

Installation and Maintenance Manual

IM 903

Air Cooled Split System Condensing Unit for Rooftop Systems and Air Handlers

Group: **Applied Systems**

Part Number: IM 903

Date: January 2008

Model RCS 025C to 135C
R-22/R-407C Refrigerant



Contents

Introduction	3	Oil Pressure (115C to 135C only)	27
Hazard Identification Information	3	Refrigerant Piping Checkout	27
Agency Listed	3	Electrical Checkout	27
Nomenclature	3	Operation	28
Condenser Fan Arrangement	4	Hot Gas Bypass (Optional)	28
Refrigeration Piping	5	System Adjustment	28
Mechanical Installation	7	Liquid Line Sight Glass and Moisture Indicator	28
Receiving Inspection	7	Refrigerant Charging	28
Unit Placement	7	Thermostatic Expansion Valve	28
Clearances	7	Crankcase Heaters	28
Restricted Air Flow	9	Maintenance	29
Case 1, Building/Wall on One Side of Unit	9	Servicing Control Panel Components	29
Case 2, Open Screening Walls	10	Planned Maintenance	29
Case 3, Pit/Solid Wall Installation	11	Unit Storage	29
Rigging and Handling	12	Location	29
Refrigerant Piping	13	Preparation	29
Pumpdown	14	Restart	29
Holding Charge	14	Refrigerant Charge	29
Leak Testing	15	Servicing Refrigerant Sensors or Switches	30
Evacuation	15	Control Panel Components	30
Charging the System	17	Manual Motor Protector (MMP)	30
Refrigerant Charge	18	Other MMP features:	30
Subcooling	18	Disconnect	31
Refrigeration Service Valves	18	Terminals	32
Electrical Installation	19	Phase Voltage Monitor (PVM)	32
Field Power Wiring	19	Service and Warranty Procedure	33
Wiring Diagrams	20	Replacement Parts	33
Unit Options	24	Scroll Compressor (025C to 105C)	33
SpeedTrol™	24	Reciprocating Compressors (115C to 135C)	33
Check, Test, and Start Procedures	25	All Compressors	34
Servicing Control Panel Components	25	In-Warranty Return Material Procedure	34
Before Start-up	25	Limited Product Warranty (North America)	35
Compressor Startup	26	Exceptions	35
Scroll Compressor Rotational		Assistance	35
Direction (025C to 105C)	26	Sole Remedy/Disclaimer	35
Expansion Valve Superheat Adjustment	26	RCS Rooftop Equipment Warranty Registration	
R-407C Superheat	26	Form	36
Checking Superheat	26	Quality Assurance Survey Report	38

The Condensing Unit for Applied Rooftop and Air Handler Systems

- The Daikin RCS air cooled, remote condenser offers a wide selection of nominal capacities from 25 to 135 tons.
- Units are designed for quiet and energy efficient operation meeting ASHRAE 90.1 efficiency requirements.
- Dual circuits with scroll compressors from 25 to 105 tons with multiple stages for maximum capacity control.
- Dual circuits with Copeland Discus™ compressors (from 110 to 135 tons) with multiple steps of unloading for maximum capacity control.
- The RCS unit can be matched to a Daikin Vision®, Skyline®, or Destiny® air handling unit. No need for an estimated balance point.
- Using Daikin Select Tools a complete system can be designed and selected. Capacity, electrical information, and dimensional drawings are right at your fingertips.

Hazard Identification Information

DANGER

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

WARNING

Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

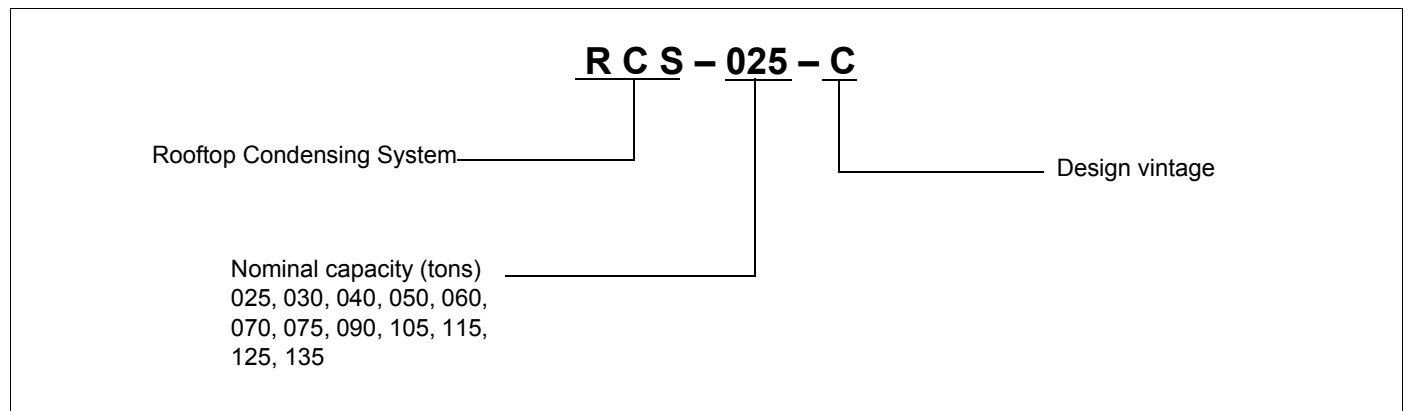
CAUTION

Cautions indicate potentially hazardous situations, which can result in personal injury or equipment damage if not avoided.

Agency Listed



Nomenclature



Introduction

Condenser Fan Arrangement

Table 1 shows the condenser fan numbering conventions and locations for each unit size.

Table 1: Condenser Fan Arrangement

Unit size	Refrigerant circuit	Arrangement	Unit size	Refrigerant circuit	Arrangement
025C 030C	1 or 2		075C 080C 090C	1 2	
040C	1 2		105C	1 2	
045C 050C	1 2		115C	1 2	
060C 070C	1 2		125C 135C	1 2	

Refrigeration Piping

The various available configurations for unit refrigeration piping are shown in the following diagrams:

Figure 1: Circuit Schematic

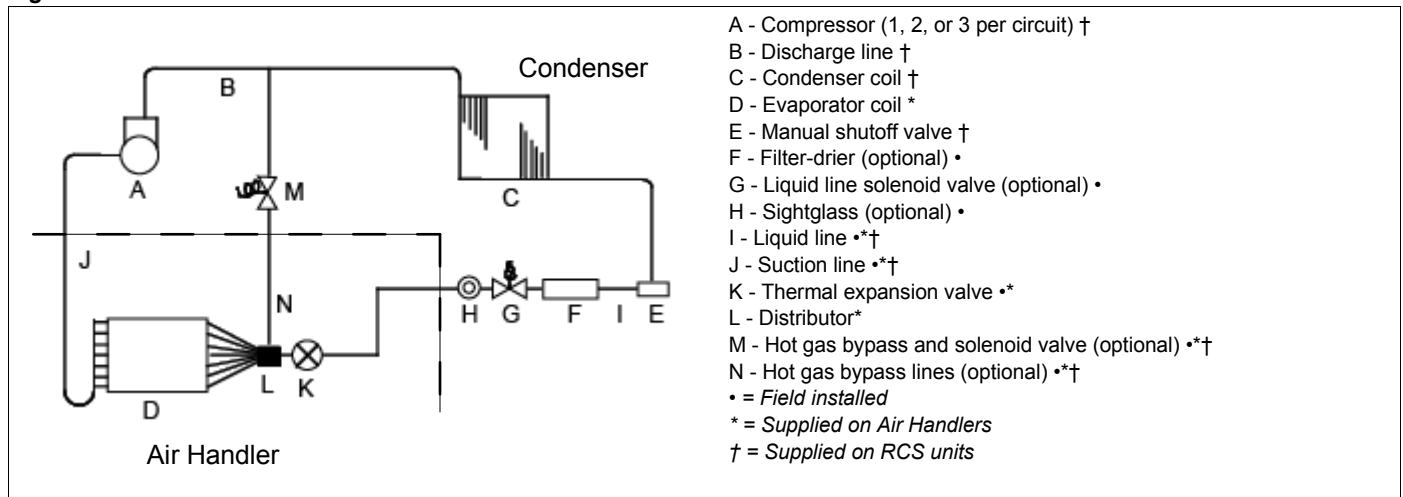
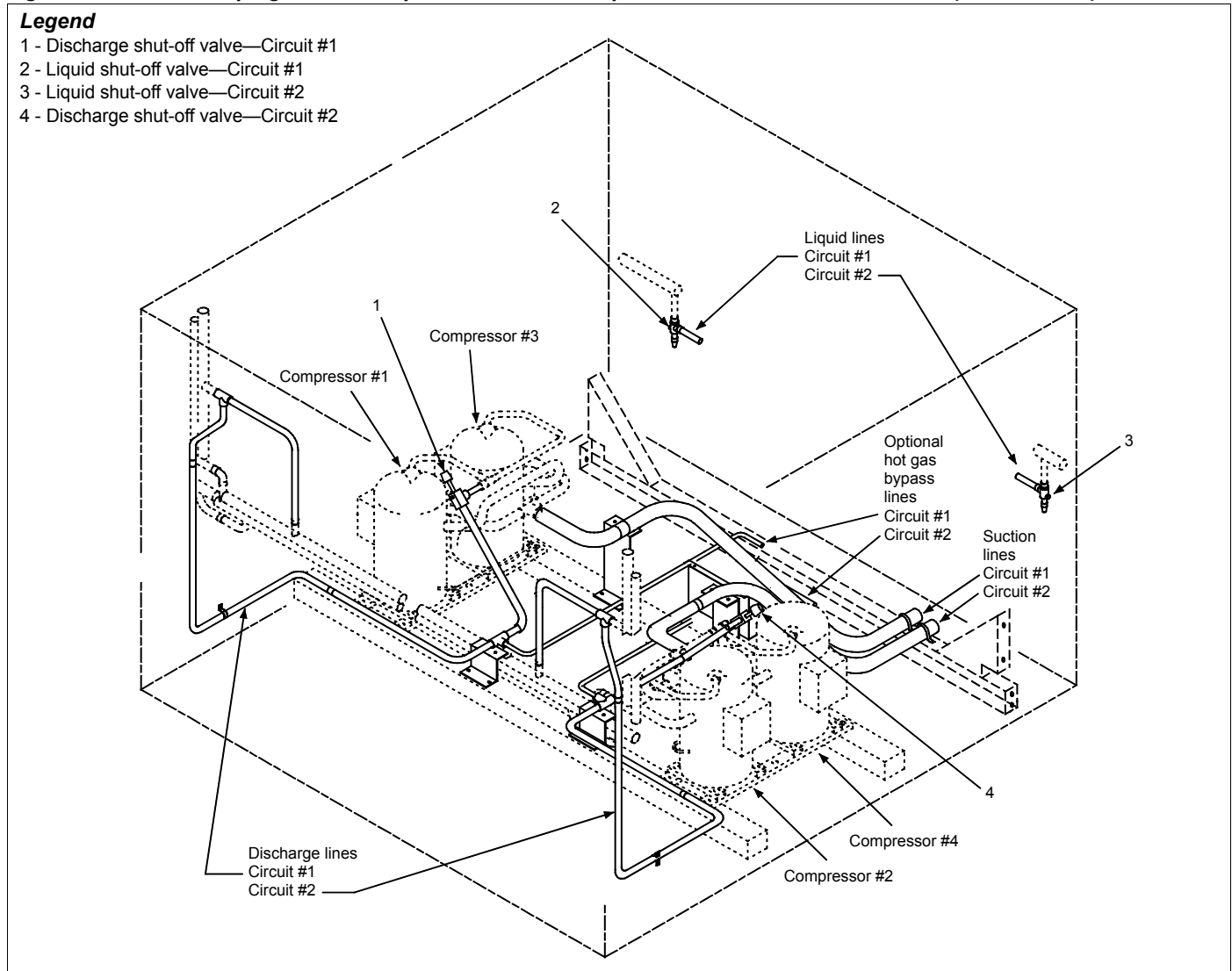
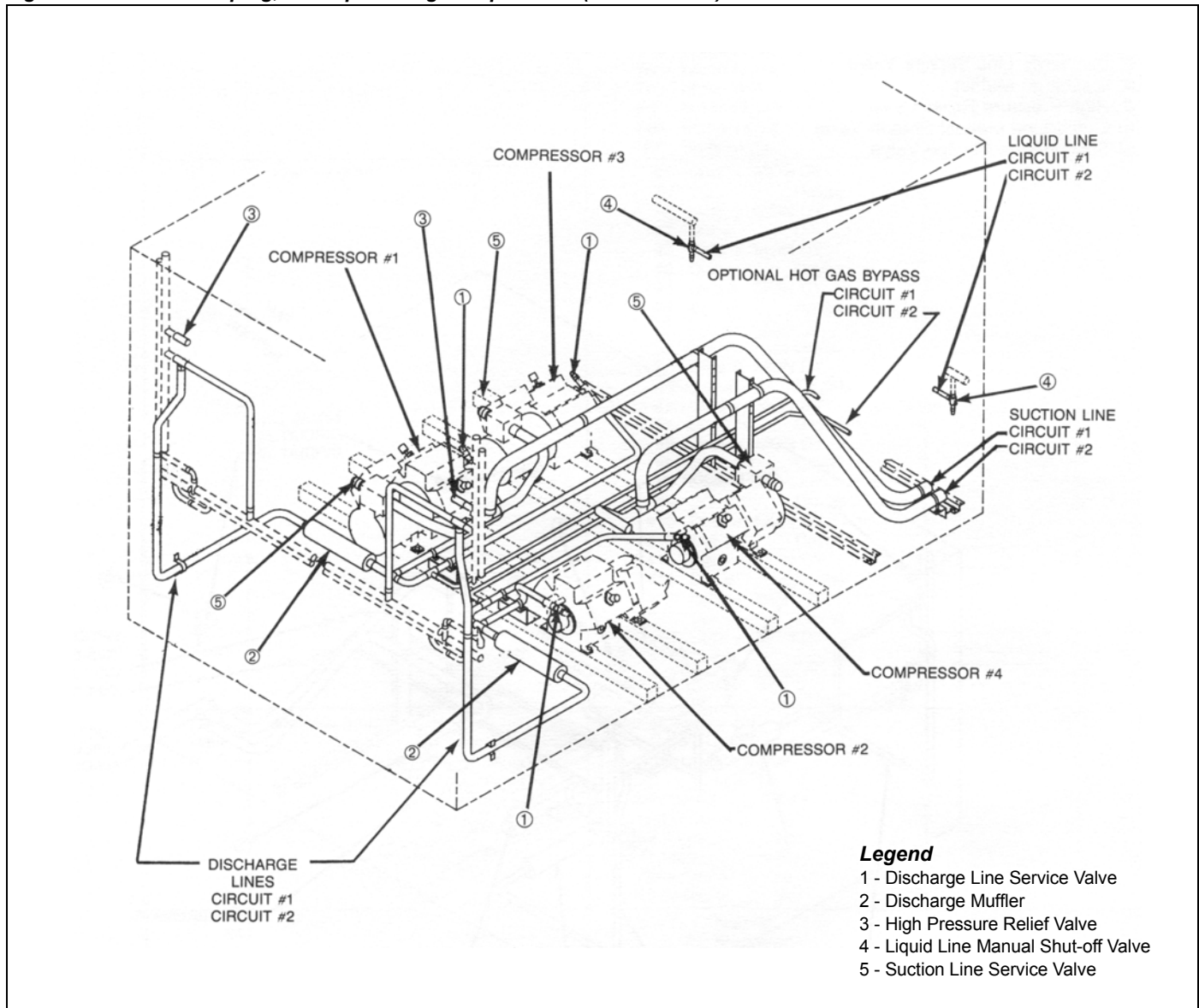


Figure 2: Condenser Piping, Scroll Compressors, 1 to 3 Compressors Per Circuit are Provided (025C to 105C)



Introduction

Figure 3: Condenser Piping, 4 Reciprocating Compressors (115C to 135C)



The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes. It is the responsibility of the installer to determine and follow the applicable codes. 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) provided the unit is not exposed to windy conditions. The system designer is responsible for assuring the condensing unit is not exposed to excessive wind or air recirculation.

⚠ CAUTION

Sharp edges on sheet metal and fasteners can cause personal injury. This equipment must be installed, operated, and serviced only by an experienced installation company and fully trained personnel.

Receiving Inspection

When the equipment is received, all items should be carefully checked 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.**

All units should be inspected carefully for damage when received. Report all shipping damage to the carrier and file a claim. In most cases, equipment ships F.O.B. factory and claims for freight damage should be filed by the consignee.

Before unloading the unit, check the unit nameplate to make sure the voltage complies with the power supply available.

Unit Placement

RCS units are for outdoor applications and can be mounted either on a roof or at ground level. For roof mounted applications, install the unit on a steel channel or I-beam frame to support the unit above the roof. For ground level applications, install the unit on a substantial base that will not settle. A one-piece concrete slab with footings extended below the frost line is recommended. Be sure the foundation is level within 1/2" (13mm) over its length and width. The foundation must be strong enough to support the units weight.

Clearances

Do not block the flow of air to and from the condenser coil. Restricting airflow or allowing air recirculation will result in a decrease in unit performance and efficiency because discharge pressures are increased. There must be no obstruction above

the unit that would deflect discharge air downward where it could be recirculated back to the inlet of the condenser coil. The condenser fans are propeller type and will not operate with ductwork.

Install the unit with enough side clearance for air entrance to the coil and for servicing. Provide service access to the compressors, electrical control panel and piping components. Do not allow debris to accumulate near the unit where it could be drawn into the condenser coil. Keep condenser coils and fan discharge free of snow or other obstructions to permit adequate airflow for proper operation.

Figure 4: RCS 025C - 030C Service Clearances

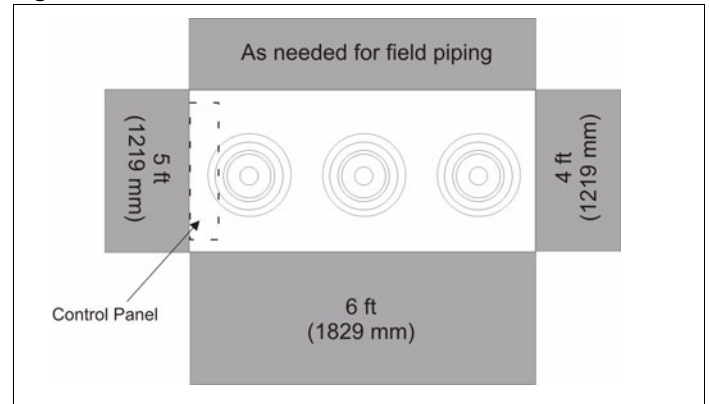
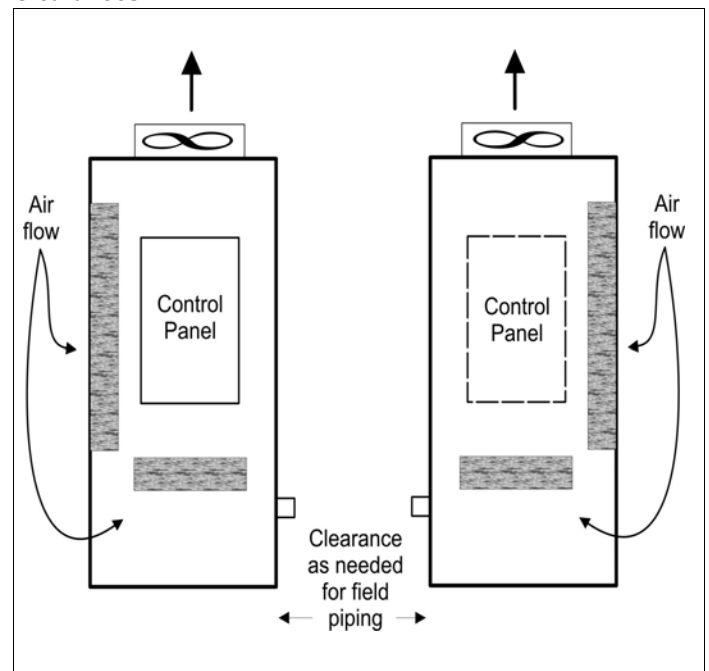


Figure 5: RCS 025C - 030C Side by Side Service Clearances



Mechanical Installation

Figure 6: RCS 040C - 135C Service Clearances

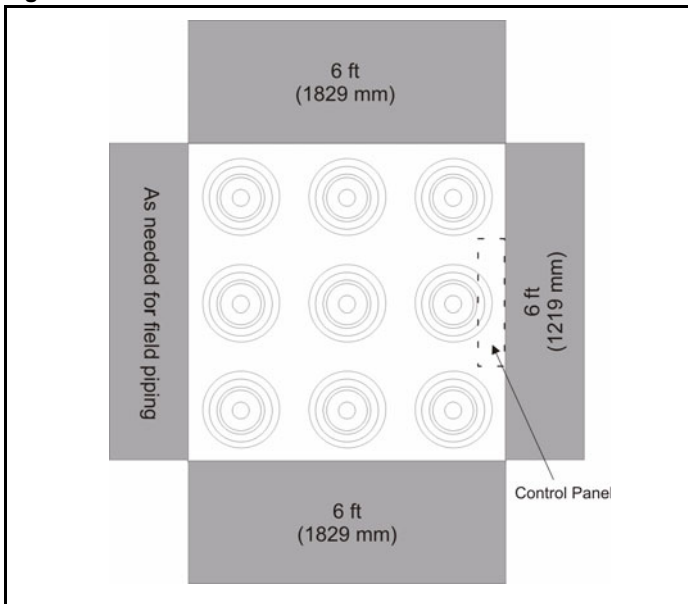


Figure 7: RCS 040C - 135C Side by Side Service Clearances

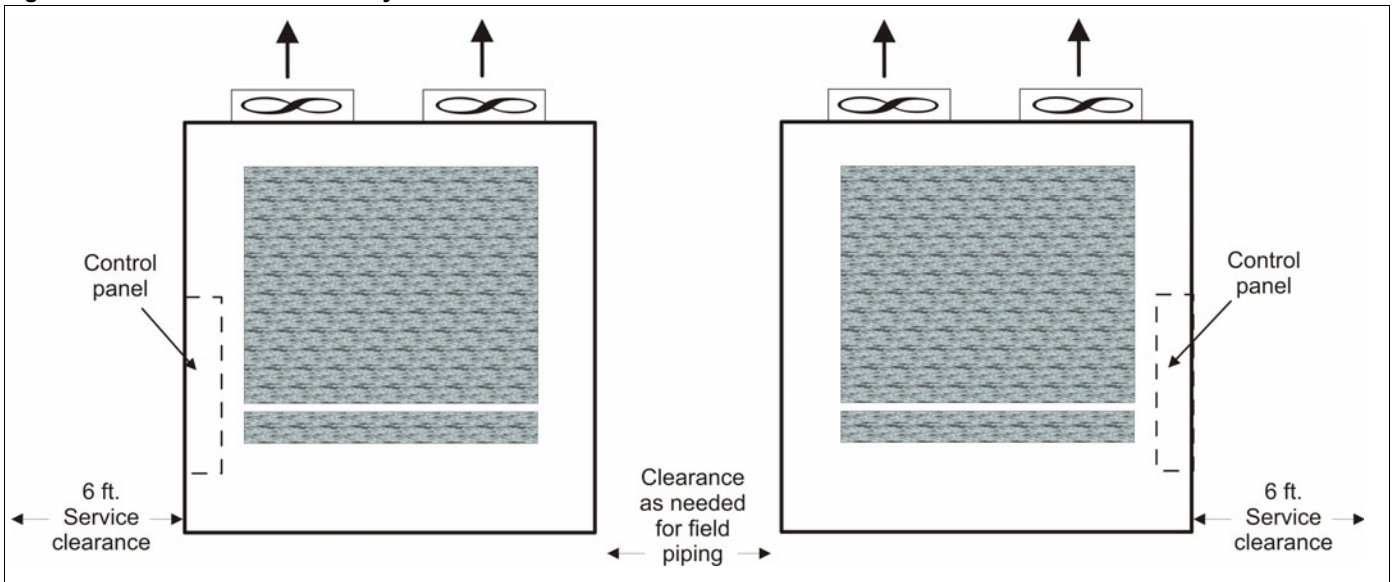
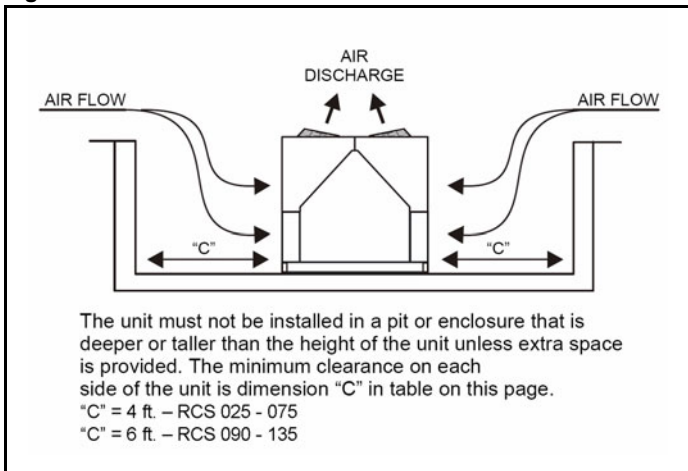


Figure 8: RCS 025C - 135C Pit Service Clearances

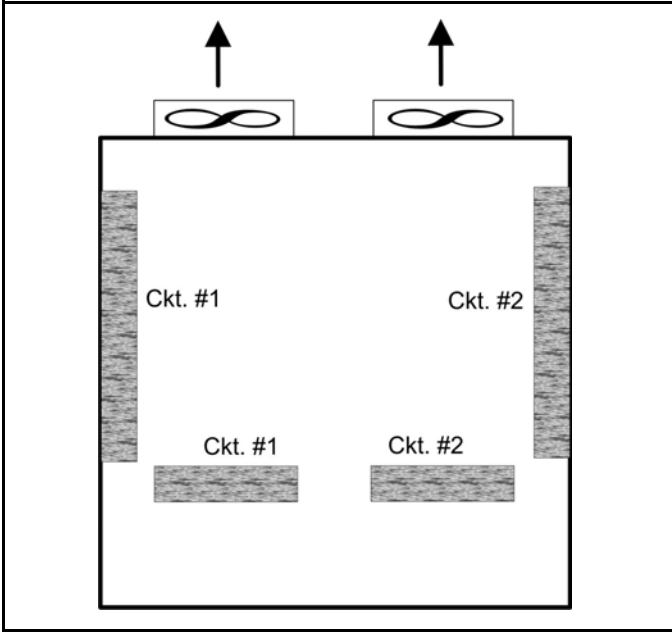


Restricted Air Flow

The clearances required for design-life operation of RCS air-cooled units are described in the previous section. Occasionally, these clearances cannot be maintained due to site restrictions, such as units being too close together, or a fence or wall restricting airflow, or both.

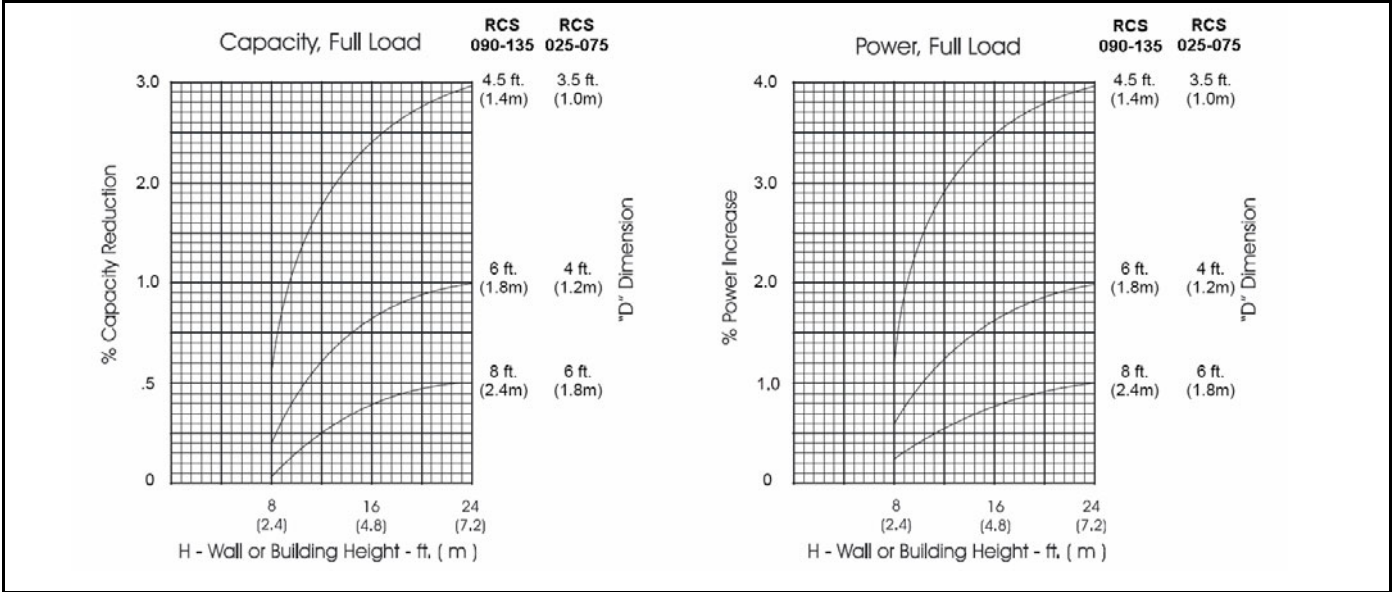
The condenser section is configured as shown in Figure 9. This configuration allows inlet air for the condenser coil to come in from either side. The controls sequence should be such that the circuit located away from the wall is the lead circuit.

Figure 9: Coil and Fan Arrangement (RCS 040C - 135C)



The following sections discuss the most common situations of condenser air restriction and give capacity and power adjustment factors for each.

Figure 11: Adjustment Factors

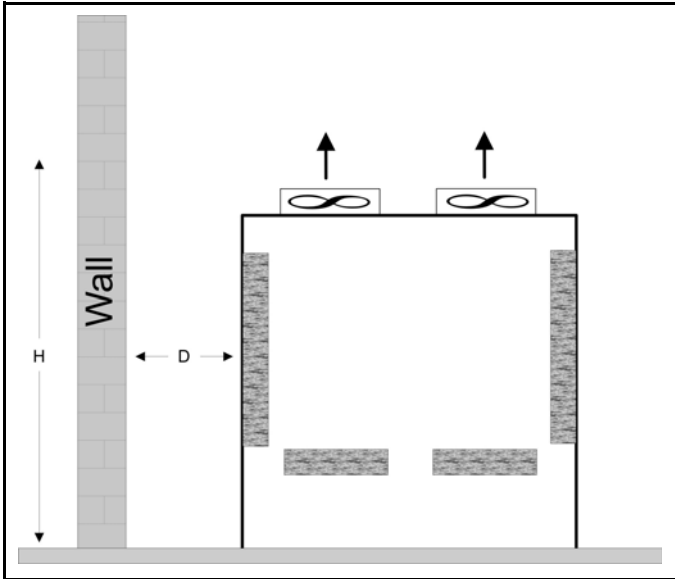


Case 1, Building/Wall on One Side of Unit

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

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

Figure 10: Unit Adjacent to Wall



Mechanical Installation

Case 2, Open Screening Walls

Decorative screening walls are often used to help conceal a unit either on grade or on a rooftop. These walls should be designed such that the combination of their open area and distance from the unit do not require performance adjustment. It is assumed that the wall height is equal to or less than the unit height when mounted on its base support. This is usually satisfactory for concealment. If the wall height is greater than the unit height, see “Case 3, Pit/Solid Wall Installation” on page 11.

The distance from the ends of the unit to the end walls must be sufficient for service, opening control panel doors, and pulling evaporator tubes, as applicable.

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

Figure 12: Opening Screening Walls

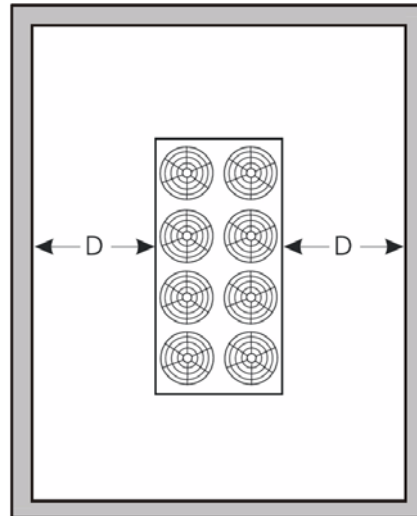
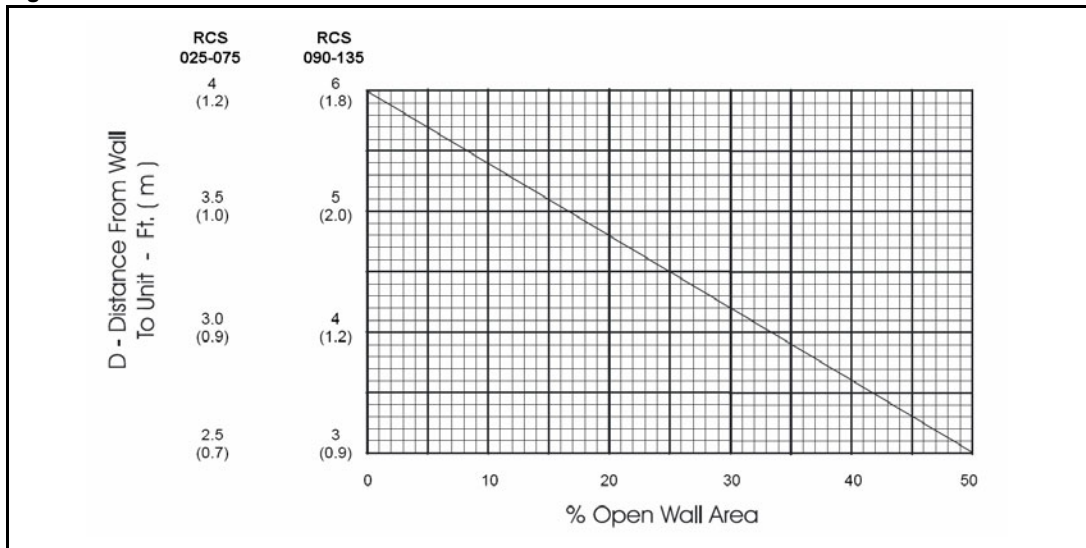


Figure 13: Wall Free Area vs. Distance



Case 3, Pit/Solid Wall Installation

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

Steel grating is sometimes used to cover a pit to prevent accidental falls or trips into the pit. The grating material and installation design must be strong enough to prevent such accidents, yet provide abundant open area or serious recirculation problems will occur. Have any pit installation reviewed by Daikin application engineers prior to installation for air-flow characteristics. The installation design engineer must approve the work to avoid an unreasonable risk of accident and is responsible for final design criteria.

Figure 14: Pit Installation

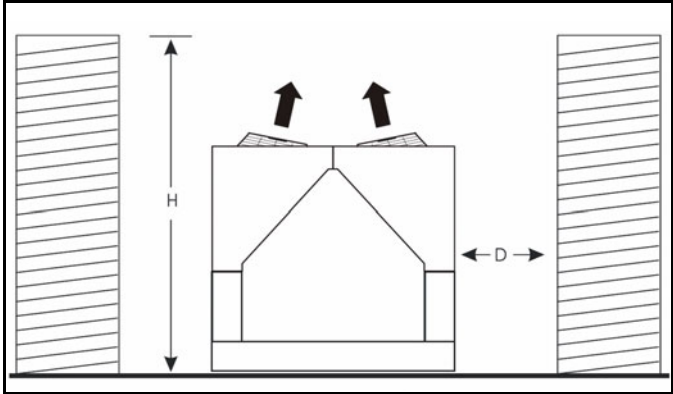
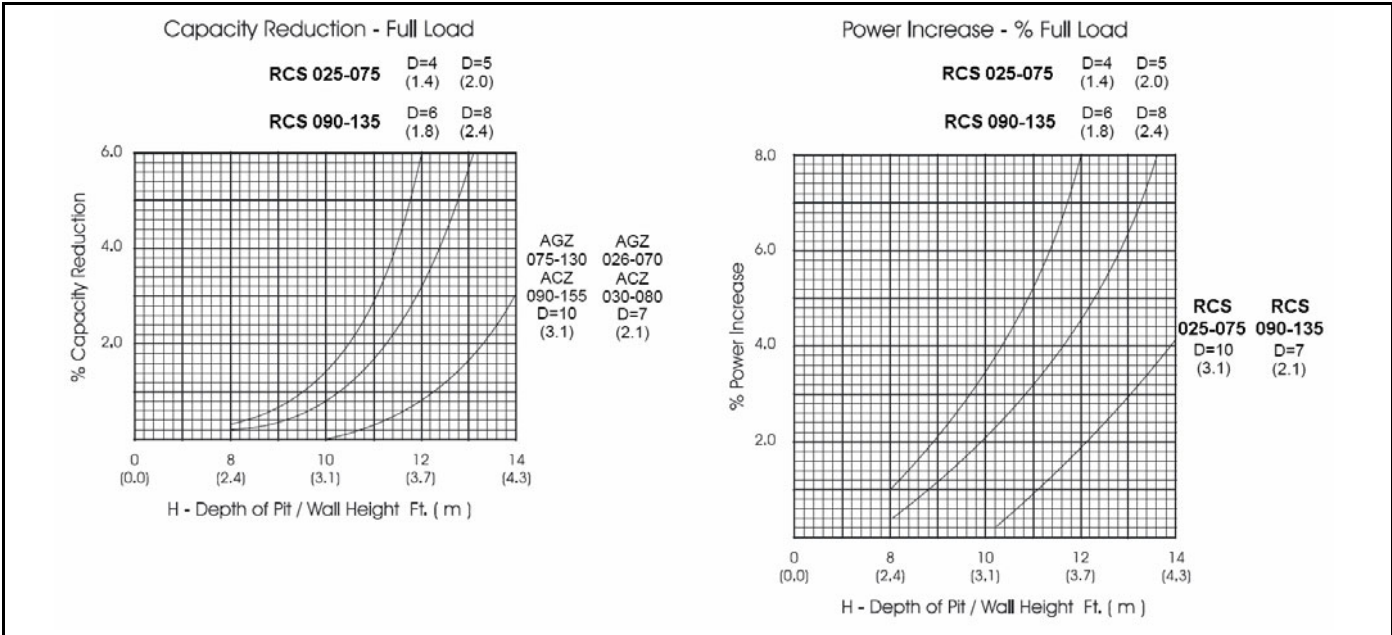


Figure 15: Pit Adjustment Factor



Mechanical Installation

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. Improper lifting can cause severe personal injury and property damage.

Figure 16: 025C to 040C Lifting Points

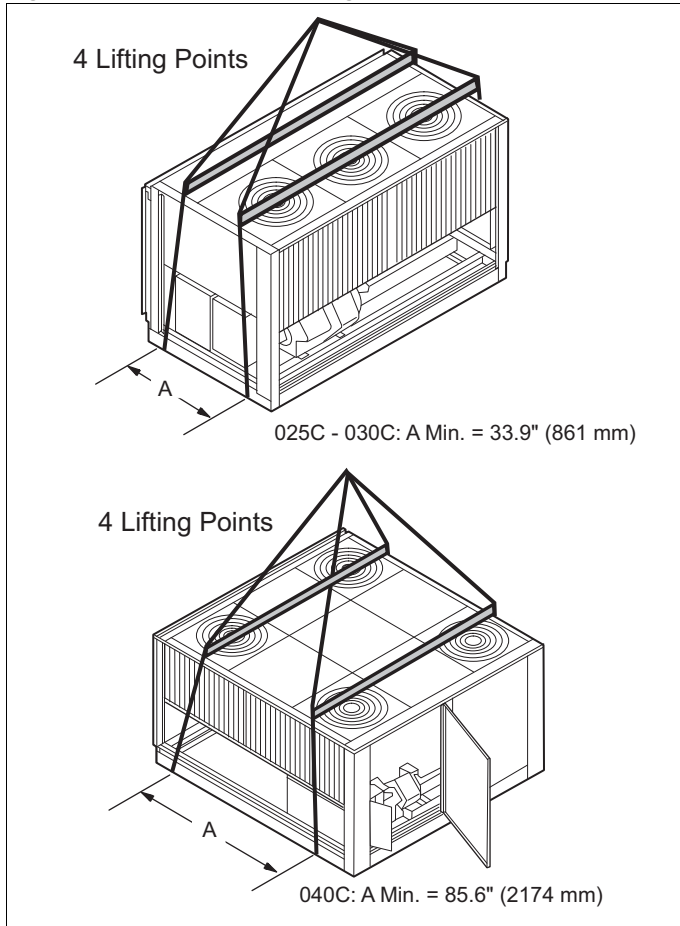
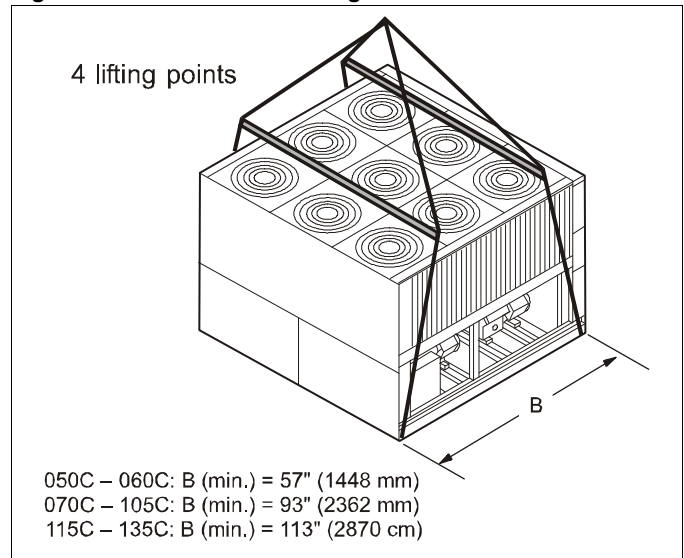


Figure 17: 050C to 135C Lifting Points



Refrigerant Piping

All field piping, wiring, and procedures must be performed in accordance with ASHRAE, EPA, and industry standards. Proper refrigerant piping can make the difference between a reliable system and an inefficient, problematic system.

The primary concerns related to piping are refrigerant pressure drop, a solid liquid feed to the expansion valves, continuous oil return and properly sized refrigerant specialties.

Insulate the suction line to reduce excessive superheat build-up. Insulate the liquid line, where located in areas above ambient temperature, to prevent loss of subcooling and consequent liquid flashing.

The recommended source for refrigerant piping techniques and sizing is the Daikin AG31-011 Refrigerant Piping Design Guide.

Although conflicting piping recommendations can be found in different sources, Daikin offers the following recommendations for these controversial issues.

The use of double risers for vertical gas risers is generally not required and should be used only as a last resort to maintain the minimum refrigerant flow to carry oil up the vertical risers. Slightly downsizing the vertical riser is a preferable option to providing double risers.

Slope the refrigerant lines 1" per 10 feet of horizontal run in the direction of refrigerant flow to assist oil return.

Resist using hot gas bypass for applications when operation in ambient temperature below 40 degrees is expected. This recommendation helps to maintain adequate condensing pressures and liquid refrigerant at the expansion valve when condenser capacities are at their maximum.

Pressure drops in the refrigerant lines should be maintained at or below the ASHRAE recommendations and line lengths should be made as short as possible. Exceeding these recommendations will decrease performance and could impact reliability.

Small traps should be provided at the base of each major vertical gas riser to assist in the collection of oil. If vertical risers exceed more than 25 feet, install a small trap at the midpoint and at a maximum of 20 foot intervals.

Use caution in sizing the liquid line in applications where the evaporator is above the outdoor section. The weight of the liquid refrigerant in the vertical column will decrease the pressure at the top of the riser (approximately 0.5 psi per foot

of vertical rise) allowing some of the refrigerant to flash to a gas. Adequate refrigerant subcooling is needed at the outdoor section to prevent large volumes of refrigerant gas at the expansion valve.

The piping systems should always extend above the highest component in the refrigeration system before dropping down to make the final refrigerant connections to components. This practice will hinder the draining of condensed refrigerant to the lower component when normal shutdown procedures do not occur (such as a power failure).

Note: Do not run refrigerant lines underground.

Figure 18: 025C to 030C Refrigerant Piping Connections

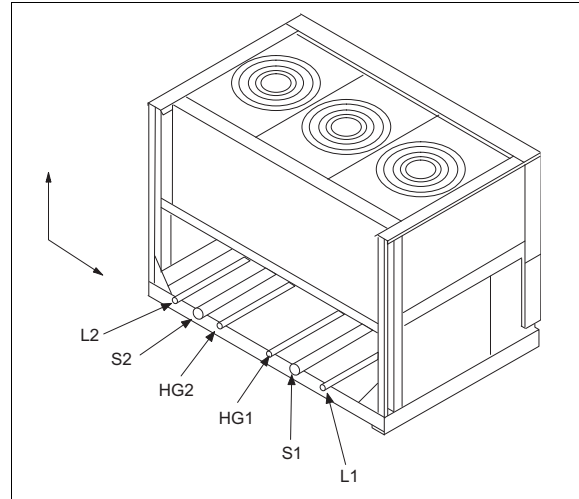
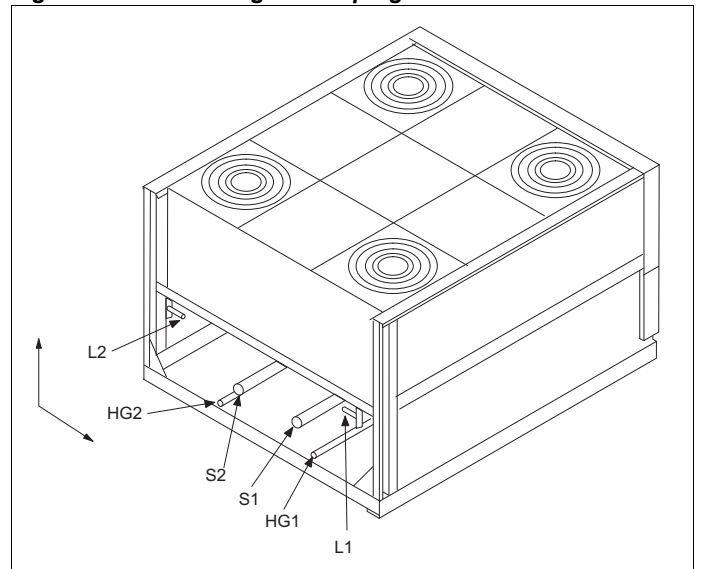


Figure 19: 040C Refrigerant Piping Connections



Mechanical Installation

Table 2: Connection Sizes and Locations, Figure 18 and Figure 19

Component circuit			Connection sizes		Connection locations			
			025C	030C to 040C	RCS 025 to 030		RCS 040	
					X (in.)	Y (in.)	X (in.)	Y (in.)
S1	Suction line	Ckt.1	1 5/8	1 5/8	67.60	6.25	59.50	19.30
S2	Suction line	Ckt.2	1 3/8	1 5/8	28.00	6.25	34.60	19.30
L1	Liquid line	Ckt.1	7/8	7/8	75.00	6.25	70.50	25.00
L2	Liquid line	Ckt.2	7/8	7/8	21.00	6.25	23.50	25.00
HG1	HGBP line	Ckt.1	7/8	7/8	60.80	6.25	64.60	6.60
HG2	HGBP line	Ckt.2	7/8	7/8	35.50	6.25	29.50	6.00

Figure 20: 045C to 135C Refrigerant Piping Connections

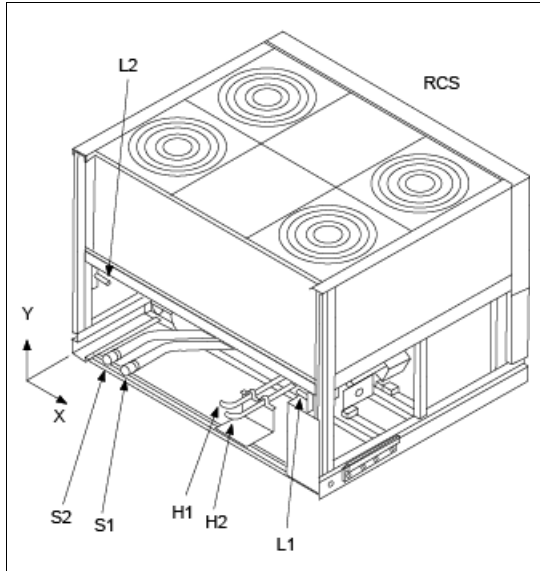


Table 3: Connection Sizes and Locations, Figure 20

Component circuit			Connection sizes			Connection locations			
			050C to 075C	090C	105C to 135C	RCS 045 to 075C		080 to 135C	
						X (in.)	Y (in.)	X (in.)	Y (in.)
S1	Suction line	Ckt.1	2 1/8	2 1/8	2 5/8	21.	7.0	5.7	11.7
S2	Suction line	Ckt.2	2 1/8	2 1/8	2 5/8	16.5	7.0	5.7	7.5
L1	Liquid line	Ckt.1	7/8	1-1/8	1 1/8	81.5	29.1	29.1	81.4
L2	Liquid line	Ckt.2	7/8	1 1/8	1 1/8	10.3	29.1	29.1	10.4
HG1	HGBP line	Ckt.1	7/8	7/8	7/8	52.1	10.4	10.4	52.1
HG2	HGBP line	Ckt.2	7/8	7/8	7/8	40.9	4.7	4.7	40.9

Pumpdown

The pumpdown capacity of RCS units is given in the Table 4 on page 16. Care should be exercised to include all equipment and lines when calculating the system charge relative to the unit's pumpdown capacity.

Holding Charge

The RCS unit ships with a nitrogen holding charge. At the time the unit is received, a visual inspection of the unit piping should be made to be sure no breakage occurred or that the fittings did not loosen during shipping. A pressure test on the RCS units should indicate a positive pressure in the unit. If no pressure is evident, the unit must be leak tested and the leak

repaired. Note and report this to the Daikin sales representative and freight carrier (if the loss is due to shipping damage).

⚠ DANGER

Before applying heat to remove brazed piping caps and plugs, *a/ways* vent piping to atmosphere. Failure to do so will cause hazardous pressures, explosion, severe personal injuries, or death.

Vent to atmosphere by opening gauge ports at the compressors and liquid line shutoff valves. Make sure manual valves are not back seated to shut off the gauge ports.

Leak Testing

In the case of loss of the nitrogen holding charge, the unit should be checked for leaks prior to charging the complete system. If the full charge was lost, leak testing can be done by charging the refrigerant into the unit to build the pressure to approximately 10 psig and adding sufficient dry nitrogen to bring the pressure to a maximum of 125 psig. The unit should then be leak tested with halide or electronic leak detector. After making any necessary repair, the system should be evacuated as described in the following paragraphs.



WARNING

Do not use oxygen or air to build up pressure. Explosion hazard can cause severe personal injury or death.

Evacuation

After determining the unit is tight and there are no refrigerant leaks, evacuate the system. Use a vacuum pump with a pumping capacity of approximately 3 cu.ft./min. and the ability to reduce the vacuum in the unit to at least 1 mm (1000 microns).

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

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

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

Table 6 on page 17 shows the relationship between pressure, microns, atmospheres, and the boiling point of water.



CAUTION

Before replacing refrigerant sensors or protective devices, see "Refrigerant Charge" on page 18 for an important warning to prevent an abrupt loss of the entire charge.



CAUTION

To service liquid line components, the manual shutoff valve is closed and refrigerant is pumped into the condenser. The pounds of refrigerant in the system may exceed the capacity of the condenser, depending on the amount of refrigerant in the liquid lines. Suitable means of containing the refrigerant is required.

Mechanical Installation

Table 4: Approximate R-22 Refrigerant Charge per Circuit, 025C to 135C

Unit size	Base charge lbs per circuit		Condenser pumpdown capacity* (lbs)
	Circuit #1	Circuit #2	
025C	23	22	72
030C	23	21	72
040C	33	32	106
045C	34	33	108
050C	34	33	108
060C	35	34	108
070C	39	39	134
075C	39	39	134
080C	40	41	140
090C	46	47	160
105C	50	51	208
115C	59	60	208
125C	—	60	208
135C	—	60	208

* Condenser pumpdown capacity is the total charge for both circuits and is based on volume between condenser entrance and liquid line solenoid at 90°F, 90% full at the condenser.

Table 5: Weight of Refrigerant in Copper Lines (Pounds per 100 feet of Type L Tubing)

O.D. line size	Vol. per 100 ft in cubic feet	Weight of refrigerant, lbs./100 feet							
		Liquid @100°F		Hot gas@120°F cond.		Suction gas (superheat to 85°F)			
		R-22	R-407C	R-22	R-407C	30°F		40°F	
						R-22	R-407C	R-22	R-407C
3/8"	0.054	3.84	3.64	0.20	0.46	0.052	0.047	0.077	0.071
1/2"	0.100	7.12	6.74	0.37	0.85	0.096	0.088	0.143	0.132
5/8"	0.162	11.53	10.92	0.61	1.38	0.156	0.142	0.232	0.214
7/8"	0.336	23.92	22.65	1.26	2.87	0.324	0.294	0.480	0.444
1 1/8"	0.573	40.80	38.62	2.14	4.89	0.552	0.501	0.819	0.756
1 3/8"	0.872	62.09	58.77	3.26	7.44	0.840	0.763	1.247	1.151
1 5/8"	1.237	88.07	83.37	4.63	10.55	1.191	1.082	1.769	1.633
2 1/8"	2.147	152.87	144.71	8.03	18.31	2.068	1.879	3.070	2.834
2 5/8"	3.312	235.81	223.23	12.38	28.25	3.189	2.898	4.736	4.372
3 1/8"	4.728	336.63	318.67	17.68	40.33	4.553	4.137	6.761	6.241
3 5/8"	6.398	455.54	431.23	23.92	54.57	6.161	5.598	9.149	8.445
4 1/8"	8.313	591.89	560.30	31.08	70.91	8.005	7.274	11.888	10.973

Table 6: Pressure - Vacuum Equivalents

Absolute pressure above zero		Vacuum below 1 atmosphere		Approximate fraction of 1 atmosphere	H ₂ O boiling point at each pressure (°F)
Microns	PSIA	Mercury (mm)	Mercury (in)		
0	0	760.00	29.921	—	—
50	0.001	759.95	29.920	1/15,200	-50
100	0.002	759.90	29.920	1/7,600	-40
150	0.003	759.85	29.920	1/5,100	-33
200	0.004	759.80	29.910	1/3,800	-28
300	0.006	759.70	29.910	1/2,500	-21
500	0.009	759.50	29.900	1/1,520	-12
1,000	0.019	759.00	29.880	1/760	1
2000	0.039	758.00	29.840	1/380	15
4,000	0.078	756.00	29.760	1/189	29
6000	0.117	754.00	29.690	1/127	39
8,000	0.156	752.00	29.600	1/95	46
10,000	0.193	750.00	29.530	1/76	52
15,000	0.290	745.00	29.330	1/50	63
20,000	0.387	740.00	29.130	1/38	72
30,000	0.580	730.00	28.740	1/25	84
50,000	0.967	710.00	27.950	1/15	101
100,000	1.930	660.00	25.980	2/15	125
200,000	3.870	560.00	22.050	1/4	152
500,000	9.670	260.00	10.240	2/3	192
760,000	14.697	0	0	1 atmosphere	212

Charging the System

RCS units are leak tested at the factory and shipped with a nitrogen holding charge. If the holding charge has been lost due to shipping damage, charge the system with enough refrigerant to raise the unit pressure to 30 psig after first repairing the leaks and evacuating the system.

- 1 After all refrigerant piping is complete and the system is evacuated, it can be charged as described in the paragraphs following. Connect the refrigerant drum to the gauge port on the liquid shutoff valve and purge the charging line between the refrigerant cylinder and the valve. Then open the valve to the mid position.
- 2 If the system is under a vacuum, stand the refrigerant drum with the connection up, open the drum, and break the vacuum with refrigerant gas.
- 3 With a system gas pressure higher than the equivalent of a freezing temperature, invert the charging cylinder and elevate the drum above the condenser. With the drum in this position and the valves open, liquid refrigerant flows into the condenser. Approximately 75% of the total requirement estimated for the unit can be charged in this manner.
- 4 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.

Mechanical Installation

5 After 75% of the required charge enters the condenser, reconnect the refrigerant drum and charging line to the suction side of the system. Again, purge the connecting line, stand the drum with the connection side up, and place the service valve in the open position.

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

Note: Stamp the total operating charge per circuit on the unit nameplate for future reference.

CAUTION

Adding refrigerant to the suction always risks liquid-related damage to the compressor.

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 7: Acceptable Refrigerant Oils

Polyolester [POE] oils <i>Note: Do not use mineral oils with R-407C.</i>
Copeland ULtra 22 CC
Mobil EAL™ Arctic 22 CC
ICI EMKARATE RL™ 32CL

Refrigerant Charge

Each unit is designed for use with R-22 or R-407C. The total charge per circuit is the sum of the following values:

- Condenser section charge. Refer to manufacturer's data., see Table 4 on page 16.
- Evaporator coil charge, see Table 4 on page 16.
- Charge for length of unit piping to the evaporator coil, see Table 4 on page 16.

- Charge for length of interconnecting piping between the RCS unit (installed by field), see Table 5 on page 16.

The exact charge for a one piece RCS is on the unit nameplate.

Note: The total operating charge per circuit should not exceed the pumpdown capacity per circuit shown in Tables 4 to 5 on page 16.

Subcooling

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

- All compressors on each circuit operate 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).
- SpeedTrol motors operating at 100% (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.

Refrigeration Service Valves

The unit is shipped with all refrigeration service valves closed. RCS units have the following:

Sizes 025 to 105—One discharge valve per refrigerant circuit, located between the compressors and condenser.

Sizes 115 to 135—One service valve is provided on the discharge and suction of each compressor.

All Units—One liquid valve is provided per refrigeration circuit, located at end of condensing section opposite condenser control box.

Before attempting to start the compressors, all refrigeration service valves should be fully opened and backseated.

Field Power Wiring

Wiring must comply with all applicable codes and ordinances. The warranty is voided if wiring is not in accordance with these specifications. An open fuse, tripped circuit breaker, or Manual Motor Protector (MMP) indicates a short, ground, or overload. Before replacing a fuse, circuit breaker, MMP, or restarting a compressor or fan motor, identify the trouble and correct.

According to the National Electrical Code, a disconnecting means shall be located within sight of and readily accessible from the air conditioning equipment. The unit can 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 (MROPD) appears on the unit nameplate.

In compliance with the National Electrical Code, an electrically isolated 115 V 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 15 A, 115 V power supply. Leads are brought into the RCS unit through a 7/8" knockout in the bottom of the main control panel, near the power wire entry point.

Figure 21: RCS 025C–030C Power Wiring Connections

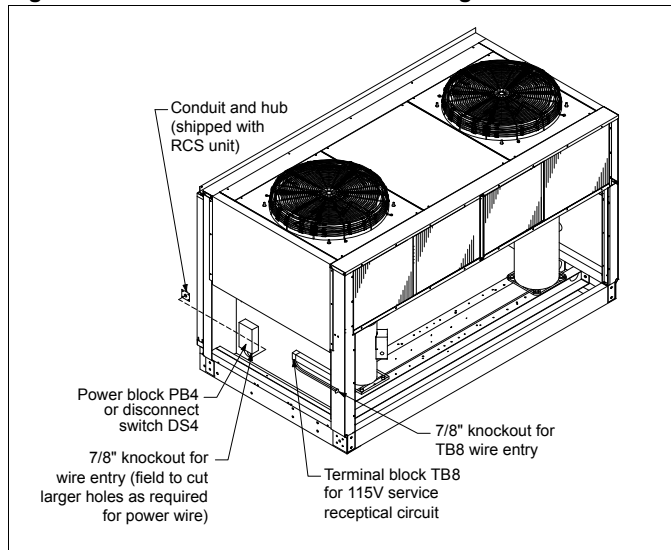


Figure 22: RCS 040C and 135C Power Wiring Connections

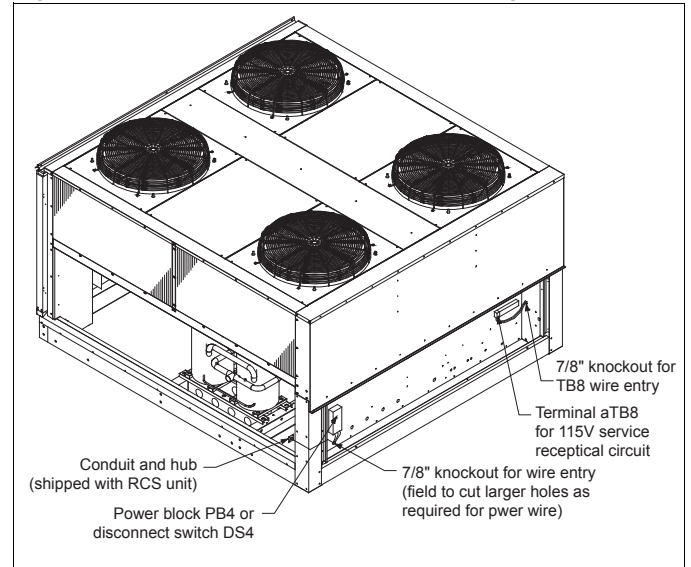


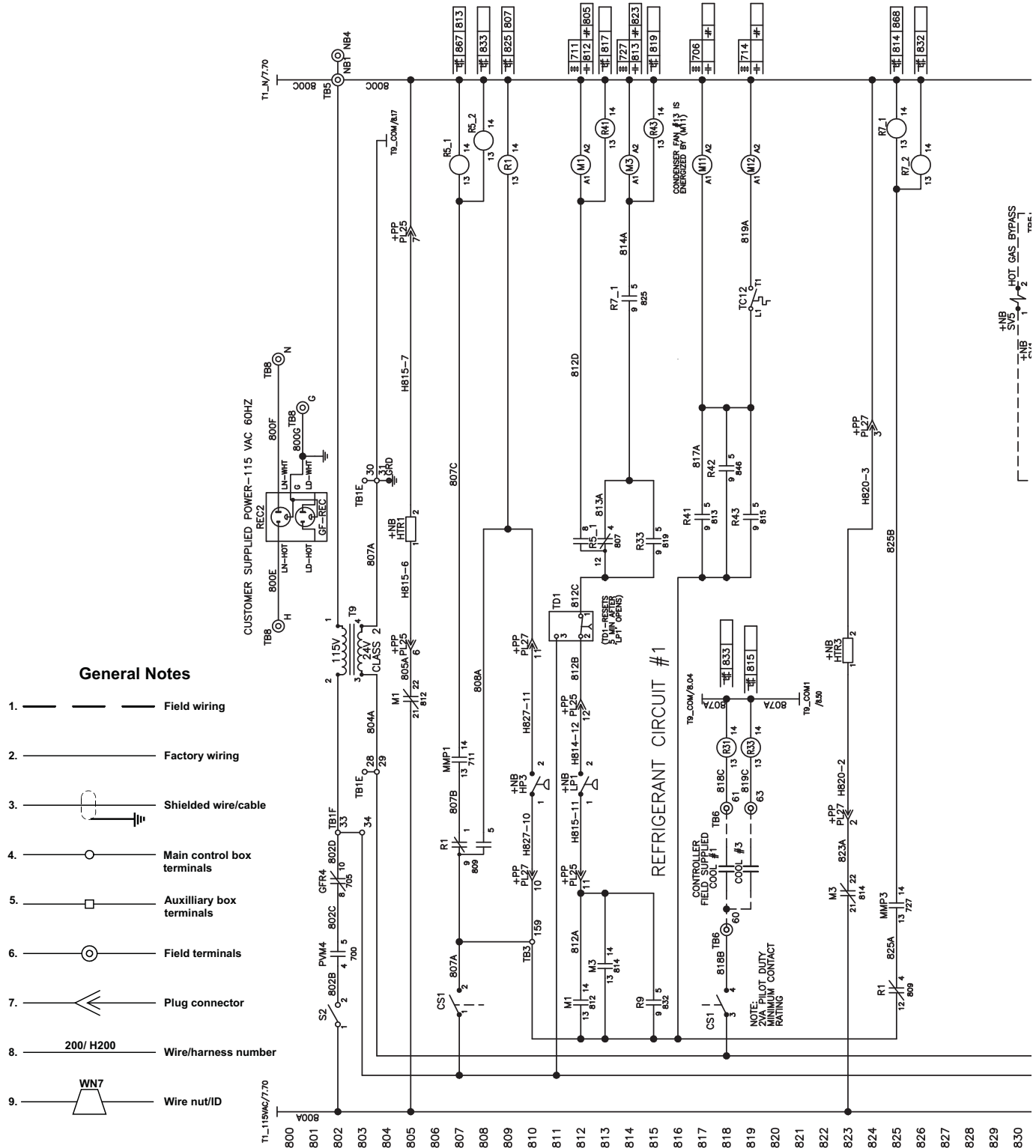
Table 8: Recommended 3-Phase Power Wiring to Ensure Disconnects and Power Blocks Mate with Power Wiring

Wire gauge	Qty./pole	Insulation rating (°C)	No. of conduits	Conduit (trade size, in.)	For MCA up to (amps)
10	1	75	1	1/2	35
8	1	75	1	3/4	50
6	1	75	1	1	65
4	1	75	1	1 1/4	85
3	1	75	1	1 1/4	100
2	1	75	1	1 1/4	115
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

1. All wire sizes assume separate conduit for each set of parallel conductors.
2. All wire sizes based on NEC Table 310-16 for 75°C THW wire (copper). Canadian electrical code wire ampacities may vary.
3. All wire sizes assume no voltage drop for short power leads.

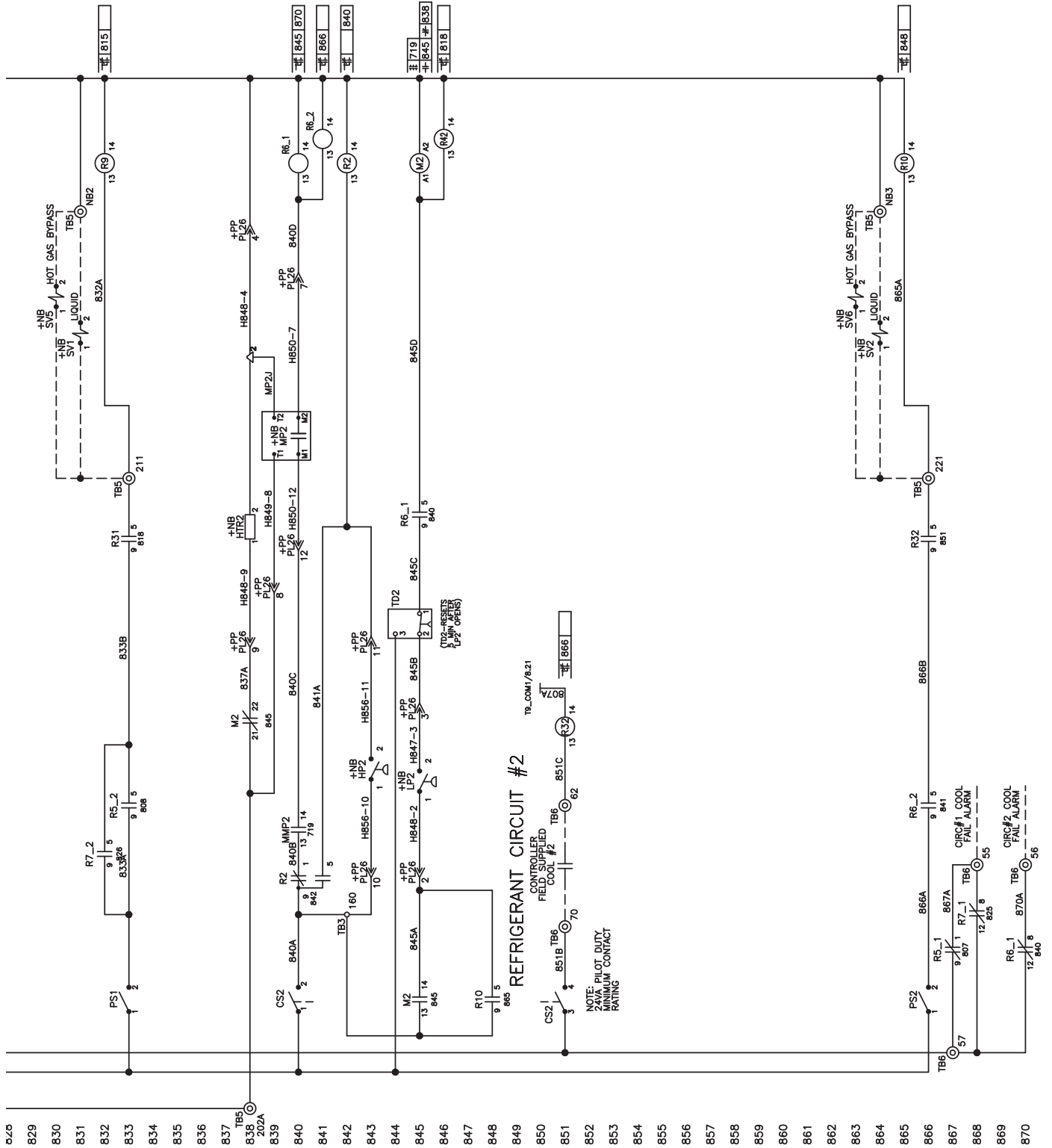
Wiring Diagrams

Figure 23: RCS 025C Typical Controls Power Wiring Diagram



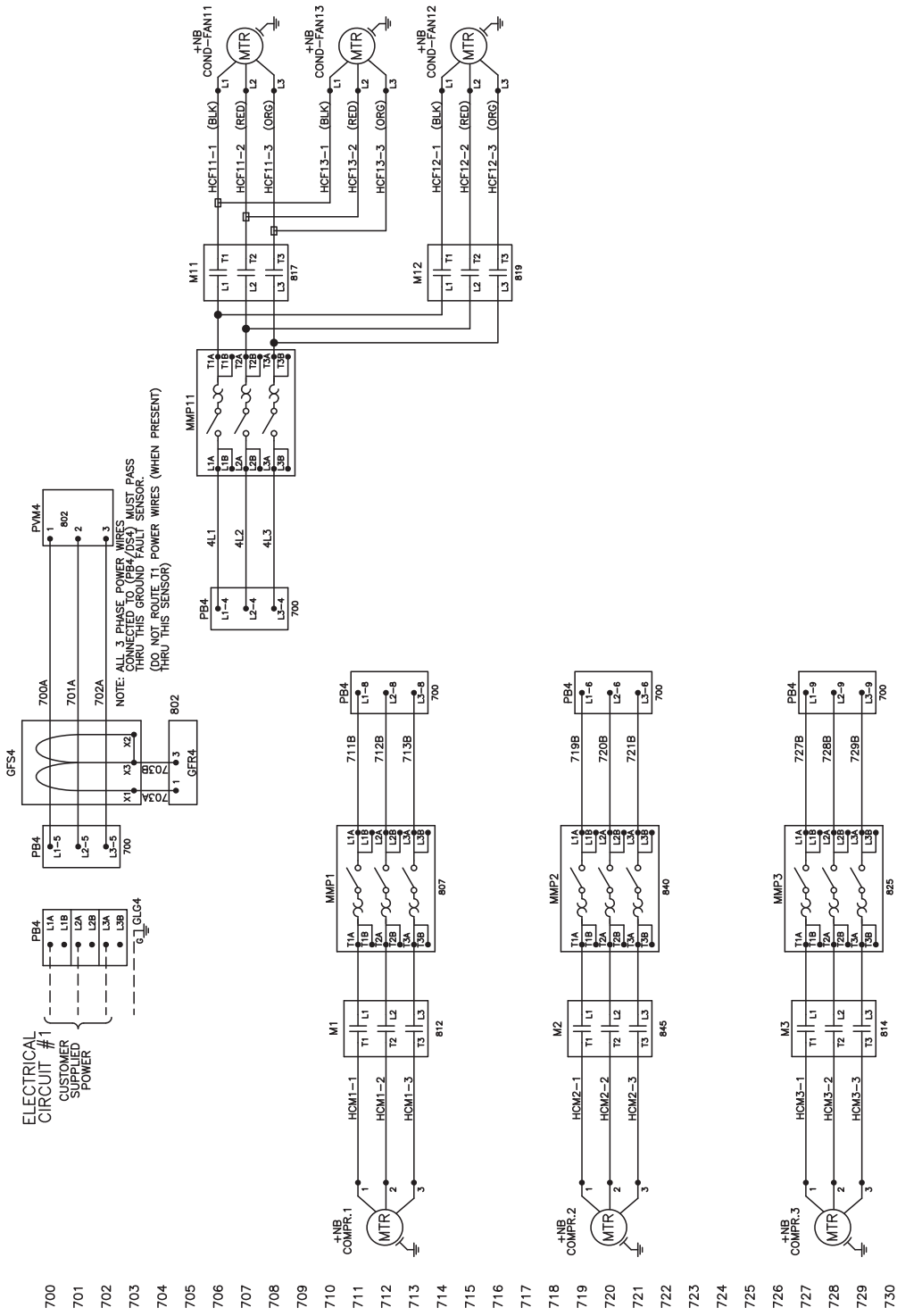
General Notes

1. Field wiring
2. Factory wiring
3. Shielded wire/cable
4. Main control box terminals
5. Auxiliary box terminals
6. Field terminals
7. Plug connector
8. 200/ H200 Wire/harness number
9. Wire nut/ID

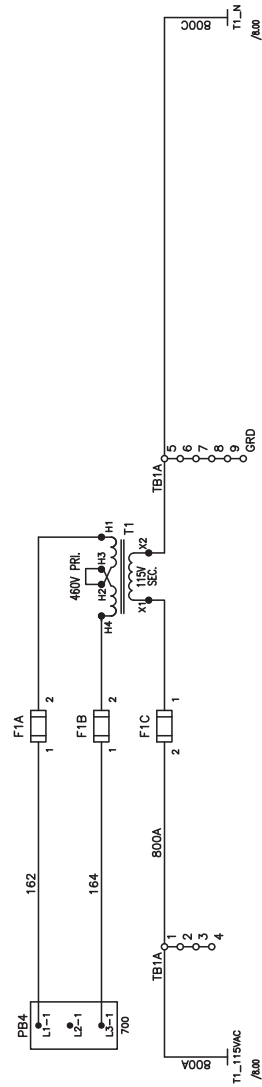


Wiring Diagrams

Figure 24: RCS 025C Typical Power Wiring Diagram



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Unit Options

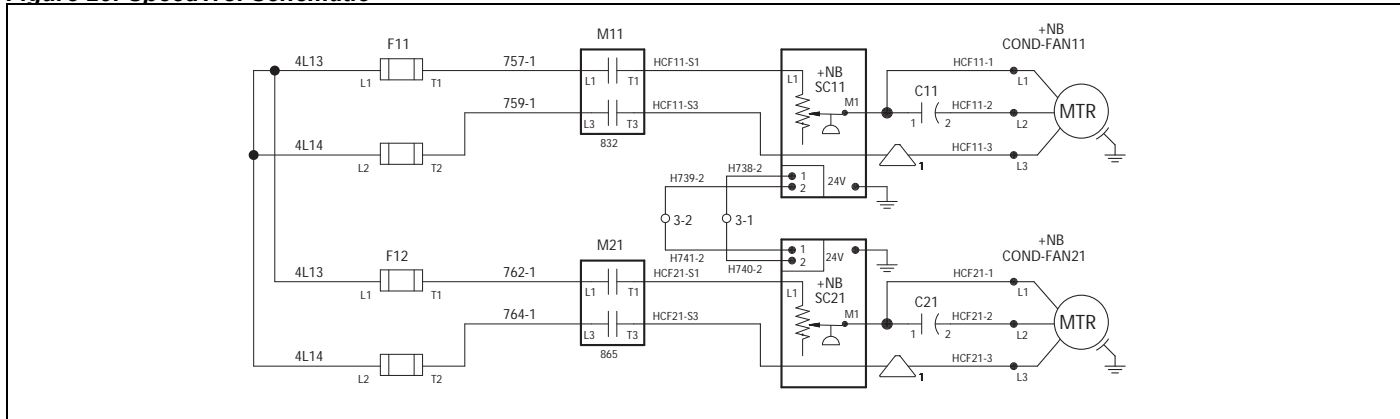
SpeedTrol™

Daikin's SpeedTrol system of head pressure control operates in conjunction with FanTrol by modulating the motor speed of the last condenser fan of each refrigeration circuit in response to condenser pressure. By varying the speed of the last condenser fan of each refrigeration circuit, the SpeedTrol option allows mechanical cooling operation in ambient temperatures down to 0°F (-18°C) provided the unit is not exposed to windy conditions. The system designer is responsible for assuring the condensing section is not exposed to excessive wind or air circulation. SpeedTrol controllers SC11 and SC21 sense refrigerant head pressure and vary the

fan speed accordingly. When the pressure rises, SpeedTrol increases the fan speed; when the pressure falls, SpeedTrol decreases the fan speed. The SpeedTrol controller's throttling range is 140 to 200 psig (1212 to 1318 kPa) fixed.

The SpeedTrol fan motor is a single phase, 208/240-volt, thermally protected motor specially designed for variable speed application. Units with 460-volt power have a transformer mounted inside the condenser fan compartment to step the voltage down to 230 volts for the SpeedTrol motor. A portion of a typical SpeedTrol power circuit schematic is shown in Figure 25.

Figure 25: SpeedTrol Schematic



To obtain full warranty coverage, complete and sign the check, test, and start form supplied with the unit and return it to Daikin Applied.

 **DANGER**

Hazardous voltage. Will cause equipment damage, severe 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.
Bond the equipment frame to the building electrical ground through grounding terminal or other approved means.

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

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.

Servicing Control Panel Components

 **DANGER**

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

Always inspect units for multiple disconnects to ensure all power is removed from the control panel and its components before servicing.

Before Start-up

- 1 Verify that the unit is completely and properly installed.
- 2 Verify that all construction debris is removed.
- 3 Verify that all electrical work is complete and properly terminated.
- 4 Verify that all electrical connections in the unit control panel and compressor terminal box are tight, and that the proper voltage is connected.
- 5 Verify all nameplate electrical data is compatible with the power supply.
- 6 Verify the phase voltage imbalance is no greater than 10%.
- 7 Manually rotate all fans and verify that they rotate freely.
- 8 Verify that all setscrews and fasteners on the fan assemblies are still tight.
- 9 Before attempting to operate the unit, review the control layout description to become familiar with the control locations.
- 10 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.
- 11 Determine which optional controls are included with the unit.

Check, Test, and Start Procedures

Compressor Startup

There should be adequate building load (at least 50 percent of the unit full load capacity) to properly check the operation of the unit's refrigerant circuits.

Record all operating parameters required by the "Compressorized Equipment Warranty Form". Return this information within 10 working days to Daikin Applied as instructed on the form to register the start-up date with the Daikin Warranty Department.

CAUTION

Electrical power must be applied to the compressor crankcase heaters 24 hours before starting unit to expel refrigerant from the oil, otherwise compressor damage may occur.

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

CAUTION

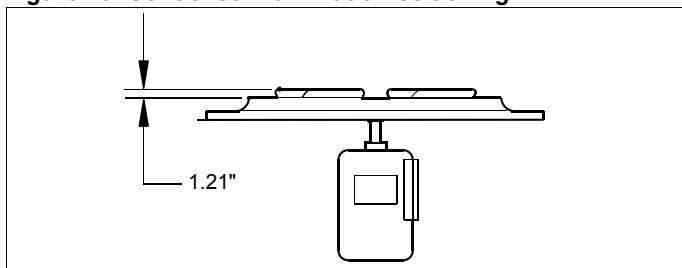
Low ambient temperature hazard. Can cause compressor damage.
Do not attempt to start up and check out the refrigeration system when the outdoor air temperature is below 50°F unless the unit is specially equipped for low ambient operation.

The unit is shipped with refrigeration service valves closed. Backseat (open) the discharge (suction on sizes 115 to 135), 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 26). The fan blade must be correctly positioned within its orifice for proper airflow across the condenser coils.

Figure 26: Condenser Fan Blade Positioning



Scroll Compressor Rotational Direction (025C to 105C)

Scroll compressors only compress in one rotational direction. Three-phase compressors rotate in either direction depending

upon phasing of the power to L1, L2, and L3. Since there is a 50/50 chance of connecting power to cause rotation in the reverse direction, verify that the compressor rotates in the proper direction after the system is installed. If the compressor is rotating properly, suction pressure drops and discharge pressure rises when the compressor is energized. If the compressor is rotating in reverse, the sound level is louder and current draw is reduced substantially. After several minutes of operation, the compressor's internal protector trips.

All three-phase compressors are wired the same internally. Therefore, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same terminals should maintain proper rotation direction.

Expansion Valve Superheat Adjustment

It is very important that the expansion valve superheat setting be adjusted to be between 10°F (-12°C) and 13°F (-11°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.

R-407C Superheat

Due to refrigerant glide, when measuring and/or adjusting TEV superheat, it is important to use SATURATED VAPOR (Dew Point) TABLES. Example: The Pressure/Temperature (P/T) chart shows that the saturated vapor temperature, at the dew point, of R-407C for 79 psig is approximately 51°F. If the actual refrigerant temperature is 60°F, the superheat is 9°F.

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.

Oil Pressure (115C to 135C only)

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, add additional. Refer to page 18 to find acceptable refrigerant oils.

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 10°F (-12°C) to 13°F (-11°C) of superheat. If proper superheat is obtained, sightglass foaming is not a concern.

Refrigerant Piping Checkout

1. Check all exposed brazed joints on the unit, as well as any field-installed piping, for evidence of leaks. Joints can have been damaged during shipping or when the unit was installed.
2. Check that all refrigerant valves are either opened or closed as required for proper operation of the unit.
3. A thorough leak test must be done using an approved electronic leak detector. Check all valve stem packing for leaks. Replace all refrigerant valve caps and tighten.

4. Check all refrigerant lines to see that they will not vibrate against each other or against other unit components and are properly supported.
5. Check all flare connections and all refrigerant threaded connectors.
6. Look for any signs of refrigerant leaks around the condenser coils and for damage during shipping or installation.
7. Leak detector is applied externally to refrigerant joints at the factory. Do not confuse this residue with an oil leak.
8. Connect refrigerant service gauges to each refrigerant circuit before starting unit.

Electrical Checkout

CAUTION

Electrical power must be applied to the compressor crankcase heaters 24 hours before starting the unit to drive off refrigerant from the oil or compressor damage can occur.

- 1 Open all electrical disconnects and check all power wiring connections. Start at the power block and check all connections through all components to and including the compressor terminals. These should be checked again after 3 months of operation and at least annually thereafter.
- 2 Check all control wiring and tighten all screw connections. Check plug-in relays for proper seating and that retaining clips are installed.
- 3 Apply power to the unit.
- 4 Check at the power block or disconnect for the proper voltage and for the proper voltage between phases. Check power for proper phasing using a phase sequence meter before starting unit.
- 5 Check for 120 V (ac) at the control transformer and at TB1A1 and TB1A5.
- 6 Check between TB1E28 and TB1E30 for 24 V (ac) control voltage.

Operation

Hot Gas Bypass (Optional)

This option allows the system to operate at lower loads without excessive on/off compressor cycling. The hot gas bypass option is required to be on both refrigerant circuits because of the lead/lag feature of the controller.

This option allows passage of discharge gas into the evaporator inlet (between the TX valve and the evaporator) which generates a false load to supplement the actual chilled water or air handler load.

Note: The hot gas bypass valve cannot generate a 100% false load.

The valve that is supplied can provide a load of approximately 10 tons. The system load added to the ten tons of the hot gas bypass valve has to exceed the compressor capacity for stage 1 compressors to produce stable system operation. This requires 3-6 tons of system load.

The MicroTech II controls solenoid valves in the hot gas bypass lines that are energized whenever their circuit is operating with only one compressor running. The hot gas bypass valve is regulated by the evaporator pressure and the remote adjustable bulb. The pressure regulating valve is factory set to begin opening at 58 psig (32°F for R-22).

WARNING

Be careful during valve checkout. The hot gas line can become hot enough to cause personal injury.

System Adjustment

To maintain peak performance at full load operation, the system superheat and liquid subcooling can require adjustment. Read the following subsections closely to determine if adjustment is required.

Liquid Line Sight Glass and Moisture Indicator

The color of the moisture indicator is an indication of the dryness of the system and is extremely important when the system has been serviced. Immediately after the system has been opened for service, the element can indicate a wet condition. It is recommended that the equipment operate for about 12 hours to allow the system to reach equilibrium before deciding if the system requires a change of drier cores.

Bubbles in the sight glass at constant full load indicates a shortage of refrigerant, a plugged filter drier, or a restriction in

the liquid line. However, it is not unusual to see bubbles in the sight glass during changing load conditions.

Refrigerant Charging

Liquid line subcooling at the liquid shut-off valve should be between 15°F and 20°F at full load. If the unit is at steady full load operation and bubbles are visible in the sight glass, then check liquid subcooling.

Thermostatic Expansion Valve

The expansion valve performs one specific function. It keeps the evaporator supplied with the proper amount of refrigerant to satisfy the load conditions.

The sensing bulb of the expansion valve is installed in the closest straight run of suction line from the evaporator. The bulb is held on by clamps around the suction line and is insulated to reduce the effect of surrounding ambient temperatures. In case the bulb must be removed, simply slit the insulation on each side of the bulb, remove the clamps and then remove the capillary tubing that runs along the suction line from the valve.

The power element is removable from the valve body without removing the valve from the line.

Note: Before adjusting superheat, check that unit charge is correct and liquid line sight glass is full with no bubbles and that the circuit is operating under stable, full load conditions.

The suction superheat for the suction leaving the evaporator is set at the factory for 8°F to 12°F at full load. To have full rated unit performance, the superheat must be about 8°F at 95°F outdoor ambient temperature.

Crankcase Heaters

The scroll compressors are equipped with externally mounted band heaters located at the oil sump level. The function of the heater is to keep the temperature in the crankcase high enough to prevent refrigerant from migrating to the crankcase and condensing in the oil during off-cycle.

CAUTION

Electrical power must be applied to the compressor crankcase heaters 24 hours before starting the unit to drive off refrigerant from the oil or compressor damage can occur.

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

DANGER

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

WARNING

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

Servicing Control Panel Components

Disconnect all electric power to the unit when servicing control panel components. Before servicing, always inspect units for multiple disconnects to ensure all power is removed from the control panel and its components.

DANGER

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

Planned Maintenance

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

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

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

- Check for proper superheat.
- Check the power and control voltages.
- Check the running amperage of all motors.
- Check all operating temperatures and pressures.
- Check and adjust all temperature and pressure controls as needed.
- Check the operation of all safety controls.

- Check the condenser fans and tighten their setscrews.
- Lubricate the door latch mechanisms.

Unit Storage

Location

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

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

Preparation

Control Box

Once a month, open the control box and verify that no moisture or debris is accumulating in the unit.

Cooling circuits

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

- 1 Provide that each circuit is properly pumped down.
- 2 Turn off the compressor MMP.
- 3 Close all the refrigerant service valves on each circuit.
- 4 Tag the valves as a warning for the technician who restarts the units.

Restart

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

Refrigerant Charge

The unit nameplate references proper charge for each refrigerant circuit in case a full charge must be added to the unit. Verify these values using pages 14–16.

WARNING

Potential severe loss of charge may occur if the high refrigerant pressure switch is replaced before reclaiming the refrigerant.
Replace switch after reclaiming refrigerant.

Maintenance

Servicing Refrigerant Sensors or Switches

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

- 1 Low refrigerant pressure sensing, operating switch, automatic reset.
 - a Disables their associated compressors on a drop in suction pressure to approximately 35 psig.
 - b Enables their associated compressors on a rise in suction pressure to approximately 60 psig.
- 2 SpeedTrol™ high refrigerant pressure sensor (not available on sizes 025C to 030C), see page 24 for more information.
- 3 High refrigerant pressure, protective switch, manual reset, reset by breaking control power to the S1 control switch.
 - a Scroll compressor units (sizes 025C to 105C) = 425 psig
 - b Reciprocating compressor units (sizes 025C to 135C) = 400 psig
 - c The switches have a differential of 100 psig.
- 4 High pressure relief, protective valve on sizes 115C to 135C only and located on the condenser headers.

The low pressure and SpeedTrol sensors/ switches sense refrigerant pressure through schrader fittings that contain cores. The cores are stop valves that do 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.

Control Panel Components

Manual Motor Protector (MMP)

The manual motor protector (MMP) provides coordinated branch circuit, short circuit protection, a disconnecting means, a motor controller, and coordinated motor overload protection. A short circuit indicator with manual reset is mounted along side 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 adjustment is accomplished as follows

- 1 For motors with a 1.15 service factor, rotate the arrow on the 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 position; then rotate knob clockwise to the ON position.

WARNING

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

Other MMP features:

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

Disconnect

DANGER

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

The optional disconnect is a “through-the-door” molded case switch with similar features of the circuit breaker. The “through-the-door” feature provides a safety interlock that disables power when an inexperienced person opens the control panel door. **This is not the normal recommended method to access the control panel or to disable power to an operating unit.**

CAUTION

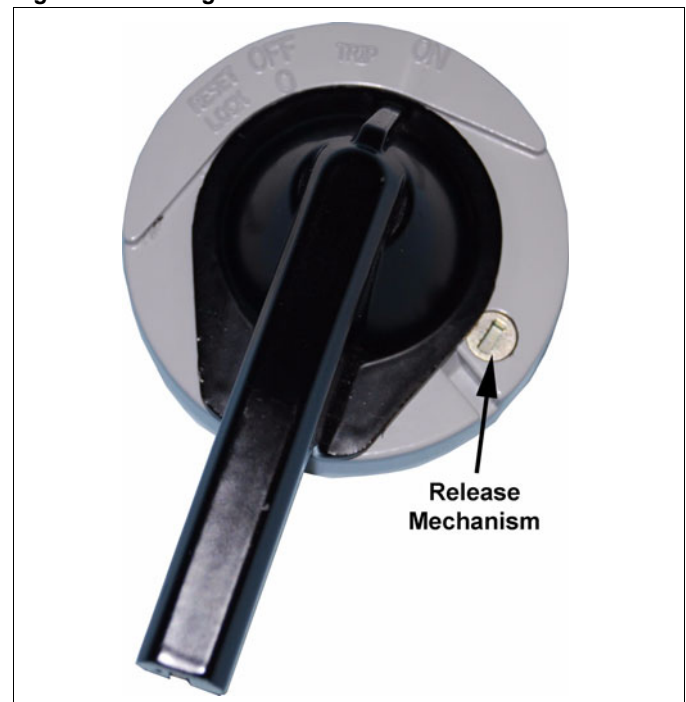
Molded case switches do not provide over-current protection. This device may automatically open the circuit at levels above the ampere rating of the switch.

Depending on the desired operating state of the unit, four different recommended methods can be utilized to access the control panel or to disable power.

- 1 Recommended method to access the controls through the “release” method (defeats the mechanical interlock and allows the control panel door to open without disconnecting power - switch is in the power “On” position):
 - a Obtain a small standard head screwdriver.
 - b Insert the head of the screwdriver into the slotted “release” located on the right hand side of the disconnect faceplate (Figure 27). Turn the release counter-clockwise.
 - c Pull open the door after the mechanical interlock is released.
- 2 Recommended normal method to turn off an operating unit (no emergency condition present):
 - a Follow the “release” method described above.
 - b Use the pump down switch to turn off the unit.
 - c The controls will then shut the liquid line solenoids, pump the refrigerant into the condenser, and turn off the compressors.

- 3 Recommended method to “lock off” power while the disconnect is off:
 - a Rotate the handle to the “Reset Lock” position.
 - b Manually push in the lockout mechanism into the slot on the faceplate.
 - c Insert a padlock into the lockout hole located on the disconnect handle.
 - d Test rotate the handle to insure that power “lockout” is provided.
- 4 Recommended normal method to “restore” power to a unit that is locked out:
 - a Unlock and remove the padlock when it is safe (doors are shut, no personnel are within reach of the condensing unit or are inside the air handler).
 - b Shut the control panel door and ensure the interlock mechanism is operable.
 - c Rotate the handle to the “On” position.

Figure 27: Through-the-Door Handle Disconnect



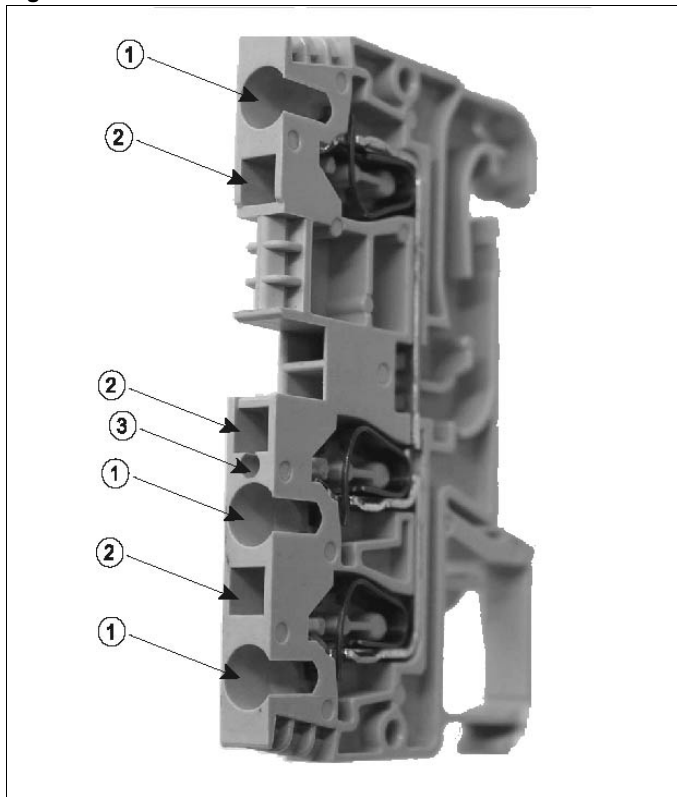
Maintenance

Terminals

The terminals are spring clamp type. They only require inserting (see #1 in Figure 28) and clamping the wire to be stripped, which offers several advantages over screw terminals. The clamping is done by inserting a flat-bladed screw driver (up to 9/64" wide). See #2 in Figure 28.

- Spring connection does not require torquing and resists vibration
- Easily identifiable terminal markers
- Built-in test ports on each terminal, up to 2.3 mm diameter (see #3 in Figure 28).

Figure 28: Terminal Connectors



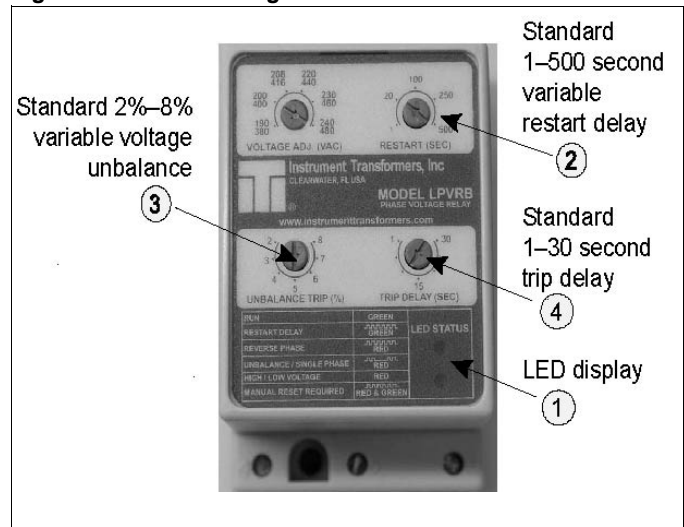
Phase Voltage Monitor (PVM)

The phase voltage monitor (Figure 29) 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.

Other features:

- LED display to indicate status (see #1 in Figure 29)
 - Loss of phase
 - High or low voltage
 - Voltage unbalance
 - Phase reversal
 - Rapid cycling
- Standard 1 to 500 second variable restart delay (see #2 in Figure 29)
- Standard 2% to 8% variable voltage unbalance (see #3 in Figure 29)
- Standard 1 to 30 second trip delay (see #4 in Figure 29)

Figure 29: Phase Voltage Monitor



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.

Scroll Compressor (025C to 105C)

Daikin Rooftops use the following Copeland Scroll Compressors.

- 1 Single compressors, one per refrigerant circuit.
- 2 Tandem compressors, basically two compressors specifically manufactured by Copeland into a single assembly.
- 3 Trio compressors, basically three 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.

Scroll service replacement compressors for Daikin Rooftop Units can be obtained from the following two sources:

- Daikin Service Parts maintains a stock of replacement compressors.
- Copeland Refrigeration has stocking wholesalers throughout the U.S. who maintain a limited stock of replacement scroll compressors. The stock of single compressors is much better than the stock of tandems “tandem/trio ready”, single compressors. Trios are almost never in wholesaler stock and are not recommended for use on Daikin Rooftops due to piping interference. Copeland does offer quick ship options through their wholesalers.

Both sources can be used, at the customer’s discretion, within the first year warranty and with the following limitations.

- 1 RCS 025C to 030C (with single and tandem compressors).
 - a If any part of the tandem fails then the entire tandem must be replaced. Both sources are acceptable.

- b Single compressor. No limitations.
 - c Circuit #1 tandem - If any part of the tandem fails then the entire tandem must be replaced. Both sources are acceptable.
 - d Circuit #2 tandem—Each of the tandem’s compressors have a rotalock and only the failed portion of the tandem may need replacement.
- 2 RCS 040C to 060C—Each of the tandem’s compressors have a rotalock and only the failed portion of the tandem may need replacement.
 - 3 RCS 070C to 105C—Each of the trio compressors have a rotalock and only the failed portion of the trio may need replacement.
 - 4 Only a “tandem or trio ready” compressor, with oil equalizer lines, can be used to replace a portion of the tandem or trio.

Reciprocating Compressors (115C to 135C)

Daikin Rooftops use Copeland Discus™ compressors mounted in “tandem.”

Tandem compressors are 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 start-up or 18 months from date of shipment, whichever comes first. Labor to install these parts is not included with this warranty. Compressors are considered a part and are included in this standard warranty.

If the equipment experiences a compressor failure within the first year parts warranty period or is a “dead” on arrival (DOA) compressor at start-up, the failed compressor is covered under the first year parts warranty. To receive a replacement compressor:

- 1 Notify the local (Copeland) wholesaler of the failure and provide the compressor model and serial number.
- 2 The customer/contractor picks up the replacement compressor from the wholesaler.
- 3 After removing the failed compressor from the equipment, return it to the local wholesaler for credit on the replacement compressor.
- 4 Consideration may be given at this time to a compressor teardown analysis, depending on the history of failures.

Service and Warranty Procedure

All Compressors

The decision to replace the failed portion of the tandem or trio, as opposed to replacing the entire tandem or trio, must be decided based on the following.

- 1 The entire tandem must be replaced if the individual portions do not include rotalocks and rotalocks are not available on the RCS 025 to 030 (tandems and the RCS circuit #1 tandem).
- 2 In warranty: Warranty only covers replacement of the failed portion of the tandem or trio. Either source may be used.
- 3 Out of warranty: The customer decides whether to replace the entire tandem/trio or just a portion and either source may be used.

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

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

- 1 Contact the Daikin Parts Department for compressor availability.
- 2 Send a completed parts order form to the Daikin Parts Department.
- 3 The Parts Department processes the order and the compressors are shipped from our Dayton, OH warehouse via ground transportation. If next-day air is required, indicate this on the parts order form and a freight charge will be billed to your account. Air freight costs are not covered under the Daikin warranty.
- 4 After the failed compressor is replaced, return it to Daikin International with a Return Goods Tag attached, which you will receive in the mail. It must be attached to the compressor. The Return Goods Tag has instructions on where to send the compressor. If the compressor is not returned, you will be billed for the replacement compressor.

- 5 Consideration may be given at this time to a compressor teardown analysis, depending on the history of failures.

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

- 1 Contact the Daikin Parts Department for compressor availability.
- 2 Send the Daikin Parts Department a completed parts order form.
- 3 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.
- 4 After the failed compressor has been replaced, it must be returned to Daikin Applied 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.
- 5 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 Applied at Minneapolis, Minnesota.

A “return goods” tag will be sent to be included with the returned material. Enter the information as called for on the tag in order to expedite handling at our 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.

Limited Product Warranty (North America)

Daikin Applied (“Company”) warrants to contractor, purchaser and any owner of the product (collectively “Owner”) that Company, at its option, will repair or replace defective parts in the event any product manufactured by Company, including products sold under the brand names Daikin Air Conditioning, AAF Air Conditioning, AAF HermanNelson and Daikin Applied, and used in the United States or Canada, proves defective in material or workmanship within twelve (12) months from initial startup or eighteen (18) months from the date shipped by Company, whichever occurs first. Authorized replaced parts are warranted for the duration of the original warranty. All shipments of such parts will be made FOB factory, freight prepaid and allowed. Company reserves the right to select carrier and method of shipment.

In addition, labor to repair or replace warranty parts is provided during Company normal working hours on products with rotary screw compressors, centrifugal compressors and on absorption chillers. Warranty labor is not provided for any other products.

Company’s liability to Owner under this warranty shall not exceed the lesser of the cost of correcting defects in the products sold or the original purchase price of the products.

PRODUCT STARTUP ON ABSORPTION, CENTRIFUGAL AND SCREW COMPRESSOR PRODUCTS IS MANDATORY and must be performed by Daikin Service or a Company authorized service representative.

It is Owner’s responsibility to complete and return the Registration and Startup Forms accompanying the product to Company within ten (10) days of original startup. If this is not done, the ship date and the startup date will be deemed the same for warranty period determination, and this warranty shall expire twelve (12) months from that date.

Exceptions

- 1 If free warranty labor is available as set forth above, such free labor does not include diagnostic visits, inspections, travel time and related expenses, or unusual access time or costs required by product location.

- 2 Refrigerants, fluids, oils and expendable items such as filters are not covered by this warranty.
- 3 This warranty shall not apply to products or parts which (a) have been opened, disassembled, repaired, or altered by anyone other than Company or its authorized service representative; or (b) have been subjected to misuse, negligence, accidents, damage, or abnormal use or service; or (c) have been operated, installed, or startup has been provided in a manner contrary to Company’s printed instructions, or (d) were manufactured or furnished by others and which are not an integral part of a product manufactured by Company; or (e) have not been fully paid for by Owner.

Assistance

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

Sole Remedy/Disclaimer

THIS WARRANTY CONSTITUTES THE OWNER’S SOLE REMEDY. IT IS GIVEN IN LIEU OF ALL OTHER WARRANTIES. THERE IS NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT AND UNDER NO CIRCUMSTANCE SHALL COMPANY BE LIABLE FOR INCIDENTAL, INDIRECT, SPECIAL, CONTINGENT OR CONSEQUENTIAL DAMAGES, WHETHER THE THEORY BE BREACH OF THIS OR ANY OTHER WARRANTY, NEGLIGENCE OR STRICT LIABILITY IN TORT.

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

For additional consideration, Company will provide an extended warranty(ies) on certain products or components thereof. The terms of the extended warranty(ies) are shown on a separate extended warranty statement.

RCS Rooftop Equipment Warranty Registration Form



To comply with the terms of Daikin Warranty, complete and return this Equipment Warranty Registration Form within 10 days to Daikin Warranty Department

Check, test, and start procedure for RoofPak roof mounted air conditioners with or without heat recovery and roof mounted air handlers.

Job Name: _____ Daikin G.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: _____

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: _____

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

I. INITIAL CHECK

- A. Is any shipping damage visible? Yes No N/A
- B. Tightened all setscrews? Yes No N/A
- C. Have the shipping spacers been removed from the compressor springs and have the neoprene spacers been installed on each compressor mounting bolt? (Only applies to 115C–135C units with compressor spring isolators.) Yes No N/A
- D. Electrical service corresponds to unit nameplate? Yes No N/A
Volts _____ Hertz _____ Phase _____
- E. Is the main disconnect adequately fused and are fuses installed? Yes No N/A
- F. Are crankcase heaters operating, and have they been operating 24 hours prior to start-up? Yes No N/A
- G. Are all electrical power connections tight? (Check compressor electrical box.) Yes No N/A
- H. Has the field piping been piped per ASHRAE recommendations? Yes No N/A

II. START-UP COMPRESSOR OPERATION

- A. Has each circuit been field leak tested?
Circuit 1 Yes No N/A
Circuit 2 Yes No N/A
- B. Refrigerant charge per circuit: Circuit 1 _____ Circuit 2 _____
- C. Backseat discharge, suction (sizes 115C –135C only), and liquid line valves? Yes No N/A
- D. Are compressors rotating in the right direction? Yes No N/A
- E. Do condenser fans rotate in the right direction? Yes No N/A
- F. Ambient temperature: _____ °F
- G. Oil safety control time delay (sizes 115C–135C only): Compressor #1 sec. _____ Compressor #3 sec. _____
Compressor #2 sec. _____ Compressor #4 sec. _____
- H. Compressor lockout timers function? Yes No N/A
- I. FanTrol functions: TC12 _____ TC13 _____ TC14 _____
- J. Part winding start time functions (sizes 115C–135C only):
Compressor: TD1 _____ TD2 _____ TD3 _____ TD4 _____
- K. Does unit start up and perform per sequence of operation? Yes No N/A

RCS Rooftop Equipment Warranty Registration Form

Equipment Warranty Registration Form (continued)

III. PERFORMANCE DATA

- A. Compressor voltage across each phase: L1-2 _____ V L2-3 _____ V L1-3 _____ V
- B. Compressor amperage of fully loaded compressor:
- | | | | |
|----------------|---------------|---------------|---------------|
| Compressor #1: | Phase 1 _____ | Phase 2 _____ | Phase 3 _____ |
| Compressor #2: | Phase 1 _____ | Phase 2 _____ | Phase 3 _____ |
| Compressor #3: | Phase 1 _____ | Phase 2 _____ | Phase 3 _____ |
| Compressor #4: | Phase 1 _____ | Phase 2 _____ | Phase 3 _____ |
| Compressor #5: | Phase 1 _____ | Phase 2 _____ | Phase 3 _____ |
| Compressor #6: | Phase 1 _____ | Phase 2 _____ | Phase 3 _____ |
- C. Low pressure cut-out: Circuit 1 _____ psig Circuit 2 _____ psig
 Low pressure cut-in: Circuit 1 _____ psig Circuit 2 _____ psig
- D. High pressure cut-out: Circuit 1 _____ psig Circuit 2 _____ psig
- E. Discharge pressure, one compressor: Circuit 1 _____ psig Circuit 2 _____ psig
 Discharge pressure, fully loaded, 2-3 compressors: Circuit 1 _____ psig Circuit 2 _____ psig
- F. Suction pressure, one compressor: Circuit 1 _____ psig Circuit 2 _____ psig
 Suction pressure, fully loaded, 2-3 compressors: Circuit 1 _____ psig Circuit 2 _____ psig
 Liquid press, fully loaded, 2-3 compressors (at liquid line shutoff valve): Circuit 1 _____ psig Circuit 2 _____ psig
 Liquid temperature, fully loaded, 2-3 compressors: Circuit 1 _____ psig Circuit 2 _____ psig
- G. System oil pressure (oil pressure-suction-net oil pressure):
 (on four-compressor units, indicate for each compressor – sizes 115C-135C only)
- | | | |
|-------------------|-------------------|-------------------|
| | Circuit 1 | Circuit 2 |
| Comp 1 _____ psig | Comp 2 _____ psig | Comp 3 _____ psig |
| Comp 3 _____ psig | Comp 4 _____ psig | |
- H. Suction line temperature: Circuit 1 _____ °F Circuit 2 _____ °F
- I. Superheat: _____ °F _____ °F
- J. Subcooling: _____ °F _____ °F
- K. Is the liquid in the liquid line sightglass clear and dry? Yes No N/A
- L. Does the hot gas bypass valve function properly? Yes No N/A
- M. At what suction pressure does the hot gas bypass valve open? Circuit 1 _____ psig Circuit 2 _____ psig
- N. Record discharge air temperature at discharge of the air handler: _____ °F
- O. Are all control lines secure to prevent excessive vibration and wear? Yes No N/A
- P. Are all gauges shut off and valve caps and packings tight after start-up? Yes No N/A

Signature: _____ Startup date: _____

Please see the following page "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 with the above completed Warranty Registration form.

RETURN COMPLETED EQUIPMENT WARRANTY REGISTRATION FORM TO:

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

Quality Assurance Survey Report

Quality Assurance Survey Report

To whom it may concern:

Please review the items below upon receiving and installing our product. Mark N/A on any item that does not apply to the product.

Job Name: _____ Daikin G.O. no. _____

Installation Address: _____

City: _____ State: _____

Purchasing Contractor: _____

City: _____ State: _____

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

- | | | | | | | |
|---|-----------|-------------|--------|-----|----|------|
| 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 |
| | 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 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".

RETURN COMPLETED QUALITY ASSURANCE SURVEY REPORT TO:
 Daikin Applied Warranty Department, 13600 Industrial Park Boulevard, Minneapolis, MN 55441

Daikin 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 Representative for warranty details. Refer to Form 933-43285Y. To find your local Daikin Representative, go to www.DaikinApplied.com.

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.

