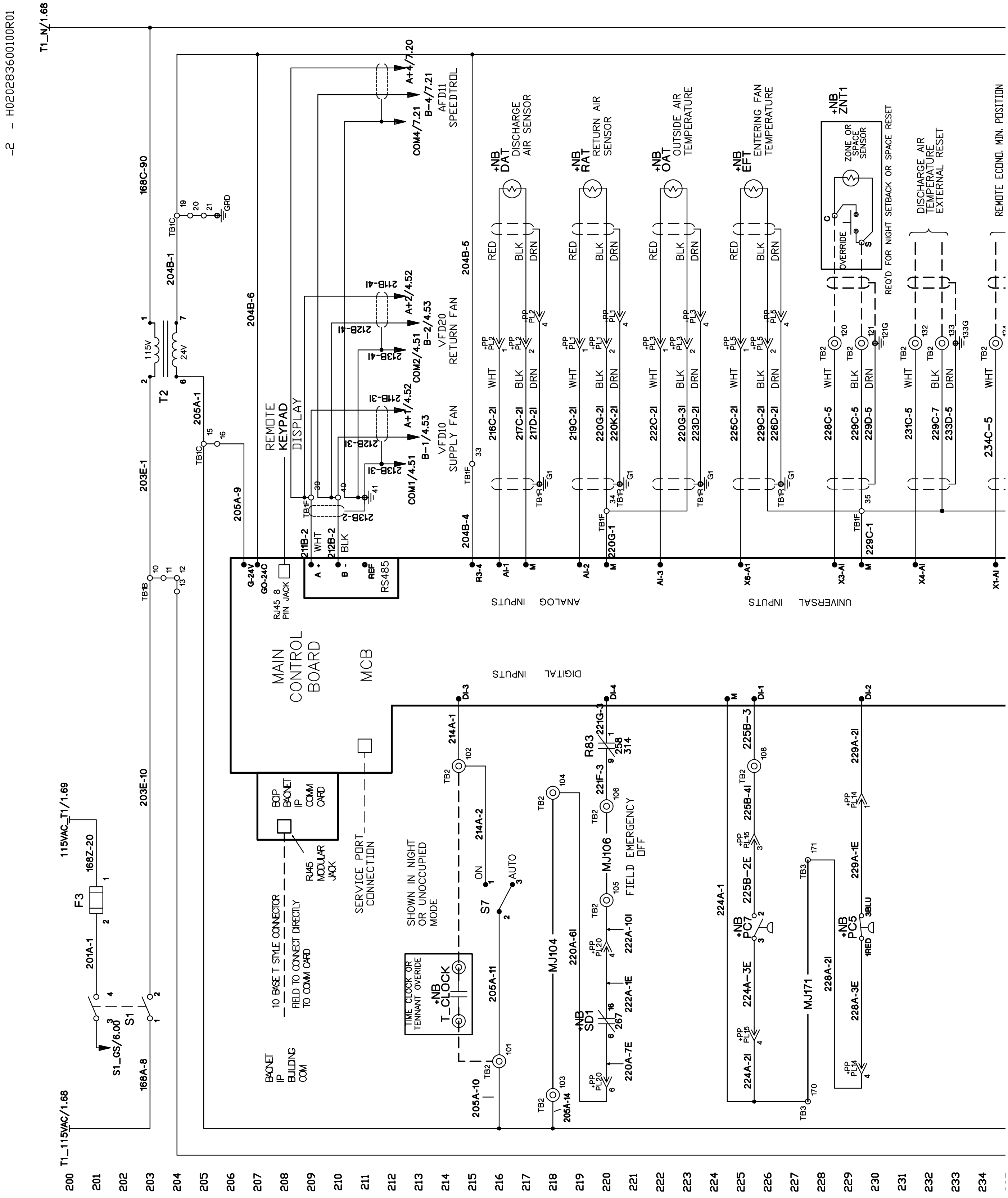
Table 9 continued: Wiring Diagram Abbreviations

ID	Description	Standard location
R61	Relay, smoke detector, discharge air	Main control box
R62, 63, 65	Relay, use on specials	Main control box
R64	Relay, sump pump	Main/RCE control box
R66	Relay, smoke detector, return air	Main control box
R67	Relay, supply fan, enable	Main control box
R68	Relay, return fan, enable	Main control box
R69	Relay, Inv. bypass VAV box interlock	Main control box
R70–79	Relay, use on specials	Main control box
RAE	Return air enthalpy sensor	Return section
RAT	Return air temperature sensor	Return section
REC1	Receptacle, main box	Main control box
REC2	Receptacle, condenser box	Condenser control box
REC3	Receptacle, field power, 115V	Discharge bulkhead
REC10–23	Receptacle, cabinet sections	Cabinet sections
S1	Switch, system on/off	Main control box
S2	Switch, system on/off, condenser unit	Condenser control box
S3	Switch, furnace on/off	Gas heat box
S4	Switch, inverter bypass, on/ off	Main control box
S7	Switch, local on/auto/off to controller	Main control box
S10–23	Switches, cabinet section lights	Cabinet sections
S40–45	Switches, door interlock, UV lights	Cabinet sections
SC11	Speed control, circuit #1	Condenser bulkhead
SC21	Speed control, circuit #2	Condenser bulkhead
SD1	Smoke detector, supply	Discharge section
SD2	Smoke detector, return	Return section
SPS1, 2	Static pressure sensors, duct/building	Main control box
SR1-3	Sequencing relays, electric heat	Electric heat box
SV1, 2	Solenoid valves, liquid	Condenser section
SV5, 6	Solenoid valves, hot gas	Condenser section
SV61, 62	Solenoid valves, sump, fill	Main/RCE control box
SV63	Solenoid valves, sump, drain	Main/RCE control box
SWT	Sump water temperature sensor	Evap. condenser section
T1	Transformer, main control (line/115 V AC)	Main control box
T2	Transformer, control input (115/24 V AC)	Main control box
T3	Transformer, control output (115/24 V AC)	Main control box
T4	Transformer, exh. damper actuator (1 15/12 V DC)	Main control box
T5	Transformer, electric heat	Electric heat box
T6	Transformer, dew point controller (115/24 V AC)	Main control box
T9	Transformer, refrig. circuit 24V	Main control box
T11	Transformer, speedtrol (line/240 V AC)	Condenser section
TB1	Terminal block, internal	Main control box
TB2	Terminal block, field	Main control box
TB3	Terminal blocks, factory	Main control box
TB4	Terminal block, RFS, field	Main control box

Table 9 continued: Wiring Diagram Abbreviations

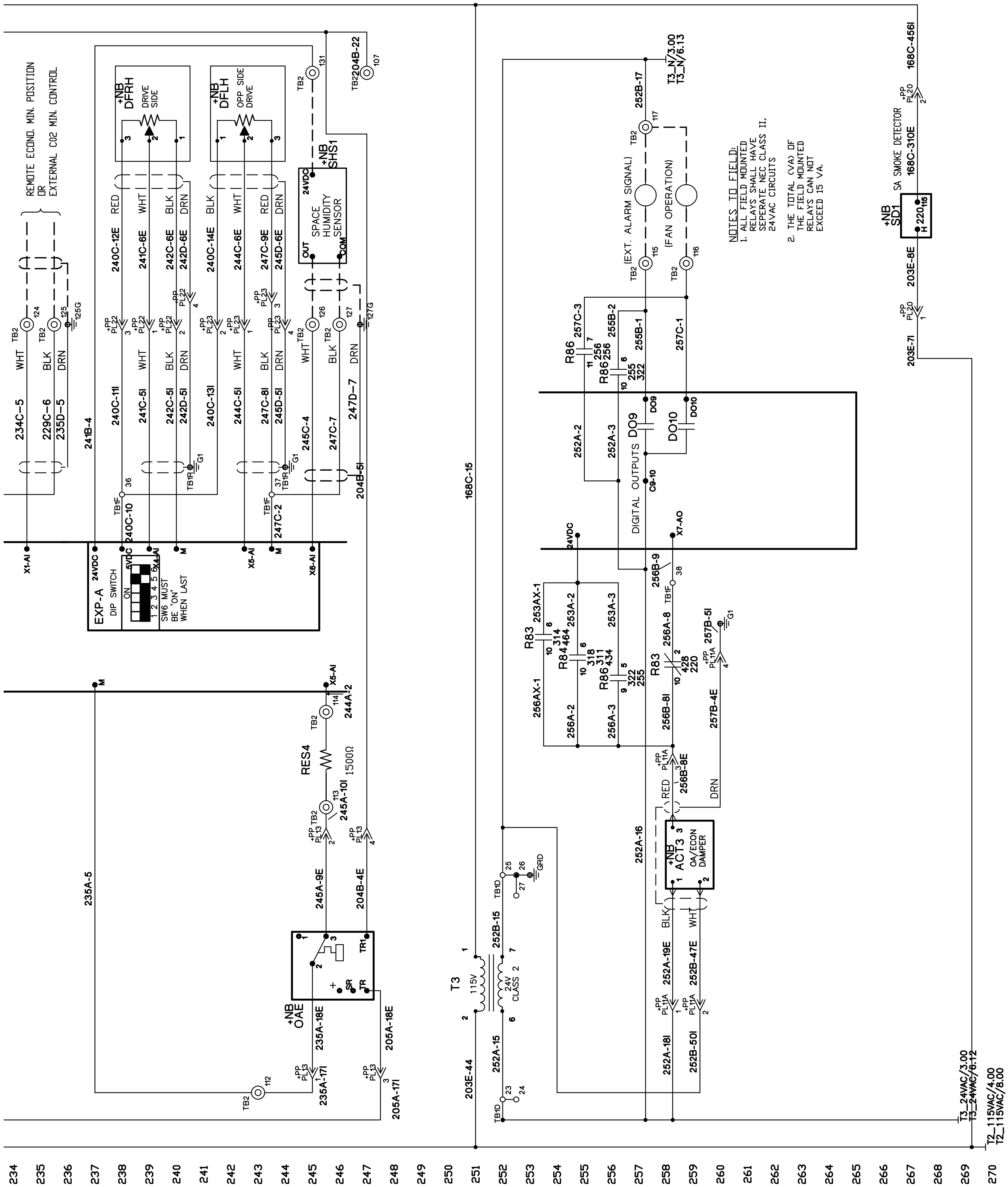
ID	Description	Standard location
TB5	Terminal block, RCS, field	Condenser control box
TB6	Terminal block, RCS, factory	Condenser control box
TB7	Terminal block, 115V convenience outlet, field	Main control box
TB8	Terminal block, 115V conv. outlet, RCS, field	Condenser control box
TB11	Terminal block, heat	Heat control box
TB23	Terminal block, oil pressure box, RPE/RCE only	Evap. condenser vestibule
TB25, 26, 27, 28	Terminal block, split unit junction box	Junction box, split unit
TC12, 13, 14	Temperature controls, Fantrol	Condenser section
TC56	Temperature control, water pipe heater	Evap. condenser vestibule
TC66	Temperature control, vestibule exhaust fan	Evap. condenser vestibule
TD1, 2	Time delay, compressor lockout	Main/cond. control box
TD3, 4	Time delay, hi-pressure	Main/cond. control box
TD5–8	Time delay, part winding, compr #1 - 4	Main control box
TD10	Time delay, hi turn down burner	Gas heat box
TD11, 12	Time delay, low ambient	Main/cond. control box
TR1, 2	Transducer, pressure	Main control box
U1, 2	Unloaders, compressors	On compressors
UV	Ultra-violet light(s)	Coil/discharge section
VM1	Valve motor #1, heating	Gas heat box/heat section
VM5	Valve motor #5, cooling	Coil section, cool
VV1	Vent valve, gas heat	Heat Section, Gas
WL63	Water level, sump, fill	Evap. condenser section
WL64	Water level, sump, low water	Evap. condenser section
ZNT1	Zone temp. sensor, setback	Field installed

Figure 46: Typical Control Schematic: Discharge Air Control (DAC)



Note: BACnet IP shown. See IM 919 pages 5-7 for more details.

Figure 46 continued: Typical Control Schematic: Discharge Air Control (DAC)



Note: BACnet IP shown. See IM 919 pages 5-7 for more details.

Figure 47: Typical Control Schematic: Zone or Space Comfort Control (SCC)

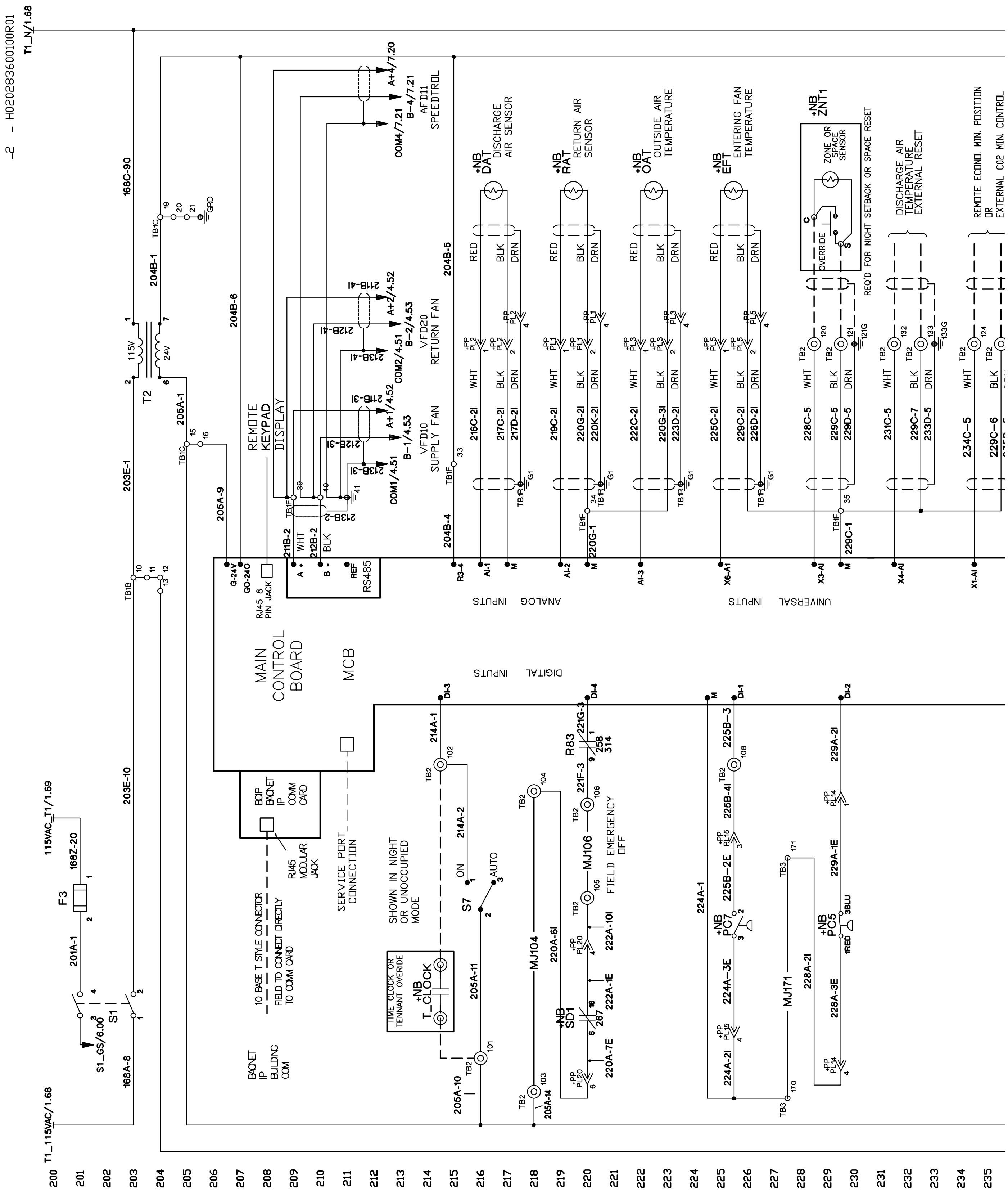


Figure 47 continued: Typical Control Schematic: Zone or Space Comfort Control (SCC)

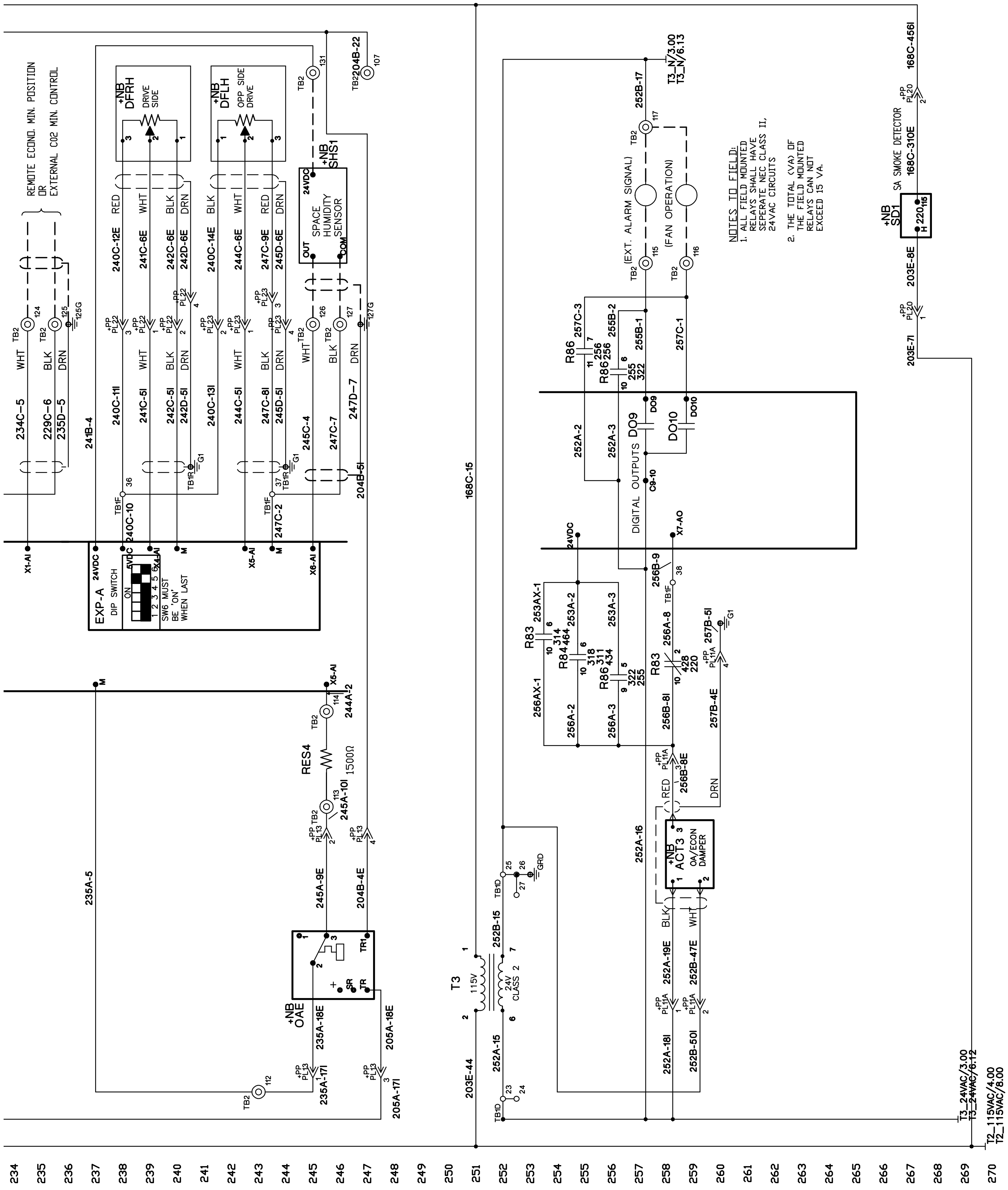


Figure 48: Typical Output Schematic: VFD Control Continued (SAF / RAF)

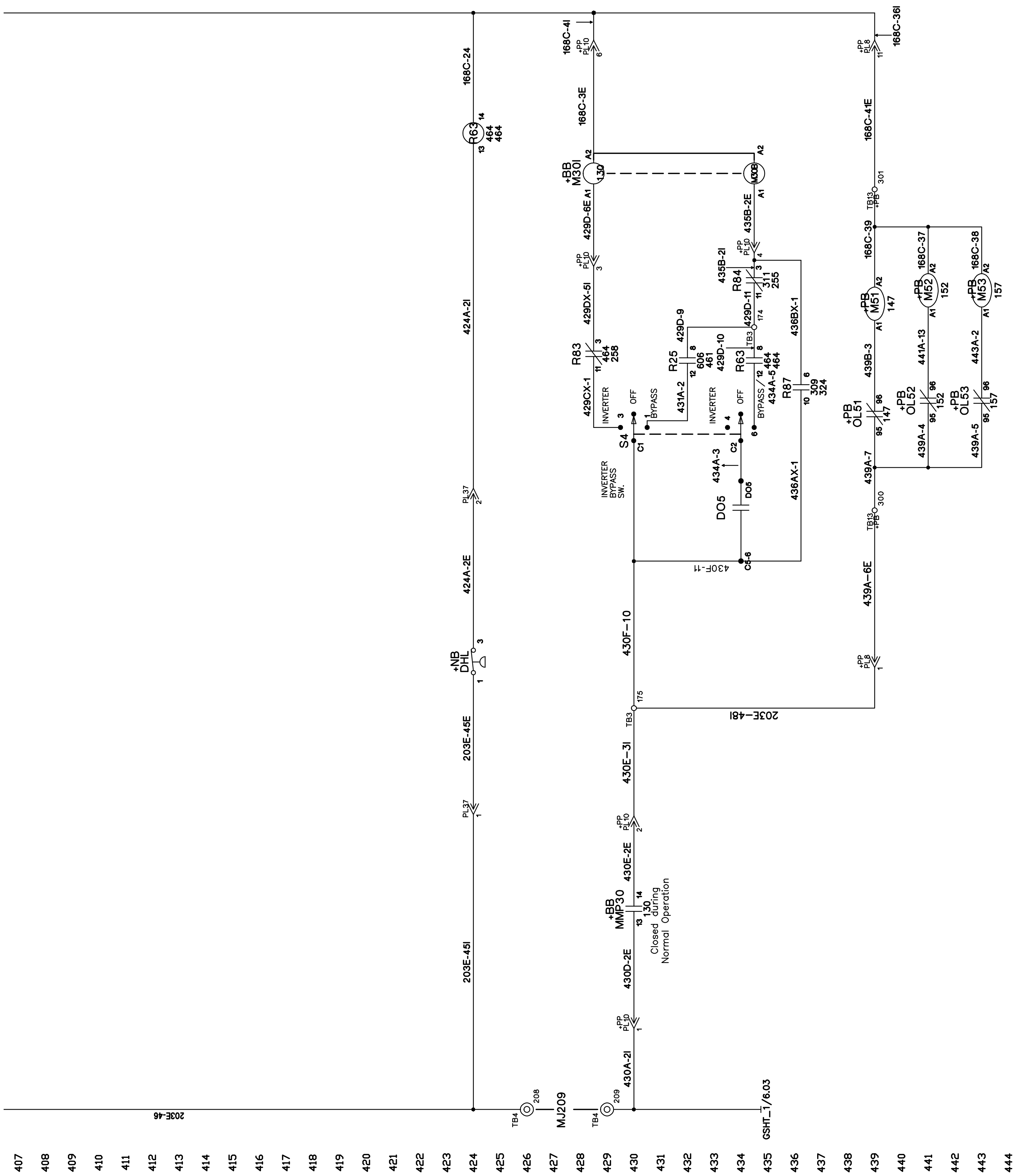


Figure 48 continued: Typical Output Schematic: VFD Control Continued (SAF / RAF)

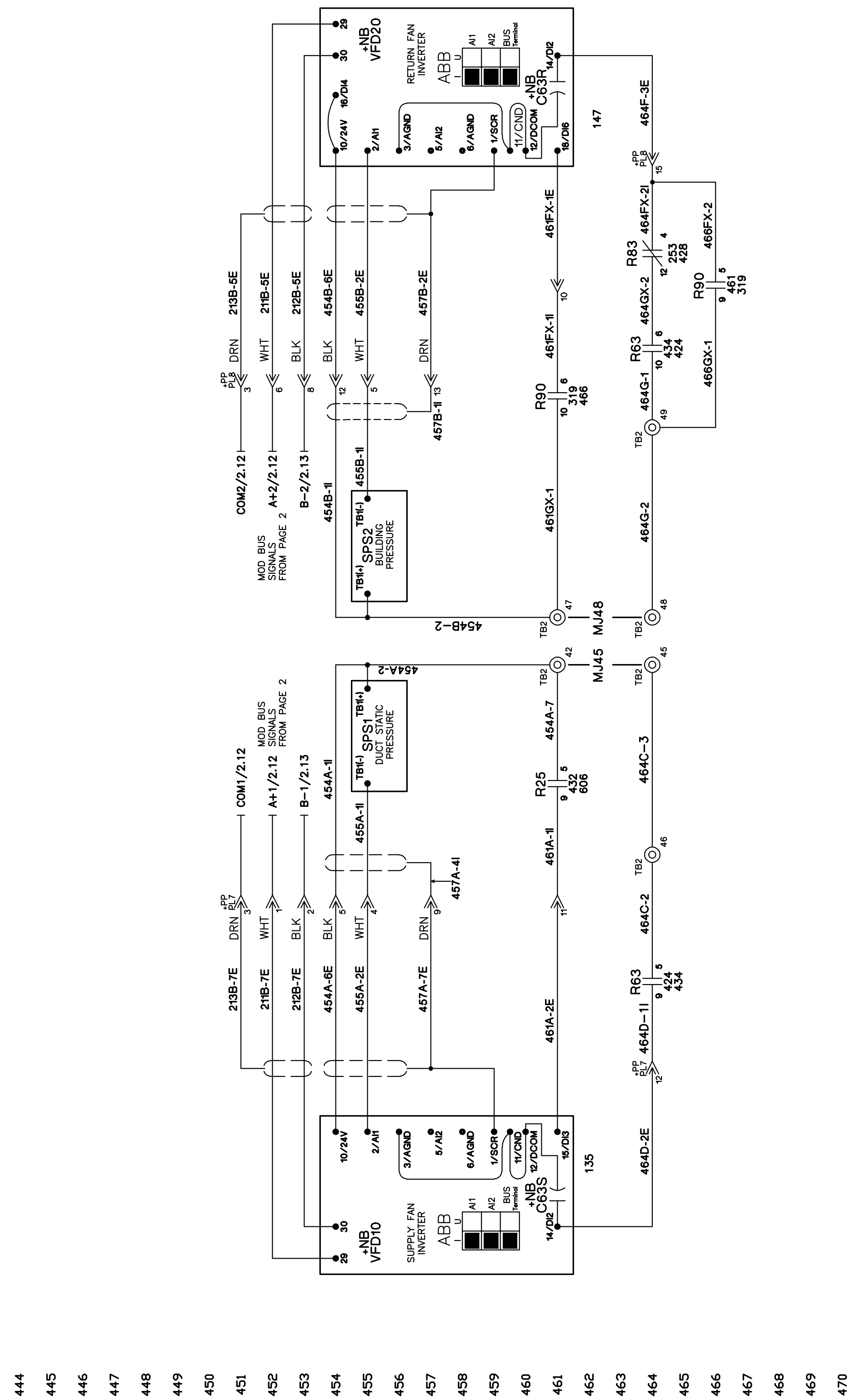


Figure 49: Typical Power Circuit Wiring - 4 Compressor - VFD

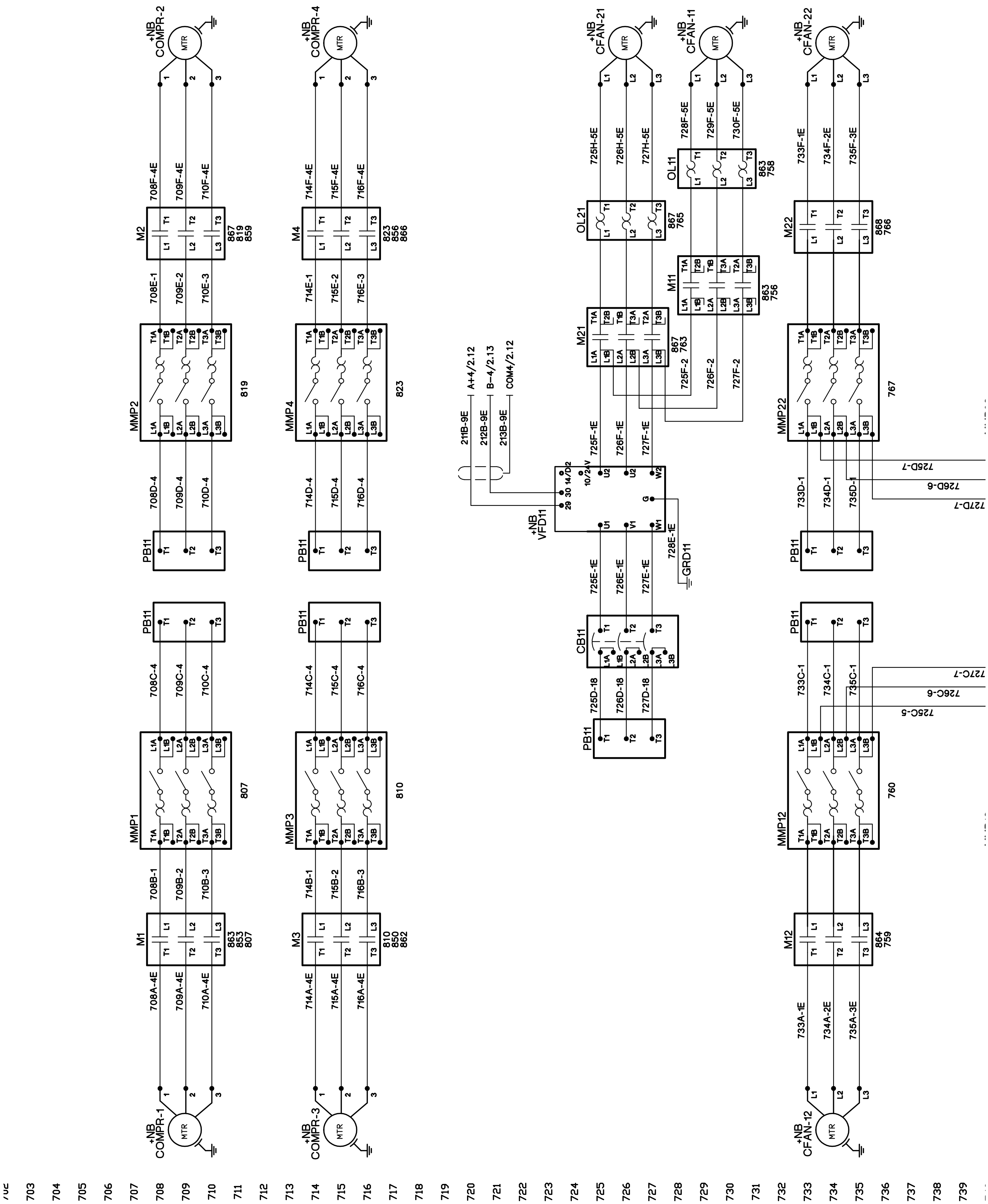


Figure 50 continued: Typical Power Circuit Wiring - 4 Compressor - VFD

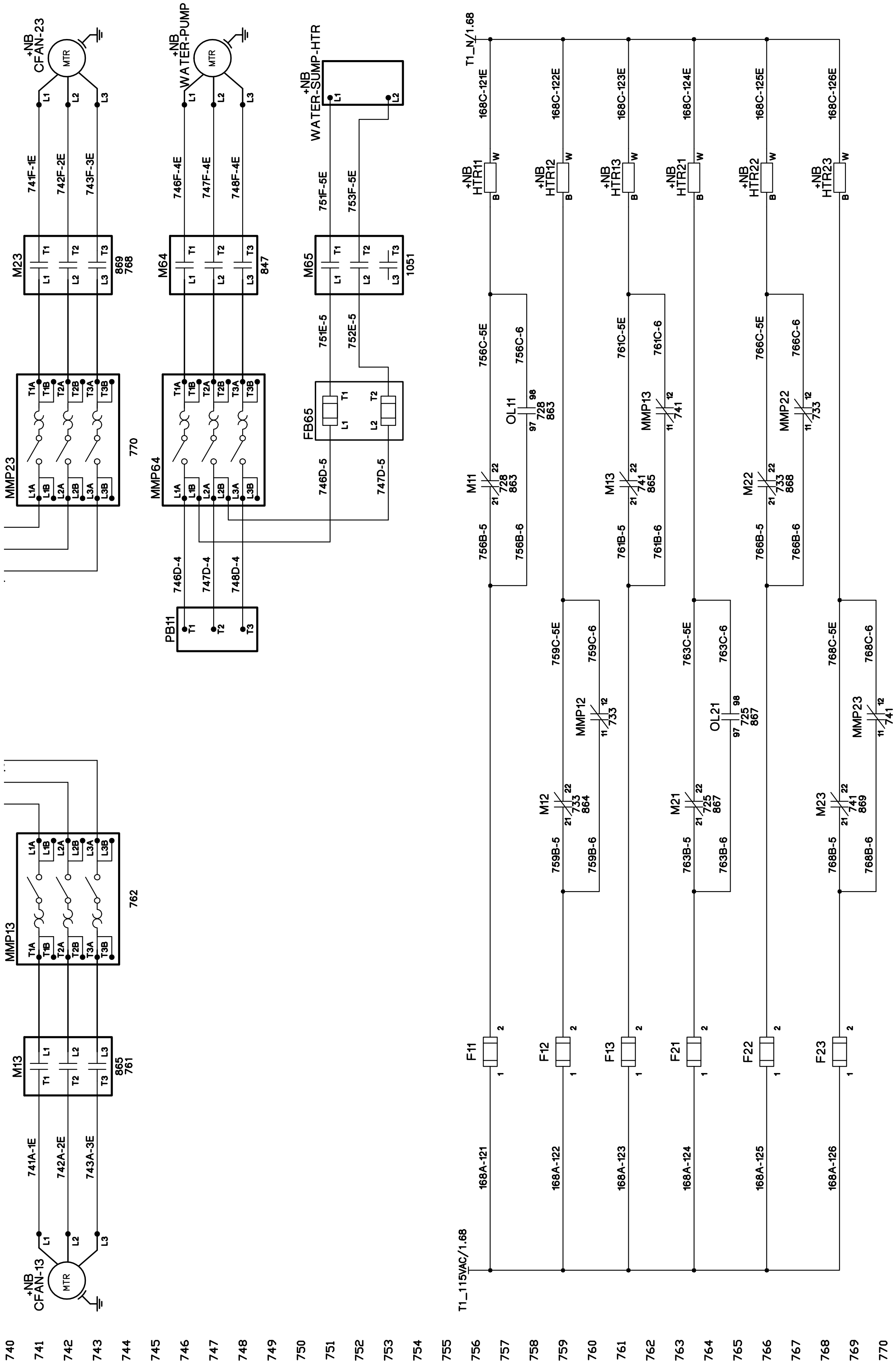


Figure 50: Typical Condensing Unit Control - MicroTech III - 4 Compressor

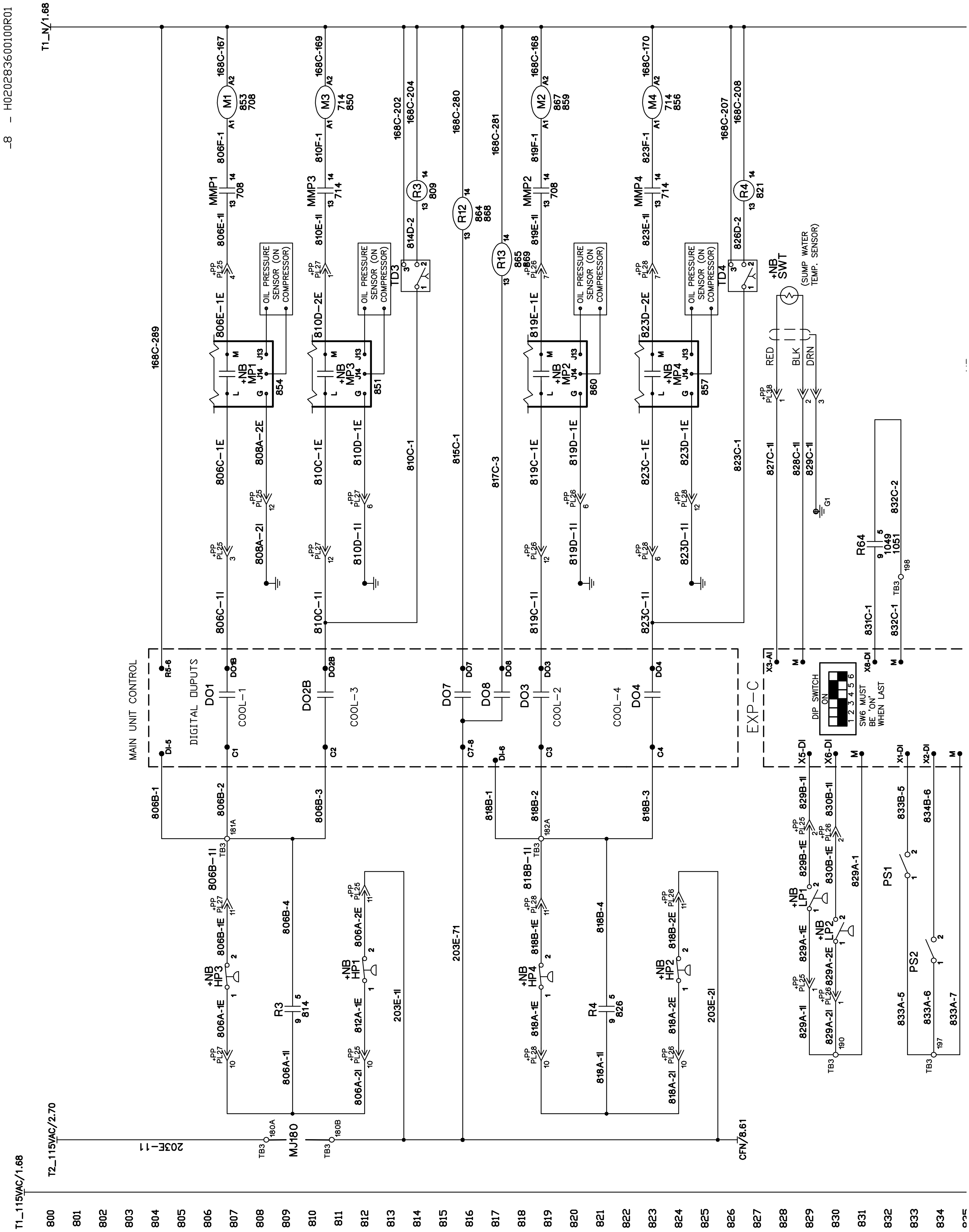


Figure 50 continued: Typical Condensing Unit Control - MicroTech III - 4 Compressor

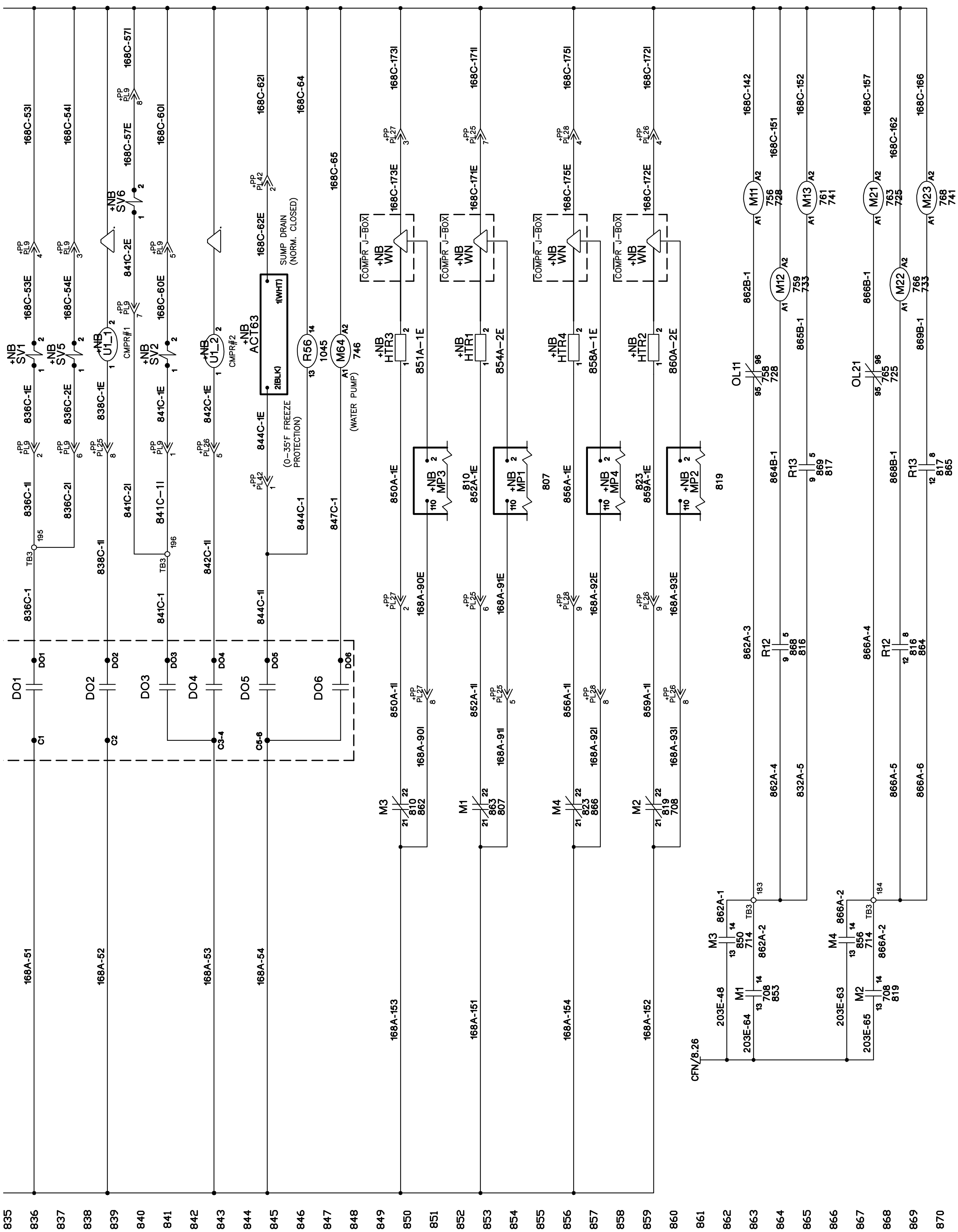


Figure 51: Typical Schematic: Condenser Fan, Anti-Corrosion Electric Heaters

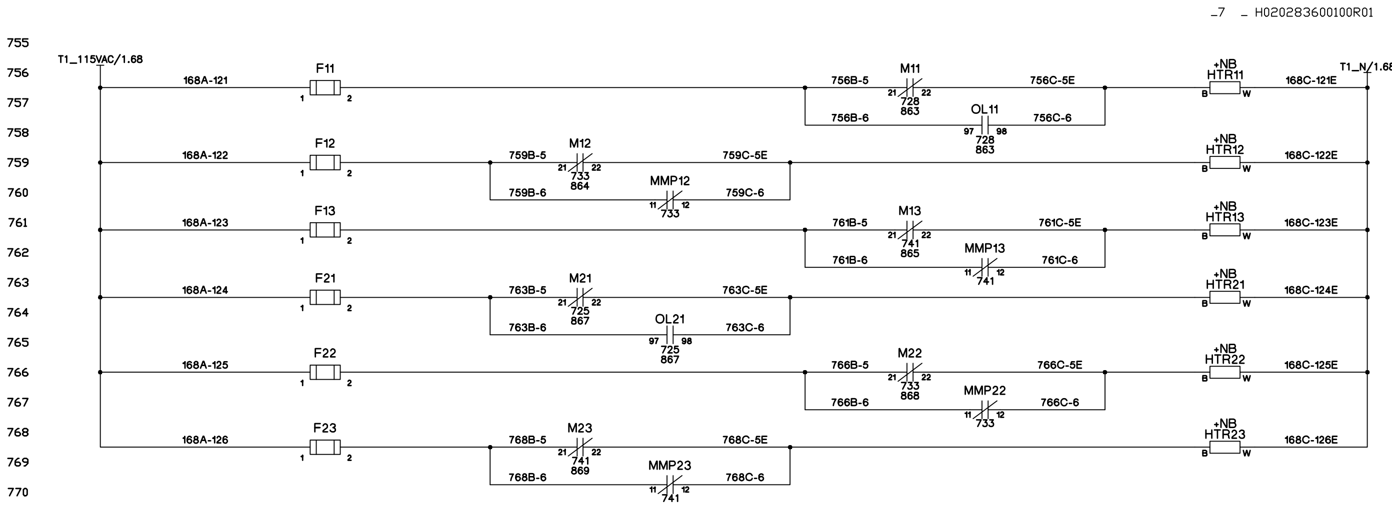


Figure 52: Typical CV Fan Control (SAF and RAF) and Light / Receptacle Power

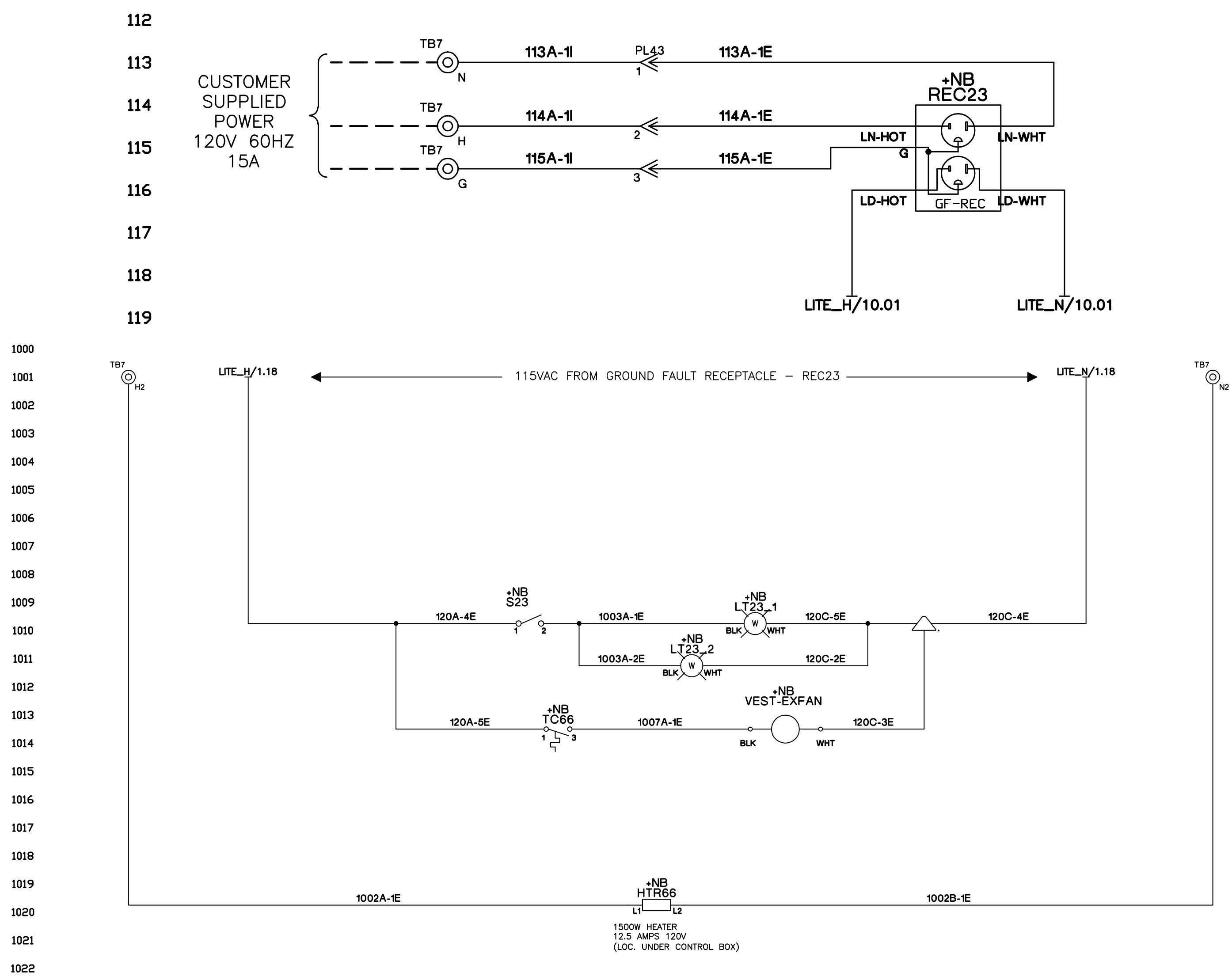
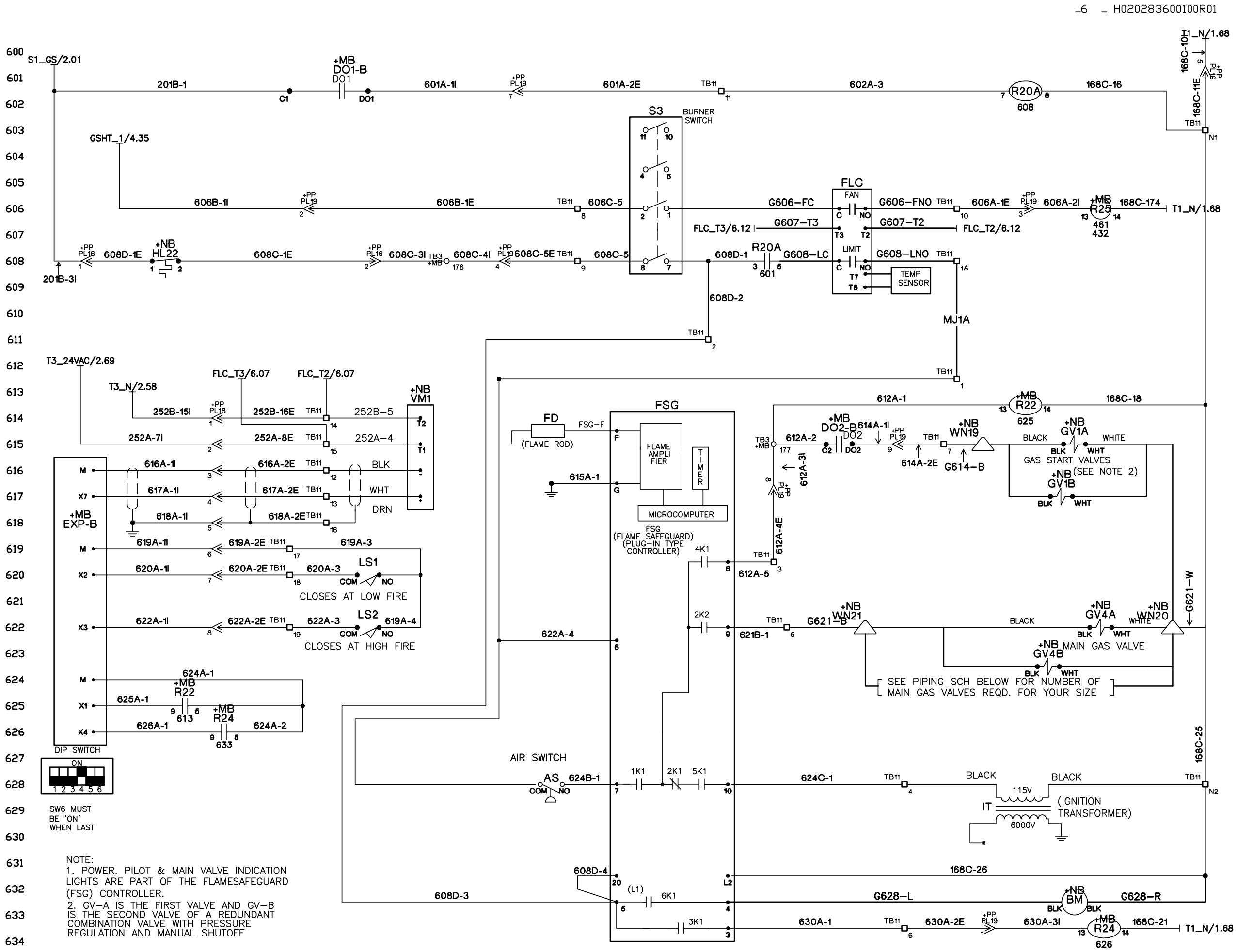


Figure 53: Typical Super Mod Gas Furnace Control (1000 MBh)



Sequence of Operation

When the rooftop unit is energized 120 volt power is supplied to the System On-Off Switch (S1), to Burner On-Off Switch (S3) and 24 Volts to the (BO#11) contacts on the Main Control Board (MCB). Burner On-Off Switch (S3) will power the Modulating Gas Valve Actuator (VM1) and Terminal #5(L1) on the Flame Safeguard (FSG). Upon a call for Heat, the Control System will close (BO#11) on the Main Control Board (MCB), thus energizing Relay (R20).When 120 Volt power is furnished through the system on-off switch (S1), through the burner on-off switch (S3), through Relay (R20) contacts, through the high limit

Control (FLC) and Terminal #6 on the Flame Safequard (FSG) is powered. The Flame Safeguard then energizes its Terminal #4, which powers the Burner Combustion Air Blower Motor (BM). Whenever power is restored to the Flame Safeguard, the Flame Safeguard will go through a 10 second initiation period before the prepurge period will begin.

The Burner Air Control Valve will be at the minimum position during off cycles. Upon a call for heat or any other time that a prepurge cycle occurs the Air Control Valve will be re-positioned to the maximum position for the prepurge and then returned to the minimum position for low fire start. (VM1), through the N/C contacts of (R20) and (R23), positions the Burner Air and Gas Control Valves to minimum after a run cycle. When (R20) is energized

For a new call for heat, (VM1) through the N/O contacts of (R20) and the N/C contacts of (R21),will re-position the Burner Air Valve to its maximum open position for prepurge. When the Air Control Valve reaches the full open position Switch (LS2) is 'made', powering (FSG) Terminal #7 through the Burner

Air switch (AS). This initiates the 60 second prepurge cycle. Concurrently, (LS2) powers Timer (TD10) which will energize Relay (R21) after 20 seconds. When (R21) is energized (VM1) will start the Air Control Valve on its way toward the minimum Air Valve position through the N/O Contact of (R21) and the N/C contact of (R23). At the completion of the 60 second prepurge cycle the valve will be at the minimum open position and the minimum position switch (LS1) will be 'made'. If (LS1) is not 'made' the combination Gas Control Start Valves (GV1) will not open and the Burner will go out on safety lockout.

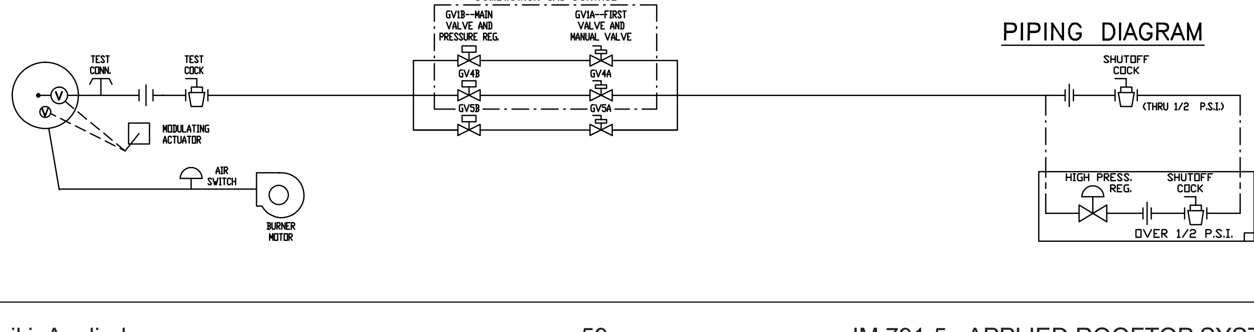
After completion of the 60 second prepurge period there will be a 10 second trial for iginition during which Terminal #8 (Combination Gas Valve—GV1) and Terminal #10 (Igntion Transformer—IT) will be energized. If flame is being detected throught the Flame Rod (FD) at the completion of the 10 second trial for ignition period Terminal #10 (Ignition Transformer—IT) will be de-energized and Terminal #9 (Relay R23 Coil and Main Gas Valves—GV4 & GV5) will be energized and the Control System will be allowed to control the firing rate. The Flame Safeguard contains "LEDs"(lower left corner) that will glow to indicated operation.

After the flame has lit and been proven, Relay (R23) is energized allowing (VM1), as controlled by (BO#9) & (BO#10) on the Main Control Board (MCB),to position the Burner Air and Gas Valves for the required firing rate. When the Main Control System closes (BO#10) on the Main Control Board (MCB), the Gas Valve Actuator will re-position toward a higher firing rate until (BO#10) opens or the actuator reaches its maximum position. When the Main Control System closes (BO#9), the Actuator will re-position toward a lower firing rate. If neither (BO#9) or (BO#10) on the Main Control Board (MCB) are closed, the actuator will remain at its present position. The heating capacity is monitored by the Main Control Board (MCB) through (AI#10) via a position feedback potentiometer on the actuator.

In the event the flame fails to ignite or the Flame Safeguard fails to detect its flame within 10 seconds, Terminals #4, 8, 9, and 10 will be de-energized, Thus de-energizing the Burner and Terminal #3 will become energized. The Flame Safeguard would then be on safety lockout and would require manual resetting.

Terminal #3 will energize the Heat Alarm Relay (R24), which would then energize the remote 'HEAT FAIL' indicator light and send a fail signal to binary Input #5 on the MicroTech III Main Control Board (MCB). If an attempt is made to restart the Burner by resetting the Flame Safeguard, or if an automatic restart is initiated after flame failure, the earlier described prepurge cycle with the wide open Air Valve will be repeated.

If the unit overheats, the High Limit Control (FLC) will cycle the Burner, limiting furnace temperature to the limit control set point.



Non-Chemical Water Treatment

The Daikin Chemical Free Water Treatment System is designed to prevent scale build-up and microbial growth in the moisture-laden condenser section of Daikin evaporative condenser rooftop units. It has several advantages over traditional chemical treatment systems and functions in the following ways (see IM 827 for more details):

- Changes precipitate formation from surface nucleation (scale) to colloidal nucleation (bulk-solution powder).
- Keeps systems free from mineral scale on the fill material, pipes, heat exchangers, and other components in the system.
- Controls the population of microorganisms such as bacteria and algae by incorporating them into colloidal precipitates (encapsulation) or damaging them with pulsed electric fields (electroporation).

Enthalpy Control

Outside Air Enthalpy Control (OAE)

Units with MicroTech III control and an economizer come standard with an electromechanical enthalpy control device (OAE) which senses both the humidity and temperature of the outside air entering the unit. This device has an enthalpy scale marked A through D. Table 10 shows the control points at 50% RH for settings A through D. Figure 54 shows this scale on a psychrometric chart. When the outside air conditions exceed the setting of the device, the outside air dampers are positioned to the minimum outside air intake position by the MicroTech III controller.

Table 10: Enthalpy Control Settings

Control Curve	Control Point Temp. At 50% RH
A	73°F (23°C)
B	70°F (21°C)
C	67°F (19°C)
D	63°F (17°C)

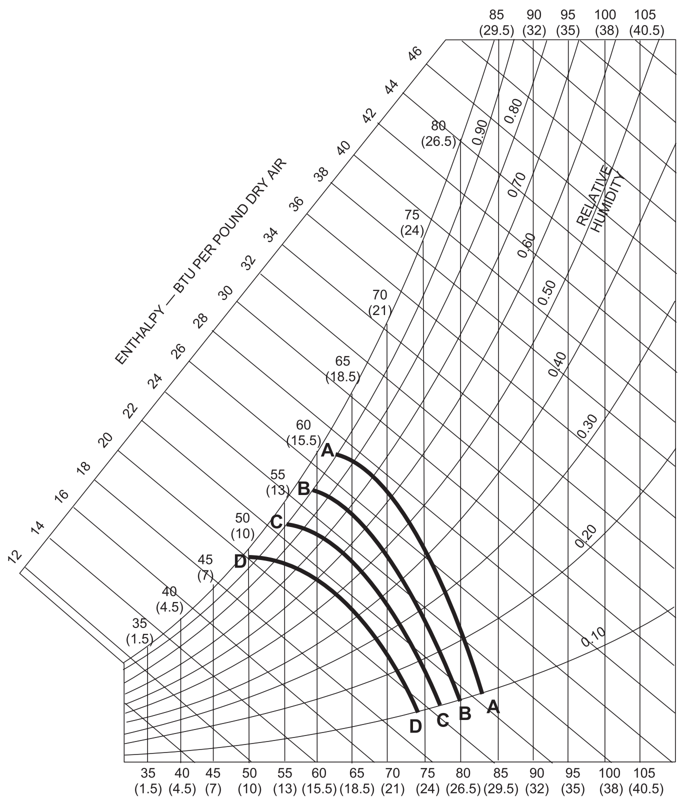
Differential Enthalpy Control (OAE/RAE)

An optional electric differential enthalpy control arrangement (OAE / RAE) is available on units with MicroTech III control. In this configuration a solid-state humidity and temperature sensing device is located in both the return (RAE) and outside intake (OAE) airstreams. This OAE device has the same A through D scale as the device described above. However, with the OAE / RAE arrangement the switch on OAE must be set all the way past the "D" setting. With this done, the MicroTech III controller will adjust the return and outside air dampers to use the airstream with the lowest enthalpy.

Ground Fault Protection

The ground fault protection is designed to protect motors from destructive arcing ground faults. The system consists of a ground fault relay and a ground fault current sensor. The ground fault relay employs solid state circuits that will trip and open a set of relay contacts in the 115 volt control circuit to shut the unit down whenever a ground fault condition exists. The ground fault relay is self powered. The ground fault sensor is a current transformer type of device located on the load side of the power block through which the power wires of all phases are run.

Figure 54: Enthalpy Control Settings



Phase Voltage Monitor

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

MicroTech® III Remote User Interface (UI)

In addition to the unit-mounted user interface provided with MicroTech III controls, Daikin applied rooftop systems and indoor vertical self-contained systems can be equipped with a remote user interface that handles up to eight units per interface. The remote user interface provides convenient access to unit diagnostics and control adjustments, without having to access your roof or mechanical rooms located on each floor.

Each remote user interface offers the same functionality as its unit-mounted counterpart, including:

- Push-and-roll navigation wheel with an 8-line by 30 character display format.
- Digital display of messages in English language.
- All operating conditions, system alarms, control parameters and schedules are monitored.

Features

- Can be wired up to 700 meters from units for flexibility in placing each remote user interface within your building.
- Unit and remote user interfaces are both active.

Figure 55: Remote User Interface

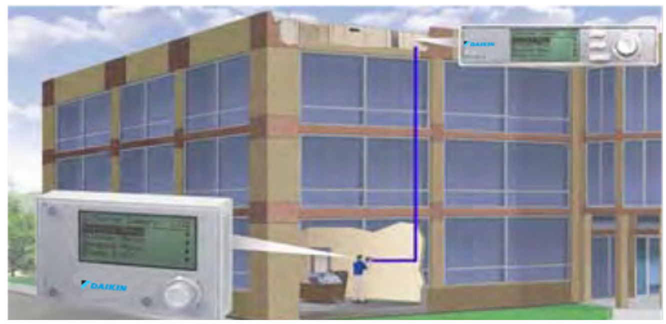


Figure 56: Process Bus Wiring Connections

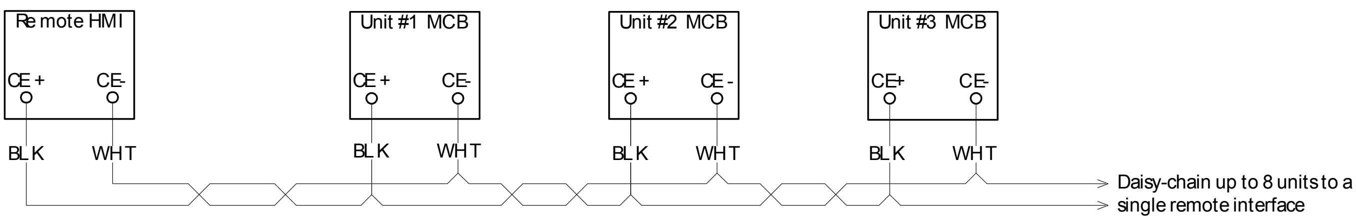
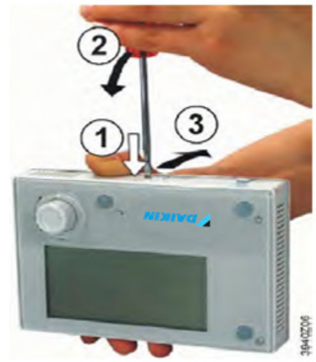
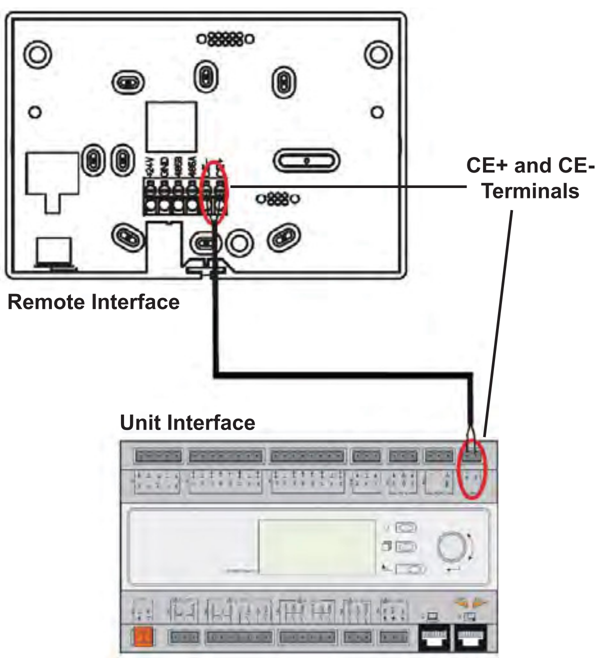


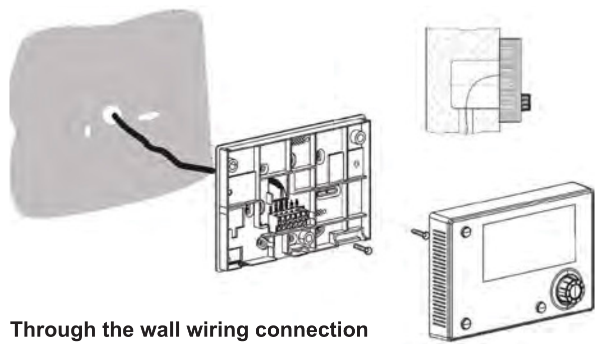
Figure 57: Specifications and Connections

Interface	
Process Bus	Up to eight interfaces per remote
Bus connection	CE+, CE-, not interchangeable
Terminal	2-screw connector
Max. length	700 m
Cable type	Twisted pair cable; 0.5…2.5 mm2
Display	
LCD type	FSTN
Dimensions	5.7 W x 3.8 H x 1.5 D inches (144 x 96 x 38 mm)
Resolution	Dot-matrix 96 X 208 pixels
Backlight	Blue or white, user-configurable
Environmental Conditions	
Operation	IEC 721-3-3
Temperature	-40 to 70 °C
Restriction LCD	-20 to 60 °C
Humidity	<90% r.h. (no condensation)
Air pressure	Min. 700 hPa, corresponding to Max. 3,000 m above sea level

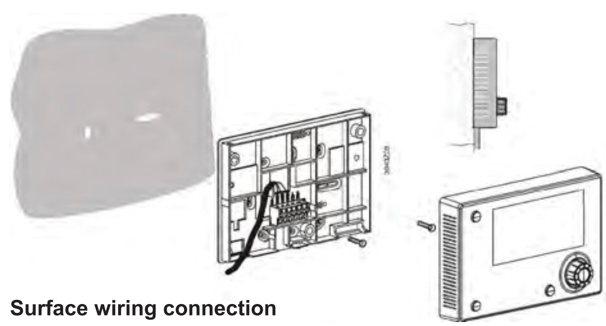


Cover Removal





Through the wall wiring connection



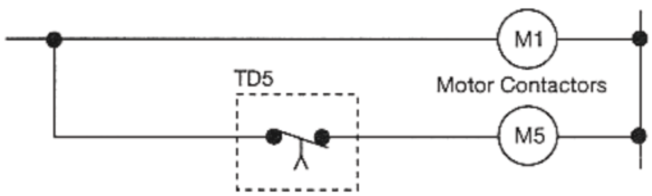
Surface wiring connection

Part Winding Start

The part winding start option is used to reduce the locked rotor in rush current of the compressor motors or the fan motors (208/230 volt units).

The motor has dual windings which are energized with dual contactors. The first contactor closes, energizing one winding. A time delay relay closes the second contactor about one second later, energizing the second winding and bringing the. motor up to full speed Figure 58 is a typical wiring schematic showing part winding start.

Figure 58: Part Winding Start



Hot Gas Bypass

Hot gas bypass is a system for maintaining evaporator pressure at or above a minimum value. The purpose for regulating the hot gas into the distributor is to keep the velocity of the refrigerant as it passes through the evaporator high enough for proper oil return to the compressor when cooling load conditions are light.

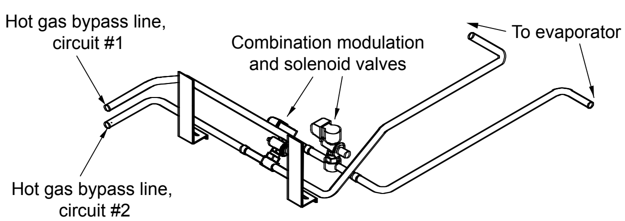
The system consists of a combination of solenoid valves and a pressure regulating valve as shown in Figure 51. The solenoid valves are factory wired to open whenever the controller calls for the first stage of cooling. The pressure regulating valve starts to modulate open at 57 psig (393 kPa).

The regulating valve opening point can be determined by slowly reducing the system load or reducing the required discharge air temperature setting while observing the suction pressure. When the bypass valve starts to open, the refrigerant line on the evaporator side of the valve will begin to feel warm to the touch.

CAUTION

Do not touch gas liner during valve checkout. The hot gas line can become hot enough in a short time to cause personal injury.

Figure 59: Hot Gas Bypass System



External Time Clock

An external time clock can be used as an alternative to (or in addition to) the MicroTech III controller's internal scheduling function. The external timing mechanism is set up to open and close the circuit between field terminals 101 and 102. When the circuit is open, power is not supplied to digital input BI1 on the MCB. This is the normal condition in which the programmable internal schedule is followed. When the circuit is closed, the MicroTech III controller responds by placing the unit in the occupied mode, overriding any set internal schedule.

For more information, please see the "Digital Inputs" section of Bulletin No. IM 919, MicroTech III Applied Rooftop Unit Controller.

Smoke Detectors

Optional smoke detectors can be located at the supply and return openings. The wiring for these smoke detectors is shown on any of the "Typical Main Control Circuit" wiring schematics within the section Wiring Diagrams starting on page 45. The sequence of operation for these detectors is as follows: When the smoke is detected by either sensor, the normally closed sensor contacts open. This removes power from digital input MCB BI8 on the Main Control Board.

The MicroTech III controller responds by shutting the unit down. The controller is placed in the Alarm Off state, and cannot be restarted until the alarm is manually cleared. Refer to the operation manual supplied with the unit for information on clearing alarms (OM 920). The smoke detectors themselves must be manually reset once they have tripped. Power must be cycled to the smoke detector to reset.

Freeze Protection

An optional freezestat is available on units with MicroTech III control that have hot water or steam heating coils. The sensing element is located on the downstream side of the heating coil in the heating section of the unit. If the freezestat detects a freezing condition and closes, the MicroTech III controller will take different action, depending on whether the fans are on or off. The freezestat is an auto reset type of control; however, the controller alarm it causes is a manual reset if the fan is on and auto reset if the fan is off.

Fan ON Operation

If the freezestat detects a freezing condition while the fan is on, the MicroTech III controller will shut down the fans, close the outdoor air dampers, open the heating valve, and set a 10-minute timer. The MicroTech III controller's active alarm will be "Freeze Stat Fault."

When the 10-minute timer expires, the controller begins checking the freezestat again. If the freezestat is open, the heating valve will close. If the freezestat closes again, the heating valve will open, and the 10-minute timer will reset. The unit will remain shut down until the "Freeze Stat Fail" alarm is manually cleared. Refer to the operation manual supplied with the unit for information clearing alarms (OM 920).

Fan OFF Operation

If the freezestat detects a freezing condition while the fan is off, the MicroTech III controller will open the heating valve and set a 10-minute timer. The MicroTech III controller's active alarm will be "Freeze Problem."

When the 10-minute timer expires, the controller begins checking the freezestat again. If the freezestat is open, the heating valve will close. If the freezestat closes again, the heating valve will open, and the 10-minute timer will reset. When the freezestat opens again, the "Freeze Stat Prob" alarm automatically clears. This feature protects the coil and allows the system to start normally after a cold night.

Low Airflow Alarm

An EFT sensor and an associated "Low Airflow Alarm" are provided on VAV units with MicroTech III control and gas or electric heat. The EFT sensor is located in the supply fan section of the unit at the supply air funnel.

Heat will be disabled whenever the airflow is detected to be too low for safe heating operation. This condition is indicated when the supply air temperature exceeds the mixed air temperature by more than 60°F (16°C). In this case, a "Low Airflow Alarm" is generated and heat will not be re-enabled until the alarm is manually cleared. Refer to the operation manual supplied with the unit for information on clearing alarms (OM 920).

Duct High Pressure Limit

The duct high pressure limit control (DHL) is provided on all VAV units, including the CAV-DTC unit that can be field converted to VAV. The DHL protects the ductwork, the terminal boxes, and the unit from over pressurization which could be caused by, for example, tripped fire dampers or control failure.

The DHL control is factory set to open when the discharge plenum pressure rises to 3.5" w.c. (872 Pa). This setting should be correct for most applications; however, it is adjustable. Removing the front cover of the device reveals a scale showing the current setting. Turning the adjustment screw located on the bottom of the device adjusts the setting up or down.

If the DHL switch opens, digital input MCB BI 14 on the Main Control Board will be de-energized. The MicroTech III controller then shuts down the unit and enters the Off-Alarm state. The alarm must be manually cleared before the unit can start again. Refer to the operation manual supplied with your unit for more information on clearing alarms (OM 920).

Condensing Unit VFD Operation

See Sequences of Operation on page 39.

Variable Frequency Drive Operation

Refer to the vendor instructions supplied with the unit.

Convenience Receptacle/Section Lights

A Ground Fault Circuit Interrupter (GFCI) convenience receptacle is provided in the main control box on all units. Both unit-powered and field-powered versions are offered.

To use the field-powered receptacle one of the following is required:

1. Connect a separate field-supplied 115 V power wiring circuit to the 115V field terminal block TB7, located in the main control box.
2. Select the factory powered outlet option at time of purchase.

Optional lights are available for certain sections in the unit. Each light includes a switch and convenience receptacle and is powered by the external 115V power supply connected to TB7.

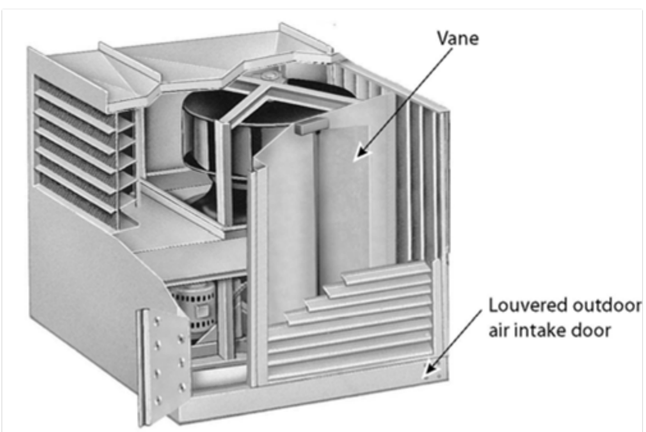
DesignFlow™ Outdoor Air Damper Option

DesignFlow™ airflow measurement stations are located inside the louvered outdoor air intake doors between the intake louver and outside air dampers (Figure 60). Essentially, they consist of a vane that is repositioned by airflow, the amount of rotation indicating the amount of airflow. They are calibrated precisely at the factory and no further calibration is required. However, a leveling adjustment is required in the field so that the DesignFlow unit is in the same orientation as when it was factory calibrated. See “DesignFlow Station Startup” below.

The rotational position of the DesignFlow unit vane is translated into CFM by the microprocessor in the MicroTech III control system. The position of the vane is determined by two things—the force of the airflow impacting the vane and the gravitational effect on the vane. Gravity is the only factor at the lower CFM end of the range. On a correctly leveled unit, this gravitational effect will be the same as when the unit was calibrated in the factory.

Accurately leveling a station involves applying a precise mechanical force against the vane. This force should cause the vane to move to a specific position if the DesignFlow unit is correctly leveled.

Figure 60: DesignFlow Station



DesignFlow Station Startup

Before initial startup of the rooftop unit, carry out the following procedure on both the right-hand (control panel side) and left-hand (side opposite the control panel) DesignFlow station vanes (see Figure 60).

1. Verify that power is supplied to the unit’s MicroTech III control system. The DesignFlow startup procedure cannot be completed without use of the MicroTech III controls.
2. Unlock and open the louvered outdoor air intake door on the side of the unit (see Figure 60).
3. The swinging vane on the measurement station is locked in place for shipment. Unlock it by removing the two shipping screws. One is located one inch from the top of the vane and the other one inch from the bottom of the vane. Both are about eight inches in from the outer edge of the vane.
4. Examine the station for shipping damage. Manually rotate the vane and verify that it does not rub against anything.
5. Manually hold the vane closed against the mechanical stop at the top of the assembly. Then, read the current vane leveling position on the MicroTech III keypad/display.

   Do this by viewing the *LH Lvl Pos*= or RH Lvl Pos= parameter in the Min OA setup menu. The *LH Lvl Pos*= parameter indicates the current position of the vane for the left-hand DesignFlow station (side opposite the control panel). The *RH Lvl Pos*= parameter indicates the current position of the vane for the right-hand DesignFlow station (control panel side).

   Important: Wait several seconds until the value on the keypad stabilizes before taking the reading. For detailed information regarding operation and navigation through the unit keypad, refer to OM 920.
6. Confirm the value of the reading. Ideally, it should read close to 20.00 (19.50 to 20.50 is acceptable). If the reading is out of range, loosen the screws fixing the mechanical stop at the top of the assembly, make a small adjustment, and recheck until the reading is in the specified range.

NOTE: Generally, adjustments should not be necessary.

7. Locate the leveling component kit, which is shipped with the unit, in the unit main control panel.
8. Duct tape the fulcrum alignment plate to the bottom corner of the vane (see Figure 61) aligning it as follows:
   a. The bottom edge of its notches should be flush with the bottom edge of the vane.
   b. The side of one notch should be even with the bend near the outer edge of the vane.
   c. The plate should be flat against the outer surface of the vane.

9. Locate and install the fulcrum used in the leveling procedure as follows (see Figure 61):
    a. Wipe the bottom of the louver door where the fulcrum will be located so that the duct tape will stick to it.
    b. b Pre-apply duct tape to the top surface of the bottom portion of the fulcrum, extending it about one inch beyond the edges on three sides.
    c. With the alignment plate taped to the vane and the vane in the zero airflow position, locate the fulcrum parallel to and against the alignment plate.
    d. Once the fulcrum is in position, press the duct tape extensions down to hold the fulcrum in place.
    e. Remove the alignment plate after installing the fulcrum.

NOTE: The zero airflow position is when the vane is swung away from the back wall and gently resting against its stop.

10. Close and latch the louvered intake door.
11. Remove the cover from the access opening in the bottom blade of the outdoor air intake louver (see Figure 64).
12. Verify that the unit fans are off and that the outdoor air dampers are closed. If there is a wind, cover the outdoor air louvers with poly film, cardboard, or other suitable material to prevent adverse readings due to wind.
13. Rest the leveling weight assembly on the fulcrum, as shown in Figure 62, so that:
    a. Its bottom two thumbscrews rest on the top edge of the fulcrum.
    b. Its top thumbscrew rests against the vertical alignment mark on the vane.

NOTE: The alignment mark is located 0.50 inch in from the bend on the outer edge of the vane. It intersects with a hole located one inch up from the bottom outer edge of the vane.

14. Set up the leveling test as follows:
    a. While holding the weight so it stays on the fulcrum, manually rotate the vane to the wide-open position, manually return it to the zero CFM position, and gently release the vane.
    b. Locate the leveling weight assembly so its contact point is against the vertical mark on the vane.
    c. While the weight assembly teeters on the fulcrum, gently rap the base frame to slightly vibrate the assembly and encourage the vane to seek its equilibrium point.
15. Read the current *LH Lvl Pos=* (or *RH Lvl Pos=*) parameter in the Min OA Setup menu on the keypad/ display. These parameters vary from 20% to 80% depending on the position of the DesignFlow vane
16. If the value indicated by the *LH Lvl Pos=* (or *RH Lvl Pos=*) parameter is not within the range of **22.56%** to **23.02%** (**22.79% is ideal**), adjust the level of the DesignFlow unit using the procedure described in "Making Level Adjustments" below.
17. When the *LH Lvl Pos=* (or *RH Lvl Pos=*) value is in range, remove the fulcrum and leveling weight assembly and replace the access opening cover in the louvered door.

Figure 61: Tape Fulcrum Alignment Plate to Vane

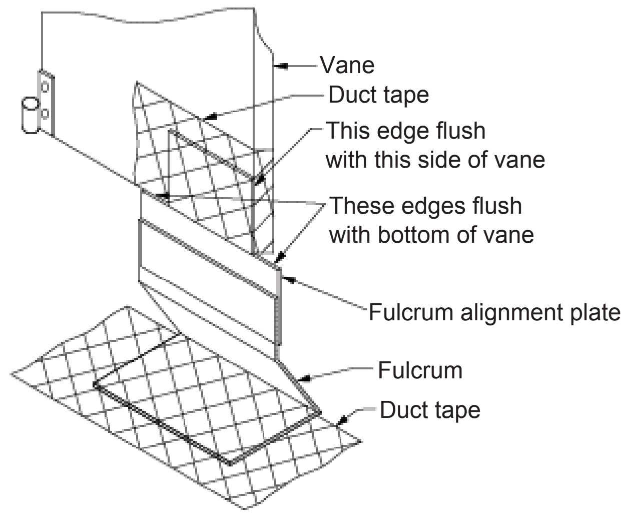
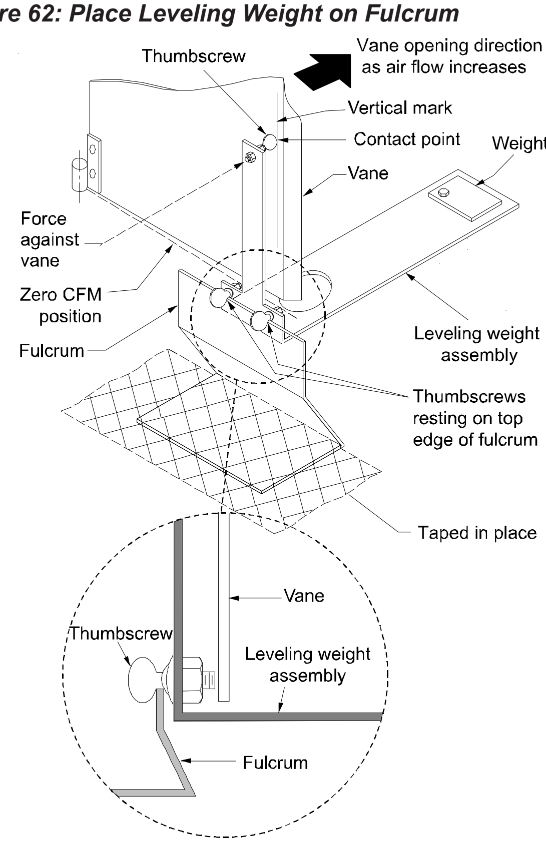


Figure 62: Place Leveling Weight on Fulcrum



Making Level Adjustments

The DesignFlow unit is mounted so that it pivots at the top when three lock nuts are loosened, two at the top and one at the bottom of the assembly (see Figure 63). Leveling the unit involves precisely pivoting the assembly with a known force applied to the vane until the vane opens to a specific position.

If after performing Steps 13 through 15 above, the vane does not come to rest within the specified range, carry out these steps:

1. Unlock and open the louvered outdoor air intake door on the side of the unit.
2. Loosen the two 1/4-20 NC lock nuts at the top of the DesignFlow frame. (See Figure 63.)
3. Close and lock the intake door.
4. Remove the cover from the access opening in the bottom blade of the outdoor air intake louver (see Figure 64).
5. Loosen the 1/4-20 NC lock nut in the slotted hole at the bottom of the DesignFlow frame. (See Figure 65.)
6. If the *LH Lvl Pos*= (or *RH Lvl Pos*=) value obtained in step 15 above is HIGHER than the specified range, move the bottom of the DesignFlow frame closer to the outdoor air dampers (away from the back end of the unit). Do this by turning the long adjuster nut to increase the L dimension in Figure 65.

   If the *LH Lvl Pos*= (or *RH Lvl Pos*=) value obtained in step 15 above is LOWER than the specified range, move the bottom of the DesignFlow frame away from the outdoor air dampers (toward the back end of the unit). Do this by turning the long adjuster nut to decrease the L dimension in Figure 65.

NOTE: If the necessary adjustment cannot be made using the long adjuster nut, reposition the two 1/4-20 NC jam nuts on the threaded rod to make larger adjustments (see Figure 65).

7. When finished making the adjustments, tighten the 1/4-20 NC lock nut in the slotted hole at the bottom of the DesignFlow frame. (See Figure 65.)

NOTE: Make sure the leveling weight's top thumbscrew is still against the vertical alignment mark on the vane.

8. Gently rap the base frame to slightly vibrate the assembly to encourage the vane to seek its equilibrium point.
9. Recheck the vane position compared to the range specified in Step 16 above. Readjust the level as necessary.

NOTE: If large adjustments are required to correctly level the vane assembly, before rechecking the level, relocate the fulcrum as described in Step 9 in DesignFlow Station Startup on page 65.

10. When the level is correct, unlock and open the louvered outdoor air intake door on the side of the unit and tighten the two 1/4-20 NC lock nuts at the top of the DesignFlow frame. (See Figure 63.)
11. Close and lock the air intake door.
12. Recheck the vane position and readjust the level as necessary.
13. When the vane position is correct, remove the fulcrum and replace the access opening cover in the louvered door.

Figure 63: DesignFlow Frame

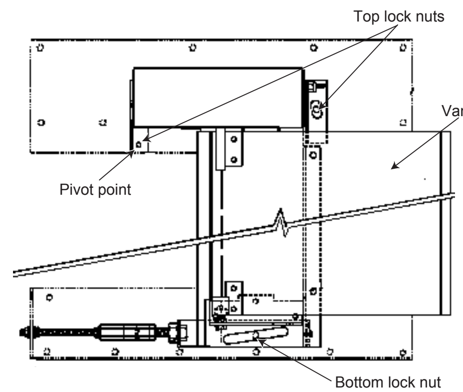


Figure 64: Remove Covers from Access Opening

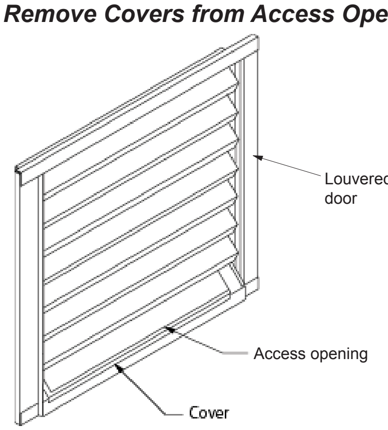
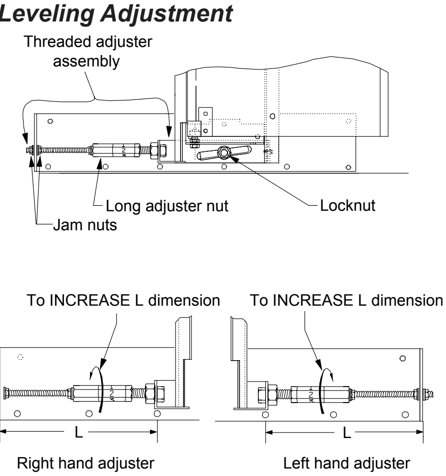


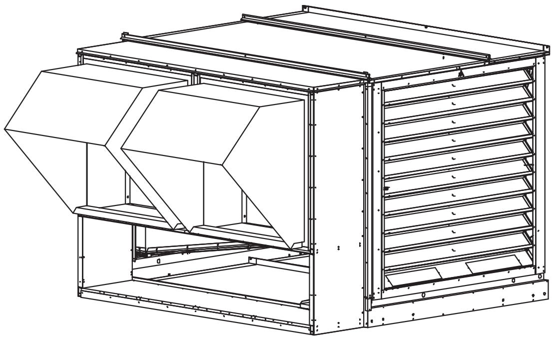
Figure 65: Leveling Adjustment

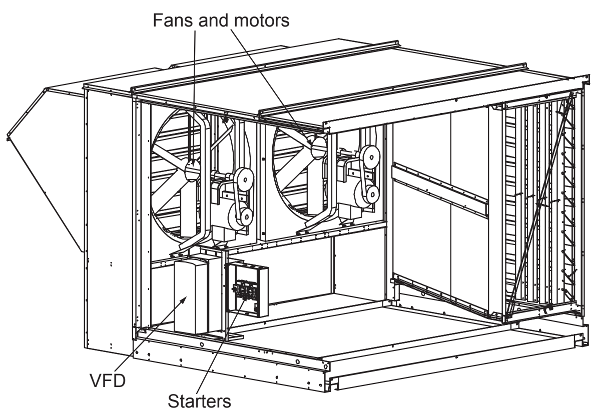


Propeller Exhaust Fan Option

Economizer units may include propeller exhaust or centrifugal return fan options. This section covers maintenance and operating instructions for the propeller exhaust option. Centrifugal return fan construction, maintenance and operation is similar to that for supply fans and covered in other sections of this manual.

Figure 66: Two Fans with Back Return Shown





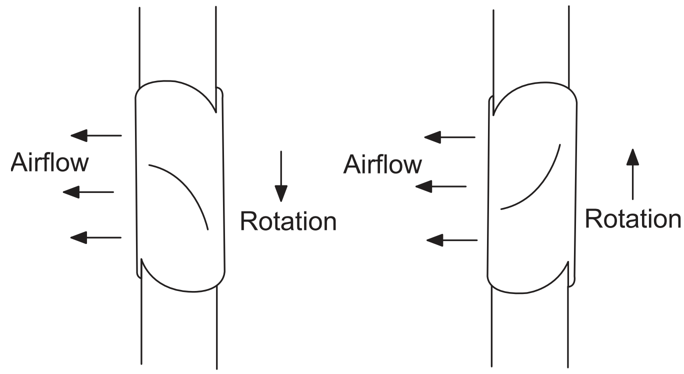
Prestarting Checks

Check all fasteners and set screws for tightness. This is especially important for bearing set screws.

The propeller should rotate freely and not rub on the fan panel venturi. Rotation direction of the propeller should be checked by momentarily turning the unit on. Rotation should be in the same direction as the rotation decal affixed to the unit or as shown in Figure 67. For three-phase installations, fan rotation can be reversed by simply interchanging any two of the three electrical leads.

The adjustable motor pulley is preset at the factory for the specified fan RPM. Fan speed can be increased by closing or decreased by opening the adjustable pulley. Two or three groove variable pitch pulleys must be adjusted an equal number of turns open. Any increase in fan speed represents a substantial increase in horsepower required from the motor. Always check motor load amperage and compare to name plate rating when changing fan speed.

Figure 67: Fan Rotation



Once the fan is put into operation, set up a periodic maintenance program to preserve the reliability and performance of the fan. Items to include in this program are:

- Belts
- Bearings
- Fasteners
- Setscrews
- Lubrication
- Removal of Dust/Dirt

Damper Counterbalance Adjustment

The following instructions should be followed when attempting to maximize the counterbalance effect on the EM or GM model dampers. Be aware that when the balance setting is highly sensitive, friction wear and contamination will have an adverse effect to the operation of the damper. The sensitivity of the counterbalance should only be set to meet the application requirements. The damper must be mounted square and plumb and operate freely before any weight adjustments are performed.

Adjustment #1 will effect the balance of the blades in the open position. Adjustment #2 will effect the balance of the blades in the closed position along with a small change to the open position balance.

If the damper blades do not achieve full open position under airflow and you want them to open further or all the way, then adjustment #1 will need to be performed. If the damper blades do not open completely and adjustment #1 has been addressed, then more weight is required.

If the airflow through the damper is light and the blades only slightly move from the closed position, then adjustment #2 and #1 are required.

Adjustment #1:

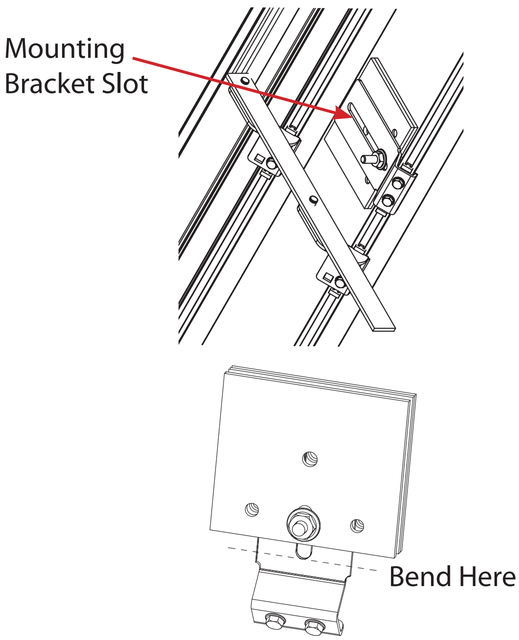
Moving the weight stack along the length of the mounting bracket slot (Figure 68) will effect the full open balance of the blade assembly. Moving the weights further away from the blade pivot point will cause the blades to become more balanced so that at some point, and with enough weight, the blades would remain open. Care must be taken to ensure that when the weights are moved outward from the blade pivot point they will not interfere with the adjacent blade when the blades close. Moving the weights back towards the blade pivot point will allow the blades to close.

Adjustment #2:

The damper is assembled with the counterbalance weights and bracket installed such that, when the blades are closed, the counterbalance weights and bracket are positioned directly inline with the blade pivot points. This position of the weights will provide a slight load that will hold the blades in the closed position. To reduce this load, the counterweight-mounting brackets can be bent (Figure 68) away from the adjacent blade surface. Bending the counterweight mounting brackets will move the counterweight stack behind the blade pivot point and therefore allow the blades to start opening at lower airflow rates. This adjustment should be performed in small increments since the blades will not fully close if the brackets are bent to far.

NOTE: Performing adjustment #2 will have a small effect on adjustment #1. Therefore, if adjustment #1 is critical, then adjustment #1 may need to be repeated.

Figure 68: Counterbalance Adjustment



Belts

Premature belt failures are frequently caused by improper belt tension (either too tight or too loose) or misaligned pulleys. The proper tension for operating a V-belt is the lowest tension at which the belts will not slip at peak load conditions. For initial tensioning, the proper belt deflection half way between pulley centers is 1/64" for each inch of belt span. For example, if the belt span is 64 inches, the belt deflection should be one inch using moderate thumb pressure at midpoint of the drive, See Figure 69.

Check belt tension two times during the first 24 hours of operation and periodically thereafter. To adjust belt tension, simply loosen four fasteners (two on each side of the motor plate) and slide the motor plate away from the fan shaft until proper belt tension is attained. On some fans, fasteners attaching the motor to the motor plate must be loosened in order to adjust the belt.

It is very important that the drive pulleys remain in proper alignment after adjustments are made. Misalignment of pulleys results in premature belt wear, noise, vibration, and power loss. See Figure 70.

Figure 69: Belt Adjustment

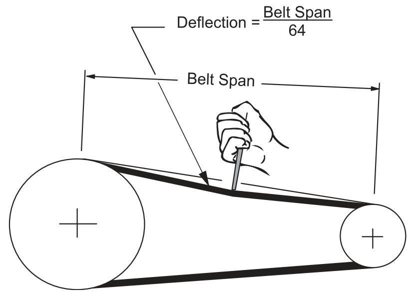


Figure 70: Drive Pulley Alignment

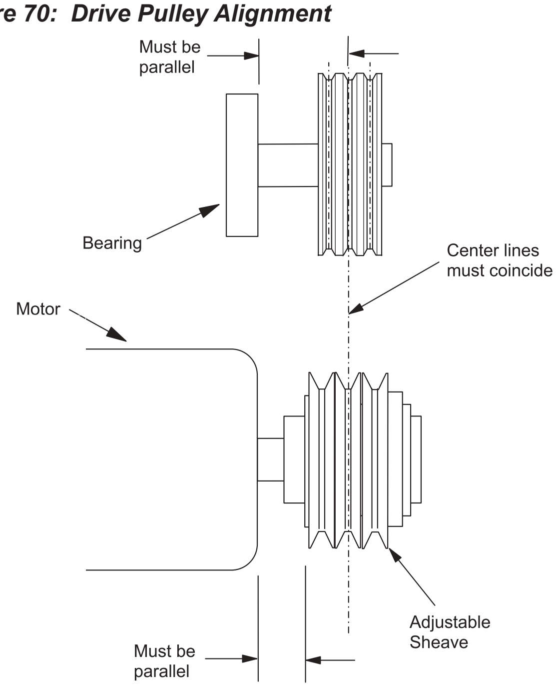
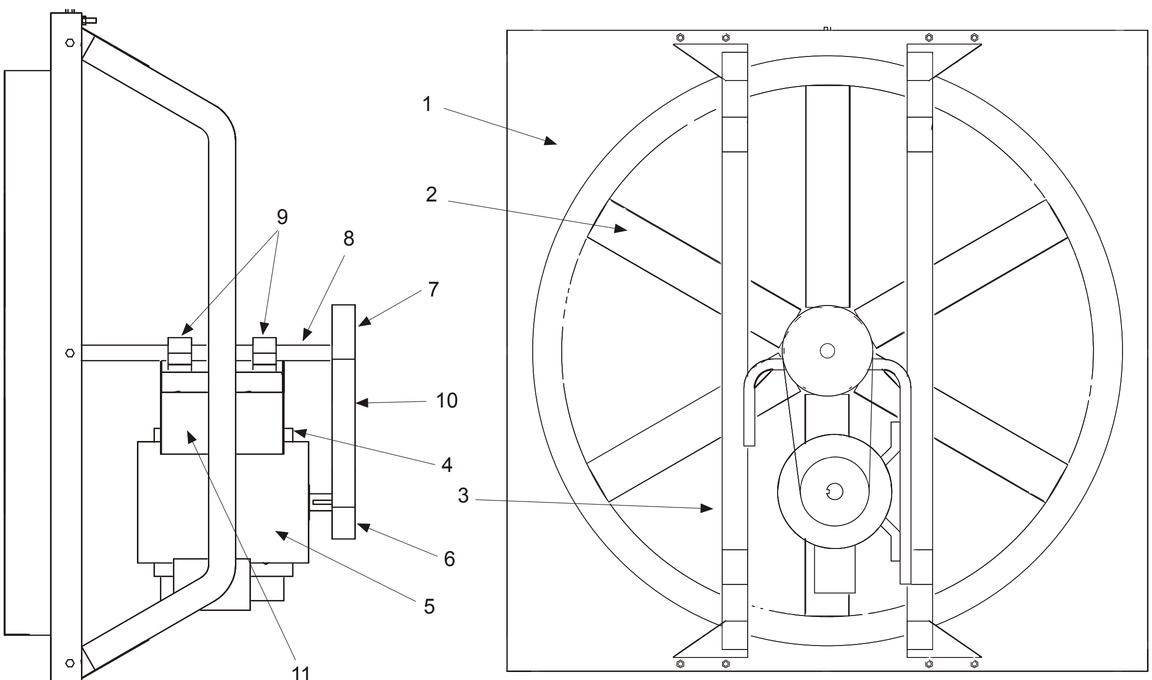


Table 11: Propeller Exhaust Fan Troubleshooting

Problem	Cause	Corrective Action
Reduced Airflow	System resistance is too high.	• Check backdraft dampers for proper operation • Remove obstructions in ductwork • Clean dirty filters • Check for adequate supply for air exhaust fans or exhaust air for supply fans
	Unit running backwards.	Prestarting Checks on page 68
	Fan speed too low.	Increase fan speed
	Excessive dirt on propeller.	Clean propeller
Excessive Noise	Bearings	• Tighten bearing collars and setscrews • Lubricate bearings • Replace defective bearings
	V-Belt drive	• Tighten pulleys on motor shaft and fan shaft • Adjust belt tension • Align pulleys • Replace worn belts or pulleys
	Excessive vibration	• Clean dirt build-up from propeller • Check all setscrews and fasteners for tightness • Check for worn bearing • Correct propeller imbalance • Check for loose dampers, guards or ductwork
	Defective motor	Replace motor.

Figure 71: Propeller Exhaust Fan Replacement Parts List



1. Fan panel
2. Propeller
3. Drive frame channel (2)
4. Motor plate
5. Motor
6. Motor pulley
7. Shaft pulley
8. Fan shaft
9. Bearings
10. Belt
11. Bearing plate

Bearings

Bearings are the most critical moving part of the fan; inspect them at periodic intervals. Check locking collars, set screws, and fasteners that attach bearings to the bearing plate for tightness. In a clean environment and temperatures above 32°F/below 200°F, lubricate fan shaft bearings with grease fittings semiannually using a high quality lithium-based grease. If unusual environmental conditions exist temperatures below 32°F/above 200°F, moisture or contaminants, more frequent lubrication is required.

With the unit running, add grease very slowly with a manual grease gun until a slight bead of grease forms at the seal. Be careful not to unseat the seal by over lubricating or using excessive pressure. Bearings without grease fittings are lubricated for life.

Fasteners and Setscrews

Any fan vibration has a tendency to loosen mechanical fasteners. A periodic inspection should include checking all fasteners and set screws for tightness. Pay particular attention to setscrews attaching the propeller to the shaft and the shaft to the bearings. Loose bearing set screws lead to premature failure of the fan shaft.

Lubrication

Refer to "Bearings" for bearing lubrication. Many fractional horsepower motors installed on the smaller fans are lubricated for life and require no further attention. Oil motors equipped with oil holes in accordance with the manufacturer's instructions printed on the motor. Use a high grade SAE 20 machine oil and use caution not to over lubricate. Grease motors supplied with grease fittings according to directions printed on the motor.

Removing Dust/Dirt

Thoroughly clean the exterior surface of the motor, fan panel, and entire propeller periodically. Dirt can clog cooling openings on motor housings, contaminate bearing lubricant, and collect on propeller blades causing severe imbalance if left unchecked. Use caution and do not allow water or solvents to enter the motor or bearings. Under no circumstances should motors or bearings be sprayed with steam or water.

Exhaust Fan ON/OFF Control

The exhaust fans are turned on and off based on building static pressure, outdoor air damper position, and discharge fan capacity. Exhaust fans do not have to always run while the supply fan is on, as does a return fan. They are turned on and off through output MCB-B02 on the Main Control Board. For detailed information on Propeller Exhaust Fan Control, see the operation manual supplied with the unit (OM 920).

Exhaust Fan Troubleshooting

Table 11 provides guidelines for troubleshooting problems with the propeller exhaust fan options. A list of parts is provided in Figure 71.

Ultraviolet Lights

When this option is employed, ultraviolet C light bathes the moist surfaces on the coil and drain pan, killing most microorganisms that can grow there.

Typically, ultraviolet lights are installed on the leaving side of the cooling coils in the unit. Each light module is mounted on a rail and is removable for convenient bulb replacement. UV Light Power Disconnect switches (two per door) are factory installed on every door that allows a direct line of sight to the UV lamps when opened. These switches are designed to prevent UV exposure when cabinet doors are opened and must not be disabled.

A viewing window near the UV lights allows viewing to determine if the lights are energized. The viewing windows use specially designed glass that blocks harmful UV light.

CAUTION

UVC exposure is harmful to the skin and eyes. Looking at an illuminated bulb can cause permanent blindness. Skin exposure to UVC can cause cancer. Always disconnect power to unit before servicing. Do not operate if disconnect switch has been disabled.

Ultraviolet Light Operation

Refer to the wiring schematic below. 115VAC power for the UV lights is provided by control circuit transformer T1. The lights operate whenever the unit is powered, system switch S1 is closed, and all doors with door power disconnect switches are closed. To turn the lights off, disconnect power to the entire unit, or open system switch S1.

The normally open disconnect switches are wired in series in a circuit that supplies 24VAC to the coil of relay R45. When all doors are closed, relay R45 is energized, and its normally open contacts (in series with system switch S1) provide 115VAC to the UV lights.

Figure 72: Typical Ultraviolet Light Installation

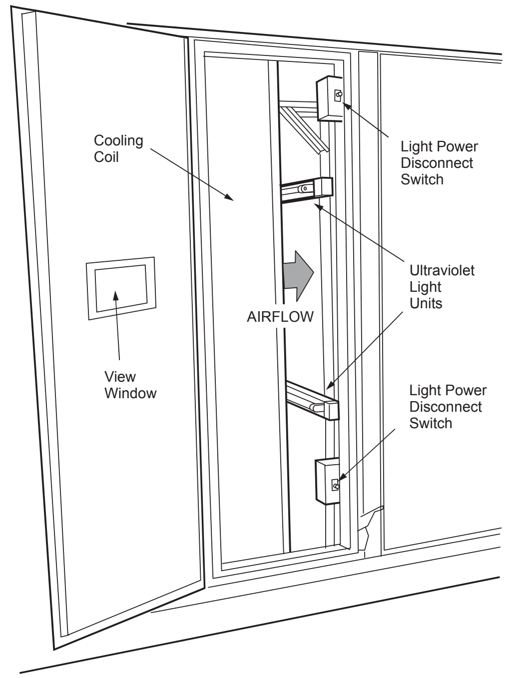
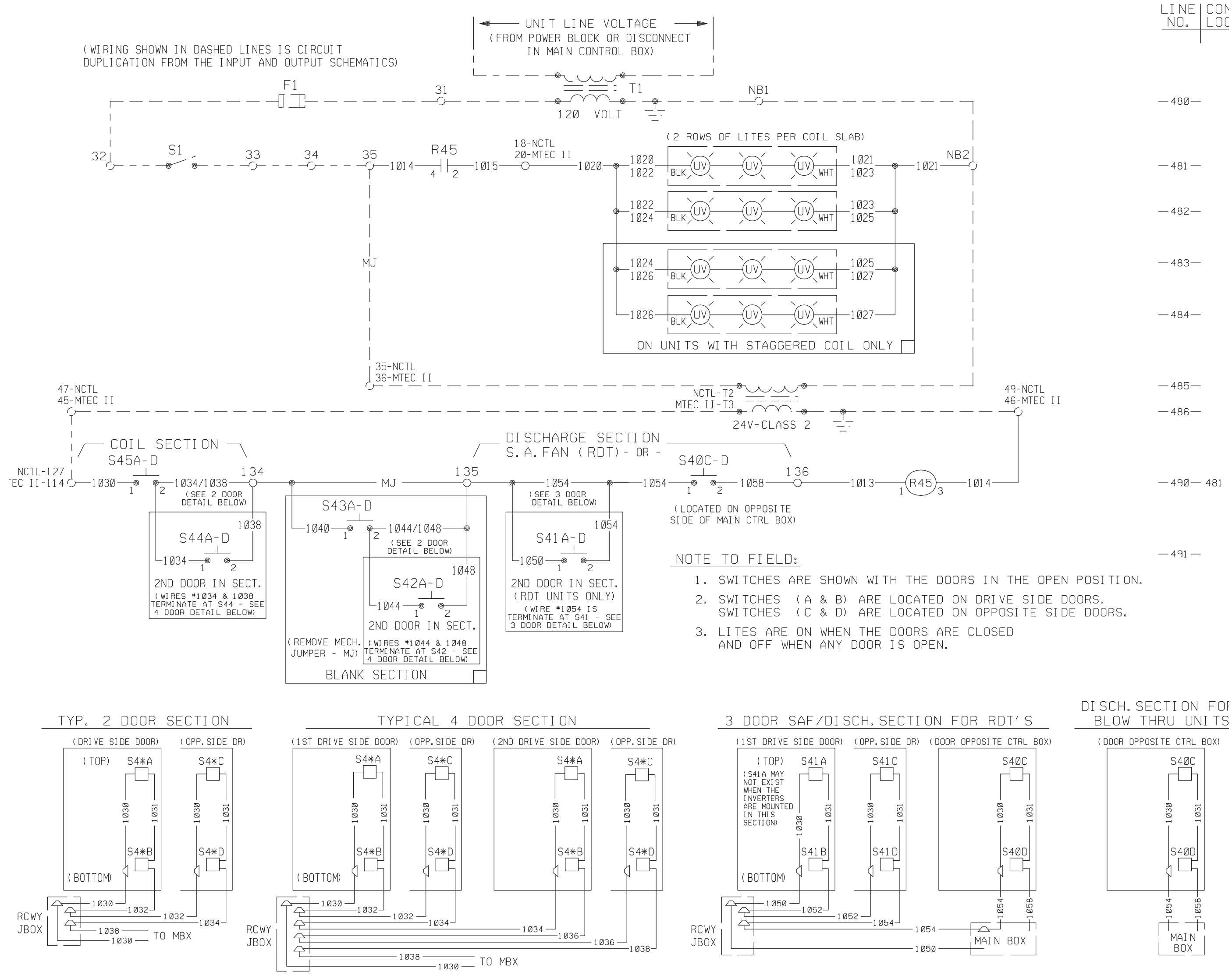


Figure 73: Typical Ultraviolet Light Wiring Schematic



Check, Test and Start Procedures

⚠ WARNING

Electric shock and moving machinery hazard. Can cause severe equipment damage, personal injury, or death.

Disconnect and tag out all electrical power before servicing this equipment.

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

Read and follow this manual: "MicroTech III Applied Rooftop Unit Controller" manual (OM 920) before operating or servicing.

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

All units are completely run tested at the factory to promote proper operation in the field. Nevertheless, the following check, test, and start procedures must be performed to properly start the unit. To obtain full warranty coverage, complete and sign the check, test, and start form supplied with the unit, or complete the Rooftop Equipment Warranty Registration Form on page 118 and return it to Daikin.

A representative of the owner or the operator of the equipment should be present during start-up to receive instructions in the operation, care, and ma enance of the unit. If the unit has a factory mounted disconnect switch, use the switch's bypass mechanism to open the main control panel door without de-energizing the control panel. See page 113 for instructions.

Servicing Control Panel Components

⚠ DANGER

Hazardous voltage. May cause severe injury or death.

Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize the unit.

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

Before Start-up

1. Verify that the unit is completely and properly installed with ductwork connected.
2. Verify that all construction debris is removed, and that the filters are clean.
3. Verify that all electrical work is complete and properly terminated.
4. Verify that all electrical connections in the unit control panel and compressor terminal box are tight, and that the proper voltage is connected.
5. Verify all nameplate electrical data is compatible with the power supply.
6. Verify the phase voltage imbalance is no greater than 3%.
7. Verify that gas piping is complete and leak tight.
8. Verify that the shutoff cock is installed ahead of the furnace, and that all air has been bled from the gas lines.
9. Manually rotate all fans and verify that they rotate freely.
10. Verify that the belts are tight and the sheaves are aligned.
11. Verify that all setscrews and fasteners on the fan assemblies are still tight. Do this by reading and following the instructions in "Setscrews," which is in the "Maintenance" section of this manual.
12. Verify that the evaporator condensate drain is trapped and that the drain pan is level.
13. If unit is curb mounted, verify that the curb is properly flashed to prevent water leakage.
14. Before attempting to operate the unit, review the control layout description to become familiar with the control locations.
15. Review the equipment and service literature, the sequences of operation, and the wiring diagrams to become familiar with the functions and purposes of the controls and devices.
16. Determine which optional controls are included with the unit.
17. Before closing (connecting) the power disconnect switch, open (disconnect) the following unit control circuit switches:
    a. Main Control Panel
       – Turn system switch S1 to OFF.
       – Electric heat units: turn switch HS1 to OFF.
    b. Furnace Control Compartment
       – Turn furnace switch S3 to OFF.
       – Main Control Panel Switch S7 to OFF.
18. If the DAC or SCC unit does not have an optional zone temperature sensor (ZNT1) connected to it, you may need to change the keypad entry under *Main Menu\Commission Unit\Unit Setup\Space Sensor = from none, Analog/Net, Digital/Net.*

NOTE: If desired, you can significantly reduce all MicroTech III internal control timers by the changing the entry under keypad menu *Main Menu\Commission Unit\Timer Settings\Service Time* = (from *0 min to X min* where X is the number of minutes you want the unit to operate with fast timers).

Power Up

1. Close the unit disconnect switch. With the control system switch S1 in the OFF position, power should be available only to the control circuit transformer (T1) and the compressor crankcase heaters.
2. Turn the Switch S1 to ON. Power should now be supplied to the control panel, and the LEDs on MCB1 should follow the normal startup sequence (refer to Power-up on page 39).

Fan Start-up

1. Verify all duct isolation dampers are open. Unit mounted isolation dampers may be in the supply or return sections.
2. Place the unit into the Fan Only mode through the keypad menu *Main Menu\Quick Menu\Ctrl Mode = Fan*.
3. Turn Switch S7 to ON. The controller should enter the Startup Initial operating state. If the fan does not run:
   a. Check fuses F1 and F3.
   b. Check the manual motor protectors or that the circuit breakers have not tripped.
   c. Check the optional phase monitor.
4. If the fans are equipped with optional spring isolators, check the fan spring mount adjustment. When the fans are running they should be level. Refer to Spring Isolated Fans on page 36.
5. Verify the fan rotation is correct.
6. Verify the DHL safety is opening at a pressure compatible with duct working pressure limits.

NOTE: The supply and return fan drives usually are selected for operation in the drive's mid-speed range. The return fan drives are usually shipped with fixed pitch sheaves that will provide the selected fan speed; however, the supply fan drives are usually shipped with variable pitch sheaves that are adjusted to provide the minimum fan speed. Both drives should be adjusted for proper airflow during air balancing. See Air Balancing on page 79.

Economizer Start-up

⚠ CAUTION

Adjust dampers properly. Improper adjustment can damage the dampers. When an economizer is ordered without an actuator, the linkage requires a 3.14" linear stroke to open it fully. Do not allow dampers to be driven beyond their normal full closed or full open position.

1. Check whether the outdoor air is suitable for free cooling by displaying the keypad menu *Main Menu View\Set Unit\Econo Status. See* OM 920 *"Determining Economizer Status" section*. *Low* indicates low outdoor air enthalpy; *High* indicates high outdoor air enthalpy. See Outside Air Enthalpy Control (OAE) on page 60 to verify that the enthalpy changeover control is working properly. You may want to take temperature and humidity measurements.
2. At the keypad, set the cooling setpoint low enough so the controller calls for cooling. Adjust the value in *View\Set Unit\Cooling\Occ Clg Spt* below the temperature shown in *View\Set Unit\Temperatures\Control Temp*. In addition, on DAC units, adjust the value in *View\Set Unit\Cooling\DAT Clg Spt* below the temperature shown in *View\Set Unit\Temperatures\Discharge Temp.*
3. Place the unit into cooling mode through the keypad menu *Quick Menu\Ctrl Mode = Cool Only*.
4. Observe the outdoor air dampers:
   a. If the outdoor enthalpy is low, the control algorithm should start to modulate the dampers open to maintain the discharge air setpoint.
   b. If the outdoor enthalpy is high, the dampers should maintain their minimum position. Look at menu *View\Set Unit\Min OA Damper\Min OA Pos*. Change this entry to another value. Verify that the dampers move to the new minimum position setpoint.
5. If the unit is equipped with the electromechanical enthalpy changeover control (Honeywell H205) and the outdoor air condition is borderline, attempt to change its input to the MicroTech III controller by turning the switch adjustment to A or D. Check enthalpy status in keypad menu *Main Menu View\Set Unit\Econo Status. See* OM 920 *"Determining Economizer Status" section.* If this reading is *Low*, go to Step 5a. If it is *High*, go to Step 5b.

NOTE: It may not be possible to check the economizer operation in both low and high enthalpy states on the same day. If this is the case, repeat this procedure on another day when the opposite outdoor air enthalpy conditions exist.

Evaporative Condenser Start-Up

1. Verify that the sump is completely empty and the drain plugs are fully installed and tight.
2. Open the manual city water valve. Solenoid valve SV61 should be energized by sump water level switch WL63. Supply water piping should be leak tight. Observe the sump begin to fill.
3. Make sure that pumpdown switches PS1, PS2 and PS3 are turned to “OFF”.
4. Turn compressor control circuit switch CS1 to “ON”.
5. Verify that the compressors remain off.
6. Place a jumper between terminals 57 and 59. If the sump low water switch is working properly, spray pump M64 will remain off when the sump is empty. If the spray pump turns on without water in the sump, pull the jumper immediately and check the switch and associated wiring.
7. When the water fills past the low water switch WL64, the spray pump will energize. Observe piping inside the service section and in the condensing section. Make sure piping is water tight and that the spray pattern is completely covering the condensing coil.
8. Remove the jumper and the spray pump should shut down.
9. When the water level reaches WL63, the supply water solenoid should shut off city water into the unit.
10. If the unit is equipped with the optional sump heater, check its internal thermostat. Set the dial to a setpoint above the current sump temperature. Measure the current draw of the heater and compare to the heater nameplate data. When finished, put the setpoint back to the desired operating value (about 50°F)
11. If the unit is equipped with optional freeze protection, check its operation. Go to the evaporative condenser keypad menu and set the sump dump setpoint below the current sump temperature. Solenoid valve SV63 should energize and start the sump draining. Solenoid valve SV61 and spray pump M64 should be de-energized. When finished, change setpoint back to 35°F (default).

Compressor Startup

⚠ CAUTION

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

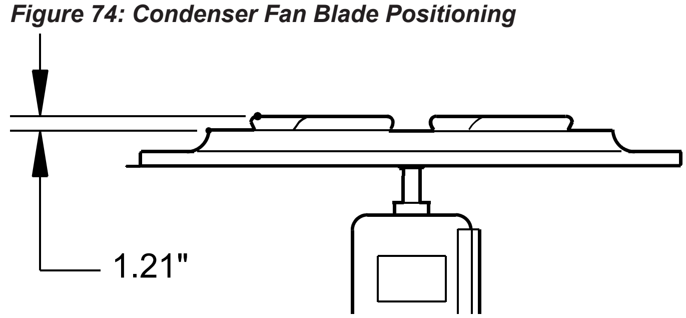
With the supply and return fans operational, prepare for compressor operation.

The unit is shipped with refrigeration service valves closed. Backseat (open) the discharge, and liquid line valves. Connect service gauges and crack the valves off the backseat position (one turn forward). Verify that the unit has not lost its refrigerant charge.

Verify that the crankcase heaters are operating. These should operate for at least 24 hours before starting the compressors.

Verify that the condenser fan blades are positioned properly and that the screws are tight (see Figure 74). The fan blade must be correctly positioned within its orifice for proper airflow across the condenser coils.

Figure 74: Condenser Fan Blade Positioning



Perform the following procedure on all units:

1. At the keypad, set the cooling setpoint low enough so that the controller will call for cooling. The value in *View\Set Unit\Cooling\Occ Clg Spt* will need to be adjusted below the temperature shown in *View\Set Unit\Temperatures\Control Temp*. In addition, on DAC units, the value in *View\Set Unit\Cooling\DAT Clg Spt* will need to be adjusted below the temperature shown in *View\Set Unit\Temperatures\Discharge Temp*.
2. Place the unit into cooling mode through the keypad menu *Quick Menu\Ctrl Mode = Cool Only*.
3. Verify that the low ambient compressor lockout temperature setpoint, *Main Menu\Commission Unit\Cooling Setup\Clg Lo OAT Lk* is set below the current outside air temperature (shown in *View\Set Unit\Temperatures\OA Temp*).

NOTE: Do not attempt to operate the compressors if the outdoor air is too cool. See the caution statement under “Compressor Startup”.

4. Turn pumpdown switch PS3 to “on.”
5. Turn compressor control circuit switch CS1 and pumpdown switch PS1 to “on.” Now refrigeration circuit #1 is enabled and circuit #2 is disabled. Note that if the unit has an economizer and the outdoor air enthalpy is low, the economizer must fully open before the controller will energize mechanical cooling. When the outdoor air damper has fully opened and the internal timer has expired, liquid line solenoid valve SV1 should open. If the solenoid valve does not open, do the following:
    a. Verify that there is a call for cooling by checking the keypad menu *Main Menu\View\Set Unit\Unit Status\Settings\Clg Status =*.The Compressors will only run if this reads (Enabled). This should be in *Cooling*.
    b. Check the keypad menu *Main Menu\View\Set Unit\Unit Status\Settings\Clg Status =*. The compressors will only run if this reads (Enabled).
    c. Trace the control circuits.

⚠ **NOTICE**

Venting refrigerant to atmosphere is not allowed per most local laws and/or codes.

6. Verify that compressor #1 starts. If the compressor motor hums but does not run, verify that it is getting three-phase power.
7. The compressor should operate continuously while there is a call for cooling. If the compressor cycles on its low pressure switch, do the following:
    a. Verify that the circuit is not short of refrigerant.
    b. Check for low airflow.
    c. Check for clogged filters.
    d. Check for restricted ductwork.
    e. Check for very low temperature return air entering the unit.
    f. Verify that the liquid line components, expansion valve, and distributor tubes are feeding the evaporator coil.
    g. Verify that all air handling section panels are closed.
    h. Verify that the liquid line service valves are completely open.
8. Verify that the compressors stage properly. As the circuit loads up the second compressor (if available) will be energized. For more information on staging sequences, refer to IM 919 and OM 920.
9. Verify that the condenser fans are cycling and rotating properly (blowing air upward). When the compressor starts, at least one condenser fan should also start. The CCB1 should control the remaining condenser fans based on ambient air conditions. Look at keypad menu *Main Menu\Commission Unit\Cooling Setup\ Cfan Out1 Spt =, Cfan Out2 Spt =, Cfan Out3 Spt*. Table 3 on page 15 and Table 4 on page 32 shows recommended setpoints based on the unit size. Cond Fan1 controls BO5, Cond Fan2 controls BO6, Cond Fan3 controls BO7, Cond Fan4 controls BO8. Refer to the unit wiring diagrams and Table 5: Recommended 3-Phase Power Wiring* on page 34.

10. After 15 minutes of run time, check the oil level in the compressor sightglass. If low oil or heavy foaming is observed, it is possible that liquid refrigerant is returning to the compressor. Check the suction superheat (see "Expansion Valve Superheat Adjustment"). It should be between 10°F (5.5°C) and 13°F (7.2°C).
11. Open S1. the compressor should stop. Place the unit into the "Fan Only" mode through the keypad menu *Main Menu\Quick Menu\Ctrl Mode = fan only*.
12. Check refrigerant circuit #2 by repeating steps 2 through 9, substituting circuit #2 nomenclature for circuit #1 nomenclature (CS2, TD2, CCB2, and compressor #2 (and #4).
13. Check the compressor oil level again, add oil if low.
14. Verify that the condenser refrigerant subcooling at full capacity is between 13 and 20°F.

Expansion Valve Superheat Adjustment

It is very important that the expansion valve superheat setting be adjusted to be between 8°F (–13°C) and 14°F (–10°C). Insufficient superheat will cause liquid floodback to the compressor which may result in slugging. Excessive superheat will reduce system capacity and shorten compressor life.

Turn the adjustment stem clockwise to increase superheat. Not exceeding one turn, adjust the stem and then observe the superheat. Allow up to 30 minutes for the system to rebalance at the final superheat setting.

On refrigeration circuits with multiple expansion valves, the superheat adjustment should be approximately the same for all valves in the circuit.

Checking Superheat

Following are recommendations for checking superheat:

1. Close the unit section doors. Running the unit with its doors open will affect expansion valve and system operation considerably.
2. For units with one expansion valve per circuit, check the pressure and temperature at the compressor suction valve.
3. For units with multiple expansion valves per circuit, check the pressure at the compressor, and check the temperature at the suction header that is fed by the valve.

NOTE: If low oil level is accompanied by heavy foaming visible in the oil sightglass, it is possible that excess liquid refrigerant is returning to the compressor depending on the rotation of the crank shaft. Check the suction superheat and adjust the expansion valve for 8°F (–13°C) and 14°F (–10°C) of superheat. If proper superheat is obtained, sightglass foaming is not a concern.

For RCS/RFS applications in which the condensing section is remote from the air handling section, consideration should have been given to proper piping between the sections, as this can affect the compressor oil level. Refer to the "ASHRAE Handbooks" for more information on proper refrigeration piping design and installation.

Oil Pressure

When the compressor has operated long enough to stabilize conditions, proper oil pressure should be maintained. The actual oil pressure value varies from compressor to compressor and depends upon the temperature, oil viscosity, compressor size, and the amount of clearance in the compressor bearings. Oil pressure values from 20 to 60 psi (138-414 kPa) (over suction pressure) are not uncommon.

The oil level in the compressor sightglass can vary widely and depends upon the same factors listed above. In fact, it is not unusual for two compressors that serve the same circuit to have very different oil levels. Therefore, it is recommended that oil pressure, not sightglass level, be used to judge whether there is enough oil in a refrigerant circuit. If the oil pressure is low, additional oil should be added (use only dry refrigerant grade oil, Sunisco 3GS, Texaco WF32, or Calumet R015).

NOTE: If low oil level is accompanied by heavy foaming visible in the oil sightglass, it is possible that excess liquid refrigerant is returning to the compressor. Check the suction superheat and adjust the expansion valve for 10°F (-12°C) to 13°F (-11°C) of superheat

Heating System Startup

General

1. At the keypad, set the heating setpoints high enough so that the controller calls for heating.Adjust the value in *Main Menu View\Set Unit\Heating\Occ Htg Spt* = (above the temperature shown in) *Main Menu View\Set Unit\Temperatures\Control Temp*. In addition, on DAC units, adjust the value in *Main Menu View\Set Unit\Heating\DAT Htg Spt* above the temperature shown in *Main Menu View\Set Unit\Temperatures\Disch Temp*.
2. Place the unit into heating mode through the keypad menu *Main Menu\quick Menu\Ctrl Mode = Heat Only*.
3. Verify that the high ambient heat lockout temperature setpoint, *Main Menu\Commission Unit\Heating Setup\Htg Hi OAT Lk* is set above the current outside air temperature (shown in *Main Menu\View\Set Unit\Temperatures\OA Temp*).

Gas Furnace

Refer to the "Start-up and Operating Procedures" section of the Forced Draft Gas Fired Furnace Installation Manual, IM 684 or IM 685. Perform the start-up procedures given in it.

Electric Heat

Turn the electric heat switch HS1 to ON. The electric heaters should energize. If the unit has multistage electric heat, the MicroTech III Auxiliary Control board EHB1 should energize the heaters in successive stages. The rate of staging is set in keypad menu *Main Menu\Commission Unit\Heating Setup\Htg Stage Time*. The default value of *"5 min"* can be adjusted from 2 to 60 minutes.

Steam Heat

The steam valve actuator should open the valve. The steam valve is open when the valve stem is up. If the unit loses power, the spring in the actuator should drive the valve wide open. Check this by opening system switch S1.

Hot Water Heat

The hot water valve actuator should open the valve to the coil. The three-way hot water valve is open to the coil when the valve stem is down. If the unit loses power, the spring in the actuator should drive the valve wide open to the coil. Check this by opening system switch S1.

Air Balancing

⚠ WARNING

Moving machinery hazard. Can cause severe personalinjury or death.

Do not use a mechanically driven tachometer to measure the speed of return fans on this fan arrangement. Use a strobe tachometer.

⚠ WARNING

Rotating parts can cause severe personal injury or death Replace all belt/fan guards that are temporarily removed for service.

Air balancing should be performed by a qualified air balancing technician. Note that the supply fan motors are usually shipped with variable pitch sheaves which are typically set at the low end of the drive's fan rpm range. See Mounting and Adjusting Motor Sheaves on page 80. The return fan motors are usually shipped with fixed pitch sheaves.

The following should be performed as part of the air balancing procedure:

1. Check the operating balance with the economizer dampers positioned for both full outdoor air and minimum outdoor air.
2. Verify that the total airflow will never be less than that required for operation of the electric heaters or gas furnace.
3. For VAV units that have fan tracking control, adjust the supply/return fan balance by using the MicroTech III controller's built-in, automatic capability. For complete information on using this feature, see OM 920, MicroTech III Applied Rooftop Unit Controller.
4. When the final drive adjustments or changes are complete,check the current draw of the supply and return fan motors.The amperage must not exceed the service factor stamped on the motor nameplate.
5. Upon completion of the air balance, replace variable pitch motor sheaves (if any) with comparably sized fixed pitch sheaves. A fixed pitch sheave will reduce vibration and provide longer belt and bearing life.

Drive Belt Adjustment

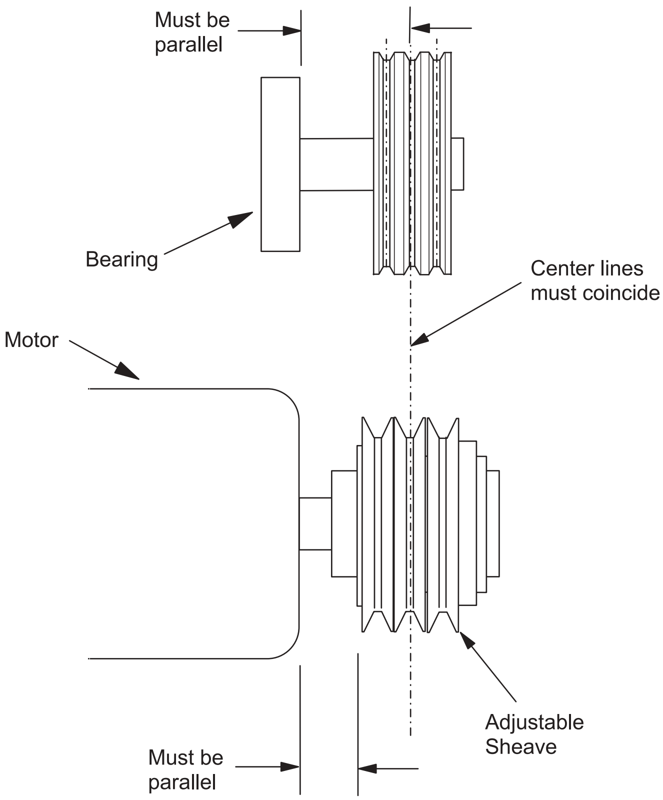
Mounting and Adjusting Motor Sheaves

Sheave Alignment

Mounting:

1. Verify both driving and driven sheaves are in alignment and the shafts are parallel. The center line of the driving sheave must be in line with the center line of the driven sheave. See Figure 75.
2. Verify that all setscrews are torqued to the values shown in Table 20 on page 105 before starting drive. Check setscrew torque and belt tension after 24 hours of service.

Figure 75: Sheave Alignment (Adjustable Shown)



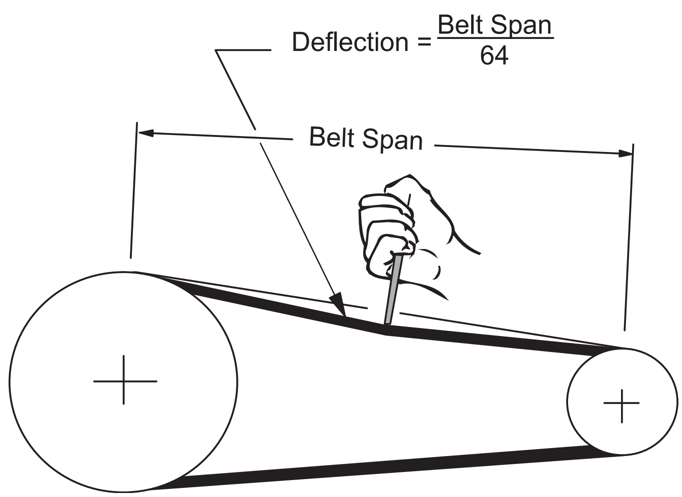
General Rules of Tensioning

1. The ideal tension is the lowest tension at which the belt will not slip under peak load conditions.
2. Check tension frequently during the first 24-48 hours of operation.
3. Over tensioning shortens belt and bearing life.
4. Keep belts free from foreign material which may cause slippage.
5. Make V-drive inspection on a periodic basis. Adjust tension if the belt is slipping. Do not apply belt dressing. This may damage the belt and cause early failure.

Tension Measurement Procedure

1. Measure the belt span. See Figure 76.
2. Place belt tension checker squarely on one belt at the center of the belt span. Apply force to the checker, perpendicular to the belt span, until the belt deflection equals belt span distance divided by 64. Determine force applied while in this position.
3. Compare this force to the values in on the drive kit label found on the fan housing.

Figure 76: Drive Belt Adjustment



VM and VP Variable Pitch Sheaves

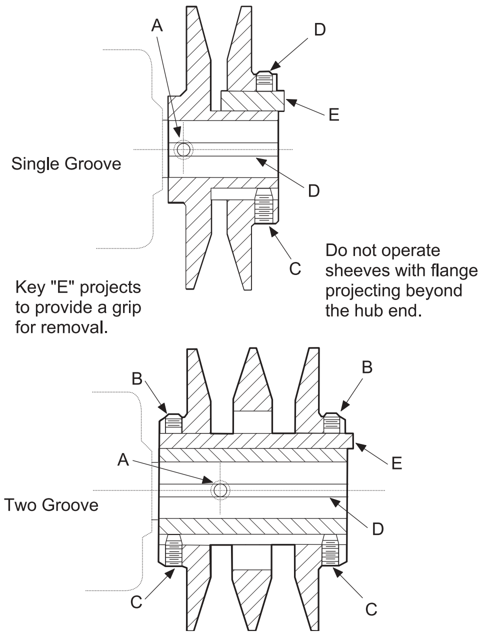
Mounting:

1. All sheaves should be mounted on the motor shaft with setscrew “A” toward the motor (see Figure 77.
2. Be sure both the driving and driven sheaves are in alignment and that the shafts are parallel.
3. Fit internal key “D” between sheave and shaft, and lock setscrew “A” securely in place.

Adjusting:

1. Slack off all belt tension by moving the motor toward the driven shaft until the belts are free from the grooves. For easiest adjustment, remove the belts.
2. Loosen setscrews “B” and “C” in the moving parts of the sheave and pull out external key “E” (see Figure 77). This key projects a small amount to provide a grip for removing.
3. Adjust the sheave pitch diameter for the desired fan speed by opening the moving parts by half or full turns from closed position. Do not open more than five full turns for “A” belts or six full turns for “B” belts. Adjust both halves of two-groove sheaves by the same number of turns from closed to ensure that both grooves have the same pitch diameter.
4. Replace external key “E” and securely tighten setscrews “B” over the key. Tighten setscrews “C” into the keyway in the fixed half of the sheave.
5. Put on belts and adjust the belt tension. Do not force belts over grooves. Loosen the belts by adjusting the motor base closer to the fan shaft.
6. Be sure that all keys are in place and that all setscrews are tight before starting the drive. Check the setscrews and belt tension after 24 hours of service.

Figure 77: VM and VP Variable Pitch Sheaves



LVP Variable Pitch Sheaves

Mounting:

1. For single-groove sheaves, slide the sheave onto the motor shaft so that the side of the sheave with setscrew “A” is next to the motor (see Figure 78 on page 82).
   For two-groove sheaves, slide the sheave onto the motor shaft so that the side of the sheave with setscrew “A” is away from the motor (see Figure 78).
2. To remove the flange and locking rings:
   a. Loosen setscrews “D”.
   b. Loosen, but do not remove, capscrews “E”.
   c. Remove key “F”. This key projects a small amount to provide a grip for removing.
   d. Rotate the flange counterclockwise until it disengages the threads on the shaft barrel.
3. Be sure that the driving and driven sheaves are in alignment and the shafts are parallel. When aligning two-groove sheaves, allow room between the sheave and motor to get to capscrews “E”.
4. Insert key “C” between the sheave and the shaft and tighten setscrew “A” securely.

Adjusting:

1. Slack off all belt tension by moving the motor toward the driven shaft until the belts are free from the grooves. For easiest adjustment, remove the belts.
2. Loosen setscrews “D”.
3. Loosen, but do not remove, capscrews “E”.
4. Remove key “F”. This key projects a small amount to provide a grip for removing.
5. Adjust the pitch diameter by opening or closing the movable flange by half or full turns. Note that two-groove sheaves are supplied with both grooves set at the same pitch diameter. Both movable flanges must be moved the same number of turns to ensure the same pitch diameter for satisfactory operation. Do not open sheaves more than five turns for “A” belts or six turns for “B” belts.
6. Replace key “F”.
7. Tighten setscrews “D” and capscrews “E”.
8. Put on the belts and adjust the belt tension. Do not force belts over grooves. Loosen the belts by adjusting the motor base closer to the fan shaft.
9. Be sure that all keys are in place and that all setscrews and all capscrews are tight before starting the drive. Check and retighten all screws and retension the belts after approximately 24 hours of operation.

MVP Variable Pitch Sheaves

(Refer to Figure 79 and Figure 80)

Adjusting:

1. Slack off belt tension by moving the motor toward the driven shaft until the belts are free from the grooves. For easiest adjustment, remove the belts.
2. Loosen both locking screws “A” in outer locking ring, but do not remove them from the sheave. There is a gap of approximately 0.2" (1 mm) between the inner and outer locking rings. This gap must be maintained for satisfactory locking of the sheave.

   If locking screws “A” are removed by accident and the gap is lost, screw the outer locking ring down until it touches the inner locking ring. Then back off the outer ring 1/2 to 3/4 turn until the inner and outer ring screw holes are lined up. Reinsert locking screws “A”, but do not tighten them until after adjustment is made.
3. Adjust the sheave to the desired pitch diameter by turning the outer locking ring with a spanner wrench. Any pitch diameter can be obtained within the sheave range. One complete turn of the outer locking ring will result in a 0.233" (6 mm) change in pitch diameter.] Do not open “AB” sheaves more than 4-3/4 turns for “A” belts or 6 turns for “B” belts. Do not open “C” sheaves more than 9-1/2 turns.
4. Tighten both locking screws “A” in the outer locking ring.
5. Put on the belts and adjust the belt tension. Do not force belts over grooves. Loosen the belts by adjusting the motor base closer to the fan shaft.

Important: Do not loosen any screws other than the two locking screws “A” in the outer locking ring. These screws must be tightened securely before the drive is operated.

Figure 78: LVP Variable Pitch Sleeves

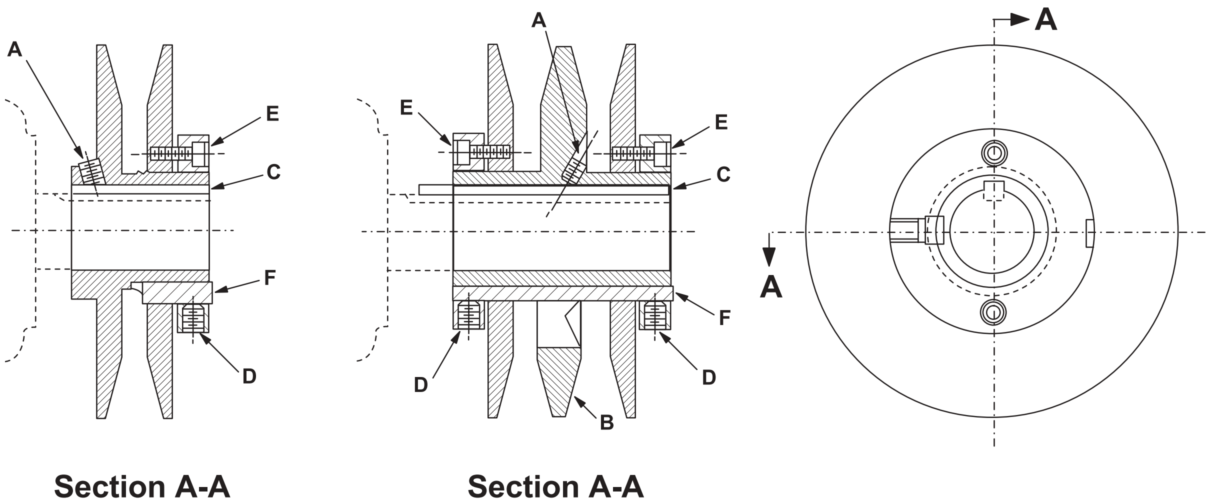


Figure 79: MVP Variable Pitch Sheaves (Type A-B)

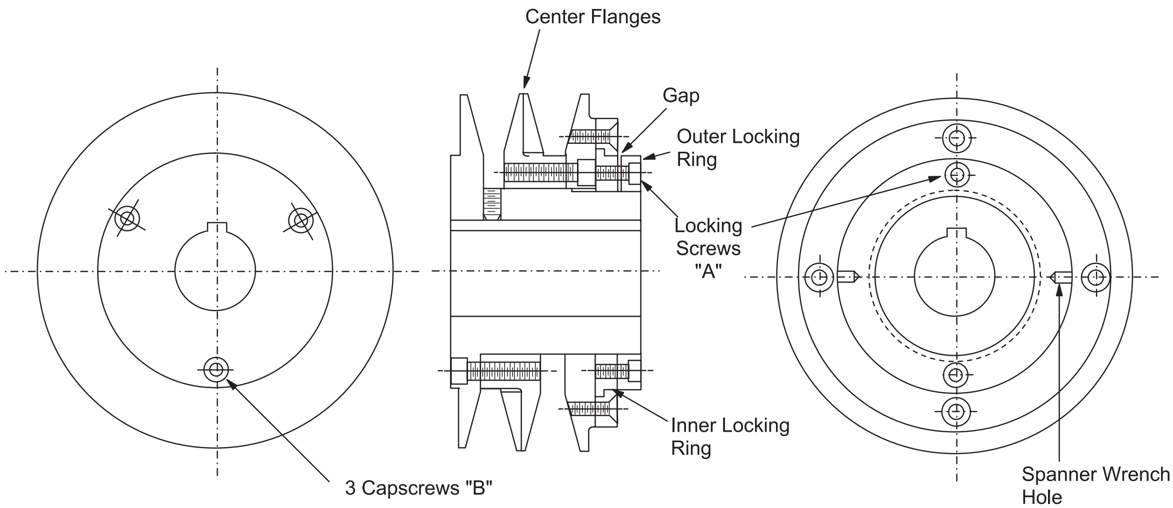
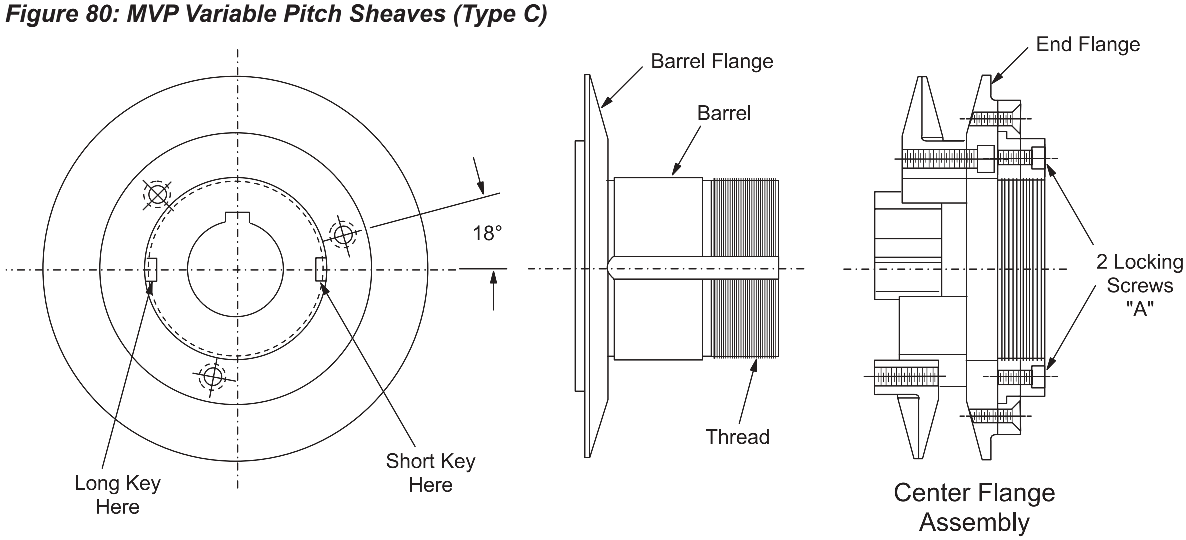


Figure 80: MVP Variable Pitch Sheaves (Type C)



When all start-up procedures have been completed, set the controls and program the MicroTech III controller for normal operation. Use the following list as a guide; some items may not apply to your unit. For more detail, refer to IM 919.

1. Turn system switch S1 & S7 to "ON."
2. Turn gas furnace switch S3 to "auto" or turn electric heat switch HS1 to "ON."
3. Turn compressor control switches CS1 and CS2 to "ON."
4. Turn liquid line solenoid switches PS1, PS2, and PS3 to "ON."
5. Set the electromechanical (Honeywell H205) enthalpy control (OAE) as required (A, B, C, or D). Set the solid-state (Honeywell H705/C7400) enthalpy control (OAE / RAE) past "D".
6. Set the heating and cooling parameters as required for normal unit operation:
    a. Temperature \ Zone Cooling \
    b. Temperature \ Zone Heating \
    c. Temperature \ Discharge Cooling \
    d. Temperature \ Discharge Heating \
7. Set the low ambient compressor lockout setpoint as required in menu, Temperature \ OA Damper \ OATComp Lock =. Do not set it below 50°F (10°C) unless the unit is equipped for low ambient operation.
8. Set the high ambient heat lockout temperature setpoint, Temperature \ Zone Heating \ OATHtg Lock = as required.
9. Set the alarm limits as required in Setup / Service \ Alarm Limits \.
10. Set the compressor lead / lag function as desired using keypad menu Setup / Service \ Compressor Setup \ Lead Circuit= and Setup / Service \ Compressor Setup \ CompCtrl=. Refer to "Compressor Staging" in OM 137 and OM 138.

NOTE: If the unit has hot gas bypass on circuit #1 only, lead circuit must always be "#1".

11. Set the duct static pressure control parameters as required in keypad menu Airflow \ Duct Pressure \.
12. Set the building static pressure control parameters as required in keypad menu Airflow \ Bldg Pressure \.
13. Set the fan tracking parameters as required in keypad menus Setup / Service \ Fan Tracking Setup \ and Setup / Service \ Fan Balance \.
14. Set the economizer control parameters as required in keypad menu Temperature \ OA Damper \.
15. Set the control timers as required in keypad menu Setup / Service \ Timer Settings \.
16. Set the date and time in keypad menu Setup / Service \ Time / Date \.
17. Set the operating schedule as required using keypad menus.
    a. Schedules \ Daily Schedule \
    b. Schedules \ Holiday Schedule \

NOTE: When used with a Building Automation System, these settings may need to be kept at the default of no schedule.:

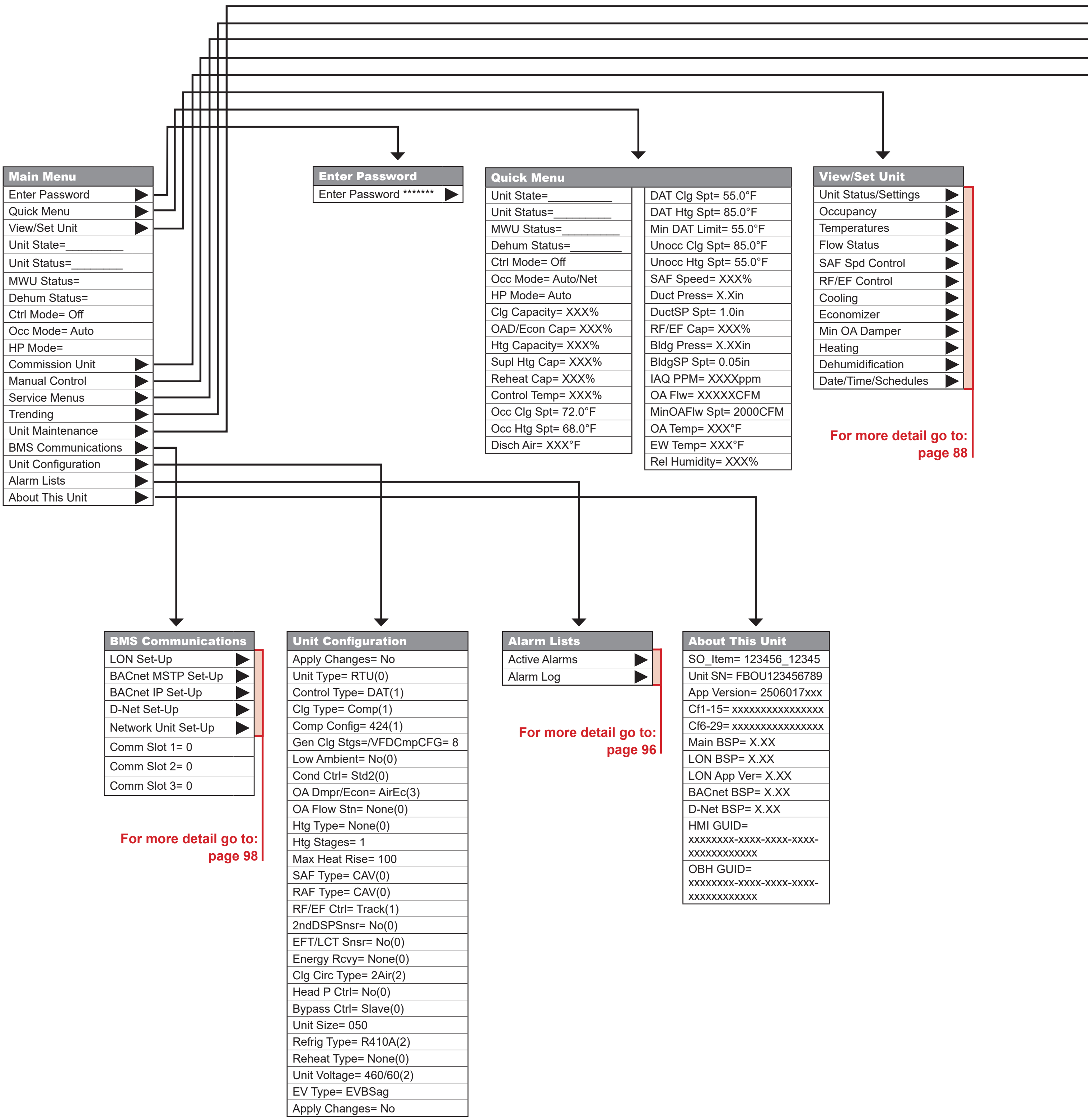
18. Place the unit into the Calibrate mode by using the keypad menu Setup / Service \ Unit Configuration \ Calibrate Mode= and changing the value from "No" to "Yes". Calibrate will automatically zero all static pressure sensors and calibrate any actuator feedback pots connected to the MicroTech III controller. When calibrate is finished, keypad menu System Summary \ System \ UnitStatus= will change from "Calib" to "Off Man". To restart the unit change keypad menu System Summary \ System \ Ctrl Mode = from "OFF" to "Auto".

Maintaining Control Parameter Records

Record and save the MicroTech III controller's set points and parameters for future reference. If the Microprocessor Control Board ever requires replacement, this record will facilitate entering the unit's proper data. The following diagrams for Figure 81 display all the set points, monitoring points, and program variables offered by MicroTech III plus the keypad road map used to find each parameter. Keep a record of any changes made.

The following is a description of the MicroTech III menu structure. These menus and items can all be displayed with the keypad/ display. Menu items displayed will change based on the selected unit configuration.

***Figure 81: Main Menu** – Keypad/Display Menu Structure*



Commission Unit
Unit Set-Up ▶
Timer Settings ▶
SAF Set-Up ▶
RF/EF Set-Up ▶
Htg/Clg ChgOvr Set-Up ▶
Cooling Set-Up ▶
INV Cmp Set-Up ▶
Var Cmp Set-Up ▶
Econo Set-Up ▶
Min OA Set-Up ▶
Heating Set-Up ▶
OA Fan Set-Up ▶
Exp Valve Set-Up ▶
Defrost Set-Up ▶
Dehum Set-Up ▶
Energy Rec Set-Up ▶
Head Pressure Set-Up ▶
Evap Cond Set-Up ▶
D3 Set-Up ▶
Alarm Configuration ▶

For more detail go to: page 90

Manual Control	
Manual Control= Normal	CFan Outpt 1= Off
Supply Fan= Off	CFan Outpt 2= Off
SAF Spd Cmd= 0%	CFan Outpt 3= Off
Manual Ctrl= Normal	BP/WR Valve= 0%
Supply Fan= Off	CW Valve= 0%
SAF Spd Cmd= 0%	ExhFan Out 1= Off
INV/OF Ena= Off	ExhFan Out 2= Off
INV Cmp= Off	ECond VFD= Off
INV Cmp Cmd= 0%	ECFan Spd Cmd= 0%
Comp 3= Off	EC Dm Valve= Close
OA Fan= Off	Sump Pump= Off
OA Fan Cmd= 0%	Sep Flsh Vlv= Off
4 Way Valve= Off	SV1= Off
RcvSol Valve=Off	SV2= Off
BP Sol Valve= Off	Gas Htg On/Off= Off
EVI Cmd= 0%	Htg Valve= 0%
EVO Cmd= 0%	SCR Out= 0%
RF/EF Fan= Off	F&BP Damper= 0%
RF/EF Spd Cmd= 0%	Htg Stg 1= Off
OAD/Econo= 0%	SCR Ena 1= Off
OAD OpCl= Close	Htg Stg 2= Off
Var Cmp= Off	SCR Ena 2= Off
Var Cmp Cmd= 0%	Htg Stg 3= Off
VCmp Emg Stop= Nrml	Htg Stg 4= Off
Comp 1= Off	Htg Stg 5= Off
Comp 2= Off	Htg Stg 6= Off
Comp 3= Off	Reheat Valve= 0%
Comp 4= Off	RH Output= Off
Comp 5= Off	LSCRH Valve= Off
Comp 6= Off	HGBP Valve= Off
Comp 7= Off	ERec Wheel= Off
Comp 8= Off	ER Whl Cmd= 0%
U1 Comp 1= Off	ERBP Dmpr Cl= Off
U1 Comp 2= Off	ERBP Dmpr Op= Off
U2 Comp 1= Off	Cond Wtr Pump= Off
U2 Comp 2= Off	Alm Output= Off
Cond Sol 1= Off	Fan Op Out= Off
Cond Sol 2= Off	

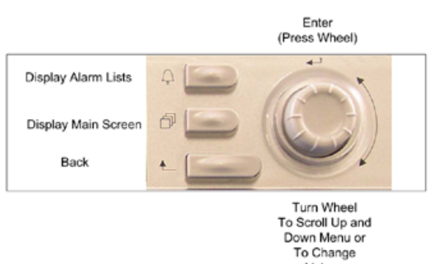
Service Menus
Timer Settings ▶
Operating Hours ▶
Save/Restore Settings ▶
Active Alarms ▶
Alarm Log ▶
Alarm Configuration ▶
Analog Input Status ▶
Universal I/O Status ▶
Digital Input Status ▶
Digital Output Status ▶
Network Input Status ▶
Modbus Status ▶
D3 Status ▶
Sensor Offsets ▶
Reset Counter= XXXX

For more detail go to: page 94

Trending
Trending Ena= No
Apply Chgs= No
Sample Time= 300s
TrendOnOff= Off
Export Data= No
Clear Trend= Done
Points 1–8 (Fixed) ▶
Points 9–24 (from List) ▶
Points 25–27 (with IDs) ▶
Points 28–30 (with IDs) ▶

For more detail go to: page 98

Unit Maintenance
Operating Hours



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

***Figure 81 continued:* View/Set Unit** *– Keypad/Display Menu Structure*

View/Set Unit
Unit Status/Settings ▶
Occupancy ▶
Temperatures ▶
Flow Status ▶
SAF Spd Control ▶
RF/EF Control ▶
Cooling ▶
Economizer ▶
Min OA Damper ▶
Heating ▶
Dehumidification ▶
Date/Time/Schedules ▶

Unit Status/Settings
Unit State= ___________
Unit Status= __________
MWU Status= _________
Dehum Status= ________
Ctrl Mode= Off
Clg Status= ___________
Htg Status= ___________
SuplHtgStatus= ________
Econo Status= _________
Clg Capacity= XXX%
Htg Capacity= XXX%
Supl Htg Cap= XXX%
Reheat Cap= XXX%
SAF Speed= XXX%
RF/EF Cap= XXX%
OAD/Econo Cap=XXX%
Rel Humidiy= XXX%
Net Emrg Ovrd= Normal
Net App Mode= Auto

Occupancy
Occupancy= __________
Occ Mode= Auto/Net
OccSrc= _____________
UnoccSrc= ___________
Tnt Ovrde Tm= 0 min

Temperatures
Control Temp= XXX°F
Disch Temp= XXX°F
Return Air= XXX°F
Space Temp= XXX°F
OA Temp= XXX°F
EF/LC Temp= XXX°F
EW Temp= XXX°F
Mixed Air= XXX°F
ER LAT= XXX°F
ER EAT= XXX°F
Sump Temp= XXX°F
PA Temp= XXX°F
DRT1= XXX°F
DRT2= XXX°F
DRT3= XXX°F
SRT= XXX°F
DFT= XXX°F
IRT= XXX°F
ORT= XXX°F
INVCompTemp= XXX°F

Flow Status
Airflow= ______________
Waterflow= ___________
Water Pump= _________
Supply Fan= __________
Ret/Exh Fan= _________

SAF Speed Control
SAF Speed= XXX%
Speed Cmd= XXX%
Duct Press= X.Xin
DuctSP Spt= 1.0in
IAQ PPM= XXXXPPM
OA Flw= XXXXXCFM
MinOAFlw Spt= 2000CFM
Bldg Press= X.XXin
BldgSP Spt= 0.05in

RF/EF Control
RF/EF Cap= XXX%
Speed Cmd= XXX%
Bldg Press- X.XXin
BldgSP Spt= 0.050in

Cooling
Occ Clg Spt= 72.0°F
Unocc Clg Spt= 85.0°F
DAT Clg Spt= 55.0°F

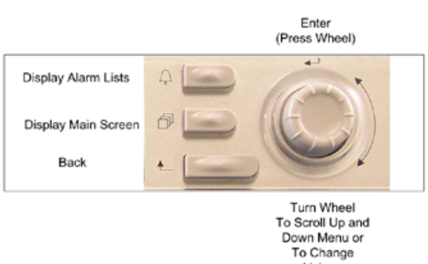
Economizer
OAD/Econo Pos= XXX%
DAT Clg Spt= 55.0°F
Min OA Pos= XXX%
FreeClgStatus = _______
Occ Clg Spt= 72.0°F
Unocc Clg Spt= 85.0°F

Min OA Damper
Min OA Pos= XXX%
Vent Limit= 20%
LoFlo V Lmt= 30%
DCV Limit= 10%
Min OA Src= __________

Heating
Occ Htg Spt= 68.0°F
Unocc Htg Spt= 55.0°F
MWU Spt= 70.0°F
DAT Htg Spt= 85.0°F

Dehumidification
Dehum Status= ________
Rel Humidity= XXX%
Dewpoint= XXX°F
Dehum Method= None
RH Setpoint= 50%
Dewpoint Spt= 50°F
Reheat Spt= XXX°F
Reheat Cap= XXX%

Date/Time/Schedules
Time= hh:mm:ss
Date= MM/DD/YY
UTC Diff= -60min
DAILY SCHEDULE
Mon= HH:MM-HH:MM
Tue= HH:MM-HH:MM
Wed= HH:MM-HH:MM
Thu= HH:MM-HH:MM
Fri= HH:MM-HH:MM
Sat= HH:MM-HH:MM
Sun= HH:MM-HH:MM
Hol= HH:MM-HH:MM
HOLIDAY DATES
Hol 1=MMMDD/YY-MMMDD/YY
Hol 2=MMMDD/YY-MMMDD/YY
Hol 3=MMMDD/YY-MMMDD/YY
Hol 4=MMMDD/YY-MMMDD/YY
Hol 5=MMMDD/YY-MMMDD/YY
Hol 6=MMMDD/YY-MMMDD/YY
Hol 7=MMMDD/YY-MMMDD/YY
Hol 8=MMMDD/YY-MMMDD/YY
Hol 9=MMMDD/YY-MMMDD/YY
Hol 10=MMMDD/YY-MMMDD/YY
ONE EVENT SCHEDULE
Beg= MMMDD/YY@HH:MM
End= MMMDD/YY@HH:MM
OPTIMAL START
Enable= No
Htg Range= 0.4 ºF/min
Htg OAT= 35 ºF
Des Htg OAT= 0 ºF
Clg Rate= 0.4 ºF/min
Clg OAT= 85 ºF
Des Clg OAT= 95 ºF
DAYLIGHT SAVINGS
DLS Strt Mon= Mar
DLS Strt Wk= 2nd Week
DLS End Mon= Nov
DLS End Wk= 1st Week
DLS Enable= Auto
PURGE
Max Purge= 0min



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

***Figure 81 continued: Commission Unit** – Keypad/Display Menu Structure*

Commission Unit
Unit Set-Up ▶
Timer Settings ▶
SAF Set-Up ▶
RF/EF Set-Up ▶
Htg/Clg ChgOvr Set-Up ▶
Cooling Set-Up ▶
INV Cmp Set-Up ▶
Var Cmp Set-Up ▶
Econo Set-Up ▶
Min OA Set-Up ▶
Heating Set-Up ▶
OA Fan Set-Up ▶
Exp Valve Set-Up ▶
Defrost Set-Up ▶
Dehum Set-Up ▶
Energy Rec Set-Up ▶
Head Pressure Set-Up ▶
Evap Cond Set-Up ▶
D3 Set-Up ▶
Alarm Configuration ▶

List continues on page 92

Unit Set-Up
Apply Changes= No
RAT Sensor= Yes
OAT Sensor= Yes
Space Sensor= Digtl/Net
Eng Units= English
Unit Name= xxxxxxxxxxxx
Rapid Start= No
Rapid Start Tm= 10min
DO10 Clg= FanOp

Timer Settings
Service Time= 0min
Start Up= 180s
Recirculate= 180s
Zero OA Time= 0min
Tnt Override= 120min
Post Heat= 0s
Pwd Timeout= 10min
Low DAT= 6min
ClgStateDelay= 300s
Bypass Valve= 300s
Clg Stg Time= 5min
Htg Stg Time= 5min
Air Flw Ign= 120s
MinExStrtTm= 120s
MinExStopTm= 120s
ER Whl Stg Tm= 5min
ER Whl Off Tm= 20min
EvCnd Stg Tm= 10min
WRV Init Tm= 60s
Min WRV Time= 60s
Htg Wrmup Tm= 240s
Htg Hld Period= 240s
RH Srg Time= 10min
Srvc Time Inc= 20s
OffHtClDelay= 120s

SAF Set-Up

SAF Ctrl= DSP	CO_2 CONTROL	BSP CONTROL
AplyInputChgs= No	Min PPM= 0PPM	BSP DB= 0.01in
CO2 Input= None	Max PPM= 2000PPM	BSP Period= 5s
CFM Input= None	V/A @ Min PPM= 0V	BSP Gain= 0.2
BSP Input= No	V/A @ Max PPM= 10V	Max Spd Chg= 4%
SPEED CONTROL	Min SAF PPM= 800PPM	SAF SETUP
Rem SAF Cap= 33%	Max SAF PPM= 1100PPM	SAF Ctrl Dly= 30s
DSP CONTROL	Min PPM Spd= 50%	Min Speed= 33%
DSP DB= 0.1in	Max PPM Spd= 100%	VAVBox Out= ________
VFD Ramp Time= 60s	CFM CONTROL	Max SAF Hz=
Min Period= 5s	Min CFM= 0CFM	Max Vent Speed= 100%
Max Spd Chg= 15%	Max CFM= 10000CFM	Max SAF RPM= 2600
Duct Press 1= X.Xin	V/A @ Min CFM= 0V	ECM Status= ________
Duct Press 2= X.Xin	V/A @ Max CFM= 10 V	
1 ZONE VAV CONTROL	SAF CFM DB= 3%	
Min Clg Spd= 40%	SAF CFM Period= 30s	
Max Clg Spd= 100%	SAF CFM Gain= 0.1	
Min Htg Spd= 40%	SAF CFM MxChg= 5%	
Max Htg Spd= 100%		
Space Period= 60s		
Space Gain= 0.8		
Space PAT= 400s		
Space Max Chg= 10%		

INV Cmp Set-Up

COMPRESSOR STATUS	COMPRESSOR SETUP
Clg State= ____________	Clg Lo OAT Lk= 55°F (RTU/SCU) 0°F (MPS) 25°F (DPS)
Htg State= ____________	Htg Lo OAT Lk= 0.0ºF 45°F (100% OA w/o ER)
INV Cmp Spd= XXX.X%	Htg Hi OAT Lk= 55.0ºF
INV Spd Cmd= XXX.X%	EffHtgOATLk= _______ºF
Comp 3=_____________	OAT Diff= 2ºF
Prev Standby=_______ ▶	INV Period= 20s
Compressor Limiting ▶	INV Gain= 2.5
Fault Code Details ▶ 1	INV PAT= 10s
INV Port Temp= XXX.XºF	INV Max Chg= 15%
INV Fin Temp= XXX.XºF	IFB COMM STATUS ▶ 2
INV Cmp Amps= XX.XA	
REFRIG CIRCUIT STATUS	
PTD= XXX.Xpsi	
PTS= XXX.Xpsi	
4 Way Valve=__________	
RcvrSol Valve=_________	
BP Sol Valve=_________	

Date/Time
MM/DD/YYYY HH:MM:SS

Compressor Limiting
Clg Press Lmtg=_______
Htg Press Lmtg=_______
C Ratio Lmtg=_________
Ref DLT Lmtg=_________
INV Brd Lmtg=_________
INV Man Dsbl= Enable
Comp3 ManDsbl= Enable

Var Comp Set-Up
COMPRESSOR STATUS
Var Cmp Status= _______
Var Spd Cmd= _________
Comp 1= _____________
Comp 3= _____________
Comp 5= _____________
REFRIG CIRCUIT STATUS
PTD1= _______________
PTD2= _______________
VCmpDischSH= _______
C1DschSatTmp= _______
C2DschSatTmp= _______
DRT1= ______________
DRT2= ______________
Cond Sol 1= Off
Cond Sol 2= Off
COMPRESSOR SET-UP
Var Cmp Period= 20s
Var Cmp Gain= 1
Var Cmp PAT= 40s
VarCmp MaxChg= 10%
OilBoost= Off
LowOilTime= 10min
OilBoostTime= 15min
LowTcOAT= 80°F

Econo Set-Up
EconChgovr= Enth&DB
Econo FDD= On
Clg Stage Time= 5min
Chgover Temp= 55.0°F
Clg DB= 2.0°F
Econo Period= 30/40s (air/water)
Econo Gain= 1-Oct (air/water)
Econo PAT= 60/40s (air/water)
Econo Max Chg= 10/15% (air/water)
Flush Econo= Yes
Econo Diff= 2.0°F
EWT Diff= 3.0°F
Clg Reset= None
Min Clg Spt= 55.0°F
Min Clg Spt @= 0/NA
Max Clg Spt= 65.0°F
Max Clg Spt@= 100/NA
Max OAT Lmt= 75°F
Min OAT Lmt= 70°F
Calibrate OAD= No
PosSwOpen= 97%
Max Sw Diff= 3%
PosSwClose= 3%
Min SW Diff= 5%
OAD Sw Status= _______

1, 2 **See the expansion information on page 97**

RF/EF Set-Up

RF/EF Ctrl= Tracking	MinExStrtTm= 120s
Rem RAF Cap= 5%	MinExStopTm= 120s
Rem ExhF Cap= 5%	MinExOAPos= 5%
BSP DB= 0.01in	MinExSAFCap= 10%
BSP Period= 5s	ExhOnOAPos= 40%
BSP Gain= 0.2s	ExhMxOAPos= 100%
Max Spd Chg= 4%	Exh Stg 1 On= 40%
Sup Fan Max= 100%	Exh Stg 1 Off= 30%
RF @ SF Max= 95%	Exh Stg 2 On= 55%
Sup Fan Min= 30%	Exh Stg 2 Off= 40%
RF @ SF Min= 25%	Exh Stg 3 On= 70%
Lo Fan Diff= 75%	Exh Stg 3 Off= 50%
Hi Fan Diff- 75%	Max RF/EF Hz= 60Hz
RFEF Ctrl Dly= 30s	Max Vent Spd= 100%
Min Speed= 5% (with Exhaust Fan) 33% (with Return Fan)	Max RFEF RPM= 2600
	ECM Status= _________

Htg/Clg ChgOvr Set-Up

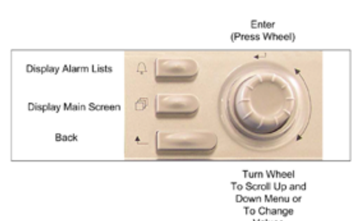
Ctlr Temp Src= RAT
AplyTstatchg= No
Use Tstat Spt= No
Occ Clg DB= 2.0°F
Clg Period= 60s
Clg Gain= 0.1
Clg PAT= 600s
Max Clg Chg= 5.0°F
Occ Htg DB= 2.0°F
Htg Period= 60s
Htg Gain= 0.1
Htg PAT= 600s
Max Htg Chg= 5.0°F
CalDRemSpt@10°C= No
CalDRemSpt@50°F= No
CalDRemSpt@30°C= No
CalDRemSpt@86°F= No
DemandShed= Ena
ClgDmdShdInc= 4°F
HtgDmdShdInc= 4°F
ClgShedRate= 2.0°F/hr
HtgShedRate= 2.0°F/hr

Cooling Set-Up

Clg Stage Time= 5min
Clg DB= 2.0°F
Clg Period= 20s
Clg Gain= 1
Clg PAT= 40s
CW Max Chg= 15%
Clg Lo OAT Lk= 55ºF (RTU/SCU) 0°F (MPS) 25°F (DPS or RTU w/ VFD Cmps)
OAT Diff= 2.0°F
Min EWT= 55°F
Clg Reset= None
Min Clg Spt= 55.0°F
Min Clg Spt @= 0/NA
Max Clg Spt= 65.0°F
Max Clg Spt@= 100/NA
Lead Circuit= #1
Staging Type= Std
CFanOut1 Spt= 55°F
CFanOut2 Spt= 65°F
CFanOut3 Spt= 75°F
Cond Fan Diff= 5°F
Unocc Diff= 3°F
DT Above Spt= ________
DT Below Spt= ________

Min OA Set-Up

AplyMinOAChg= No (Uses MinOAT Type Instance Name)	CFM RESET	FAN SPEED RESET
	OA Flow= XXXXXCFM	Min Fan Diff= 20%
Min OA Reset= None	MinOAFlwSpt= 2000CFM	Max Fan Diff= 50%
BSPOAOvrd= No	Field Stn Rst= No	Min Clg Spd= 40%
RstLmtSnsr= None	Field Stn Cfg= VDC	Des Clg Spd= 100%
EXTERNAL RESET	Min CFM= 0 CFM	BSP RESET
OA @ MinV/mA= 0%	Max CFM= 10000 CFM	MinRFEFTm= 120s
OA @ MaxV/mA= 100%	V/A @Min CFM= 0.0/V	BSP OvdST= 5s
Min V/mA= 0.0/V	V/A @Max CFM= 10.0/V	BSP OvdGain= 0.2
Max V/mA= 10.0/V	OA CFM DB= 3%	BSP OvdMaxChg= 4%
CO_2 RESET	OA CFM Period= 30s	DAMPER LIMITING
IAQ Reset= Yes	OA CFM Gain= 0.1	RstTLmt= 32.0ºF
PPM@DCVLmt= 800PPM	OA CFM Max Chg= 5%	RstTSmplTm= 5s
PPM@VntLmt= 1000PPM	Design Flow= Yes	RstTGain= 0.2
IAQ PPM= XXXXPPM	Des Flo DB= 3%	RstPAT= 60s
Min PPM= 0 PPM	DF Period= 30s	RstTMaxChg= 4%
Max PPM= 2000 PPM	Des Flo Gain= 0.1	0–30% OA Max= 30%
V/A @Min PPM= 0.0/V	DF Max Chg= 5%	Min Inc Rate= 0.03
V/A @Max PPM= 10.0/V	RH Lvl Pos= ____________	Max Inc Rate= 1.0
	LH Lvl Pos= ____________	



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

Figure 81 continued: ***Commission Unit*** *– Keypad/Display Menu Structure (continued)*

Commission Unit
Unit Set-Up ▶
Timer Settings ▶
SAF Set-Up ▶
RF/EF Set-Up ▶
Htg/Clg ChgOvr Set-Up ▶
Cooling Set-Up ▶
Cooling Set-Up (2) ▶
INV Cmp Set-Up ▶
Var Cmp Set-Up ▶
Econo Set-Up ▶
Min OA Set-Up ▶
Heating Set-Up ▶
OA Fan Set-Up ▶
Exp Valve Set-Up ▶
Defrost Set-Up ▶
Dehum Set-Up ▶
Energy Rec Set-Up ▶
Head Pressure Set-Up ▶
Evap Cond Set-Up ▶
D3 Set-Up ▶
Alarm Configuration ▶

Heating Set-Up
Htg Stage Time= 5min
Htg DB= 2.0°F
Htg Period= 60s
Htg Gain= 0.8
Htg PAT= 120s
Htg Max Chg= 10%
Htg Lo OAT Lk= 0.0°F – 45.0°F (100% OA w/o ER)
Htg Hi OAT Lk= 55.0°F
EffHtgOATLk= 55.0°F
SplHtgOATLk= 55.0°F
OAT Diff= 2.0°F
Htg Reset= None
Min Htg Spt= 55.0°F
Min Htg Spt @= 0
Max Htg Spt= 120.0°F
Max Htg Spt@= 100
Min DAT Ctrl= Yes
Min DAT Limit= 55.0°F
F&BP Method= OpenVlv
F&BP ChgOvrT= 37°F
Occ Heating= Yes
Unocc Diff= 55.0°F
Htg Wmup Tm= 60s
Htg Hld Period= 240s
Max Purge Hld= 20s
Gas Derate V= 10.0v
MWUSensor= RAT

OA Fan Set-Up
OA FAN STATUS
OA Fan1 Spd= XXX%
OA Fan1 Cmd= XXX%
OA Fan1Amps= XX.XA
Fault Code Details ▶ 1
OA Fan2 Spd= XXX%
OA Fan2 Cmd= XXX%
OA Fan2Amps= XX.XA
Fault Code Details ▶ 1
REFRIG CIRCUIT STATUS
PTS= XXX.Xpsi
PTD= XXX.Xpsi
Disch Sat Tmp= XXX.X°F
EffDshSatTSpt= XXX.X°F
OA Temp= XXX°F
INV Fin Temp= XXX°F
OA FAN SET UP
DischSatTDiff= 15°F
DischSatTDB= 2.0°F
OA Fan Period= 25s
OA Fan Gain= 2.5
OA Fan PAT= 75s
OA Fan Max= 90%
IFB COMM STATUS ▶ 2

1, 2 **See the expansion information on page 97**

Exp Valve Set-Up	
EXP VALVE STATUS	EXP VALVE SETUP
EVI Pos= XXX%	SSH DB= 2.0ºF
EVO Pos= XXX%	SH Lo Base= 6.0ºF/5.0ºF/2.0ºF (15THP/3–12THP/ClgOnly)
EVStatus=____________	SH Hi Base= 9.0ºF
REFRIG CIRCUIT STATUS	Htg EVI Meth= SbC
PTS= XXX.Xpsi	IC SC Spt= 9.0ºF
PTD= XXX.Xpsi	IC SC DB= 2.0ºF
Suction SH= XX.XºF	HtgSC EVI Min= 12% (Unit Size≤6) 50% (Unit Size>6)
Discharge SH= XX.XºF	Clg EVO Meth= SbC
Subcooling= XX.X°F	OC SC Spt= 9.0ºF
Eff SSH Spt= XX.X°F	OC SC DB= 2.0ºF
EffSH Base= XX.X°F	ClgSC EVO Min= 12%
Eff SC Spt= XX.X°F	ManCtrl EV Op= Auto
Eff SC Lo Lmt= XXX%	
SRT= XXX°F	
Disch Sat Tmp= XXX.X°F	
Sucn Sat Tmp= XXX.X°F	
IRT= XXX°F	
ORT= XXX°F	

Evap Cond Set-Up
Cond Fan Spd= XXX%
CFan Spd Cmd= XXX%
Min Fan Speed= 33%
EvCond Stg Tm= 10min
Sump Temp= XXX°F
Min Sump T= 75.0°F
Max Sump T= 85.0°F
Sump Dump Spt= 35.0°F
Cndtvy= XXXS/CM
Hi Cndtvy Spt= XXXS/CM
SmpWtrLvDly= 5min
PostClgTime= 10min
SepFlshtime= 1min
Dolphin Sys= No

D3 Set-Up
Itouch Vers= __________
Unit D3 Addr= Jan–00
Set D3 Addr= No
OA Unit Num= 0
OA Unit Amps= 0
OA Unit Addr= 0
Set OA Unit= No
Rst All OA= No
Min Load= 20%
Max Load= 50%
HiCapReset= No
DATLoDiff= 10.0ºF
Eco Method= None
DATHiDiff= 5.0ºF
OA Enth Max= 24.5 BTU/lb
OA Hum Max= 0.0107lb/lb (Units not displayed on HMI)
OAT Max= 84ºF
Temp Display= DAT
Low Speed= 33%
Med Speed= 60%
Hi Speed= 100%

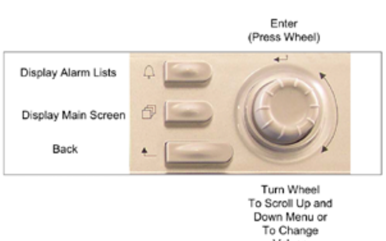
Alarm Configuration
ALARM LIMITS
Hi Disch Temp= 170°F
Lo Disch Temp= 40°F
Hi Return Temp= 120°F
ALARM OUT CONFIG
Faults= Fast
Problems= Slow
Warnings= Off
ALARM DELAYS
Frz Delay Time= 30s
LP Delay= 2s
LP Comp Delay= 5s (410A) 65s (R22)
Air Flw Ing=120s
Sens Alm Dly= 30s
Temp AlmDly= 30s
ALARM CONFIG
Emerg Stop= ManClr

Defrost Set-Up
Defrost State= _________
Manual DF= No
MinCmpOpTm= 10min
MinAccCmpTm= 40min
MaxFrostTm= 120min
Defrost Temp= XXºF
Tdef Adj= 0.0ºF
CmpOpTm= XXXmin
AccCmpOpTm= XXXmin
LoFrstAccTm= XXXmin
HiFrstAccTm= XXXmin

Dehum Set-Up
Dehum Method= None
RH DB= 2%
Dewpoint DB= 2°F
RH Period= 30s
RH Gain= 1
RH PAT= 30s
RH Max Chg= 10%
RH Stg Time= 10min
Stg Rht DB= 5.0°F
Dehum Ctrl= Occupied
Sensor Loc= Return
Mn Lvg Coil T= 45.0°F
Mx Lvg Coil T= 52.0°F
Rht Cmp Lmtg= Yes
Min Rheat Spt= 55.0°F
Max Rheat Spt= 65.0°F
RH Sens Type= VDC
RH Min Sig= 0.0V
RH Max Sig= 10.0V
Min Dehum Spd= 33%
Max Dehum Spd= 100%
Rht Min Pos= 10% (RPS) 15% (MPS) 5% (DPS, DPH)
RH Dec Rate= 1
RHOutMaxV= 10

Energy Rec Set-Up
Energy Rcvy= Yes
ER Wheel= ___________
Wheel Speed= XXX%
Whl Spd Cmd= XXX%
ER LAT= XXX°F
ER EAT= XXX°F
Min ExhT Diff= 2.0°F
Max ExhT Diff= 6.0°F
ER Whl Stg Tm= 5min
ER Whl Off Tm= 20min
Rel Humidity= XXX%
Min Whl Spd= 5%
Intersect Pt= XXX.XºF
Fst Mgnt Meth= Timed
OA Frst Temp= -20.56°F
Defrost Time= 5min
Defrost Period= 60min
Defrst On Tm= 1s
Defrst Off Tm= 24s
ER Whl Period= 30s
ER Whl Gain= 1.0
ER Whl PAT= 30s
ER Max Chg= 10%
LoERLATCmpLk= 45.0°F

Head Pressure Set-Up
Wtr Reg Vlv= XXX%
Head P Circ 1= XXXPSI
Head P Circ 2= XXXPSI
Setpoint= 260PSI
Head Press DB= 10PSI
WRV Period= 10s
WRV Gain= 3.6
WRV PAT= 10s
WRV Max Chg=7%
WRV Init Tm= 60s
Min WRV Pos=10%
Min WRV Tmp= 58°F
Max WRV Tmp= 150°F
WRV Act Time= 60s
Min WRV Time= 60s



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

***Figure 81 continued: Service Menu** – Keypad/Display Menu Structure*

Service Menus
Timer Settings ▶
Operating Hours ▶
Save/Restore Settings ▶
Active Alarms ▶
Alarm Log ▶
Alarm Configuration ▶
Analog Input Status ▶
Universal I/O Status ▶
Digital Input Status ▶
Digital Output Status ▶
Network Input Status ▶
Modbus Status ▶
D3 Input Status ▶
Sensor Offsets ▶
Reset Counte= XXXX

List continues on page 96

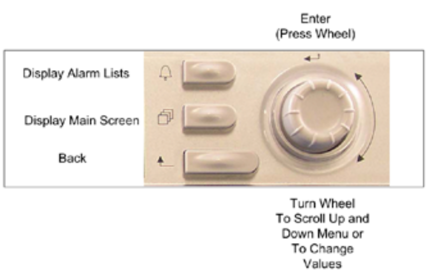
Timer Settings
Service Time= 0min
Start Up= 180s
Recirculate= 180s
Zero OA Time= 0min
Tnt Override= 120min
Post Heat= 0s
Pwd Timeout= 10min
Low DAT= 6min
ClgStateDelay= 300s
Clg Stg Time= 5min
Htg Stg Time= 5min
Air Flw Ign= 120s
MinExStrtTm= 120s
MinExStopTm= 120s
ER Whl Stg Tm= 5min
ER Whl Off Tm= 20min
Srvc Time Inc= 20s
OffHtClDelay= 120s

Operating Hours
Supply Fan= XXXXXh
Ret/Exh Fan= XXXXXh
Exh Out1= XXXXXh
Exh Out2= XXXXXh
Mech Cool= __________
Var Comp= __________
Comp # 1= XXXXXh
Comp # 2= XXXXXh
Comp # 3= XXXXXh
Comp # 4= XXXXXh
Comp # 5= XXXXXh
Comp # 6= XXXXXh
Comp # 7= XXXXXh
Comp # 8= XXXXXh
Cmp Cooling= __________
INV Comp= __________
Comp 3= __________
Heating= XXXXXh
Cmp Heating= __________
Economizer= XXXXXh
Tnt Override= XXXXXh
Dehumid= XXXXXh
Reheat= __________
ER Wheel= XXXXXh

Save/Restore Settings
Save Params= No
Rstr Params= No
Rstr Factory= No
SaveToCard= No
LoadFromCard= No
CreateTrace= No
Trace To SD= No

Active Alarms
Alm Count: xx Clr Alms= No
+Alarm 1: Alarm Type ▶
+Alarm 2: Alarm Type ▶
•
•
•
+Alarm 10: Alarm Type ▶

3



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

Alarm Log
Log Count: xx Clr Log= No ▶
+/-Alarm 1: Alarm Type ▶
+/-Alarm 2: Alarm Type ▶
•
•
•
+/-Alarm 10: Alarm Type ▶
•
•
•
+/-Alarm 50: Alarm Type ▶

4

Alarm Configuration
ALARM LIMITS
Hi Disch Temp= 170°F
Lo Disch Temp= 40°F
Hi Return Temp= 120°F
ALARM OUT CONFIG
Faults= Fast
Problems= Slow
Warnings= Off
ALARM DELAYS
Frz Delay Time= 30s
LP Delay= 2s
LP Comp Delay= 5s
Air Flw Ing=120s
Sens Alm Dly= 30s
Temp AlmDly= 30s
ALARM CONFIG
Emerg Stop= ManClr

3, 4 **See connection on page 97**

Analog Input Status
MCB AI1= XXXXXXXX
MCB AI2= XXXXXXXX
MCB AI3= XXXXXXXX

Universal I/O Status	
MCB X1= XXXXXXXX	EMC X1= XXXXXXXX
MCB X2= XXXXXXXX	EMC X2= XXXXXXXX
MCB X3= XXXXXXXX	EMC X3= XXXXXXXX
MCB X4= XXXXXXXX	EMC X4= XXXXXXXX
MCB X5= XXXXXXXX	EMC X5= XXXXXXXX
MCB X6= XXXXXXXX	EMC X6= XXXXXXXX
MCB X7= XXXXXXXX	EMC X7= XXXXXXXX
MCB X8= XXXXXXXX	EMC X8= XXXXXXXX
EMA X1= XXXXXXXX	EMD X1= XXXXXXXX
EMA X2= XXXXXXXX	EMD X2= XXXXXXXX
EMA X3= XXXXXXXX	EMD X3= XXXXXXXX
EMA X4= XXXXXXXX	EMD X4= XXXXXXXX
EMA X5= XXXXXXXX	EMD X5= XXXXXXXX
EMA X6= XXXXXXXX	EMD X6= XXXXXXXX
EMA X7= XXXXXXXX	EMD X7= XXXXXXXX
EMA X8= XXXXXXXX	EMD X8= XXXXXXXX
EMB X1= XXXXXXXX	EME X1= XXXXXXXX
EMB X2= XXXXXXXX	EME X2= XXXXXXXX
EMB X3= XXXXXXXX	EME X3= XXXXXXXX
EMB X4= XXXXXXXX	EME X4= XXXXXXXX
EMB X5= XXXXXXXX	EME X5= XXXXXXXX
EMB X6= XXXXXXXX	EME X6= XXXXXXXX
EMB X7= XXXXXXXX	EME X7= XXXXXXXX
EMB X8= XXXXXXXX	EME X8= XXXXXXXX

Digital Input Status
MCB DI1= ___________
MCB DI2= ___________
MCB DI3= ___________
MCB DI4= ___________
MCB DI5= ___________
MCB DI6= ___________
EMD DLA1= _________

Digital Output Status	
MCB DO1= __________	EMC DO1= __________
MCB DO2= __________	EMC DO2= __________
MCB DO3= __________	EMC DO3= __________
MCB DO4= __________	EMC DO4= __________
MCB DO5= __________	EMC DO5= __________
MCB DO6= __________	EMC DO6= __________
MCB DO7= __________	EMD DO1= __________
MCB DO8= __________	EMD DO2= __________
MCB DO9= __________	EMD DO3= __________
MCB DO10= __________	EMD DO4= __________
EMA DO1= __________	EMD DO5= __________
EMA DO2= __________	EMD DO6= __________
EMA DO3= __________	EME DO1= __________
EMA DO4= __________	EME DO2= __________
EMA DO5= __________	EME DO3= __________
EMA DO6= __________	EME DO4= __________
EMB DO1= __________	EME DO5= __________
EMB DO2= __________	EME DO6= __________
EMB DO3= __________	
EMB DO4= __________	
EMB DO5= __________	
EMB DO6= __________	

***Figure 81 continued: Service Menu** – Keypad/Display Menu Structure (continued)*

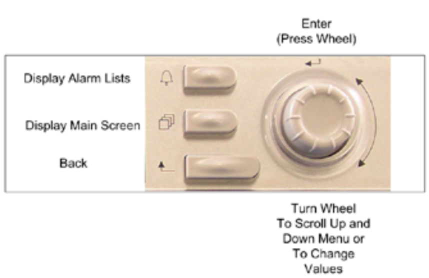
Service Menus
Timer Settings ▶
Operating Hours ▶
Save/Restore Settings ▶
Active Alarms ▶
Alarm Log ▶
Alarm Configuration ▶
Analog Input Status ▶
Universal I/O Status ▶
Digital Input Status ▶
Digital Output Status ▶
Network Input Status ▶
Modbus Status ▶
D3 Input Status ▶
Sensor Offsets ▶
Reset Counte= XXXX

Network Input Status
Net OAT In= XXX.XºF
Net Space In= XXX.XºF
NetCurrState= _________
NetNextState= _________
NetTmToNxtSt= XXXXXmin
Net App Mode= ________
Net Cl Ena Sw= X.X
Net Cl Ena Vl= XXX%
Net Ht Ena Sw= X.X
Net Ht Ena Vl= XXX%
Net Ec Ena Sw= X.X
Net Ec Ena Vl= XXX%
Net SAF Cap= XXX%
Net RAF Cap= XXX%
Net ExhF Cap= XXX%
Net CFlw Sw= XXX%
Net Flw Val= XXX%
Net Space IAQ= XXXXPPM
Net Rel Humid= XXX%
Net DATClgSpt= XXX.XºF
Net DATHtgSpt= XXX.XºF
nviSetpoint= XXX.XºF
OccManCmd= _________
Net Min OA= XXX%
nvoEffSpt= XXX.XºF
nciOccClgSpt= XXX.XºF
nciOccHtgSpt= XXX.XºF
nciHVACType= _________

Modbus Status
SF MB Status=_________
RF/EF MB Status=______
ER MB Status=________
OF MB Status= ________
IFB MB Status= ________
D3 MB Status=_________
SAFVFD Ex Flt= _______
RxFVFD Ex Flt= _______
ER VFD Ex Flt= ________
OF VFD Ex Flt= ________
MB Resistance= Yes
ECM Config= Done

D3 Status
D3 Comm Sts= ________
D3 Addr Err= __________
D3 On/Off= ___________
D3 Mode= ____________
D3 Clg Spt= XXX.XºF
D3 Htg Spt= XXX.XºF
D3 Fan Spd= __________
D3 Min Load= XXX%
D3 Max Load= XXX%
D3 Eco Ena= __________
OA Enthalpy= XXXBTU/lb
OA Hum Ratio= g/kg
D3 SWVers= XXXXXXXXXX
OAAdd1–16= __________
OAAdd17–32= _________
OAAdd33–49= _________
OAAdd50–64= _________
SetOAAddr= XX
CurrOAAddr= XX
CurrOAAmps= XXXA
CurrOARLA= XXXA

Sensor Offsets
Disch Air= 0.0ºF
Return Air= 0.0ºF
Space Temp= 0.0ºF
OA Temp= 0.0ºF
EF/LC Temp= 0.0ºF
EW Temp= 0.0ºF
Mixed Air= 0.0ºF
MAT LON SCC= 0.0ºF
ER LAT= 0.0ºF
ER EAT= 0.0ºF
Sump Temp= 0.0ºF
DRT1= 0.0ºF
DRT3= 0.0ºF
SRT= 0.0ºF
DFT= 0.0ºF
IRT= 0.0ºF
ORT= 0.0ºF



This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

Alarm Lists
Active Alarms ▶
Alarm Log ▶
Event Log ▶
LogCt:** Clr Log= -:No
+Event 1 ▶
+Event 2 ▶
•
•
•
+Event 49 ▶
+Event 50 ▶
Event Details ▶
+Alarm: Alarm Type ▶
Alarm Date
Alarm Time

3

Active Alarms
Alm Count: xx Clr Alms= No
+Alarm 1: Alarm Type ▶
+Alarm 2: Alarm Type ▶
•
•
•
+Alarm 10: Alarm Type ▶

4

Alarm Log
Log Count: xx Clr Log= No ▶
+/-Alarm 1: Alarm Type ▶
+/-Alarm 2: Alarm Type ▶
•
•
•
+/-Alarm 10: Alarm Type ▶
•
•
•
+/-Alarm 50: Alarm Type ▶

Alarm Details
+/-Alarm 1: Alarm Type
MM/DD/YYYY HH:MM:SS

Expansion Information

1

Fault Code Details
ACTIVE FAULT CODES
INVAlarmCode=______
Code Text
OF1AlarmCode=_______
Code Text
OF2AlarmCode=_______
Code Text
PREVIOUS FAULT CODES
PrvINVAlmCode=_______
Code Text
MM/DD/YYYY HH:MM:SS
PrvOF1AlmCode=______
Code Text
MM/DD/YYYY HH:MM:SS
PrvOF2AlmCode=______
Code Text
MM/DD/YYYY HH:MM:SS

2

IFB Comm Status
IFB SW Vers= VP0329008
IFBCommStatus=____
PrvCommStatus=_______
MM/DD/YYYY HH:MM:SS
ACS1 DataRcvd=_______
ACS3 DataRcvd=_______

Figure 81 continued: ***BMS Communications*** *– Keypad/Display Menu Structure*

BMS Communications
LON Set-Up ▶
BACnet MSTP Set-Up ▶
BACnet IP Set-Up ▶
D-Net Set-Up ▶
Network Unit Set-Up ▶

IM 918

LON Set-Up
Neuron ID= xxxxxxxxxxxx
SndHrtBT= 60s
RcvHrtBT= 30s
MinSndTm= 0s
Comm Status=_________
LON BSP= X.XXX
LON App Ver= XXXX

IM 917

BACnet MSTP Set-Up
ApplyMSTPChgs= No
Name= xxxxxxxxxxxxxxxx
Dev Instance= xxxxxxxxxx
MSTP Address= XXX
Baud Rate= 76800
Max Master= 127
Max Info Frm= 10
Unit Support= English
Term Resistor= No
NC Dev 1= 0
NC Dev 2= 0
AHU Loc/Net= Network
Comm Status= ________
RstOutofSrvc= Done
BACnet BSP= X.X.XX

IM 916

BACnet IP Set-Up
ApplyIPChgs= No
Name= xxxxxxxxxxxxxxxx
Dev Instance= xxxxxxxxxx
UDP Port= 47808
DHCP= On
Act IP= 0.0.0.0
ActMsk- 0.0.0.0
ActGwy= xxx.xxx.xxx.xxx
Gvn IP= 127.0.0.1
GvnMsk= 255.255.255.0
GvnGwy= 127.0.0.1
Unit Support= English
NC Dev 1= 0
NC Dev 2= 0
Comm Status= ________
AHU Loc/Net= Network
Comm Status= ________
RstOutofSrvc= Done
BACnet BSP= X.X.XX

D-Net Set-Up
ApplyD-NetChgs= No
DHCP= On
Act IP= 0.0.0.0
ActMsk- 0.0.0.0
ActGwy= xxx.xxx.xxx.xxx
Gvn IP= 127.0.0.1
GvnMsk= 255.255.255.0
GvnGwy= 127.0.0.1
Remote Srv En= Disable
Comm Status= ________
D-net BSP= X.X.XX

Network Unit Set-Up
Space Sensor= Local/Net
UNIT MODE SETTINGS
Ctrl Mode= Off
Occ Mode= Auto/net
RESET OPTIONS
Clg Reset= None
Htg Reset= None
AplyMinOAChg= No (Uses MinOA Type Instance Name)
Min OA Reset= None
Apply Changes= No
HEAT/COOL CHANGEOVER
Ctrl Temp SRC= RAT
AplyTstatChg= No
Use Tstat Spt= No
Occ Clg Spt= 72°F
Occ Htg Spt= 68°F
FAN CONTROL OPTIONS
SAF Ctlr= DSP
RF/EF Ctlr= Tracking

Figure 81 continued: ***Trending*** *– Keypad/Display Menu Structure*

Trending
Trending Ena= No
Apply Chgs= No
Sample Time= 300s
TrendOnOff= Off
Export Data= No
Clear Trend= Done
Points 1–8 (Fixed) ▶
Points 9–24 (from List) ▶
Points 25–27 (with IDs) ▶
Points 28–30 (with IDs) ▶

Points 1–8 (Fixed)
Point 1= UnitSt
Point 2= Clg%
Point 3= Htg%
Point 4= SAF%
Point 5= OAD/Eco%
Point 6= CtrlTmp
Point 7= DAT
Point 8= OAT

Points 9–24 (from List)
Point 9= None
Point 10= None
Point 11= None
Point 12= None
Point 13= None
Point 14= None
Point 15= None
Point 16= None
Point 17= None
Point 18= None
Point 19= None
Point 20= None
Point 21= None
Point 22= None
Point 23= None
Point 24= None

Points 25–27 (with IDs)
Point 25
ID= F0AF0000
Type= 0000
Mem Num= 0100
Point 26
ID= F0AF0000
Type= 0000
Mem Num= 0100
Point 27
ID= F0AF0000
Type= 0000
Mem Num= 0100

Points 28–30 (with IDs)
Point 28
ID= F0AF0000
Type= 0000
Mem Num= 0100
Point 29
ID= F0AF0000
Type= 0000
Mem Num= 0100
Point 30
ID= F0AF0000
Type= 0000
Mem Num= 0100

This navigation map represents all possible AHU menus and menu items. Not all menus and items shown here will appear on the HMI display depending upon the specific unit configuration. Those that do not appear are not applicable to this unit.

⚠ CAUTION

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

⚠ WARNING

Moving machinery and electrical power hazards. Can cause severe personal injury or death. Lock out and tag out all power before servicing equipment.

⚠ CAUTION

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

Planned Maintenance

Planned maintenance is the best way to avoid unnecessary expense and inconvenience. Have this system inspected at regular intervals by a qualified service technician. The required frequency of inspections depends upon the total operating time and the indoor and outdoor environmental conditions, but guidelines are provided in Table 12 on page 100 includes the following items:

Weekly

1. Clean or replace the filters as needed. Inspect every 40 hours under normal operation. More frequent inspection is required during construction periods or any other period that generates greater than normal filter loading
2. Check the water treatment system. Refer to IM 827 for Daikin Chemical Free Water Treatment System. For other treatment systems, follow the manufacturer's recommendations. Generally, the following are required:
    a. Verify that chemical tanks have sufficient reserves.
    b. Verify that chemical pumps are primed and functioning.
    c. Confirm water hardness sensor is cleaned and functioning.
    d. Inspect condenser tubes for evidence of scale buildup
    e. Inspect for water leaks
3. During cooling season:
    a. Inspect the roof area for evidence of over spray.
    b. Inspect the sump for buildup of mud and debris. Clean if necessary. Refer to Sump Cleaning on page 101.
4. Check each circuit's refrigerant sightglass when the circuit is operating under steady-state, full load conditions. The sightglass should then be full and clear. If it is not, check for refrigerant leaks.

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

5. Check for blockage of the condensate drain. Clean the condensate pan as needed.
6. Check the power and control voltages.
7. Check and adjust all temperature and pressure controls as needed.
8. Examine the gas furnace (see IM 684 or IM 685).

Monthly

1. During cooling season:
    a. Depress the low sump water float (WL64) to confirm spray pump shutdown
    b. Depress sump water float (WL63) to confirm activation of supply water solenoid valve SV61.
2. Check for proper superheat and subcooling (see Expansion Valve Superheat Adjustment on page 78 and Refrigerant Charge on page 107).
3. Check the running amperage of all motors.
4. Check all operating temperatures and pressures.

Bi-Monthly

1. Tighten, align, and replace any frayed belts. Tighten all wire connections, and setscrews (Note: Belts must be checked for tightness after 24 hours of initial operation).
2. Clean the evaporator and condenser 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. Lubricate the motor (page 102)and fan shaft (page 103) bearings and page 68 for EAFs).
4. Check and adjust all damper linkages.
5. Check the operation of all safety controls.
6. Check the condenser fans and tighten their setscrews.

Annually

1. At the beginning of the cooling season, perform the complete start up (see Check, Test, and Start Procedures starting on page 74).
2. At the end of the cooling season, shut down city water, drain and clean the sump, verify that the spray pump is completely drained. If there is no heat in the service compartment, flush water piping with antifreeze and either drain the city water supply to a level below the roof, or confirm that any field supplied heat tape is functioning.
3. Lubricate the door latch mechanisms.

Table 12: Maintenance Schedule

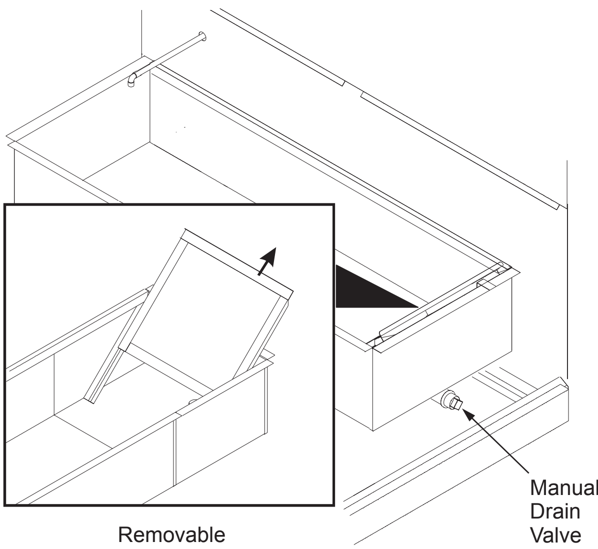
Maintenance Task	Weekly	Monthly	Bi-Monthly	Annually
Weekly Procedures				
Clean or replace filters if necessary	X	X	X	X
Water treatment system - verify reserves in chemical tanks	X	X	X	X
Water treatment system - verify operation of chemical pumps	X	X	X	X
Water treatment system - verify operation of water hardness sensor and clean residue if necessary	X	X	X	X
Water treatment system - inspect condenser tubes for residue and clean if necessary	X	X	X	X
Water treatment system - verify chemical tanks have reserves	X	X	X	X
Water treatment system - inspect for water leaks	X	X	X	X
Inspect roof area for evidence of over spray (during cooling season)	X	X	X	X
Inspect sump for residue and clean if necessary (during cooling season)	X	X	X	X
Inspect refrigerant sightglass and inspect for leaks if necessary	X	X	X	X
Inspect condensate drain pan for residue and clean if necessary	X	X	X	X
Inspect power and control voltages	X	X	X	X
Inspect all temperature and pressure controls. Adjust if necessary	X	X	X	X
Inspect gas furnace	X	X	X	X
Monthly Procedures				
Depress low sump water float and confirm spray pump shutdown (cooling season only)		X	X	X
Depress sump water float and confirm supply water solenoid valve operation (cooling season only)		X	X	X
Inspect for proper superheat and subcooling		X	X	X
Inspect running amperage of all motors		X	X	X
Inspect all operating temperatures and pressures		X	X	X
Bi-Monthly Procedures				
Tighten / align belts or replace frayed belts			X	X
Inspect evaporator / condenser coils for residue and clean if necessary			X	X
Lubricate motor and fan shaft bearings			X	X
Inspect all damper linkages and adjust if necessary			X	X
Inspect all safety controls and verify operation			X	X
Inspect condenser fans and tighten setscrews if necessary			X	X
Annual Procedures				
Perform complete start up procedures (beginning of cooling season)				X
Drain and clean the sump				X
Verify any field supplied heat tape is functioning				X
Lubricate all door latch mechanisms				X

Sump Cleaning

The spray operation washes articles out of the condenser air and condenser heat rejection evaporates water. The evaporation process leaves behind minerals and particles that settle in the sump and sump screen. The sump screen protects the pump and spray system and must be in place when the unit is operating. To clean the sump (see Figure 82):

1. Drain the Sump by opening the manual Drain Valve and pumping as much water as possible into a sanitary sewer.
2. Gravity drain the remaining water into containers and dispose of properly.
3. Remove the Sump Screen and clean.
4. A Hose Bib and Shut Off Valve is provided inside the service compartment. See Figure 6 on page 8. Use a hose to wash any remaining sediment out of the drain.

Figure 82: Cleaning the Sump



Unit Storage

Location

The Daikin Rooftop Packaged System Unit is an outdoor unit. However, the schedule may dictate storage either on the ground or in its final position at the site. If the unit is stored on the ground, additional precautions should be taken as follows:

1. Make sure that the unit is well supported along the length of the base rail.
2. Make sure that the unit is level (no twists or uneven ground surface).
3. Provide proper drainage around the unit to prevent flooding of the equipment
4. Provide adequate protection from vandalism, mechanical contact, etc. The condenser fins are particularly vulnerable to damage by even light contact with ground based objects.
5. Provide unit doors are securely closed and locked.
6. If isolation dampers are provided, verify that they are properly installed and fully closed to prevent the entry of animals and debris through the supply and return air openings.
7. Units without isolation dampers should be fitted with covers over the supply and return air openings.

Preparation

Supply (and Return) fans

1. Move the motor base to check and lubricate slides and leadscrews.
2. Remove the drive belts, tag them with the fan name and unit serial number and store them in a conditioned space out of direct sunlight.
3. Turn the supply and return fan manual motor protectors (MMPs) to the off position.
4. Once every month, rotate the fan and motor shafts. Mark the shaft positions fIrst to make sure they stop in a different position.
5. Depending on local climatic conditions, condensate can collect on components inside the units. To prevent surface rust and discoloration, spray all bare metal parts with a rust preventive compound. Pay close attention to fan shafts, sheaves, bearings and bearing supports,

Cabinet Sections

Once a month, open a door on each section and verify that no moisture or debris is accumulating in the unit.

Cooling Circuits

1. Provide that each circuit is properly pumped down.
2. Pull the fuses to each compressor(store them in the control cabinet)
3. Close all the refrigerant service valves on each circuit
4. Tag the valves as a warning for the technician who will be restarting the units

NOTE: Steps 1 to 4 are not necessary if the unit had not yet been started.

Gas Furnace

If the unit is equipped with a gas furnace, close the gas shutoff valve and open furnace control switch S3.

Control Compartment

1. Daikin recommends that the electronic control equipment in the unit be stored in a 5% to 95% RH (non-condensing) environment.
2. It may be necessary to put a heat source (light bulb) in the main control panel to prevent the accumulation of atmospheric condensate within the panel.
3. The location and wattage of the heat source will be dependent on local environmental conditions.
4. Check the control compartment every two weeks to provide that the heat source is functional and is adequate for current conditions.

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. Following the start up procedure will help discover these and other issues that may have developed during the storage interval.

Gas Furnace

For information on maintenance of the gas furnace, refer to IM 684 or IM 685.

Bearing Lubrication

⚠ CAUTION

Bearing overheating potential. Can cause damage to the equipment.

Do not overlubricate bearings.

Use only a high grade mineral grease with a 200°F safe operating temperature. Refer to the list below for recommended lubricant types.

Motor Bearings

Supply and Return Fans—Supply and return fan motors should have grease added after every 2000 hours of operation. Use one of the greases shown below. using the following procedure, lubricate the bearings while the motor is warm, but not running.

1. Remove and clean the upper and lower grease plugs.
2. Insert a grease fitting into the upper hole and add clean grease according to the grease charge shown in Table 10 with a low pressure grease gun.
3. Run the motor for 6 minutes before replacing the plugs.

NOTE: Specific greasing instructions may be located on a tag attached to the motor. If specific lubrication instructions are on the motor, they supersede all other instructions.

Condenser Fan—Condenser fan motors are permanently lubricated and require no periodic lubrication.

Table 13: Fan Bearing Recommended Lubricants and Amounts

Manufacturer	NEMA Frame Size	Bearing Grease Charge (oz)
Polyrex EM (Exxon Mobile) Texaco Polystar Rykon Premium #2 Penzoil Pen 2 Lube Chevron SRI	56 to 140	0.08
	140	0.15
	180	0.19
	210	0.3
	250	0.47
	280	0.61
	320	0.76
	360	0.81
	400	1.25
	440	2.12

Fan Shaft Bearings

Any good quality lithium or lithium complex base grease,using mineral oil, conforming to NLGI grade 2 consistency,and an oil viscosity of 455-1135 SUS at 100°F (100-200 cSt at 40°C) may be used for relubrication.

Compatibility of grease is critical. Relubricatable Browning bearings are supplied with grease fittings or zerks for ease of lubrication with hand or automatic grease guns. Always wipe the fitting and grease nozzle clean.

CAUTION

For safety, stop rotating equipment. Add one half of the recommended amount shown in Table 13. Start bearing, and run for a few minutes. Stop bearing and add the second half of the recommended amount. A temperature rise, sometimes 30°F (1°C), after relubrication is normal. Bearing should operate at temperature less than 200°F (94°C) and should not exceed 225°F (107°C) for intermittent operation. For a relubrication schedule, see Table 14. For any applications that are not in the ranges of the table, contact Daikin.

CAUTION

The tables below state general lubrication recommendations based on our experience and are intended as suggested or starting points only. For best results, specific applications should be monitored regularly and lubrication intervals and amounts adjusted accordingly.

Table 14: SAF and RAF Relubrication Intervals

(Use NLGI #2 Lithium or Lithium Complex Grease)			
Speed	**Temperature**	**Cleanliness**	**Relub. intervals**
100 rpm	Up to 120°F (50°C)	Clean	6 to 12 months
500 rpm	Up to 150°F (65°C)	Clean	2 to 6 months
1000 rpm	Up to 210°F (100°C)	Clean	2 weeks to 2 months
1500 rpm	Over 210°F (100°C) to 250°F (120°C)	Clean	Weekly
Above 1500 rpm	Up to 150°F (65°C)	Dirty / wet	1 week to 1 month
Maximum catalog rating	Over 150°F (65°C) to 250°F (120°C)	Dirty / wet	Daily to 2 weeks
	Above 250°F (120°C)		Contact Browning

Table 15: SAF and RAF Recommended Relubrication Grease Charge

Shaft Size in Inches (mm)	OZ. (grams)
1/2 to 3/4 (20)	0.03 (0.85)
7/8 to 1-3/16 (25-30)	0.10 (2.84)
1-1/4 to 1-1/2 (35-40)	0.15 (4.25)
1-11/16 to 1-15/16 (45-50)	0.20 (5.67)
2 to 2-7/16 (55-60)	0.30 (8.51)
2-1/2 to 2-15/16 (65-70)	0.50 (15.59)
3 to 3-7/16 (75-80)	0.85 (24.10)
3-1/2 to 4 () 85-105	1.50 (42.53)

NOTE: Temperature ranges over 225°F are shown for lubricants only. High temperature applications are not suitable for standard air handler components.

Table 16: Recommended lubricants for fan shaft bearings

Product Name	Temperature Range	Base	Thickener	NLGI Grade
Texaco Premium RB	30 to 350ºF (34 to 177ºC)	Paraffinic mineral oil	Lithium	2
Mobil AW2	40 to 437ºF (40 to 175ºC)	Mineral oil	Lithium	2
Mobil SCH 100	58 to 356ºF (50 to 180ºC)	Synthetic	Lithium	2
Chevron Altiplex Synthetic	60 to 450ºF (51 to 232ºC)	Synthetic	Lithium	2
Exxon Ronex MP	40 to 300ºF (40 to 149ºC)	Mineral oil	Lithium	2

CAUTION

Failure to observe safety precautions can cause personal injury or equipment damage.

CAUTION

Failure to carefully follow installation instructions can result in improper installation, which can cause bearing performance problems as well as derious personal injury. Before attempting to install or remove bearings, read installation / removal instructions in their entirety.

Bearing Replacement

The following instructions must be read in entirety before attempting installation or removal. The procedures indicated should be carefully followed. Failure to do so can result in improper installation which could cause bearing performance problems as well as serious personal injury.

Bearings in Bolt-On Housings (Units)

1. Check area - Clean and organize bearing installation area and keep well lit. Be sure mounting surfaces are clean and flat.
2. Check shaft - Shaft should be within tolerance range shown in Table 17, clean, and free of nicks and burrs. Mount bearing on unused section of shafting or repair / replace shafting as required.
3. Install unit - Slide unit onto shaft. If it is difficult to mount bearing on shaft, use a piece of emery cloth to reduce any high spots on shaft. Do not hammer on any component of the bearing.
4. Fasten unit in place - Install housing mounting bolts, check and align bearing and tighten mounting bolts to recommended fastener torques. Exercising extreme caution and safety, rotate shaft slowly to center bearing.

Table 17: Shaft Size Tolerances

Shaft Size (in)	Tolerance
1-11/16 to 2-7/16	+0 to -0.0015
2-7/16 and up	+0 to -0.002

BOA Concentric Inserts

1. Be sure that BOA Concentric collar is fitted square and snug against the shoulder on the inner ring.
2. Torque BOA Concentric collar cap screw to torque recommended in Table 18.

Table 18: Recommended Torque Values for Concentric Locking Bearing / Shaft Size

Fan Size (in)	Bore Size (in)	Torx Screw	Size In lbs.
27 (AF)/ 40 & 49 (SWSI)	2-3/16	T-30	180
30 & 33 (AF)/ 44 (SWSI)	2-7/16	T-45	400
36 (AF)	2-11/16	T-45	400
40 (AF)	2-15/16	T-45	400

NOTE: AF = DWDI AF, SWSI = AF Plenum Fan

Monitor Installed Bearing

After bearing has been run for several minutes, and again after several hours, check bearing for excessive noise or vibration. Shutdown machine and check housing temperature: typical applications operate at 100°F–105°F (38°C–66°C). Tighten all locking devices after 500 hours or 3 months, whichever comes first.

Propeller Exhaust Fan

See Propeller Exhaust Fan Option starting on page 68.

Vibration Levels

Each unit as shipped has been trim-balanced to operate smoothly. To provide satisfactory operation after shipping and installation, use the accepted industry guidelines for field balancing fans. See Table 19.

Table 19: Vibration Levels

Fan speed (RPM)	Vibration
800 or less	5 mils maximum displacement
801 or greater	0.20 in/sec. maximum velocity

NOTE: Excessive vibration from any cause contributes to premature fan and motorbearing failure. Overall vibration levels should be monitored every six months of operation. An increase in levels is an indication of potential trouble.

Vibration Causes

1. Wheel imbalance.
   a. Dirt or debris on wheel blades.
   b. Loose setscrews in wheel hub or bearing-to-shaft.
   c. Wheel distorted from overspeed.
2. Bent shaft.
3. Drive faulty.
   a. Variable pitch sheaves - Axial and radial runout of flanges; uneven groove spacing; out of balance. Also similar faults in driven sheave.
   b. Bad V-belts; lumpy, or mismatched; belt tension too tight or too loose.
4. Bad bearings, loose bearing hold-down bolts.
5. Motor imbalance.
6. Fan section not supported evenly on foundation.

Periodic Service and Maintenance

1. Check all moving parts for wear every six months.
2. Check bearing collar, sheave, and wheel hub setscrews, sheave capscrews, and bearing hold-down bolts for tightness every six months.

Setscrews

Setscrews lock bearings, sheaves, locking collars and fan wheel to their shafts. It is very important that all setscrews be checked periodically to provide that they have not loosened. If this is not done, severe equipment damage could occur.

⚠ CAUTION

Improperly tightened setscrews can lead to severe equipment damage.

Using Table 20 and Table 21, check the tightness of all setscrews with a torque wrench. Note that if the return fan bearing setscrews need to be retightened, a special procedure is required to equally load both bearings (see Return Fan Bearing Setscrews).

If a setscrew is checked for proper torque and is found to be below the minimum torque or is loose or has been removed, it is a good indication that the assembly conditions have changed. Do not attempt to reuse a setscrew in this case. (Setscrews have special points designed to cut into the shaft material to create the clamping force. Use of the proper torque will always cause deformation of this point. Reusing a setscrew with a deformed point will give an unknown clamping force for a given torque.)

Before installing a new setscrew, clean out the threads in the hole. Apply one drop of light machine oil to the threads of the setscrew prior to installation. Excess oil or any grease will compromise the clamping pressure that is required for proper installation. Do not use oil with EP (extreme pressure) additive. Do not use liquid chemical thread sealant such as Loctite since it may foul the threads and give improper torque settings.

Table 20: Screw Torque Settings, Socket Head for Bearings

Socket Head for bearings	Diamond Faceted and knurled point setscrews	
Dia. (in.)	Low (ft-lb.)	High (ft-lb.)
1/4	5.0	6.5
5/16	12	14
3/8	20	25
7/16	30	38
3/4	50	52
5/8	91	94

Table 21: Screw Torque Settings, Square Head for Fan Hubs

Square Head for fan hubs (across flats)	Cup Point setscrews	
Dia. (in.)	Low (ft-lb.)	High (ft-lb.)
3/8	23	30
3/4	60	75
5/8	125	150

Return Fan Bearing Setscrews

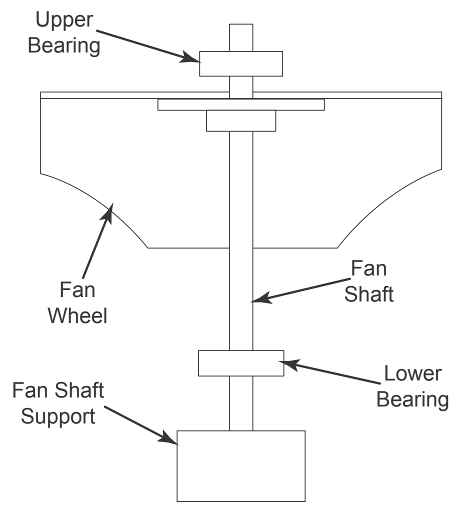
Because the return fan Is mounted on a vertical shaft, the following procedure must be used to retighten any return fan bearing setscrews that have loosened. This procedure will provide that both bearings are equally loaded. If one bearing is carrying the entire weight of the fan, it could fail prematurely.

⚠ IMPORTANT

In order to maintain proper drive alignment and fan-to-tunnel clearance, the fan and shaft must not drop at all when the setscrews are loosened in Step 4.

1. Loosen the fan belts.
2. Support the weight of the fan and the fan shaft with timbers or some other suitable means (see Figure 83).
3. Verify that the upper shaft collar is securely fastened to the shaft. Check the setscrew torque.
4. Loosen the upper and lower bearing setscrews. The entire weight of the fan and shaft is now supported by the fan shaft support.
5. Retighten all bearings to the torque specification given in Table 20. Remove the fan shaft support and retension the belts.

Figure 83: Return Fan Assembly



Supply Fan Wheel-to-Funnel Alignment

If the unit is equipped with an airfoil or backward curved supply fan, the fan wheel-to-funnel alignment must be as shown in Figure 84, Figure 85 and Figure 86 to obtain proper air delivery and operating clearance. If necessary, adjustments are made as follows:

1. Verify that the fan shaft has not moved in its bearings.
2. Loosen the fan hub setscrews and move the wheel(s) along the shaft as necessary to obtain the correct dimension shown in Table 22.
3. Retighten the setscrews to the torque specification given in Table 20 on page 105. Tighten the setscrews over the keyway first; tighten those at 90 degrees to the keyway last.
4. Verify that the radial clearance around the fan is uniform. Radial clearance can be adjusted by slightly loosening the funnel hold-down fasteners, shifting the funnel as required, and retightening the fasteners.

Figure 84: 27"–33" Airfoil Wheel-to-Funnel Alignment

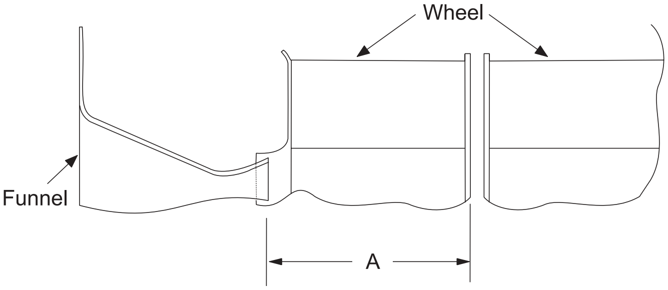


Figure 85: 40" Airfoil Wheel-to-Funnel Alignment (RDT 045–075)

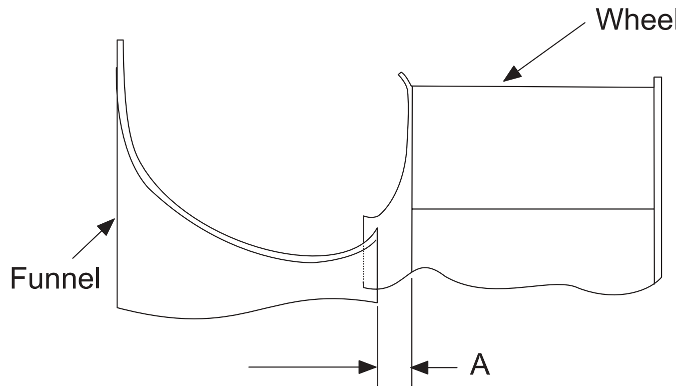


Figure 86: 44" Airfoil Wheel-to-Funnel Alignment

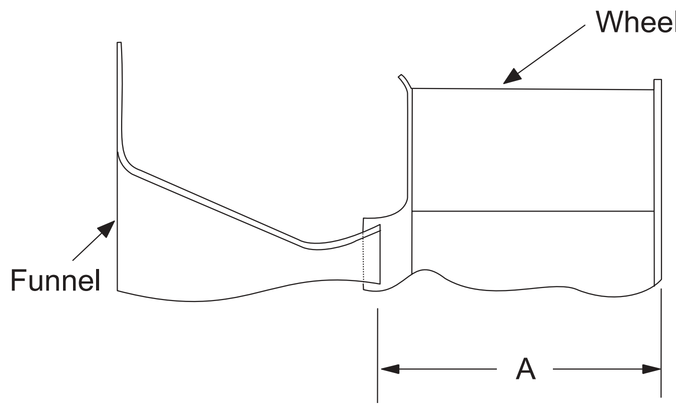


Table 22: Airfoil Wheel-to-Funnel Tolerances

Wheel-to-Funnel Relationship – in. (mm)	
Wheel Diameter (in.)	"A" (±0.3)
27	9.90 (246 mm)
30	10.60 (269 mm)
33	11.70 (297 mm)
40	0.62 (16 mm)
44	16.21 (411 mm)

Refrigerant Charge

The unit nameplate references proper charge for each refrigerant circuit in case a full charge must be added to the unit.

⚠ WARNING

Abrupt loss of charge can cause severe personal injury. Reclaim refrigerant before replacing.

Take special care to add refrigerant slowly enough to the suction to prevent damage. Adjust the charging tank hand valve so liquid leaves the tank but vapor enters the compressor.

This is especially true with R-407C because the charge must be drawn from the liquid portion of the tank.

⚠ CAUTION

Units purchased for R-22 operation must be charged only with R-22. Units purchased for R-407C operation must be charged only with R-407C. Field mixing or changing of refrigerants can compromise performance and damage equipment.

Table 23: Acceptable Refrigerant Oils

Polyolester [POE] oils
Copeland ULtra 22 CC
Mobil EAL™ Arctic 22 CC
ICI EMKARATE RL™ 32CL

NOTE: Do not use mineral oils

Subcooling

When field charging the unit, use the following to properly charge the unit:

- All compressors on each circuit operating at full capacity.
- Allowable subcooling ranges are between 13°F to 20°F.
- Be sure to measure pressure and temperature at the same location when finding / calculating subcooling. Compare the actual temperature and pressures to the saturated liquid temperature. R-407C example: A pressure of 250 psi is measured at the condenser outlet. From the R-407C chart, 250 psig is approximately 108°F saturated liquid temperature. If the actual refrigerant temperature is 98°F, the liquid is subcooled 10°F.
- Ambient temperature must be between 60°F and 105°F.
- Hot Gas Bypass NOT operating (only if unit is supplied with option).

If any one of the above items is not followed, subcooling readings will not be accurate and the potential exists for over or undercharging of the refrigerant circuit.

Refrigerant Charging with Zeotropes

R-407C is a zeotropic mixture. During initial charging or “topping” off a system, it is important to remove the refrigerant from the charging cylinder in the liquid phase. Many of the cylinders for the newer refrigerants use a dip tube so that in the upright position liquid is drawn from the cylinder. DO NOT vapor charge out of a cylinder unless the entire cylinder is to be charged into the system. Refer to charging instructions provided by the refrigerant manufacturer.

Replacing Failed Refrigerant Sensors or Switches

The Daikin Rooftop Unit includes the following refrigerant sensors or switches.

1. Low refrigerant sensing, operating switch
2. High refrigerant pressure, safety switch

The low pressure and Speedtrol sensors / switches sense refrigerant pressure through schrader fittings that contain cores. The cores are stop valves that will not allow refrigerant to flow through the schrader unless the device is in place. Therefore the low pressure and Speedtrol sensors / switches can be replaced without reclaiming the refrigerant.

The Schrader that serves the high pressure switch does not contain a core, in order to maximize the functionality of the safety. Therefore it cannot be replaced unless the refrigerant has already been reclaimed.

Evaporative Condenser Section

Nozzle and Spray Tree Removal

1. Remove outer trim panels
2. Disconnect either or both spray trees from the 2" PVC bushing at the rear manifold by rotating the tree assembly counter-clockwise.
3. After tree assembly is disconnected, rotate it so the nozzles are horizontal and pull assembly out.
4. See Figure 91 through Figure 93 for more detail.

Figure 87: Nozzle and Spray Tree Removal

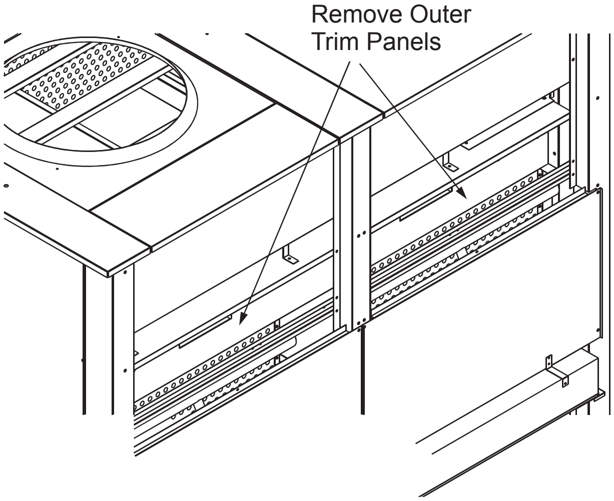
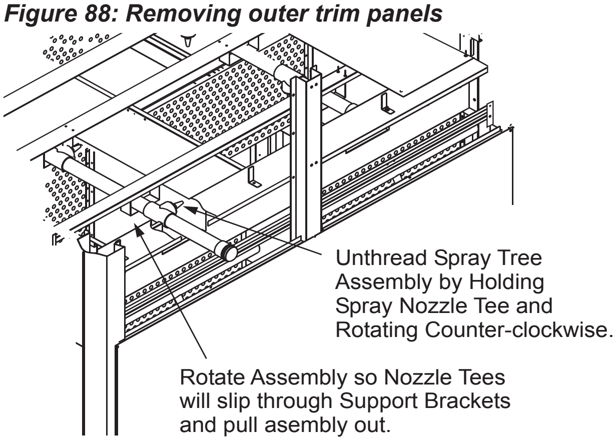


Figure 88: Removing outer trim panels



Condenser Coil Return Bend Cleaning

Condenser coil return bends are in an enclosed area outside the spray containment vessel. The return bends on one side of the coil are susceptible to the moist, condenser fan air flow and moisture is often condensing on or evaporating from these return bends. This process can cause mineral scale build up on the return bends which can be mildly corrosive especially if chemical water treatment is used. It is critical that these condenser return bends be inspected every 3-6 months and any scale be removed. Scale should be removed with a soft bristle brush. A wire brush should not be used on the softer copper tubes.

The return bends are easily accessed.

- Remove the end louver panels (Figure 89)
- Remove the spray enclosure end panel (Figure 90)
- The return bends are then accessed as shown (Figure 91)

Figure 89: Removing the end louver panels

Figure 90: Removing the spray enclosure end panel

Figure 91: Return bends and spray tree access door exposed

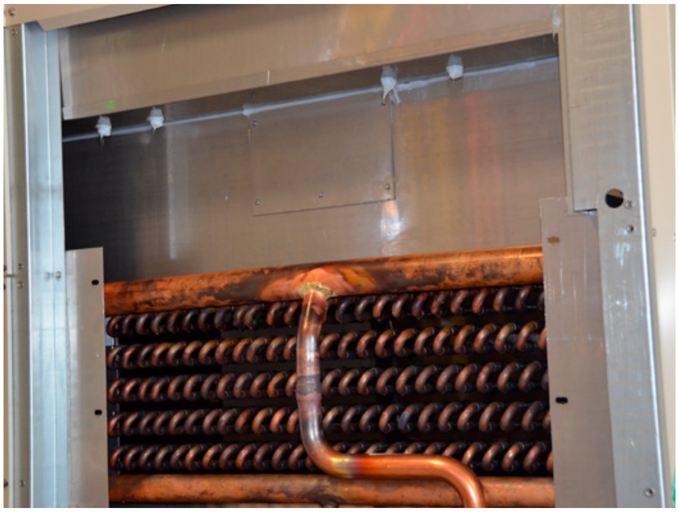
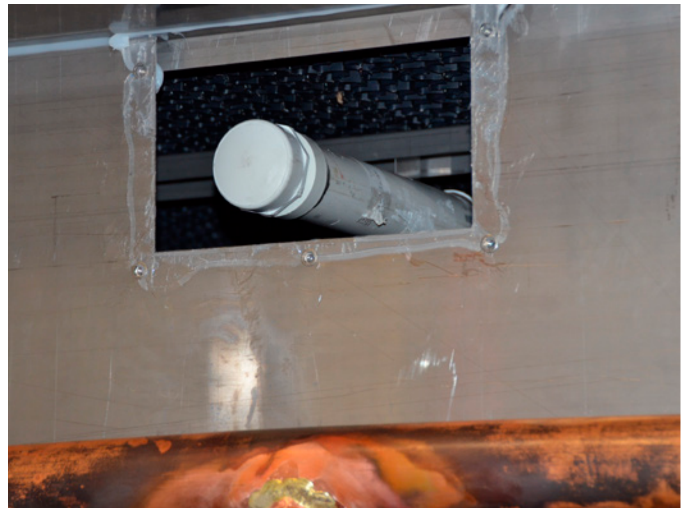


Figure 92: Removing spray tree door

Figure 93: Spray tree accessed



Control Panel Components

The following motor control protection is provided.

Table 24: RoofPak Individual Motor Control and Protection

Motor Type	Short Circuit	Overload	On-Off
Compressor < 100 Amps	MMP	Internal	Contactor
Compressor > 100 Amps	CB	Internal	Contactor
Condenser Fans	MMP	VFD	Contactor
EAF, One Fan	CB*	OL	Contactor
EAF, 2-3 Fans	CB*		Contactor
SAF & RAF with VFD No Bypass In Bypass	 CB* CB	 VFD OL	 Contactor Contactor

MMP = manual motor protecto
Internal = vendor motor protect
CB = circuit breaker [* FB with MD4
OL = over load relay

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. A short circuit indicator with manual reset is mounted alongside of each MMP as a means to differentiate between a short circuit and overload trip conditions.

The MMP trip points are factory set. Do not change unless the motor ampacity changes or the MMP is replaced with a new device with incorrect setpoint adjustment. Any other non-authorized trip point or setpoint adjustment voids all or portions of the unit's warranty. Authorized setpoint adjustments accomplished as follows

1. For motors with a 1.15 service factor, rotate the arrow onthe dial to correspond to the motor FLA.
2. For motors with a 1.0 service factor, multiply the motor FLA by 0.9; then rotate the arrow on the dial to correspond to that value.

To reset a tripped MMP, clear the trip by rotating the knob counterclockwise to the OFF (O) position; then rotate knob clockwise to the ON (I) position. See Figure 94.

⚠ 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.

Other MMP Features:

- Three-position rotary operator: OFF (O)-TRIP-ON (I) (Figure 94).
- Lockout—tagoutable rotary operator: turn the rotary operator to OFF (O), slide out the extension arm, and insert a lockout pin.
- Ambient compensated –20°C to +40°C.
- Single-phase sensitivity: if one phase exceeds setpoint, all three phases open.
- Trip test: insert a 9/64" screw driver in the test slot (Figure 94) to simulate a trip.

Figure 94: Manual Motor Protector

Thermal Overload Relay

Designed to provide current-dependent protection for loads with normal starting against impermissibility high temperature rises due to overload, phase asymmetry or phase failure. Increase in motor current beyond set point as a result to overload or phase failure will trip the overload and disconnect the motor.

The Relay trip points are factory set. Do not change unless the motor ampacity changes or the Relay is replaced with a new device with incorrect set point adjustment. Any other non-authorized trip points or set points adjustment voids all or portions of the unit's warranty. Authorized set point adjustment is accomplishment as follows:

1. For motors with 1.15 service factor, rotate the arrow on the dial to correspond to the motor FLA (See Figure 95).
2. For motors with a 1.0 service factor, multiply the motor FLA with 0.9; then rotate the arrow on the dial to correspond to that value.

To reset a tripped Relay, push the blue RESET button. To disconnect, push the Red stop Button (See Figure 95).

Other Relay features:

- Three connection systems options, Screw type, spring loaded and ring cable lug connection.
- Switch position indicator to indicate a trip and TEST function for wiring.
- Large rotary button to adjust current to Motor RLA.
- Selector switch for manual/and automatic RESET.

Figure 95: Overload Relay

Circuit Breaker

Circuit breakers are installed upstream of all VFDs to provide short circuit protection. These breakers are not adjustable.

To reset a tripped circuit breaker: Clear the trip by rotating the lever down to the OFF position (see Figure 96). Then rotate lever up to the ON position (Figure 96).

Breakers, like MMPs, have three distinct modes of operation which are clearly indicated by the handle position. The positions are ON (usually up, OFF (usually down), and TRIPPED (midway). Some circuit breakers may have a push-to-test button.

1. Press the handle or rotate the lever to the OFF position.
2. Press the handle or rotate the lever the opposite direction to the ON position.

Reset After Tripping Information

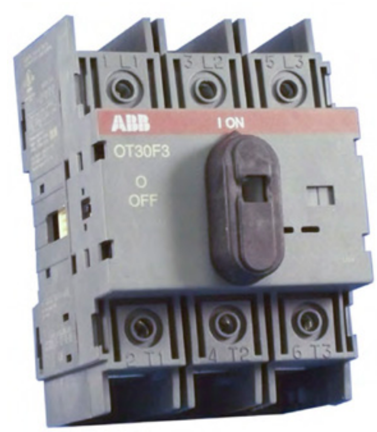
⚠ CAUTION

If a breaker is tripped, the handle/lever will be halfway between the OFF and ON positions. To reset a tripped circuit breaker:

⚠ WARNING

If a circuit breaker has tripped due to an overload or a fault current (short circuit), prior to resetting, the connected wiring circuits must be checked to determine the cause of the interruption.

Figure 96: Circuit Breaker

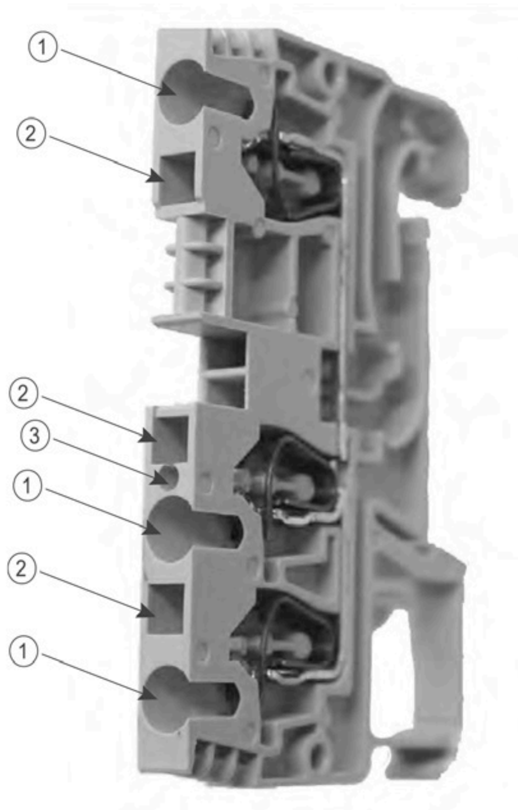


Field Wiring Terminals

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 Wire connections require inserting ("1" in Figure 97 a stripped wire a round port and clamping the stripped wire by inserting a flat-bladed screw driver in the adjacent square port ("2" in Figure 97).

Figure 97: Terminal Connectors



Phase Voltage Monitor (PVM)

The phase voltage monitor (Figure 129)is designed to protect three-phase loads from damaging power conditions. A microprocessor-based voltage and phase sensing circuit constantly monitors the three-phase voltages to detect harmful power line conditions. When a harmful condition is detected, its output relay is deactivated after a specified trip delay (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.

There are two LEDs on the face of the PVM ("1" in Figure 129) to indicate the following:

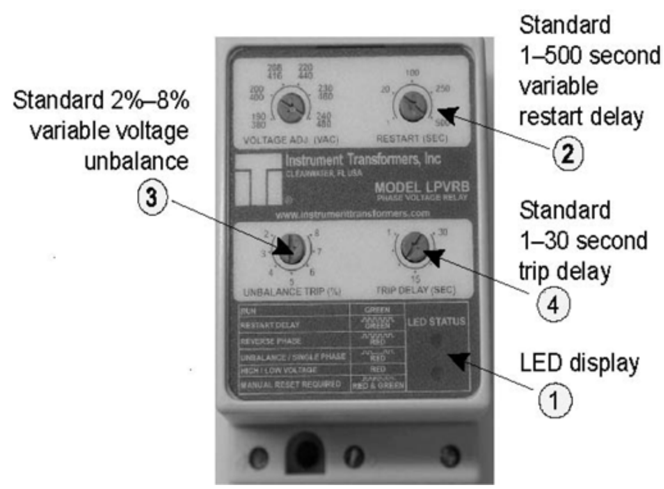
Table 25: LED Indication

Status	LED Indicator
Normal operation, no faults, relay energized	Green LED: steady ON
Loss of input phase (relay de-energized)	Red LED: flash twice, OFF, flash twice, OFF, etc.
Voltage unbalance (relay de-energized)	Red LED: flash twice, OFF, flash twice, OFF, etc.
High or low voltage (relay de-energized)	Red LED: steady ON
Phase reversal (relay de-energized)	Red LED: pulse ON, OFF, ON, OFF, etc.
Restart delay (fault cleared, PVM pending restart, relay de-energized)	Green LED: pulse ON, OFF, ON, OFF, etc.

Other features:

- Standard 2% to 8% variable voltage unbalance ("3" in Figure 98).
- Standard 1 to 500 second variable restart delay ("2" in Figure 98).
- Standard 1 to 30 second trip delay ("4" in Figure 98) (except loss of phase, which trips at 1 second nonadjustable).

Figure 98: Phase Voltage Monitor



Through-the-door Disconnect

⚠ DANGER

Hazardous voltage. May cause severe injury or death. Disconnect electric power before servicing equipment. More than one disconnect may be required to de-energize 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.

The optional "through-the-door" disconnect is a molded case switch with similar features of the circuit breaker. The "through-the-door" feature provides a safety interlock that disables power when the control panel door is opened. Opening the through-the-door disconnect without performing a proper machine shut-down is not recommended except in emergencies.

The through-the-door disconnect also provides for locking out power to the unit. To lock out power to the unit, rotate the handle to the "Reset/Lock" position and insert a padlock or locking device through the base of the handle. Do not lockout the handle with the Interlock in bypass mode.

Figure 99: Through-the-door Handle Disconnect

Figure 100: Interlock Bypass

Controlled Shut-down/Interlock Bypass

To access the control panel while power is active, for troubleshooting or performing a controlled shut-down, the through-the-door disconnect's interlock feature can be bypassed. The control panel door can be opened without disabling power to the control panel.

1. Insert a flat blade screwdriver into the slotted "release" located on the end of the disconnect faceplate (Figure 131).
2. Turn the release counter-clockwise and pull the door open.
3. To shut down an operating unit (no emergency condition present):
    a. Use the pump down switch to turn off the unit.
    b. The controls will then shut the liquid line solenoids, pump the refrigerant into the condenser, and turn off the compressors.

Pressure Sensors

The MicroTech III controller uses 0 to 5" W.C. static pressure transducers for measuring duct static pressure. As the duct static pressure varies from 0-5" W.C., the transducer output will vary from 4-20mA. The transducer output signal is 420mA however the signal entering the VFD is converted to a DC signal via a 500 Ohm resistor across the output signal at the transducer.

If building static pressure control is provided, a -0.25" W.C. to 0.25" W.C. static pressure transducer is used. As the building static pressure varies from -0.25" W.C. to 0.25" W.C., the transducer output will vary from 4-20mA. The transducer output signal is 4-20mA however the signal entering the VFD is converted to a DC signal via a 500 Ohm resistor across the output signal at the transducer.

Troubleshooting Pressure Transducers

Use the following procedure to troubleshoot a suspect sensor: If the duct static pressure always reads 0" WC on the unit keypad/display and the VFD speed is continuously ramping to 100%, check the following:

If the unit has two duct static pressure sensors (SPS1 and SPS2), verify that they both function properly per the following procedure. Also check for faulty wiring connections at the VFD analog inputs.

The controller displays and controls to the lower of the two readings. If a sensor is defective and inputs 0 volts to the VFD, the static pressure reading on the keypad/display reads 0 and the controller attempts to increase the 0 value to set point by ramping the VFD up.

If a second sensor (SPS2) is not installed or the pressure tubing to it is not connected, make sure the 2nd DSP Sensor= parameter in the Unit Configuration menu of the keypad/display is set to "No" so that the controller ignores the second static pressure analog input.

If a second sensor (SPS2) is installed, make sure the 2nd DSP Sensor= parameter in the Unit Configuration menu of the keypad/display is set to "Yes."

Check the 24 V (dc) power supply to the sensor, verify that there is 24 V (dc) between the suspect transducer "+" and "-" terminals.

Using an accurate manometer or gauge, measure the same pressure that the suspect transducer is sensing. To do this, tap into the transducer high and low pressure tubing or locate the measurement device taps next to the transducer taps.

If the suspect sensor is measuring duct static pressure, verify that the high and low pressure taps are properly installed. An improper pressure tap installation can cause severe fluctuations in the sensed pressure. Refer to the model-specific installation manual for pressure tap installation guidelines.

Measure the DC voltage output from the transducer across the sensor "S" and "-" terminals.

If the measured voltage and pressure do not match, there may be a wiring problem, the factory 500 ohm resistor across "S" and "-" or the transducer may be defective. Check the transducer input circuit wiring and connections for defects. If the measured voltage and pressure match, the VFD parameters and/or ModBus communication between the controller and the VFD will need to be verified.

Remove powers from the controller by opening system switch S1. If available, swap a similar good transducer with the suspect transducer or try installing a new transducer. Restore power by closing S1 and verify whether the suspect transducer is defective.

Table 26: Parts List

Component Designation	Description	Daikin Part Number
MCB	Main Controller—must be programmed (unit GO# required)	193407301
NA	Connector, Extension I/O Direct Connect	193409701
NA	Terminal Block, MCB–2 Pole	193410302
NA	Terminal Block, MCB–3 Pole	193410303
NA	Terminal Block, MCB–5 Pole	193410305
NA	Terminal Block, MCB–6 Pole	193410306
NA	Terminal Block, MCB–7 Pole	193410307
NA	Terminal Block, MCB–8 Pole	193410308
EXP A	Expansion Module—Condenser/Energy Recovery	193407501
EXP B	Expansion Module—Heat	193407501
EXP C	Expansion Module—Specials	193407501
NA	Terminal Block, MCB–2 Pole	193410302
NA	Terminal Block, MCB–3 Pole	193410303
NA	Terminal Block, MCB–7 Pole	193410307
NA	Terminal Block, MCB–8 Pole	193410308
CCB1	Auxiliary Cooling Control Board (DX Circuit #1 or generic condenser)	112026101 (replaces 106102701)
CCB2	Auxiliary Cooling Control Board (DX Circuit #2)	112026101 (replaces 106102701)
EHB1	Auxiliary Electric Heat Control Board	112026101 (replaces 106102701)
ERB1	Auxiliary Energy Recovery Control Board	112026101 (replaces 106102801)
—	RS-485 Communication Module (for Auxiliary Control Boards)	060006202
—	Standoffs for mounting RS-485 Communication Module (PN 060006206) onto Auxiliary Control Board (PN 112026101)	048166707
—	Keypad/Display	060006301
—	Keypad-Main Control Board Cable	111044601
ZNT1	Zone Temperature Sensor with Tenant Override	111048101
	Zone Temperature Sensor with Tenant Override & Remote Setpoint Adjustment (SCC units only)	111048102
DAT	Discharge Air Temperature Sensor (50 ft cable length-field cut to length)	060004705
EFT	Entering Fan Air Temperature Sensor (50 ft cable length-field cut to length)	060004705
OAT	Outside Air Temperature Sensor (50 ft cable length-field cut to length)	060004705
RAT	Return Air Temperature Sensor (50 ft cable length-field cut to length)	060004705
SPS1	Static Pressure Sensor: Duct, No. 1	049545007
SPS2	Static Pressure Sensor: Duct, No. 2	049545007
	Static Pressure Sensor: Building (Space) Pressure	049545006
T2	Transformer: 115/24 V (ac)	060004601
T3	Transformer: 115/24 V (ac)	060004601
T9	Transformer: 115/24 V (ac)	060630801
HUM1	Humidity Sensor: Wall Mount	067294901
	Humidity Sensor: Duct Mount	067295001
PC5	Dirty Filter Switch: First Filter Section	065493801
PC6	Dirty Filter Switch: Final Filter Section	065493801
PC7	Airflow Proving Switch	060015801
DHL	Duct High Limit Switch	065493801
OAE	Enthalpy Control: Electromechanical	030706702
	Enthalpy Control: Electronic (Used with RAE)	049262201
RAE	Return Air Enthalpy Sensor (Used with Electronic OAE)	049262202
SD1	Smoke Detector: Supply Air	049025001
SD2	Smoke Detector: Return Air	049025001
—	BACnet MS/TP Communication Module (RS485)	090016710
—	BACnet/IP Communication Module (Ethernet Cable 10BASET)	090016709
—	LonMark Space Comfort Controller (SCC) Communication Module	090016712
—	LonMark Discharge Air Controller (DAC) Communication Module	090016711
—	5 V (dc) Power Supply	111049601
—	Serial Port Ribbon	111047201
—	MCB Battery	BR2325
—	MCB Connector Repair Kit	300036605
—	Power Disconnect Switch	033696300
—	18 in. Lamp Holder	205484001
—	24 in. Lamp Holder	205484101
—	36 in. Lamp Holder	205484201
—	Hard Wire Module	205485501
—	18 in. Lamp	205484501
—	24 in. Lamp	205484601
—	36 in. Lamp	205484701

Limited Product Warranty

Consult your local Daikin Representative for warranty details. To find your local Daikin Representative, go to www.DaikinApplied.com.

Replacement Parts

When writing to Daikin 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.

Compressor

Daikin Rooftops use the following Copeland® Compressors.

1. Single compressors, one per refrigerant circuit.
2. Tandem compressors, basically two single compressors factory piped in parallel with equalization lines.

All Daikin Rooftop Products include a first year parts only warranty. The warranty period extends 12 months from startup 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.

1. If the equipment experiences a compressor failure within the first year parts warranty period or is a DOA compressor at start-up, the failed compressor is covered under the first year parts warranty. To receive a replacement compressor:
    a. The local (Copeland) Wholesaler must be notified of the failure and provided with the compressor model and serial number.
    b. The customer / contractor picks up the replacement compressor from the Wholesaler.
    c. After the failed compressor is removed from the equipment, it must be returned to the local Wholesaler for credit on the replacement compressor.
    d. Consideration may be given at this time to a compressor teardown analysis, depending on the history of failures.
2. If there was a delay in the start-up of the equipment and the (Copeland) 1st year warranty has expired on the compressor, but within the 18 month from shipment warranty, the replacement compressor must be ordered through the Daikin Parts Department.
    a. Contact the Daikin Parts Department for compressor availability.
    b. Fax the Daikin Parts Department a completed parts order form.
    c. The Parts Department will process the order and the compressors will be shipped from our Dayton, OH warehouse via ground transportation. If next-day air is required, you will need to 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 warranty.
    d. After the failed compressor has been replaced, it must be returned to Daikin with a Return Goods Tag attached. You will receive the tag in the mail and 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.
    e. Consideration may be given at this time to a compressor teardown analysis, depending on the history of failures.
3. On Daikin equipment that includes the extended 2nd–5th year compressor warranty option, the replacement compressor must be ordered through the Daikin Parts Department.
    a. Contact the Daikin Parts Department for compressor availability.
    b. Fax the Daikin Parts Department a completed parts order form.
    c. The Parts Department will process the order and the compressors will be shipped from our Dayton, OH warehouse via ground transportation. If next-day air is required, you will need to 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 warranty.
    d. After the failed compressor has been replaced, it must be returned to Daikin with a Return Goods Tag attached. You will receive the tag in the mail and 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.
    e. Consideration may be given at this time to a compressor teardown analysis, depending on the history of failures.

In-Warranty Return Material Procedure

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

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

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

If it is determined that the failure of the returned part is due to faulty material or workmanship within the standard warranty period, credit will be issued on the customer’s purchase order.

Rooftop
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 Rooftop roof mounted air conditioners 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:** ______________________

Compressor 1 model number: ______________________________ **Serial number:** ______________________

Compressor 2 model number: ______________________________ **Serial number:** ______________________

Compressor 3 model number: ______________________________ **Serial number:** ______________________

Compressor 4 model number: ______________________________ **Serial number:** ______________________

Compressor 5 model number: ______________________________ **Serial number:** ______________________

Compressor 6 model number: ______________________________ **Serial number:** ______________________

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Rooftop 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. Do fans turn freely? . . . . . ☐Yes ☐No ☐N/A

F. Has the discharge static pressure reference line been properly located within the building? . . . . . ☐Yes ☐No ☐N/A

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

G1. Voltage at Terminal Block | Disconnect 1–2_____________ V 2–3 _____________ V 1–3 _____________ V

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

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

J. Are all electrical power connections tight? (Check compressorelectrical box.) . . . . . ☐Yes ☐No ☐N/A

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

II. FAN DATA

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

B. Voltage at supply fan motor: . . . . . 1–2_____________ V 2–3 _____________ V 1–3 _____________ V

C. Supply fan motor amp draw per phase: . . . . . L1 _____________ L2 _____________ L3 _____________

D. Fuse sizes: . . . . . ____

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

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

G. Voltage at return fan motor: . . . . . 1–2_____________ V 2–3 _____________ V 1–3 _____________ V

H. Return fan motor amp draw per phase: . . . . . L1 _____________ L2 _____________ L3 _____________

I. Fuse sizes: . . . . . ____

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: . . . . . _____________

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DAIKIN

Rooftop Equipment Warranty Registration Form (continued)

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

III. START-UP COMPRESSOR OPERATION

A. Do compressors have holding charges?

Circuit #1. . . . . . ☐ Yes ☐ No ☐ N/A

Circuit #2. . . . . . ☐ Yes ☐ No ☐ N/A

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

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

D. Ambient temperature (°F): . . . . . . ____________

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

IV. PERFORMANCE DATA

A. Compressor voltage across each phase: . . . . . . 1–2____________ V 2–3 ____________ V 1–3 ____________ V

B. Compressor amperage of fully loaded compressor:

Compressor #1 — Phase 1________ Phase 2 ________ Phase 3 _______

Compressor #2 — Phase 1________ Phase 2 ________ Phase 3 _______

Compressor #3 — Phase 1________ Phase 2 ________ Phase 3 _______

Compressor #4 — Phase 1________ Phase 2 ________ Phase 3 _______

Compressor #5 — Phase 1________ Phase 2 ________ Phase 3 _______

Compressor #6 — Phase 1________ Phase 2 ________ Phase 3 _______

C. Low pressure cut-out: . . . . . . Circuit 1 __________ psig Circuit 2 __________ psig

D. Low pressure cut-in: . . . . . . Circuit 1 __________ psig Circuit 2 __________ psig

E. High pressure cut-out: . . . . . . Circuit 1 __________ psig Circuit 2 __________ psig

F. Discharge pressure, one compressor: . . . . . . Circuit 1 __________ psig Circuit 2 __________ psig

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

H. Suction pressure, one compressor: . . . . . . Circuit 1 __________ psig Circuit 2 __________ psig

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

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

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

L. Suction line temperature: . . . . . . ____________ °F ____________°F

M. Superheat: . . . . . . ____________ °F ____________°F

N. Subcooling:. . . . . . ____________ °F ____________°F

O. Is the liquid in the line sightglass clear and dry? . . . . . . ☐ Yes ☐ No ☐ N/A

P. Does the hot gas bypass valve function properly?. . . . . . ☐ Yes ☐ No ☐ N/A

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DAIKIN

Rooftop Equipment Warranty Registration Form (continued)

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

Q. At what suction pressure does the hot gas bypass valve open? . . . . Circuit 1 __________ psig Circuit 2 __________ psig

R. Record discharge air temperature at discharge of unit: ___________ °F

S. Are all control lines secure to prevent excessive vibration and wear? . . . . ☐ Yes ☐ No ☐ N/A

T. Are all gauges shut off and valve caps and packings tight after start-up? . . . . ☐ Yes ☐ No ☐ N/A

V. ELECTRIC HEAT CHECK, TEST & START

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

VI. GAS BURNER CHECK, TEST, & START

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

A. Gas Furnace:. . . . . Model no. _________________

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

C. Gas Rated firing rate (MBH input): . . . . ._________________

D. Gas Altitude (ft. above sea level): . . . . ._________________

E. Input (CFH): . . . . _________________

F. Gas pressure at burner (inches w.c.): . . . . _________________

G. CO_2 (%) . . . . _________________

H. CO_2 (%): . . . . _________________

I. Pilot flame only in microamps (steady at low fire): . . . . _________________

J. Pilot Tap-gas pressure (inches w.c.): . . . . _________________

K. Motor only/burner FLA running amps: . . . . _________________

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

M. Flame safeguard (microamps): . . . . _________________

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Rooftop Equipment Warranty Registration Form (continued)

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

N. Flame failure shutoff (seconds): . . . . ________________

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

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

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

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

S. Modulation Gas Heat Performance

Gas Pressure

Mod. Valve	**Reg. Valve**
25% ______ in Wc.	25% ______ in Wc.
50% ______ in Wc.	50% ______ in Wc.
75% ______ in Wc.	75% ______ in Wc.
100% ______ in Wc.	100% ______ in Wc.

VII. Hot Water Coil

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

VIII. 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 No. ________________________ Serial No. __________________________

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

IX. 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.

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DAIKIN

Rooftop Equipment Warranty Registration Form (continued)

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

X. Have all electronic or electrical controls been checked, adjusted, and tested for proper operation per the installation and maintenance bulletins?

. . . . ☐ Yes ☐ No ☐ N/A

XI. MAINTAINING MICROTECH CONTROL PARAMETER RECORDS

After the unit is checked, tested, and started and the final control parameters are set, record the final settings. Keep these records on file and update whenever changes to the control parameters are made. Keeping a record facilitates any required analysis and troubleshooting of the system operation and facilitates restoration after a controller replacement.

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: AAH.Wty_WAR_forms@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

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DAIKIN

Quality Assurance Survey Report

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

Job Name: ____________________ **Daikin Applied S.O. No.**__________

Installation address:____________________

City: ____________________ State: __________

Purchasing contractor:____________________

City: ____________________ State: __________

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

Company name:____________________

Address:____________________

City/State/Zip: ____________________

Unit model number: ____________________ **Unit serial number:** __________

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

   Location on unit ____________________

2. How would you rate the overall appearance of the product; i.e., paint, fin damage, etc.?

   Excellent ☐ Good ☐ Fair ☐ Poor ☐

3. Did all sections of the unit fit together properly? . . . . Yes ☐ No ☐ N/A ☐
4. Did the cabinet have any air leakage? . . . . Yes ☐ No ☐ N/A ☐

   Location on unit ____________________

5. Were there any refrigerant leaks? . . . . Yes ☐ No ☐ N/A ☐

   From where did it occur? . . . . Shipping ☐ Workmanship ☐ Design ☐

6. Does the refrigerant piping have excessive vibration? . . . . Yes ☐ No ☐ N/A ☐

   Location on unit ____________________

7. Did all of the electrical controls function at start-up? . . . . Yes ☐ No ☐ N/A ☐

   Comments ____________________

8. Did the labeling and schematics provide adequate information? . . . . Yes ☐ No ☐ N/A ☐
9. How would you rate the serviceability of the product?

   Excellent ☐ Good ☐ Fair ☐ Poor ☐

10. How would you rate the overall quality of the product?

    Excellent ☐ Good ☐ Fair ☐ Poor ☐

11. How does the quality of Daikin Applied products rank in relation to competitive products?

    Excellent ☐ Good ☐ Fair ☐ Poor ☐

    Comments ____________________

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

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Daikin Applied Training and Development

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at www.DaikinApplied.com and click on Training, or call 540-248-9646 and ask for the Training Department.

Warranty

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied representative for warranty details. To find your local Daikin Applied representative, go to www.DaikinApplied.com.

Aftermarket Services

To find your local parts office, visit www.DaikinApplied.com or call 800-37PARTS (800-377-2787). To find your local service office, visit www.DaikinApplied.com or call 800-432-1342.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to www.DaikinApplied.com.

Products manufactured in an ISO Certified Facility.