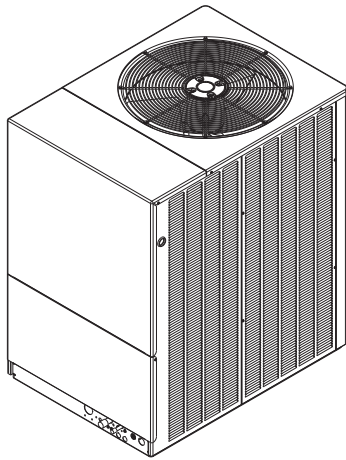


INSTALLATION INSTRUCTIONS

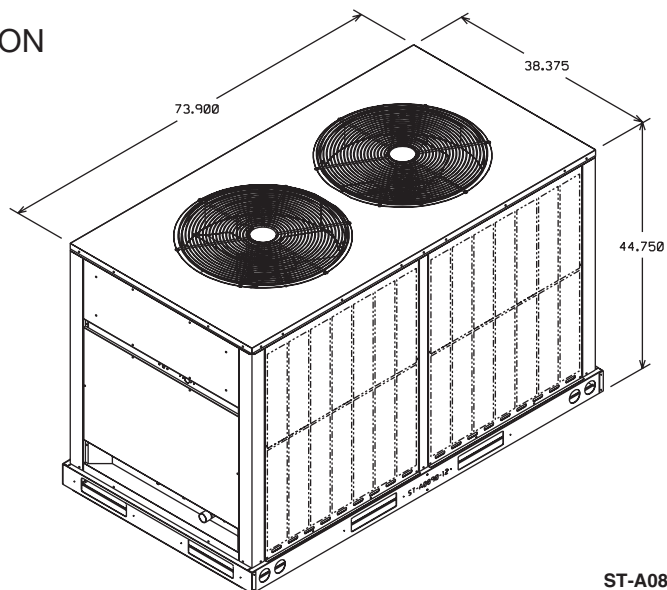
FOR HEAT PUMP CONDENSING UNITS

(-)PCY SERIES 7.5 & 10 TONS
WITH R-454B REFRIGERANT

7.5 TON



10 TON



ST-A0890-12

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP
IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.

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1.0 IMPORTANT SAFETY INFORMATION

⚠️ WARNINGS:

- These instructions are intended as an aid to qualified, licensed service personnel for proper installation, adjustment, and operation of this unit. Read these instructions thoroughly before attempting installation or operation. Failure to follow these instructions may result in improper installation, adjustment, service, or maintenance possibly resulting in fire, electrical shock, property damage, personal injury, or death.
- The unit must be permanently grounded. Failure to do so can cause electrical shock resulting in severe personal injury or death.
- Turn off electric power at the fuse box or service panel before making any electrical connections.
- Complete the ground connection before making line voltage connections. Failure to do so can result in electrical shock, severe personal injury, or death.
- Disconnect all power to unit before starting maintenance. Failure to do so can cause electrical shock resulting in severe personal injury or death.
- Never assume the unit is properly wired and/or grounded. Always test the unit cabinet with a non-contact voltage detector available at most electrical supply houses or home centers before removing access panels or coming into contact with the unit cabinet.
- Do not use oxygen to purge lines or pressurize system for leak test. Oxygen reacts violently with oil, which can cause an explosion resulting in severe personal injury or death.
- The top of the scroll compressor shell is hot. Touching the compressor top may result in serious personal injury.
- The manufacturer's warranty does not cover any damage or defect to the unit caused by the attachment or use of any components, accessories, or devices (other than those authorized by the manufacturer) into, onto, or in conjunction with the heat pump. You should be aware that the use of unauthorized components, accessories, or devices may adversely affect the operation of the heat pump and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories, or devices.

⚠️ CAUTIONS:

- Only match this outdoor unit with a matched indoor coil or air handler approved for use with this outdoor unit per the unit manufacturer's specification sheet. The use of unmatched coils or air handler will likely result in a charge imbalance between the cooling and heating modes which can cause unsatisfactory

operation including a high-pressure switch lockout condition.

- When coil is installed over a finished ceiling and/or living area, it is required that a secondary sheet metal condensate pan be constructed and installed under the entire unit. Failure to do so can result in property damage.
- The compressor has an internal overload protector. Under some conditions, it can take up to 2 hours for this overload to reset. Make sure overload has had time to reset before condemning the compressor.

⚠️ REFRIGERANT WARNINGS:

WARNING: Risk of Fire or Explosion. Dispose Of Properly In Accordance with Federal Or Local Regulations. Flammable Refrigerant Used.

DANGER: Risk of Fire Or Explosion due to Flammable Refrigerant Used. Follow Handling Instructions Carefully in Compliance with National Regulations.

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

WARNING: The appliance shall be stored in a room without continuously operating ignition sourced (for example: open flames, an operating gas appliance or an operating electric heater.)

WARNING: Do not pierce or burn.

WARNING: Be aware that refrigerants may not contain an odor.

WARNING: If this unit is connected via an air duct system to one or more rooms with an area less than Amin, that room shall be without continuously operating flames or other potential ignition sources. See **3.2: A2L Refrigerant Installation Safety Data**.

WARNING: Auxiliary devices which may be a potential ignition source shall not be installed in the duct work.

WARNING: If this unit is connected via duct to one or more rooms, only auxiliary devices approved by the manufacturer are declared suitable with A2L refrigerants shall be installed in the connecting duct work.

WARNING: Appliance shall be installed, operated and stores in a room with a floor area larger than 'X'm2. See **3.2: A2L Refrigerant Installation Safety Data**.

DANGER: Risk of fire or explosion. Flammable refrigerant used. To be repaired only by trained service personnel. Do not puncture refrigerant tubing.

DANGER: Risk of fire or explosion. Flammable refrigerant used. Consult the repair manual/owner's guide before attempting to service this product. All safety precautions must be followed.

2.0 GENERAL INFORMATION

⚠ WARNING:

Improper installation, or installation not made in accordance with these instructions, can result in unsatisfactory operation and/or dangerous conditions and can cause the related warranty not to apply.

2.1 Introduction

The information contained in this manual has been prepared to assist in the proper installation, operation, and maintenance of the air conditioning system by a qualified installer.

Read this manual and any instructions packaged with separate equipment required to make up the system prior to installation. Owner should retain this manual for future reference.

The images contained within this document may not be an exact representation of every unit, accessory, installation, etc. All dimensions contained in this document are approximations. We reserve the right to change the content of this document at any time.

2.2 Importance of Quality Installation

The equipment must be stored in a way that prevents mechanical damage from occurring.

A quality installation is critical to assure safety, reliability, comfort, and customer satisfaction. Strict adherence to applicable codes, the information in this installation manual, the outdoor unit installation manual, and the thermostat installation manual are key to a quality installation. Read the entire instruction manuals before starting the installation.

IMPORTANT: This product has been designed and manufactured to meet certified AHRI capacity and efficiency ratings with the appropriate outdoor units. However, proper refrigerant charge, proper airflow, and refrigerant line sizing are critical to achieve optimum capacity and efficiency and to assure reliable operation. Installation of this product should follow the manufacturer's refrigerant charging and airflow instructions located in this installation manual and the charging chart label affixed to the outdoor unit. Failure to confirm proper charge and airflow may reduce energy efficiency and shorten equipment life.

The equipment has been evaluated in accordance with the Code of Federal Regulations, Appendix A to Subpart F of Part 431, Title 10.

Install the unit in accordance with applicable national, state, and local codes. Latest editions are available from: "National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269." These publications are:

- ANSI/NFPA No. 70-(Latest Edition) National Electrical Code.
- NFPA90A Installation of Air Conditioning and Ventilating Systems.
- NFPA90B Installation of warm air heating and air conditioning systems.
 - UL 60335-2-40 4th Edition
 - CSA C22.2 No. 60335-2-40 4th Edition

Manufacturer Qualifications: ISO 9001: 2015

Install the indoor unit in such a way as to allow necessary access to the coil/filter rack and blower/control compartment.

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment must be on site. A dry powder CO2 fire extinguisher must be near the charging area at all times during installation, commissioning, service, and decommissioning.



RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

⚠ WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠ WARNING

PROPOSITION 65 WARNING: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.



2.0 GENERAL INFORMATION

2.3 System Sizing and Selection

Before specifying any air-conditioning equipment, a survey of the structure and heat gain calculation must be made. A heat gain calculation involves identifying all surfaces and openings that gain heat from the surrounding air and quantifying that heat to determine the amount of heat that needs to be removed. A heat gain calculation also calculates the extra heat load caused by sunlight and for humidity removal. These factors must be considered before selecting an air-conditioning system to provide year-round comfort. The Air Conditioning Contractors of America (ACCA) Manual N method of load calculation is one recognized procedure for determining the cooling load for commercial buildings.

After the proper equipment combination has been selected, satisfying both sensible and latent requirements, the system must be properly installed. Only then can the system provide the comfort it was designed to provide.

There are several factors that installers must consider.

- Outdoor unit location
- Indoor unit blower speed and airflow
- Proper equipment evacuation
- Supply and return air duct design and sizing
- Refrigerant charge
- System air balancing
- Diffuser and return air grille location and sizing

IMPORTANT: Excessive use of elbows in the refrigerant line set can produce excessive pressure drop. Follow industry best practices for installation. Installation and commissioning of this equipment is to be performed by trained and qualified HVAC professionals. For technical assistance, contact your Distributor Service Coordinator.

2.4 Importance of Proper Indoor/Outdoor Match-Ups

To assure many years of reliable operation and optimum customer comfort and to assure the outdoor unit warranty remains valid, an air-handler model or indoor coil should be selected that is properly matched to the outdoor unit. The recommended approach is to select an air-handler or indoor coil that has an AHRI match with the outdoor unit. Refer to the AHRI directory at www.ahridirectory.org to confirm the air-handler and outdoor unit are a certified combination in the AHRI Directory.

2.5 Checking Product Received

Upon receiving unit, inspect it for any shipping damage. Claims for damage, either apparent or concealed, should be filed immediately with the shipping company. Check model number, electrical characteristics, and accessories to determine if they are correct. Check system components (outdoor unit, air handler, etc.) to make sure they are properly matched.

2.6 Efficiency Testing Notice

For purposes of verifying or testing efficiency ratings, the test procedure in Title 10, Chapter II, Subchapter D, Part 431, Subpart F, Section 96 and the clarifying provisions provided in the AHRI Operations Manual 340/360 that were applicable at the date of manufacture should be used for test set up and performance.

2.7 Compressor Break-In Notice

Prior to agency testing, unit must be charged at 95°F [35°C] dry bulb outdoor and 80°F [26.7°C] dry bulb/67°F [19.4°C] wet bulb Indoor then unit must be run for 16 hours at 115°F [46.1°C] outdoor ambient temperature with 80°F [26.7°C] dry bulb/75°F [23.9°C] wet bulb indoor ambient temperature to break the compressor in. After the 16 hours break-in bring the rooms down to 95°F [35°C] dry bulb outdoor 80°F [26.7°C] dry bulb/67°F [19.4°C] wet bulb Indoor and perform the final charge based on sub-cooling listed on the charging chart.

3.0 UNIT SPECIFICATIONS

3.1 Electrical and Physical Data

Model (-)PCY2 Series	090CAZ	090DAZ	090YAZ
Cooling Performance^A			
Gross Cooling Capacity Btu [kW]	90,000 [26.4]	90,000 [26.4]	90,000 [26.4]
Gross Heating Capacity Btu [kW]	90,000 [26.4]	90,000 [26.4]	90,000 [26.4]
EER	11.0	11.0	11.0
IEER ^B	14.1	14.1	14.1
Nominal CFM/AHRI Rated CFM [L/s]	3000/2875 [1416/1357]	3000/2875 [1416/1357]	3000/2875 [1416/1357]
AHRI Net Cooling Capacity Btu [kW]	85,500 [25.1]	85,500 [25.1]	85,500 [25.1]
Net Sensible Capacity Btu [kW]	62,215 [18.2]	62,215 [18.2]	62,215 [18.2]
Net Latent Capacity Btu [kW]	23,285 [6.8]	23,285 [6.8]	23,285 [6.8]
AHRI Net Heating Capacity Btu [kW]	85,500 [25.1]	85,500 [25.1]	85,500 [25.1]
Compressor			
No./Type	1/Scroll	1/Scroll	1/Scroll
Outdoor Sound Rating (dB)^C	86	86	86
Outdoor Coil - Fin Type	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled
Tube Size in. [mm] OD	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	32.8 [3.0]	32.8 [3.0]	32.8 [3.0]
Rows / FPI [FPcm]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]
Outdoor Fan - Type	Propeller	Propeller	Propeller
No. Blades/Diameter in. [mm]	4/24 [609.6]	4/24 [609.6]	4/24 [609.6]
Drive Type/No. Speeds	ECM/1	ECM/1	PSC/1
CFM [L/s]	5,700 [2,690]	5,700 [2,690]	5,700 [2,690]
No. Motors/HP	1 at 1/2HP	1 at 3/4HP	1 at 1/2HP
Motor RPM	1150	1150	1150
Refrigerant Charge Oz. [g]	328.5 [9313]	328.5 [9313]	328.5 [9313]
Weights			
Net Weight lbs. [kg]	428 [194.1]	428 [194.1]	428 [194.1]
Ship Weight lbs. [kg]	448 [203.2]	448 [203.2]	448 [203.2]

3.0 UNIT SPECIFICATIONS

3.1 Electrical and Physical Data (cont.)

Model (-)PCY2 Series	120CAZ	120DAZ	120YAZ
Cooling Performance^A			
Gross Cooling Capacity Btu [kW]	120,000 [35.2]	120,000 [35.2]	120,000 [35.2]
Gross Heating Capacity Btu [kW]	120,000 [35.2]	120,000 [35.2]	120,000 [35.2]
EER	11.0	11.0	11.0
IEER ^B	14.1	14.1	14.1
Nominal CFM/AHRI Rated CFM [L/s]	4000/4050 [1888/1911]	4000/4050 [1888/1911]	4000/4050 [1888/1911]
AHRI Net Cooling Capacity Btu [kW]	114,000 [33.4]	114,000 [33.4]	114,000 [33.4]
Net Sensible Capacity Btu [kW]	84,000 [24.6]	84,000 [24.6]	84,000 [24.6]
Net Latent Capacity Btu [kW]	30,000 [8.8]	30,000 [8.8]	30,000 [8.8]
AHRI Net Heating Capacity Btu [kW]	114,000 [33.4]	114,000 [33.4]	114,000 [33.4]
Compressor			
No./Type	1/Scroll	1/Scroll	1/Scroll
Outdoor Sound Rating (dB)^C			
	88	88	88
Outdoor Coil - Fin Type			
Tube Type	Rifled	Rifled	Rifled
Tube Size in. [mm] OD	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	16.4 [1.5]	16.4 [1.5]	16.4 [1.5]
Rows / FPI [FPcm]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]
Outdoor Fan - Type			
	Propeller	Propeller	Propeller
No. Blades/Diameter in. [mm]	4/26 [660]	4/26 [660]	4/26 [660]
Drive Type/No. Speeds	ECM/1	ECM/1	PSC/1
CFM [L/s]	11,400 [5380]	11,400 [5380]	11,400 [5380]
No. Motors/HP	2 at 1/2HP	2 at 3/4 HP	2 at 1/2HP
Motor RPM	900	900	1100
Refrigerant Charge Oz. [g]			
	460 [13,041]	460 [13,041]	460 [13,041]
Weights			
Net Weight lbs. [kg]	642 [291]	642 [291]	642 [291]
Ship Weight lbs. [kg]	662 [300]	662 [300]	662 [300]

3.0 UNIT SPECIFICATIONS

3.1 Electrical and Physical Data

- A. Cooling Performance is rated at 95°F ambient, 80°F entering dry bulb, 67°F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to 20% of nominal CFM. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 210/240 or 360.
- B. EER and Integrated Efficiency Ratio (IEER) are rated at AHRI standards 340/360 and in accordance with DOE test procedures.
- C. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

Model Number	SHIPPING						OPERATING					
	H (Height)		L (Length)		W (Width)		H (Height)		L (Length)		W (Width)	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
(-)PCY2090	50.8	1291	44.7	1135	33.1	841	48.8	1240	42.7	1084	31.1	791
(-)PCY2120	46.8	1187	75.9	1927	41.3	1048	44.8	1137	73.9	1876	38.4	975

3.0 UNIT SPECIFICATIONS

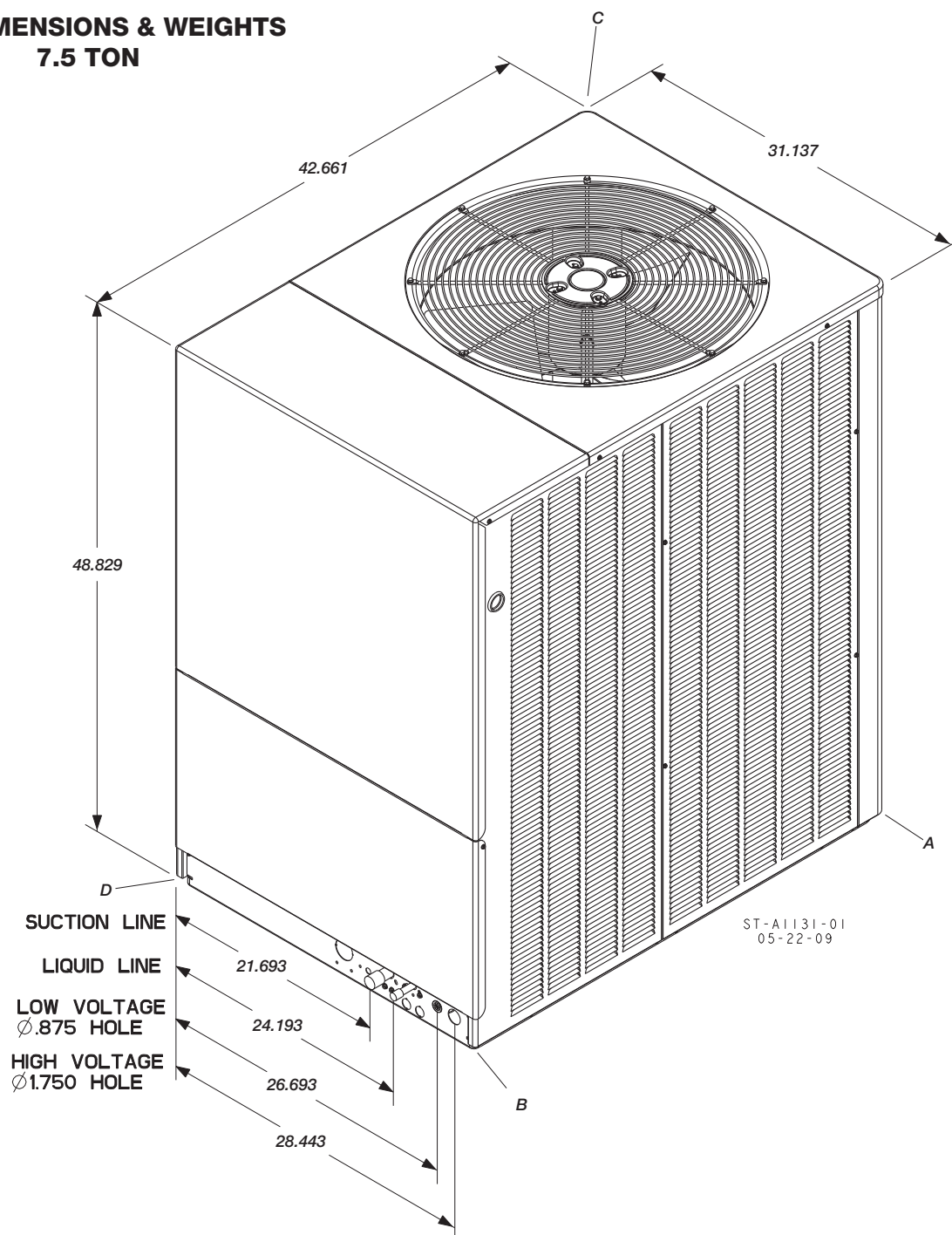
3.1 Electrical and Physical Data (cont.)

ELECTRICAL DATA – (-)PCY2 SERIES							
		090CAZ	090DAZ	090YAZ	120CAZ	120DAZ	120YAZ
Unit Information	Unit Operating Voltage Range	187-253	414-506	541-610	187-253	414-506	541-610
	Volts	208/230	460	575	208/230	460	575
	Minimum Circuit Ampacity	39/39	17	13	44/44	24	17
	Minimum Overcurrent Protection Device Size	45	20	15	60	30	20
	Maximum Overcurrent Protection Device Size	60	25	20	70	35	25
Compressor Motor	No.	1	1	1	1	1	1
	Volts	208/230	460	575	208/230	460	575
	Phase	3	3	3	3	3	3
	Amps (RLA), Comp. 1	26.3	11	9.2	26.5	14	12
	Amps (LRA), Comp. 1	178.5	95.3	65	255	123	94
Condenser Motor	No.	1	1	1	1	1	1
	Volts	208/230	460	575	208/230	460	575
	Phase	1	1	1	1	1	1
	HP	1/2	3/4	1/2	1/2	3/4	1/2
	Amps (FLA, each)	5.2	3	1	5.2	3	1
	Amps (LRA, each)	-	-	2.2	-	-	2.2

3.0 UNIT SPECIFICATIONS

3.1 Electrical and Physical Data (cont.)

UNIT DIMENSIONS & WEIGHTS 7.5 TON



Note: Corner Weights are shown in **Section 4.3.1. Corner Weights and Rigging.**

3.0 UNIT SPECIFICATIONS

3.2 A2L Refrigerant Installation Safety Data

Qmin at Rating Plate Charge Weight [0' - 200' 1/2" Line Set]						
(-)PCY2	090 [0']	090 [50']	090 [100']	090 [150']	090 [200']	
Refrigerant Chart Weight (oz)	328.5	378.5	428.5	478.5	528.5	
Minimum Total Room Area, TAmin (ft ²)	308.0	355.0	402.0	448.0	495.0	
Minimum circulation airflow, Qmin (cfm)	556	640	725	809	894	
Installed Altitude (ft above sea level)	Altitude Adjustment Factor	Minimum Total Conditioned Room Area, TAmin (sq ft)				
0	1.000	308	355	402	448	495
1000	1.025	325	373	421	469	517
2000	1.051	333	382	431	481	530
3000	1.078	342	392	443	493	544
4000	1.107	351	403	454	506	558
5000	1.138	360	414	467	520	574
6000	1.170	371	425	480	535	590
6500	1.187	376	432	487	543	598

Qmin at Rating Plate Charge Weight [0' - 200' 5/8" Line Set]						
(-)PCY2	120 [0']	120 [50']	120 [100']	120 [150']	120 [200']	
Refrigerant Chart Weight (oz)	460.0	535.0	610.0	685.0	760.0	
Minimum Total Room Area, TAmin (ft ²)	431.0	478.0	525.0	572.0	619.0	
Minimum circulation airflow, Qmin (cfm)	778	862	947	1032	1116	
Installed Altitude (ft above sea level)	Altitude Adjustment Factor	Minimum Total Conditioned Room Area, TAmin (sq ft)				
0	1.000	431	501	572	642	712
1000	1.025	325	373	421	469	517
2000	1.051	333	382	431	481	530
3000	1.078	342	392	443	493	544
4000	1.107	351	403	454	506	558
5000	1.138	360	414	467	520	574
6000	1.170	371	425	480	535	590
6500	1.187	376	432	487	543	598

4.0 INSTALLATION

4.1 Tools and Refrigerant

4.1.1 Tools Required for Installing and Servicing R-454B Models

Manifold Sets:

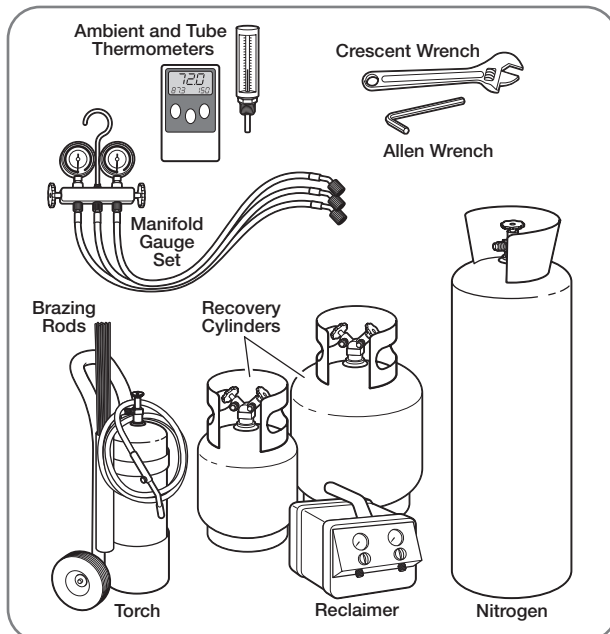
- Up to 800 PSIG High-Side
- Up to 250 PSIG Low-Side
- 550 PSIG Low-Side Retard

Manifold Hoses:

- Service Pressure Rating of 800 PSIG

Recovery Cylinders:

- 400 PSIG Pressure Rating



CAUTION: Any and all equipment must be compatible with refrigerant R-454B.

DANGER: Risk Of Fire Or Explosion. Flammable Refrigerant Used. Consult Repair Manual/Owner's Guide Before Attempting To Service This Product. All Safety Precautions Must Be Followed.

A leak detection system is installed in this unit. The unit must be powered at all times except during service.

The unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

4.1.2 Working Personnel

DANGER: Risk of Fire or Explosion. Flammable Refrigerant Used. To Be Repaired Only By Trained

Service Personnel. Do Not Puncture Refrigerant Tubing.

Every installation, maintenance, service, and repair working procedure must be conducted by qualified personnel who have been trained in operating and servicing units that employ flammable refrigerants such as R-454B.

Examples of working procedures include but are not limited to:

- Breaking into the refrigeration circuit
- Opening sealed components
- Opening ventilated enclosures

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

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

4.1.3 Specifications of R-454B

Application: R-454B is not a drop-in replacement for R-410A. Equipment designs must accommodate the safety group A2L of R-454B. It cannot be retrofitted into R-410A units.

Physical Properties: R-454B has an atmospheric bubble point of -59.6°F [50.9°C] and an atmospheric dew point of -58.0°F [-50.0°C]. Its bubble point saturation pressure at 77°F [25°C] is 213 psig [1469 kPa] and dew point saturation pressure at 77°F [25°C] is 205 psig [1415 kPa].

Pressure: The pressure of R-454B is similar to that of R-410A. Recovery and recycle equipment, pumps, hoses, and the like must have design pressure ratings appropriate for R-454B. Manifold sets need to range up to 800 psig [5,516 kPa] high-side and 250 psig [1,724 kPa] low-side with a 550 psig [3,792 kPa] low-side retard. Hoses need to have a service pressure rating of 800 psig [5,516 kPa]. Recovery cylinders need to have a 400 psig [2,758 kPa] service pressure rating, DOT 4BA400 or DOT BW400.

Flammability: R-454B is classified as safety group A2L, where the 2L flammability class indicates mild flammability.

R-454B and air should never be mixed in cylinders or supply lines or be allowed to accumulate in storage cylinders. Leak checking should never be done with a mixture of R-454B and air.

4.0 INSTALLATION

4.1.4 Quick-Reference Guide for R-454B

- Ensure that service equipment is designed to operate with R-454B.
- Refrigerant R-454B operates at pressures similar to R-410A. However, it is classified in safety group A2L. Ensure that servicing equipment is compatible with R-454B.
- Refrigerant cylinders are no longer color-coded. R-454B refrigerant cylinders are light green grey in color with a red band on the shoulder or top of the cylinder to indicate flammability.
- R-454B is only compatible with POE oils.
- Vacuum pumps will not remove moisture from POE oil used in R-454B systems.
- R-454B systems are to be charged with liquid refrigerants.
- Do not install a suction line filter drier in the liquid line.
- A factory-approved biflow liquid line filter drier is shipped with every unit and must be installed in the liquid line at the time of installation. Only manufacturer-approved liquid line filter driers can be used. These filter driers are rated for a minimum working pressure of 600 PSIG. The filter drier will only have adequate moisture-holding capacity if the system is properly evacuated.
- Desiccant (drying agent) must be compatible for POE oils and R-454B refrigerant

4.1.5 Minimum Room Area

Because this unit uses refrigerant R-454B, UL requires a minimum room area for the total conditioned space (T_{Amin}) that is supplied by this equipment. The UL Safety Standard defines an individual room area as the room area enclosed by floors, walls, partitions, and doors of the space where the unit is installed, also as the room area into which refrigerant can leak. Each room/conditioned space will need to be considered for the total area requirements. The minimum room area of the total conditioned space for each base model is listed in **3.2 A2L Refrigerant Installation Safety Data.**

4.1.6 No Ignition Sources

When performing work that involves exposing any pipework, no person working on or near the refrigerating system may use any ignition sources that could lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept far away from the site during installation, repair, removal, or disposal, during which refrigerant can possibly be released into the surrounding space. Before work takes place, the area around the equipment must be surveyed to ensure that there are no flammable hazards or ignition risks. Additionally, “No Smoking” signs must be displayed.

4.0 INSTALLATION

4.2 Choosing a Location

4.2.1 Allowable Clearances

24" [61.0 cm] to side intake louvers

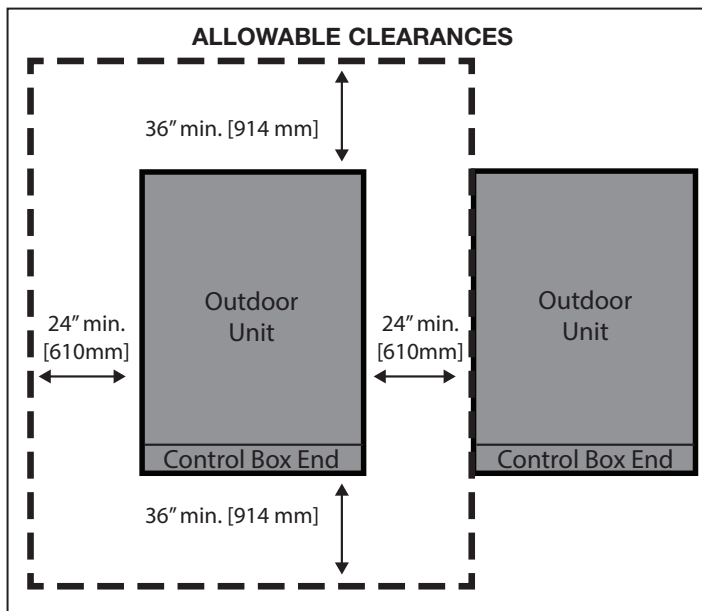
24" [61.0 cm] between multiple units

36" [91.4 cm] to service access panels

60" [152.4 cm] vertical for fan discharge

IMPORTANT: Consult local and national building codes and ordinances for special installation requirements. Following location information will provide longer life and simplified servicing of the outdoor unit.

NOTICE: These units must be installed outdoors. No ductwork can be attached, or other modifications made, to the discharge grille. Modifications will affect performance or operation.



4.2.2 Operational Issues Related to Unit Location

IMPORTANT: Locate the unit in a manner that will not prevent, impair, or compromise the performance of other equipment installed in proximity to the unit. Maintain all required minimum distances to gas and electric meters, dryer vents, and exhaust and inlet openings. In the absence of national codes or manufacturers' recommendations, local code recommendations and requirements will take precedence.

- Refrigerant piping and wiring should be properly sized and kept as short as possible to avoid capacity losses and increased operating costs.
- Locate the unit where water runoff will not create a problem with the equipment. Position the unit away from the drip edge of the roof whenever possible. Units are weatherized, but can be affected by the following:
- Water pouring into the unit from the junction of rooflines, without protective guttering. Large volumes of water entering the unit while in operation can impact fan blade or motor life.
- Closely follow the clearance recommendations in section 4.2.1.

4.0 INSTALLATION

4.2.3 Corrosive Environment

The metal parts of this unit may be subject to rust or deterioration if exposed to a corrosive environment. This oxidation could shorten the equipment's useful life.

Corrosive elements include, but are not limited to, salt spray, fog or mist in seacoast areas, sulphur or chlorine from lawn watering systems, and various chemical contaminants from industries such as paper mills and petroleum refineries.

If the unit is to be installed in an area where contaminants are likely to be a problem, special attention should be given to the equipment location and exposure.

- Avoid having lawn sprinkler heads spray directly on the unit cabinet.
- In coastal areas, locate the unit on the side of the building away from the waterfront.
- Shielding provided by a fence or shrubs may give some protection, but cannot violate minimum airflow and service access clearances.

⚠ WARNING: Disconnect all power to unit before starting maintenance. Failure to do so can cause electrical shock resulting in severe personal injury or death.

Regular maintenance will reduce the buildup of contaminants and help to protect the unit's finish.

- Frequent washing of the cabinet, fan blade, and coil with fresh water will remove most of the salt or other contaminants that build up on the unit.
- Regular cleaning and waxing of the cabinet with a good automobile polish will provide some protection.
- A good liquid cleaner may be used several times a year to remove matter that will not wash off with water.

4.2.4 Customer Satisfaction Issues

- The outdoor unit should be located away from areas where noise from the unit would be considered objectionable.
- To prevent noise transmission, the mounting pad for the outdoor unit should not be connected to the structure and should be located a sufficient distance above grade to prevent ground water from entering the unit.

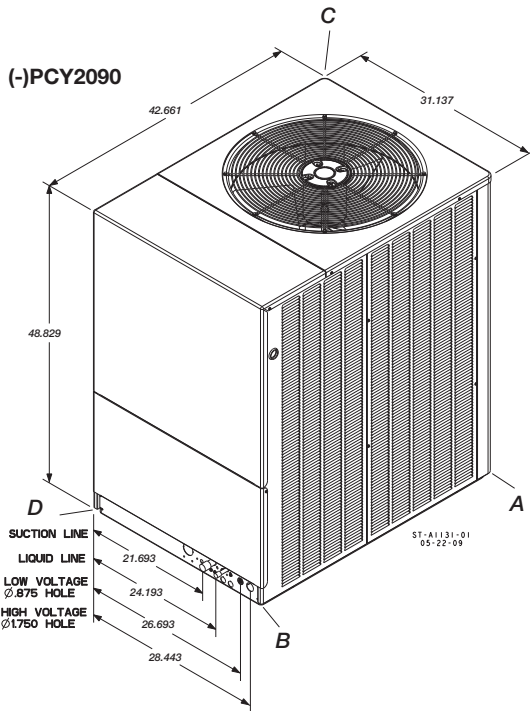
4.3 Mounting Unit

4.3.1 Corner Weights and Rigging

For lifting unit into place, rig it as shown in the illustration on the following page, making certain that the rigging slings are of sufficient length to maintain balance of the unit when it is being lifted. Before placing the unit on the roof, make certain that the roof structure is strong enough to support the weight of the unit. Corner weights are provided in the table below.

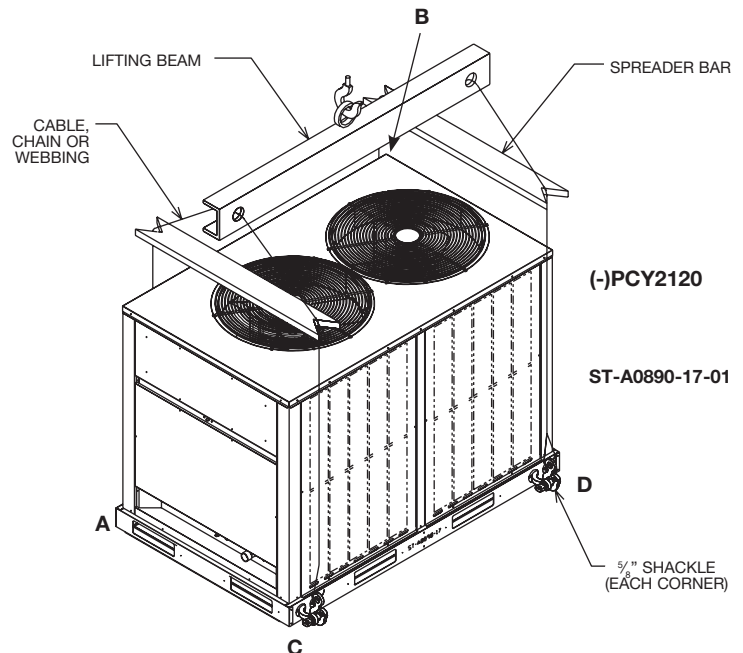
4.0 INSTALLATION

ROOFTOP INSTALLATION – RIGGING



CORNER WEIGHTS – POUNDS

Model	Total Weight Lbs [kg]	Corner Weights LBS[kg]			
		A	B	C	D
(-)PCY2090	428 [194]	75 [34]	107 [49]	79 [36]	167 [76]
(-)PCY2120	642 [291]	167 [76]	154 [70]	167 [76]	154 [70]



4.3.2 High Wind and Seismic Tie-Down Methods

The manufacturer-approved/recommended method is a guide to securing equipment for wind and seismic loads. Other methods might provide the same result, but the manufacturer method is the only one endorsed by the manufacturer for securing equipment where wind or earthquake damage can occur. Additional information is available on the manufacturer's website or from the wholesale distributor.

4.3.3 Elevating Unit

⚠ WARNING: Secure an elevated unit and its elevating stand in order to prevent tipping. Failure to do so may result in severe personal injury or death.

If elevating a unit on a flat roof, use 4" x 4" [10.2 cm x 10.2 cm] or equivalent stringers positioned to distribute unit weight evenly and prevent noise and vibration.

NOTICE: Do not block drain openings on bottom of unit.

4.0 INSTALLATION

4.4 Refrigerant Line Set Selection

4.4.1 Replacing Existing Systems

To prevent failure of a new unit, the existing line set must be correctly sized for the new unit and must be cleaned or replaced. Care must be taken so the expansion device is not plugged. For new and replacement units, a liquid line filter drier must be installed and the line set must be properly sized. Test the oil for acid. If it tests positive for acid, a suction line filter drier is mandatory.

IMPORTANT: When replacing a unit, the indoor and outdoor units must match in refrigerant type. Mismatching is not acceptable, meaning both units need to be replaced if refrigerant type is changing.

4.4.2 Line Set Length and Fitting Losses

Refrigerant tubing is measured in terms of actual length and equivalent length. Actual length is used for refrigerant charge applications. Equivalent length takes into account pressure losses from tubing length, fittings, vertical separation, accessories, and filter driers. The table below references commonly used equivalent lengths.

4.4.3 Liquid Line Selection

The purpose of the liquid line is to transport warm sub-cooled liquid refrigerant between the outdoor unit to the indoor unit. It is important not to allow the refrigerant to flash into superheated vapor prior to the expansion device of the indoor coil. The flashing of refrigerant can occur for the following reasons:

- Low refrigerant charge
- Improperly selected liquid line size
- Absorption of heat prior to expansion device

- Excessive vertical separation between the outdoor unit and indoor coil
- Restricted liquid line or filter drier
- Kinked liquid line

Table 2 lists the equivalent length per 25' of liquid line at various diameters up to 250' [76 m]. The total pressure drop allowed for the liquid line is 50 PSI [345 kPa]. The procedure for selecting the proper liquid line is as follows:

- Measure the total amount of vertical separation between the outdoor unit and indoor coil.
- Measure the linear length of liquid line needed.
- Add all of the equivalent lengths associated with any fittings or accessories using Table 1 above.
- Add the linear length to the total fitting equivalent length. This will equal your total equivalent line length.
- Reference Table 2 to verify the calculated equivalent length is acceptable with the required vertical separation and diameter of liquid line.

Notes:

1. The minimum velocity line (1500 FPM) [7.5 m/s] is recommended.
2. With the outdoor unit located below the indoor air handler, all vertical vapor lines must not exceed 1 1/8" [28.58 mm] O.D.
3. For suction pressure drop (PSIG) [6.9 kPa], multiply percent (%) loss by 1.18.
4. Size vapor lines for no more than a 5 PSIG [34.5 kPa] pressure drop (2.54% capacity loss) which corresponds to approximately 2°F [-16.7°C] loss.
5. All vertical vapor lines, 3 ft [0.91 m] or more in length, must have a short radius oil trap at the bottom of the riser.
6. All vertical vapor lines, 30 ft [9.14 m] or more in length, must have short radius oil traps every 15 to 20 feet [4.57 to 6.10 m] of run.

Table 1

Equivalent Length for Fittings (ft)				
Line Size (in)	90° Short Radius Elbow	90° Long Radius Elbow	45° Elbow	Filter Drier
1/2 [12.71]	1.4 [0.43]	0.9 [0.27]	0.4 [0.12]	6 [1.83]
5/8 [15.88]	1.5 [0.46]	1 [0.30]	0.5 [0.15]	6 [1.83]
3/4 [19.01]	1.9 [0.58]	1.3 [0.40]	0.6 [0.18]	6 [1.83]
7/8 [22.23]	2.3 [0.70]	1.5 [0.46]	0.7 [0.21]	6 [1.83]
1-1/8 [28.58]	2.7 [0.82]	1.8 [0.55]	0.9 [0.27]	N/A
1-3/8 [34.89]	3.6 [1.10]	2.4 [0.73]	1.2 [0.37]	N/A
1-5/8 [44.28]	4.2 [1.28]	2.8 [0.85]	1.4 [0.43]	N/A
2-1/8 [53.98]	5.9 [1.80]	3.9 [1.19]	1.8 [0.55]	N/A

4.0 INSTALLATION

TABLE 2

7.5 & 10 Ton Heat-Pumps (English Units)										
Unit Size	Allowable Liquid Line Size	Allowable Suction Line Size	Equivalent Length (Feet)							
			< 25	26-50	51-75	76-100	101-125	126-150	151-175	176-200
			Maximum Vertical Rise (Outdoor Unit Below Indoor Unit) * / Capacity Multiplier							
7.5 Ton	1/2"	1-1/8"	25 / 1.00	50 / 0.99	75 / 0.98	90 / 0.98	84 / 0.97	77 / 0.96	70 / 0.95	63 / 0.94
	5/8"	1-1/8"	25 / 1.00	50 / 0.99	75 / 0.98	100 / 0.98	100 / 0.97	100 / 0.96	100 / 0.95	100 / 0.94
	1/2"	1-3/8"	25 / 1.00	50 / 1.00	75 / 1.00	90 / 1.00	84 / 0.99	77 / 0.99	70 / 0.99	63 / 0.99
	5/8"	1-3/8"	25 / 1.00	50 / 1.00	75 / 1.00	100 / 1.00	100 / 0.99	100 / 0.99	100 / 0.99	100 / 0.99
10 Ton	5/8"	1-3/8"	25 / 1.00	50 / 1.00	75 / 0.99	100 / 0.99	102 / 0.99	99 / 0.99	96 / 0.98	93 / 0.98
	5/8"	1-5/8"	25 / 1.00	50 / 1.00	75 / 1.00	100 / 1.00	102 / 1.00	99 / 1.00	96 / 0.99	93 / 0.99

Notes:

- 1) Do not exceed 200ft linear line length.
- 2) Always use the smallest liquid line allowable to minimize refrigerant charge.
- 3) Applications shaded in light gray indicate capacity multipliers between 0.90 and 0.96 which are not recommended, but are allowed.

7.5 & 10 Ton Heat-Pumps (Metric Units)										
Unit Size	Allowable Liquid Line Size	Allowable Suction Line Size	Equivalent Length (Meters)							
			< 8	8-15	16-23	24-30	31-38	39-46	47-53	54-61
			Maximum Vertical Rise (Outdoor Unit Below Indoor Unit) * / Capacity Multiplier							
7.5 Ton	1/2"	1-1/8"	8 / 1.00	15 / 0.99	23 / 0.98	27 / 0.98	26 / 0.97	23 / 0.96	21 / 0.95	19 / 0.94
	5/8"	1-1/8"	8 / 1.00	15 / 0.99	23 / 0.98	30 / 0.98	30 / 0.97	30 / 0.96	30 / 0.95	30 / 0.94
	1/2"	1-3/8"	8 / 1.00	15 / 1.00	23 / 1.00	27 / 1.00	26 / 0.99	23 / 0.99	21 / 0.99	19 / 0.99
	5/8"	1-3/8"	8 / 1.00	5 / 1.00	23 / 1.00	30 / 1.00	30 / 0.99	30 / 0.99	30 / 0.99	30 / 0.99
10 Ton	5/8"	1-3/8"	8 / 1.00	15 / 1.00	23 / 0.99	30 / 0.99	31 / 0.99	30 / 0.99	29 / 0.98	28 / 0.98
	5/8"	1-5/8"	8 / 1.00	15 / 1.00	23 / 1.00	30 / 1.00	31 / 1.00	30 / 1.00	29 / 0.99	28 / 0.99

Notes:

- 1) Do not exceed 61 meters linear line length.
- 2) Always use the smallest liquid line allowable to minimize refrigerant charge.
- 3) Applications shaded in light gray indicate capacity multipliers between 0.90 and 0.96 which are not recommended, but are allowed.

Example: A 10 ton condensing unit is installed 50' below the indoor unit, requires 75' of 5/8" diameter liquid line, 1-3/8" diameter suction line, and 4 90° LR elbows, and a filter drier.

This application is acceptable because the 50' vertical rise is less than the maximum rise of 100' for this application.

- Filter Drier Equivalent Length (ft.) = 6'
- Fitting Equivalent Length (ft.) = $4 \times 1' = 3.6'$
- Total Equivalent Length (ft.) = $75' + 6' + 4' = 85'$

Unit Size	Allowable Liquid Line Size	Allowable Suction Line Size	Equivalent Length (Feet)							
			< 25	26-50	51-75	76-100	101-125	126-150	151-175	176-200
			Maximum Vertical Rise (Outdoor Unit Below Indoor Unit) * / Capacity Multiplier							
10 Ton	5/8"	1-3/8"	25 / 1.00	50 / 1.00	75 / 0.99	100 / 0.99	102 / 0.99	99 / 0.99	96 / 0.98	93 / 0.98
	5/8"	1-5/8"	25 / 1.00	50 / 1.00	75 / 1.00	100 / 1.00	102 / 1.00	99 / 1.00	96 / 0.99	93 / 0.99

4.0 INSTALLATION

4.4.4 Suction Line Selection

Purpose of the vapor line is to return superheated vapor to the condensing unit from the evaporator. Proper suction line sizing is important because it plays an important role in returning oil to the compressor to prevent potential damage to the bearings, valves, and scroll sets. Also, an undersized suction line can dramatically reduce capacity and performance of the system. The procedure for selecting the proper suction line is as follows:

- Determine the total linear length of suction line required.
- Add all of the equivalent lengths associated with any fittings or accessories using the table on previous page.
- Add the linear length and total fitting equivalent length. This will equal your total equivalent length.
- Reference Table 2 to verify that the calculated equivalent length falls within the acceptable region of the chart.
- Verify the capacity difference is compatible with the application using the multiplier in Table 2.
- Use only suction line sizes listed in Table 2.

4.4.5 Long Line Set Considerations

Generally, installations with actual (linear) line set lengths over 80 ft. [24 m] or vertical separation between the outdoor and indoor units exceed 20 ft. [6 m] are considered long line length applications and require special considerations to maintain good performance and compressor reliability. The following things should be considered when installing a system with a long line set length.

- Additional refrigerant charge
- Fitting losses and maximum equivalent length considerations
- Refrigerant migration during the off cycle
- Oil return to the compressor
- Capacity losses
- Additional oil

4.4.5.1 Oil Return to Compressor

Small amounts of compressor crankcase oil is picked up and carried out of the compressor by the moving refrigerant and is circulated through the system along with the refrigerant before it returns to the compressor crankcase. It is critical to the life of the compressor for the oil to be able to return to the compressor to maintain an adequate level of oil in the compressor crankcase. Oversized vapor lines result in inadequate refrigerant velocities

to carry the oil along with the refrigerant and will cause the oil to accumulate in the low spots in the vapor line instead of being returned to the compressor crankcase. This is especially true for long line lengths. Only use the vapor line sizes listed in Table 2 to assure proper oil return. Do not oversize the vapor line.

4.4.5.2 Refrigerant Migration During Off Cycle

Long line set applications can require a considerable amount of additional refrigerant. This additional refrigerant must be managed throughout the entire outdoor ambient operating range that the system will experience throughout its life cycle. Off-cycle refrigerant migration is where refrigerant condenses and migrates to the coldest and/or lowest part of the system. Excessive build-up of refrigerant near or inside the compressor can result in poor reliability and noisy operation during start-up. Long line set applications require a non-bleed TXV on the indoor coil and a crankcase heater. All models related to this manual have a crankcase heater from the factory and all AHRI matched indoor units have a non-bleed TXV. If only the condensing unit is being replaced, it is important to confirm that the indoor coil has a non-bleed TXV. If it doesn't, a liquid line solenoid valve must be installed near the indoor coil with the flow arrow pointing toward the indoor coil.

4.4.5.3 Maximum Liquid Pressure Drop

The total liquid line pressure drop must not exceed 50 psig [345 kPa] to assure a solid column of liquid at the metering device and stable control of superheat. Be sure to account for vertical separation, elbows, filter driers, solenoid valves, sight glasses, and check valves when calculating liquid line pressure drop.

4.4.5.4 Liquid Line Refrigerant Flashing

Excessive pressure drop and heat gain in long liquid lines can result in the refrigerant flashing into a vapor before it reaches the metering device which will dramatically reduce the capacity and efficiency of the system. For this reason, the liquid line must be sized properly using Table 2 and must be insulated in unconditioned spaces.

4.0 INSTALLATION

4.4.5.5 Compressor Oil Level Adjustment

Additional oil will need to be added for long line set applications. Below is the equation for the oil level adjustment. The compressor name plate oil charge for the different outdoor units is shown in the table below.

4.4.5.6 Capacity Losses

Long line lengths can result in a reduction in capacity due to suction line pressure drop and heat gain. Refer to Table 2 for capacity loss multipliers for various vapor line diameters and lengths. Only use vapor lines listed in Table 2 to assure proper oil return. This table does not account for any capacity loss due to heat gain from the environment. It is extremely important not to oversize the suction line to minimize capacity loss at the expense of proper oil return. The full length of the suction line must be insulated to minimize heat gain.

TABLE 3

MODEL	Compressor Nameplate Oil Charge	Oil Type
(-)PCY2090	58 fl. oz [1715 ml]	3MAF POE
(-)PCY2120	85 fl. oz. [2514 ml]	3MAF POE

Oil to be Added = [(Refrigerant Charge Adjustment (oz.) + OD Unit Refrigerant Name Plate Charge (oz.)) × (0.022)] – [(0.10) × (Compressor Name Plate Oil Charge (oz.))]

Example:

An application for an (-)PCY2120 requires 125 ft. of line set with a liquid line diameter of 5/8" and a suction line diameter of 1-3/8", Charge Adjustment = 125 ft. × (1.65 oz/ft + 0.34 oz/ft) = 248.75 oz. See **Section 5.2** for more information.

Name Plate Refrigerant Charge = 422 oz.,

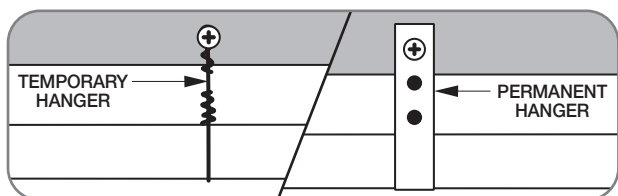
Compressor Name Plate Oil Charge = 85 oz.,

Oil to be Added = ((248.75 oz. + 422 oz.) × .022) – (.10 × 85 oz.) = 6.3 oz.

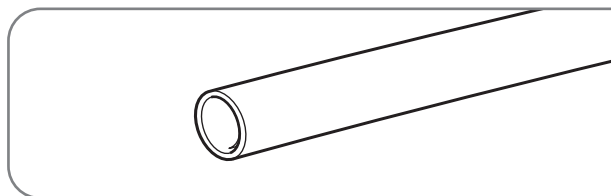
4.0 INSTALLATION

4.5 Line Set Installation

- If tubing is to be run underground, it must be run in a sealed watertight chase.
- Use care in routing tubing and do not kink or twist. Use a good quality tubing bender on the vapor line to prevent kinking.



- Locations where the tubing will be exposed to mechanical damage should be avoided. If it is necessary to use such locations, the copper tubing should be protected by a housing to prevent damage.



- Route the tubing using temporary hangers; then straighten the tubing and install permanent hangers. The tubing must be adequately supported.
- Isolate the vapor line from the building structure. If the vapor line comes in contact with inside walls, ceiling, or flooring, the vibration of the vapor line in the heating mode will result in noise inside the structure.
- Blow out the liquid and vapor lines with dry nitrogen before connecting to the outdoor unit and indoor coil to remove debris that can plug the expansion device.

4.5.1 Important Tubing Installation Practices

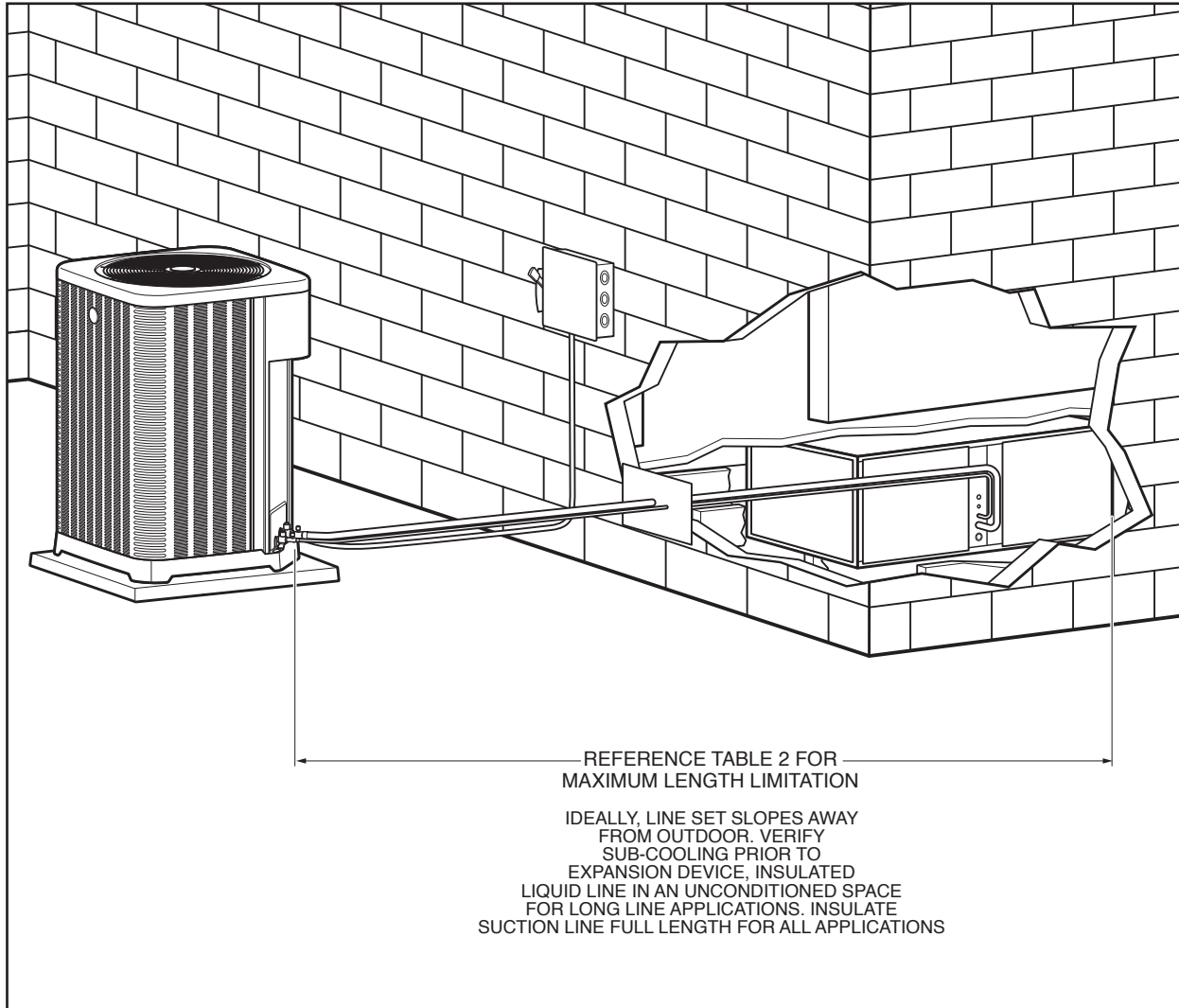
Observe the following when installing correctly sized type “L” refrigerant tubing between the outdoor unit and indoor coil:

- Check Table 2 for the correct suction line size and liquid line size.
- **If a portion of the liquid line passes through a very hot area where liquid refrigerant can be heated to form vapor, insulating the liquid line is required.**
- Use clean, dehydrated, sealed refrigeration-grade tubing.
- Always keep tubing sealed until tubing is in place and connections are to be made.
- A high-quality filter drier is included with all units and must be installed in the liquid line upon unit installation.
- If tubing has been cut, deburr the ends while holding the tubing in a position to prevent chips from falling into tubing. Burrs such as those caused by tubing cutters can affect performance dramatically, particularly on small diameter liquid lines.
- For best operation, keep tubing run as short as possible with a minimum number of elbows or bends.

4.0 INSTALLATION

4.5.2 Relative Location of Indoor and Outdoor Units

4.5.2.1 Indoor and Outdoor Unit Near Same Level



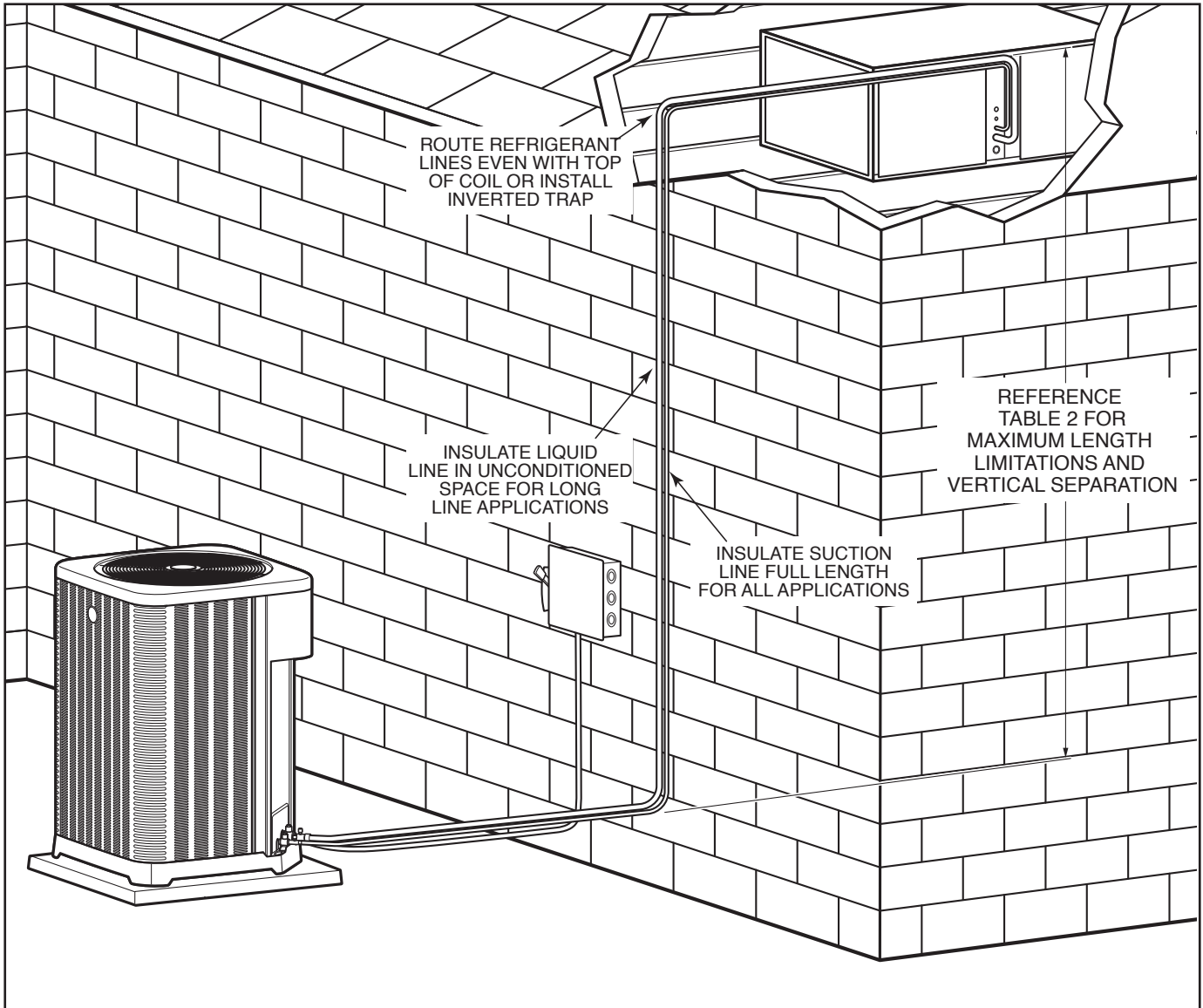
For applications that are considered to have a long line set with the outdoor unit and indoor unit near the same level the following is required:

- Insulated liquid line in unconditioned space only. Insulated suction line full length.
- Suction line should slope toward the indoor unit
- Follow the proper line sizing, maximum linear and equivalent lengths, charging requirements, and oil level adjustments spelled out in this manual.

- Verify at least 5°F [2.8°C] liquid sub-cooling at the indoor unit prior to expansion device.

4.0 INSTALLATION

4.5.2.2 Outdoor Unit Below Indoor Unit

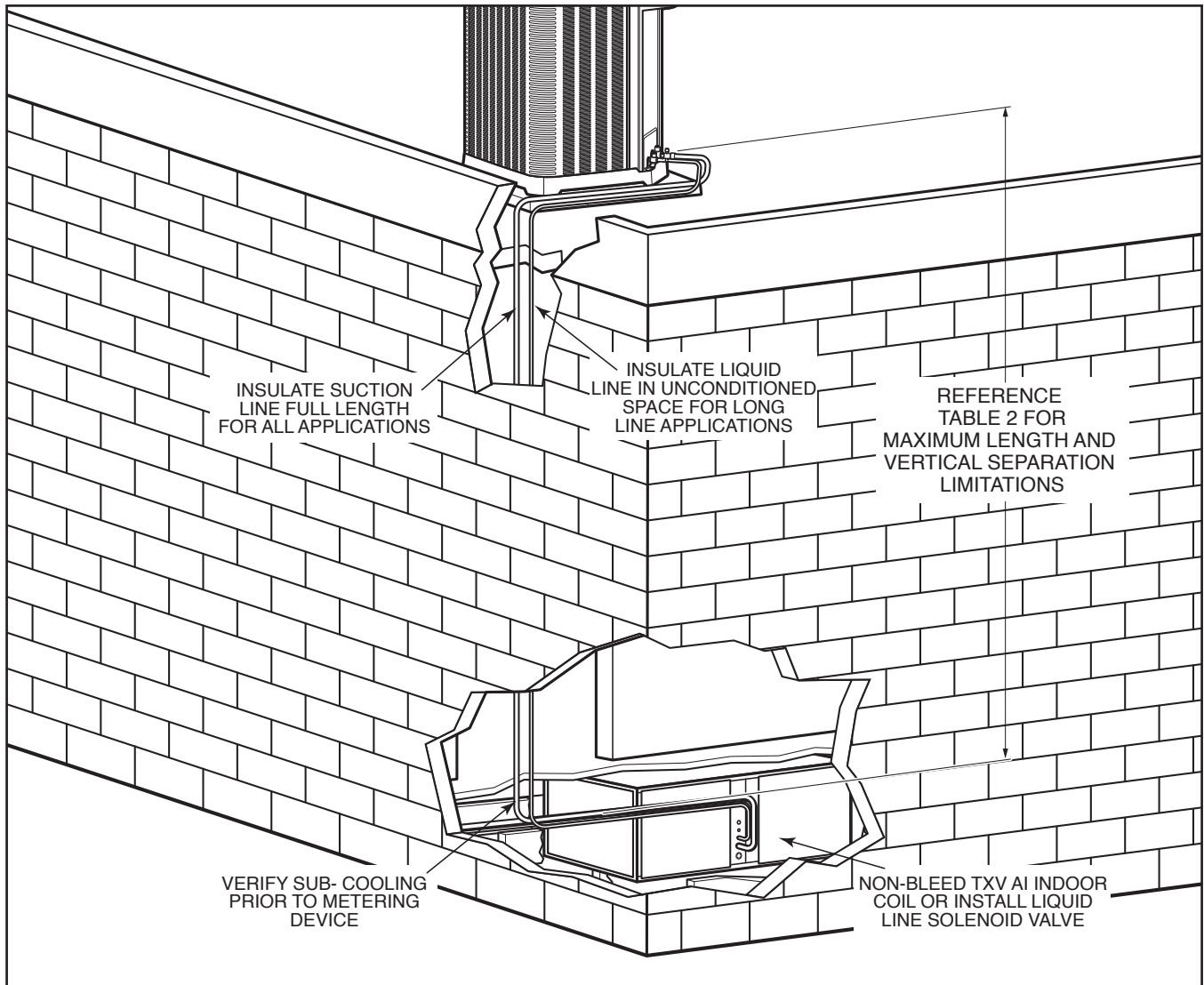


For applications that are considered to have a long line set with the outdoor unit below the indoor unit the following is required:

- Refrigerant lines should be routed even with the top of the indoor coil or an inverted trap is to be applied (refer to above illustration).
- Insulated liquid line in unconditioned space only. Insulated suction line full length.
- Follow the proper line sizing, maximum linear and equivalent lengths, charging requirements, and oil level adjustments spelled out in this manual.
- Verify at least 5°F [2.8°C] liquid sub-cooling at the indoor unit prior to expansion device.
- Vertical separations greater than 25' [7.62 m] can expect a lower sub-cooling level.

4.0 INSTALLATION

4.5.2.3 Outdoor Unit Above Indoor Unit



For applications that are considered to have a long line set with the outdoor unit above the indoor unit the following is required:

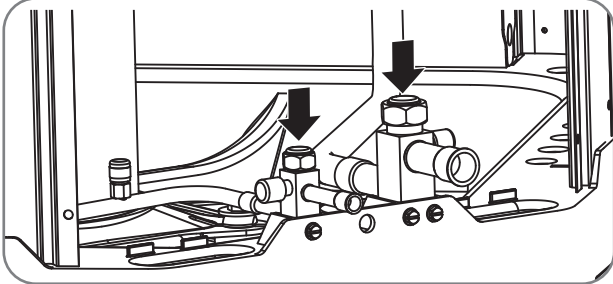
- Non-bleed TXV on the indoor coil or install liquid line solenoid valve near indoor unit with flow arrow pointing toward indoor unit.
- Insulated liquid line in unconditioned space only. Insulated suction line full length.
- Follow the proper line sizing, maximum linear and equivalent lengths, charging requirements, and oil level adjustments spelled out in this manual.

4.0 INSTALLATION

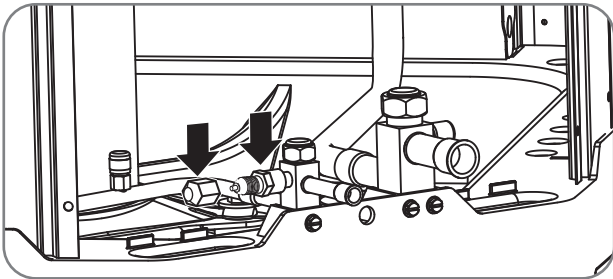
4.5.3 Tubing Connections

Indoor coils have only a holding charge of dry nitrogen. Keep all tube ends sealed until connections are to be made.

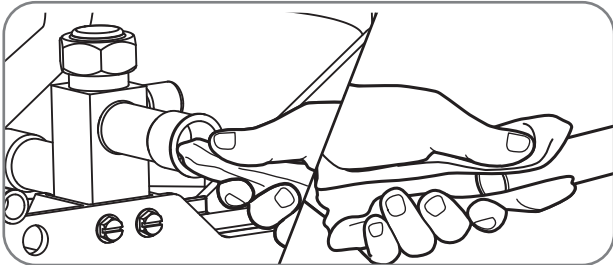
- Use type “L” copper refrigeration tubing. Braze the connections with the following alloys:
 - Copper to copper, 5% silver minimum
 - Copper to steel or brass, 15% silver minimum



- Be certain both refrigerant shutoff valves at the outdoor unit are closed.

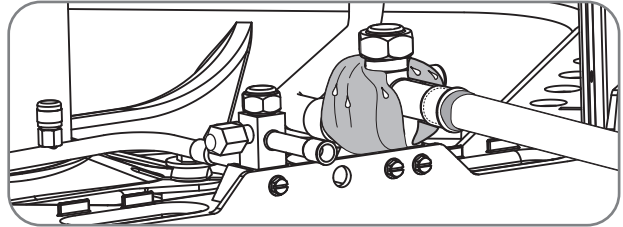


- Remove the caps and Schrader cores from the pressure ports to protect seals from heat damage. Both the Schrader valves and the service valves have seals that may be damaged by excessive heat.

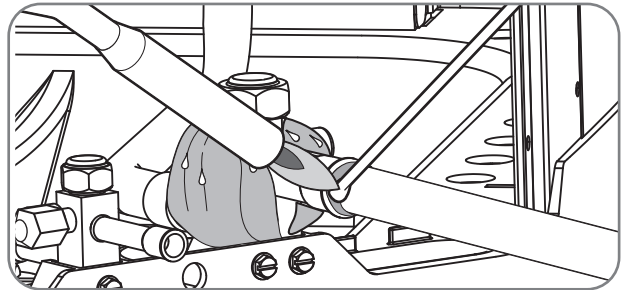


- Clean the inside of the fittings and outside of the tubing with a clean, dry cloth before soldering. Clean out debris, chips, dirt, etc., that enters tubing or service valve connections.

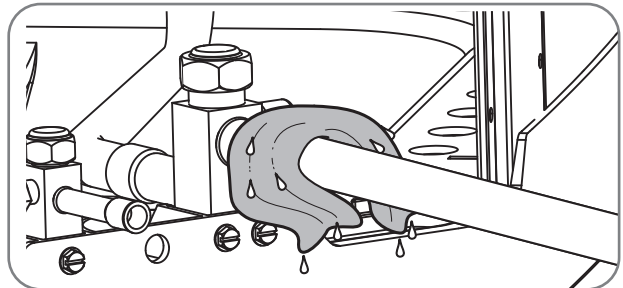
NOTE: Service valves and pressure port locations may be slightly different than shown in illustrations.



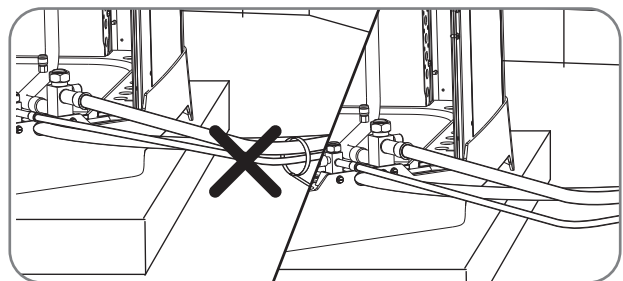
- Wrap valves with a wet rag or thermal barrier compound before applying heat.



- Braze the tubing between the outdoor unit and indoor coil. Flow dry nitrogen into a pressure port and through the tubing while brazing, but do not allow pressure inside tubing which can result in leaks. Once the system is full of nitrogen, the nitrogen regulator should be turned off to avoid pressuring the system.



- After brazing, use an appropriate heatsink material to cool the joint.
- Reinstall the Schrader cores into both pressure ports.



- Do not allow the bare suction line and liquid line to be in contact with each other. This causes an undesirable heat transfer resulting in capacity loss and increased power consumption.

4.0 INSTALLATION

4.6 Leak Testing

Before beginning any work on the system or conducting any hot work, ensure that the area is in the open or that it is adequately ventilated. Ventilation must continue while the unit is being worked on. Ventilation is required to safely disperse any released refrigerant into the atmosphere.

Inspect the unit for any damage to the coils and tubing that could cause a leak.

Under no circumstances shall potential sources of ignition be used to search for or detect refrigerant leaks. A halide torch or any other detector using a naked flame must not be used.

Electronic leak detectors may be used to detect refrigerant leaks, but the sensitivity may not be accurate and may need recalibrating to accurately detect R-454B.

Before use, ensure that the detector is not a potential ignition source and is suitable for R-454B.

Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and must be calibrated to R-454B.

Leak detection fluids are also suitable but do not use detergents containing chlorine. Examples of leak detection fluids are the bubble method and fluorescent method agents.

If a leak is suspected, all naked flames must be extinguished.

If a refrigerant leak is found that requires brazing, all of the refrigerants must be removed from the system.

4.6.1 Refrigerant Leak Detection System

The refrigerant leak detection system will continuously monitor the air for a refrigerant leak. If the leak detection system detects a leak, the system will begin mitigation procedures: the blower will turn on and the compressors will shut down. Note: Gas or electric heat functions may continue during mitigation.

At the end of 15 years or if the refrigerant leak detection system becomes inoperable, the leak detection system must be replaced with components specified by the unit's manufacturer. Refer to the manufacturer's website for replacement components. Refer to the alarm code diagnostics section for refrigerant leak detection system error codes.

4.6.2 Operation When a Leak is Detected

When the unit receives a signal from the A2L sensor, circulation airflow is activated, and the compressors will be shut off. The following mitigation actions will also be activated:

1. Energize the fan(s) of the appliance to deliver indoor airflow at or above the minimum airflow. See **3.2 A2L Refrigerant Installation Safety Data**.

- a. The fans shall be energized following the input signal to turn on the fan(s).

2. The system de-energizes compressor operation.

3. Activate additional mechanical ventilation, if applicable.

The above-mentioned actions shall continue for at least 5 minutes after the leak detection system begins mitigation. If the leak is no longer detected, the leak detection system will reset.

If the leak is still present, mitigation actions will continue for another 5 minutes. This cycle will repeat until no leak is detected.

4.0 INSTALLATION

4.7 Removal and Evacuation

The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system cannot be isolated from the low side. In which case, the entire system shall be pressure tested to the low side design pressure.

The evacuation of any system is essential before charging. Never attempt to operate a system while it is under a vacuum.

The refrigerant charge shall be recovered into R-454B recovery cylinders. The unit system must be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants, such as R-454B, again. DO NOT USE compressed air or oxygen for purging R-454B refrigerant systems.

Refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to the atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to the atmospheric pressure to enable work to take place.

The outlet for the vacuum pump must not be close to any potential ignition sources.

Ventilation is required during removal and evacuation.

NOTE: the condensing unit is shipped with a holding charge of dry nitrogen which must be purged from the unit before evacuation.

1. When breaking into the refrigeration circuit for any reason, this procedure must be followed:
2. Open the suction, discharge, and liquid shut-off valves
3. Use a refrigeration vacuum pump capable of evacuation in the 500 micron range
4. Connect the vacuum pump to the service manifold assembly with a pressure gauge that will read 30 inches vacuum.
5. Connect the service manifold to the suction line Schrader valve port.
6. Ensure there is no power to the unit.
7. With an accurate scale, ½ oz., set the refrigerant recovery cylinder in the upright position.
8. Connect the recovery cylinder to the unit using the service valves located on the outdoor unit.
9. Connect the cylinder to the liquid shut-off valve.
10. Evacuate refrigerant from the unit until the vacuum pump reads a minimum of 500 microns.
11. Purge the refrigeration circuit with inert gas until there is no refrigerant within the system.
12. Field-made refrigerant joints indoors must be tightness tested under a pressure of at least .25 times the max allowable pressure according to the unit's nameplate. Using the inert gas in the system, pressurize the unit accordingly and check the refrigerant joints for leaks.
 - If leaks are detected, make adjustments to the joints and check for leaks again.
 - If no leaks are detected, continue to the next step.
13. Evacuate the circuit again.
14. Once all inert gas is removed, pull a vacuum on the unit to check for any leaks in the system.
15. If leaks are present, spray a soapy substance over the refrigeration circuit. Bubbles will help locate the leak.
16. Patch the leak and pull a vacuum again.
17. If leaks are still detected, repeat steps eleven through sixteen..
18. If no leaks are present, charge the system as directed in the next section.
19. Remove the vacuum pump from suction, discharge, and liquid shut-off.

4.0 INSTALLATION

4.8 Charging Procedure

Prior to recharging the system, complete a leak check and purge the system with inert gas as detailed in Removal and Evacuation of Refrigerant. The charging procedure steps are as follows:

1. Ensure that the unit is properly grounded before beginning charging.
2. Install the R-454B refrigerant cylinder to the unit service valve.
3. Before tightening, purge the cylinder and service valve hose to ensure that the contamination of different refrigerants does not occur when using the charging equipment.
 - a. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
4. Position the refrigerant cylinder in the upright position. The cylinder must remain in the upright position for the entire charging procedure.
5. Use the charging charts located in this manual to properly charge the unit.
 - a. **TAKE EXTREME CARE NOT TO OVERCHARGE THE UNIT.**
 - b. Connect pressure gauges to suction and liquid ports on the condenser.
 - c. Measure the air temperature (Dry Bulb °F) entering the outdoor coil.
 - d. Place an "X" on the intersection of the suction and liquid pressures on the chart.
 - e. If "X" is below the outdoor ambient line, ADD charge and repeat step D.
 - f. If "X" is above the outdoor ambient line, RECOVER excess charge and repeat step D.
 - g. If the condenser fans are not running, the head pressure control may require jumping.
 - h. Conditions required at indoor and outdoor unit 80/67 (Indoor DB/WB °F) and 95 (Outdoor DB °F)
 - i. Connect pressure gauges to the liquid port on the condenser and install a thermocouple within 6" of the liquid port.
 - j. Calculate your subcooling by taking the pressure reading at the liquid port and the temperature value at the liquid port.
 - k. **TARGET SUBCOOLING = Refer to the Charge Chart**
 - l. Note: SUBCOOLING Tolerance = +/- 1.0 °F
 - m. If subcooling is below target, ADD charge and repeat step J.
 - n. If subcooling is above target, RECOVER excess charge and repeat step J.
6. Close the service ports on the suctions and liquid valves. Then, remove service gauges.
7. Replace service port caps and valve stem caps. These caps must be replaced to prevent leaks.
8. Label the system with the total refrigerant charge when charging is complete. This label is located on the exterior of the outdoor unit next to the rating plate.

After charging is complete, a leak test must be done. Before leaving the site, an additional leak test must also be done at the end of installation.

4.0 INSTALLATION

4.10 Control Wiring

⚠WARNING: Turn off electric power at the fuse box or service panel before making any electrical connections. Also, the ground connection must be completed before making line voltage connections. Failure to do so can result in electrical shock, severe personal injury, or death.

Running low-voltage wires in conduit with line voltage power wires is not recommended. Low-voltage wiring is to be connected to the pigtails hanging down from the bottom of the control box.

A thermostat and a 24-volt minimum transformer are required for the control circuit of the system. The appropriately sized transformer is supplied in the outdoor unit from the factory. See the wiring diagram for reference. Use "Wire Size" guide below to size the 24-volt control wiring.

Do not use phone cord to connect indoor and outdoor units and thermostat. This could damage the controls and may not be adequately sized for the control's electrical load.

FIELD WIRE SIZE FOR 24-VOLT THERMOSTAT CIRCUITS:

Runs up to 100 ft. [30.5 m]: 18 AWG

Runs over 100 ft. [30.5 m]: 16 AWG

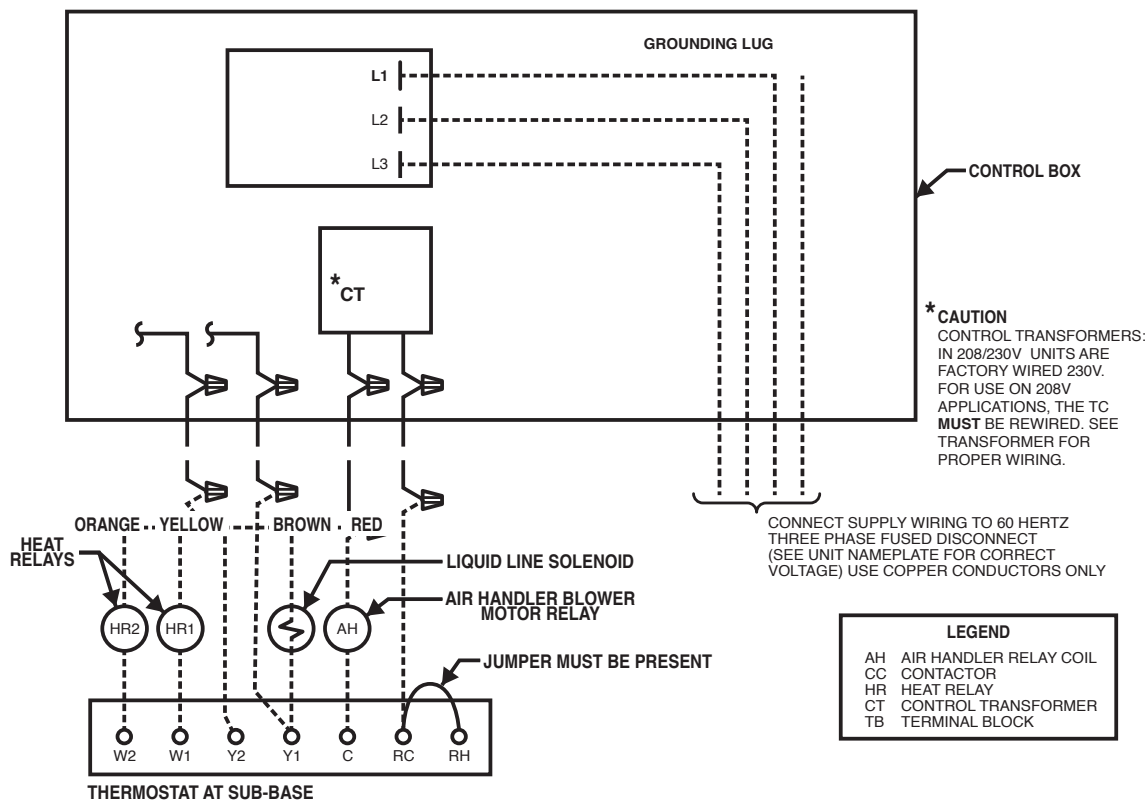
NOTICE: Do not use control wiring smaller than No. 18 AWG between thermostat and outdoor unit

After completing refrigerant removal, evacuation, and charging, check that the internal and field wiring will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects, taking into account the effects of aging or continual vibration from sources such as compressors or fans.

4.11 Typical Field Wiring

The following diagram shows the typical wiring connections for a two-stage condensing unit and an air-handler with electric heat.

TYPICAL FIELD WIRING



4.0 INSTALLATION

4.12 Configuring Control Transformer for 208V Applications

The control transformer supplied with 208/230V models is factory wired for 230V applications and must be reconfigured for 208V applications upon installation by disconnecting the Orange transformer primary lead from the compressor contactor L1 terminal and connecting the Red transformer primary lead to the compressor L1 terminal. The Orange and Red transformer primary lead terminals are insulated to prevent the disconnected lead from shorting to ground, but the terminal on the disconnected Orange transformer lead should still be secured with a wire tie so it is isolated from ground as to assure it cannot come in contact with a grounded surface and short the transformer out.

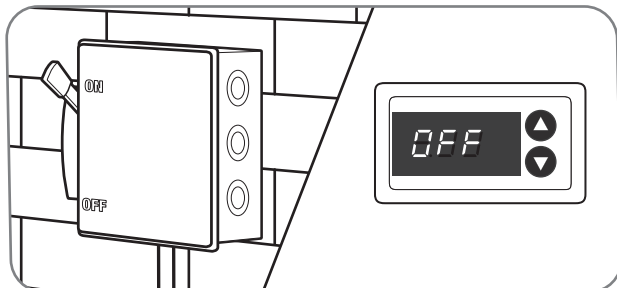
4.13 Power Wiring

It is important that proper electrical power from a commercial utility is available at the outdoor unit contactor. Voltage ranges for operation are shown below.

VOLTAGE RANGES (60 HZ)

Nameplate Voltage	Operating Voltage Range at Maximum Load Design Conditions for Compressors
208/230	187-253
460	414-506
575	517-633

Install a branch circuit disconnect within sight of the unit and of adequate size to handle the minimum circuit capacity. Refer to **Section 3.2**.



Power wiring must be run in a rain-tight conduit. Conduit must be run through the connector panel below the access cover (see illustrations in **Sections 3.2 and 3.3**) and attached to the bottom of the control box.

Connect power wiring to line-voltage lugs located in the unit electrical box. (See illustrations in **Section 7.9** of this manual. The lugs will be on the compressor contactor.)

Check all electrical connections, including factory wiring within the unit and make sure all connections are tight.

DO NOT connect aluminum field wire to the contactor terminals.

4.14 Grounding

⚠WARNING: The unit must be permanently grounded. Failure to do so can cause electrical shock resulting in severe personal injury or death.

A grounding lug is provided for a ground wire inside the control box on the left side.

4.15 Potential Ignition Sources

The UL safety standard defines potential ignition sources as hot surfaces, flames, and current carrying devices which can be the source of arcing or sparking.

In case any internal electrical components need to be replaced, those replacement parts must be ordered from the unit manufacturer's website to ensure that the internal electrical components are not potential ignition sources.

Examples of internal electrical components include contactors, relays, and control boards. This is not an exhaustive list. For the safety of customers and technicians, refer to the unit manufacturer's website for proper unit component replacement.

5.0 SYSTEM START-UP

5.1 Start-Up Overview

Once the system hardware and wiring have been properly installed and the system has been properly evacuated, the next step is to weigh in the preliminary refrigerant charge and conduct a final leak check before applying electrical power and starting the system.

When the system is first started, indoor blower motor rotation, compressor rotation, and indoor air-flow, must be verified prior to the refrigerant charge being finalized using pressures and the charging chart attached to the inside of the control box cover.

To achieve optimum system reliability and comfort, it is important to follow the procedures in the following sections to assure the indoor air-flow and the refrigerant charge are correct.

⚠ CAUTION: R-454B is mildly flammable. Failure to exercise care may result in equipment damage or personal injury.

IMPORTANT: Both the outdoor and indoor units are shipped with a nitrogen holding charge. Starting the system prior to evacuating the system and adding refrigerant or while system is in a vacuum will result in damage to the compressor.

IMPORTANT: After the preliminary refrigerant charge has been weighed in, it is recommended that the electrical power be applied to the outdoor unit for 12 hours before the compressor is started to allow the crankcase heater to drive any liquid refrigerant from the compressor shell.

5.2 Preliminary Charging by Weight and Final Leak Check

Refer to the basic system charge from the unit data plate (or table below) and add to that the required weight of refrigerant for the line set length. Complete the final system charge using the sub-cooling method according to the charge charts and specified sub-cooling.

Follow the evacuation, leak testing, and charging instructions detailed in sections **4.7 Removal and Evacuation** and **4.8 Charging Procedure**.

A leak check must be completed before leaving the site.

BASIC SYSTEM CHARGE*

MODEL	FACTORY CHARGE OZ (g)	SYSTEM CHARGE OZ (g)
(-)PCY2090	0 (0)	338 (9,582)
(-)PCY2120	0 (0)	373.5 (10,643)

*System with 0 Feet of Tubing

REQUIRED OZ. R-454B PER FT. OF TUBING

Tube Size O.D. In. [mm]	Liquid Tube		Vapor Tube		Total		Internal volume ft ³ /ft [m ³ /m]	
	oz _m /ft [g]	kg/m	oz _m /ft [g]	kg/m	oz _m /ft [g]	kg/m	ft ³ /ft	m ³ /m
3/8 [9.5]	0.5 [14.1]	0.05	0.0 [0.5]	0.00	0.5 [14.2]	0.05	5.55E-04	4.80E-05
1/2 [12.7]	1.0 [27.4]	0.09	0.0 [0.9]	0.00	1.0 [28.3]	0.09	1.08E-03	9.29E-05
5/8 [15.9]	1.5 [43.9]	0.14	0.1 [1.5]	0.00	1.6 [45.4]	0.15	1.73E-03	1.49E-04
3/4 [19.1]	2.2 [63.0]	0.21	0.1 [2.1]	0.01	2.3 [65.2]	0.21	2.48E-03	2.14E-04
7/8 [22.2]	3.1 [87.1]	0.29	0.1 [2.9]	0.01	3.2 [90.7]	0.30	3.43E-03	2.96E-04
1 [25.4]	4.0 [114.3]	0.37	0.1 [3.8]	0.01	4.2 [119.1]	0.39	4.50E-03	3.89E-04
1 1/8 [28.6]	5.2 [148.6]	0.49	0.2 [4.9]	0.02	5.4 [153.1]	0.50	5.85E-03	5.03E-04
1 1/4 [31.8]	6.5 [183.1]	0.60	0.2 [6.1]	0.02	6.7 [190.0]	0.62	7.21E-03	6.23E-04
1 3/8 [34.9]	7.3 [207.4]	0.68	0.2 [6.9]	0.02	7.6 [215.5]	0.70	8.17E-03	7.59E-04
1 1/2 [38.1]	9.4 [266.7]	0.87	0.3 [8.9]	0.03	9.7 [275.0]	0.90	1.05E-02	9.10E-04
1 5/8 [41.3]	11.2 [317.5]	1.04	0.4 [10.5]	0.03	11.6 [328.9]	1.08	1.25E-02	1.08E-03
2 1/8 [54.0]	19.5 [553.7]	1.82	0.6 [18.4]	0.06	20.2 [572.7]	1.88	2.18E-02	1.88E-03

Quantities based on 110°F liquid and 45°F vapor.

5.0 SYSTEM START-UP

5.3 Pre-Start Check

☐	YES	☐	NO	1.	Is condensing unit properly located and level?
☐	YES	☐	NO	2.	Is air free to travel to and from condensing unit?
☐	YES	☐	NO	3.	Is the wiring correct and according to the unit wiring diagram?
☐	YES	☐	NO	4.	Are wiring connections tight? (including those in unit and compressor electrical box.)
☐	YES	☐	NO	5.	Is the unit properly grounded?
☐	YES	☐	NO	6.	Is circulating air blower correctly wired?
☐	YES	☐	NO	7.	Is condensing unit properly fused?
☐	YES	☐	NO	8.	Is the thermostat level, correctly wired and in good location?
☐	YES	☐	NO	9.	Is the ductwork correctly sized, run, taped and insulated?
☐	YES	☐	NO	10.	Is refrigerant tubing neatly run and vapor line thoroughly insulated?
☐	YES	☐	NO	11.	In condensate drain line properly sized, run, tapped and pitched?
☐	YES	☐	NO	12.	Are refrigerant connections tight and leak tested?
☐	YES	☐	NO	13.	Is filter clean and in place?
☐	YES	☐	NO	14.	Does the condenser fan turn free without rubbing?
☐	YES	☐	NO	15.	Is the fan tight in the fan shaft?
☐	YES	☐	NO	16.	Are all covers and access panels in place to prevent air loss?

5.0 SYSTEM START-UP

5.4 Initial System Start-Up: Verifying Correct Indoor Blower Motor and Compressor Rotation

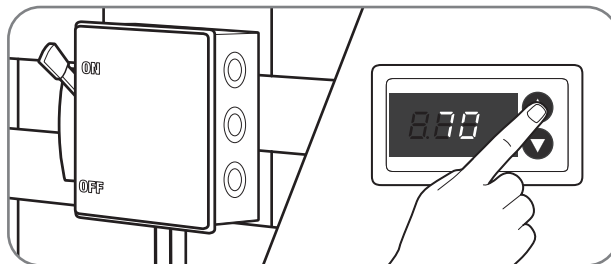
After the refrigerant charge is weighed in, it is recommended that electrical power be applied to both the indoor and outdoor units for a minimum of 12 hours with the thermostat turned to the OFF position to give the crankcase heater time to drive liquid refrigerant from the compressor shell. After 12 hours, the thermostat may be adjusted to call for the cooling mode. It is very important at this point to verify that the indoor blower motor rotation (3-phase air-handlers) and compressor rotation are both correct to prevent damage to the compressor.

- If the 3-phase indoor blower is turning backwards (blower turning, but no air-flow), shut the electrical power off to the indoor and outdoor units and reverse two incoming line voltage leads to the air-handler. Restore electrical power to the indoor and outdoor units and verify the indoor blower motor rotation is correct and air is flowing through the ductwork.
- Check to make sure the liquid pressure increases and the suction pressure decreases when the compressor first starts, indicating the compressor rotation is correct. If there is no pressure differential and the compressor is making a loud rattling sound, shut the electrical power off to the outdoor unit and reverse two of the incoming power leads at the outdoor unit contactor. Restore electrical power to the outdoor unit and confirm the liquid pressure increases the suction pressure decreases, and the compressor is operating at a normal sound level.

Note: The outdoor fan motor is a single phase motor and will therefore always have the correct rotation regardless of how the electrical power is connected to the contactor.

5.5 Verifying Indoor Air-Flow

Before final refrigerant charge adjustment, the indoor air-flow must be verified and adjusted if necessary. Adjust the thermostat set point so the indoor air-handler or furnace operates in the cooling air-flow mode. Some air-handlers and furnaces deliver a different air-flow level for continuous fan operation, so it is important to verify the indoor air-flow while the thermostat is set to operate in the cooling mode. Determine the rated indoor air-flow by referring to the AHRI Directory, manufacturer's specifications, or engineer's specification for the matched system. If this information is not available, 320 - 450 CFM per ton is a good rule of thumb. Refer to the air-handler or gas furnace installation and operation manual for air-flow tables and for adjusting the cooling mode indoor air-flow. External static pressure will need to be measured and used for this adjustment. For furnace/coil combinations, the coil pressure drop is considered part of the external static pressure to the furnace. An air velocity meter or air-flow hood can also give an accurate reading for indoor air-flow.



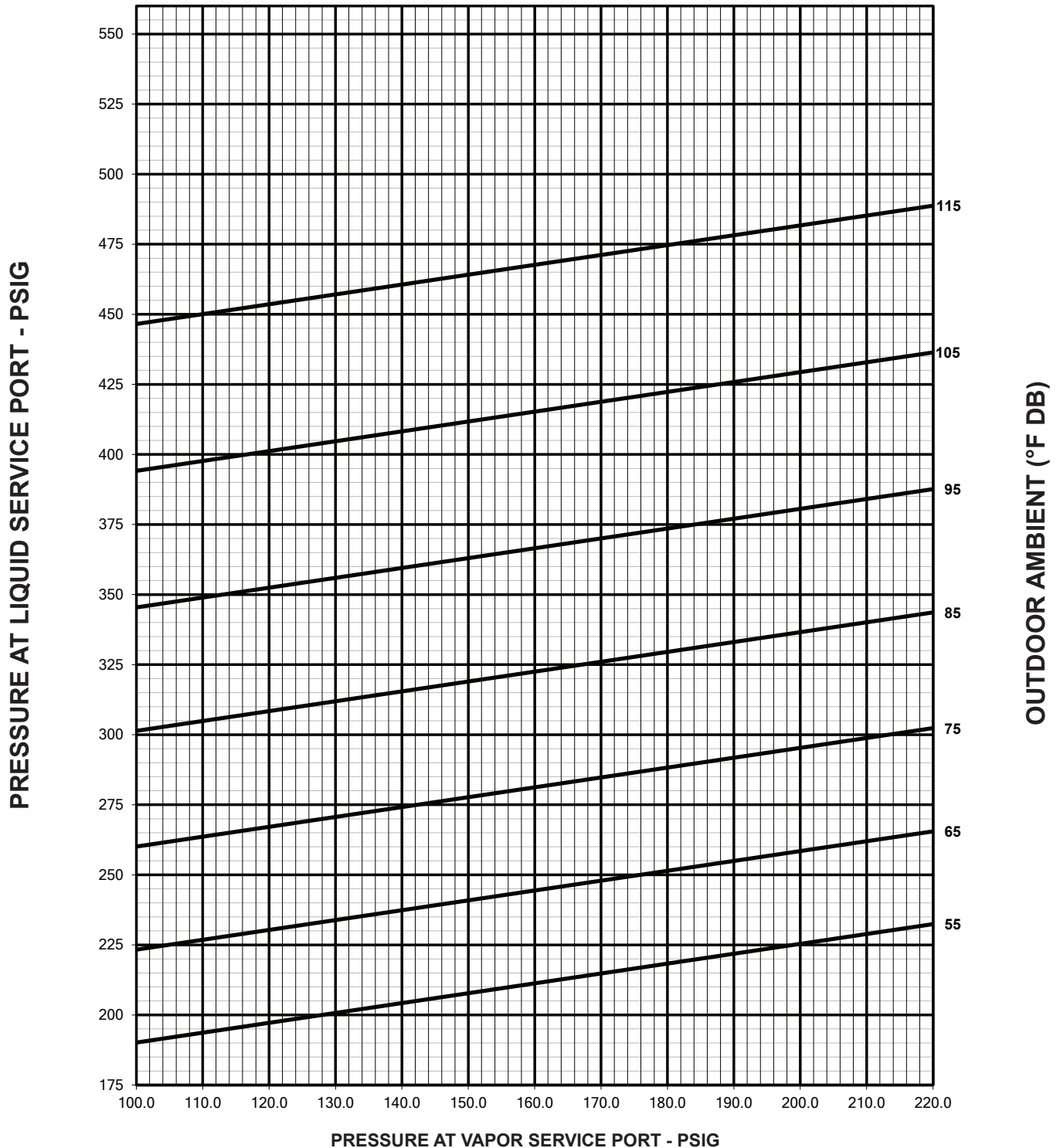
5.0 SYSTEM START-UP

5.6 Charging Charts (7.5 Ton)

COOLING CHARGE CHART

*FINAL CHARGE VERIFICATION @ 80/67-95° (HIGH STAGE)

SUB-COOLING REQUIREMENTS = 8.5° +/- 1.0°F

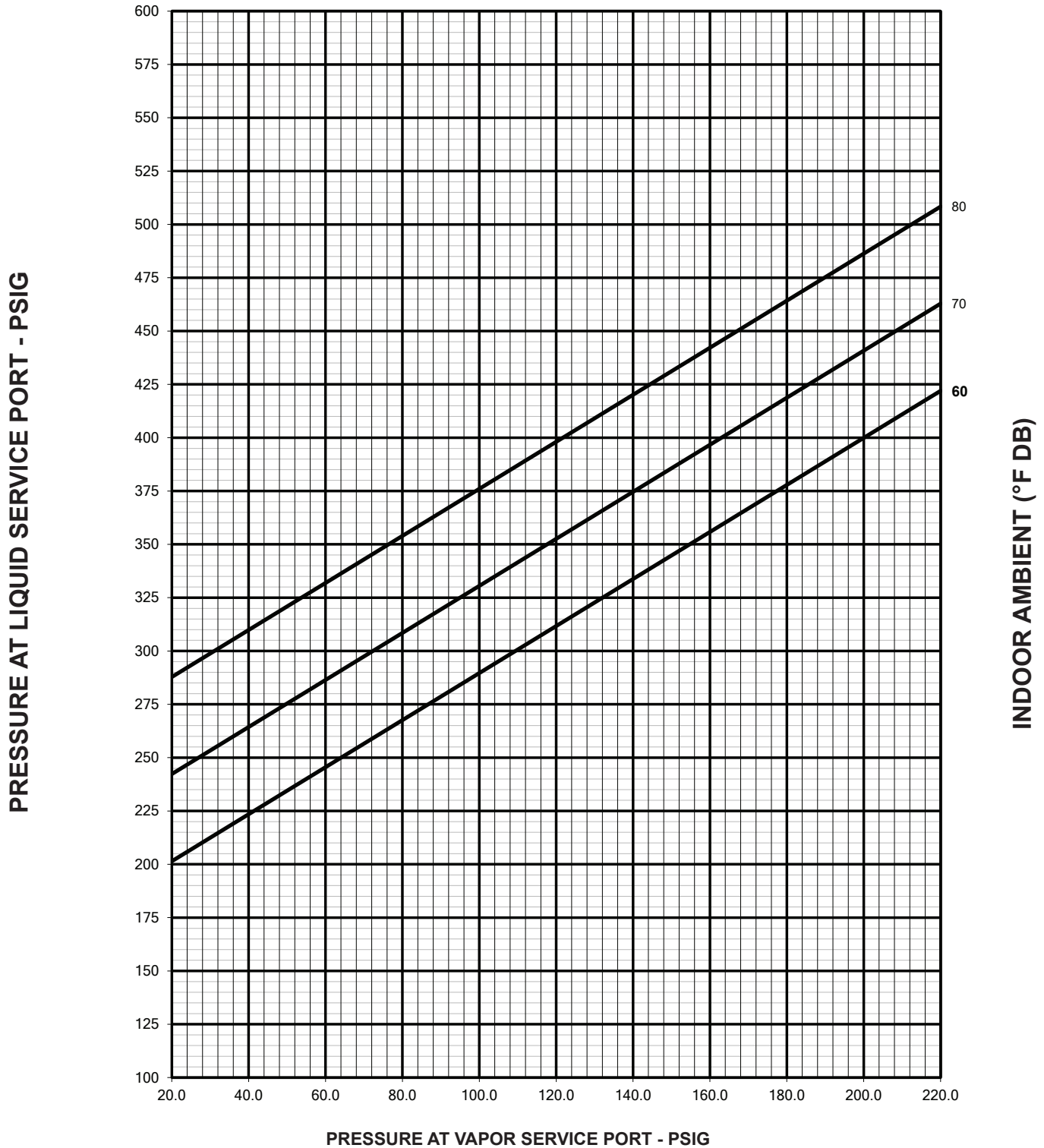


5.0 SYSTEM START-UP

5.6 Charging Charts (7.5 Ton)

HEATING CHARGE CHART

*DESIGN SUB-COOLING (at service port) = 23°F +/- 1°F @
47/43-70° AMBIENT



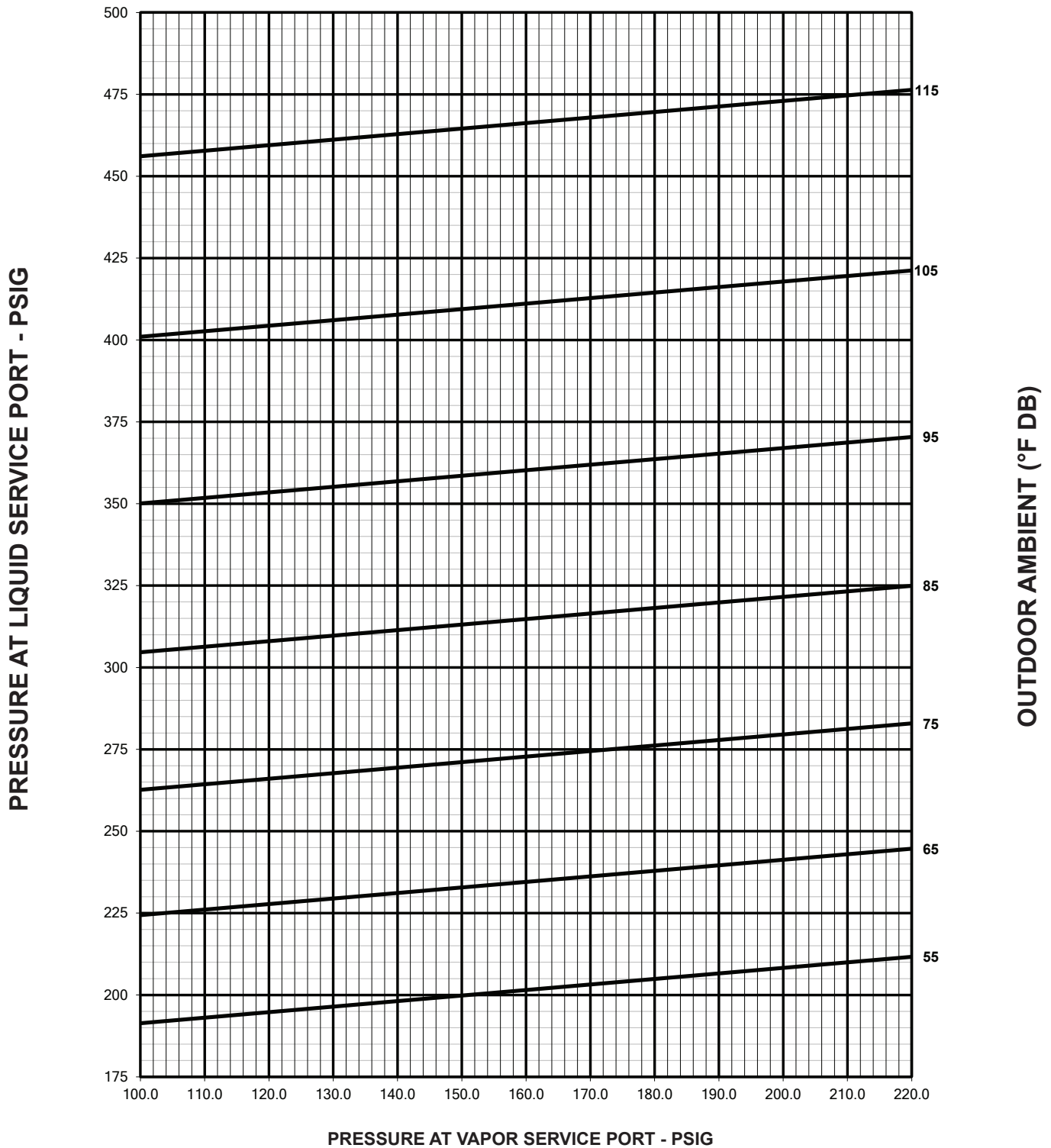
5.0 SYSTEM START-UP

5.6 Charging Charts (10 Ton)

COOLING CHARGE CHART

*FINAL CHARGE VERIFICATION @ 80/67-95° (HIGH STAGE)

SUB-COOLING REQUIREMENTS = 12.3° +/- 1.0°F

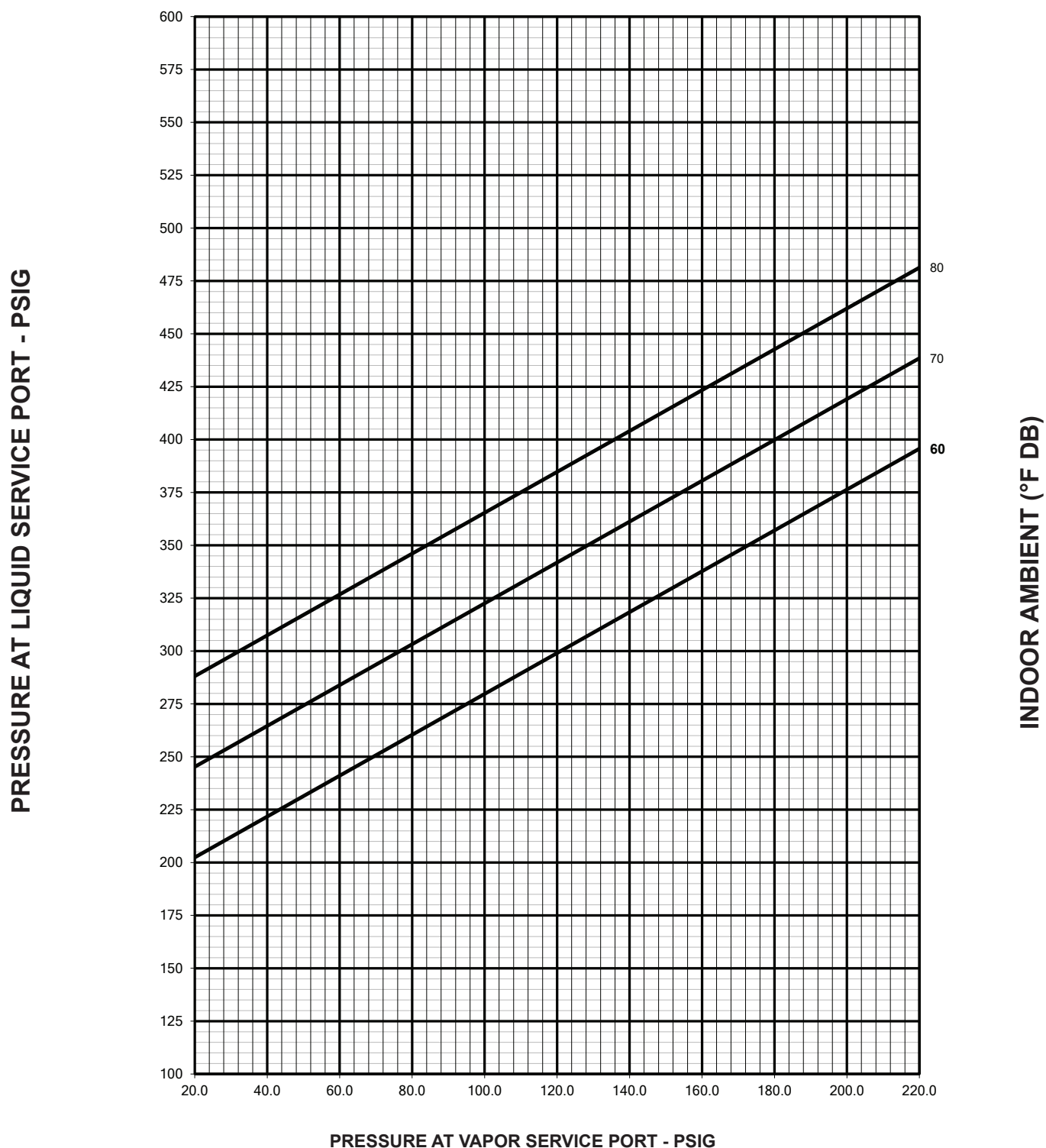


5.0 SYSTEM START-UP

5.6 Charging Charts (10 Ton)

HEATING CHARGE CHART

*DESIGN SUB-COOLING (at service port) = 14.5°F +/- 1.0°F @
47/43-70° AMBIENT



5.0 SYSTEM START-UP

5.7 Completing Installation

- Disconnect the hoses from the pressure ports. Replace the pressure port caps and tighten adequately to seal caps. **Do not overtighten.**
- Replace the service valve top caps finger-tight and then tighten with a wrench to adequately seal caps. **Do not overtighten.**
- Replace control box cover and service panel and install screws to secure panels.
- Restore power to unit at disconnect if required.
- Configure thermostat per the thermostat installation instructions and set to desired mode and temperature.
- Check that internal and external unit wiring will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects, taking into account the effects of aging or continual vibration from sources such as compressors or fans.

5.8 Safety Checks

At all times the manufacturer's maintenance and service guidelines must be followed. If in doubt, contact the manufacturer's technical support for assistance.

Before leaving the installation site the following safety checks must be completed:

- Ensure all electrical components in this system are approved by the manufacturer.
- Confirm the actual refrigerant charge complies with the minimum room size requirements outlined in **3.2 A2L Refrigerant Installation Safety Data**
- Ensure that the ventilation machinery and outlets are operating correctly and are not obstructed.
- If an indirect refrigerant circuit is being used, the secondary circuit must be checked for the presence of refrigerant.
- Ensure that all the equipment labels and markings are visible and legible. Markings, labels, and signs that are illegible must be corrected.
- Confirm that any refrigerating pipe or components are installed in a position where they are unlikely to be exposed to corrosion, unless the refrigerant-containing components are constructed of corrosion-resistant materials or are protected from corrosion.

6.0 SEQUENCE OF OPERATION

6.1 Sequence of Operation for Two-Stage Compressors

1. When the room thermostat is set on “Cool”, “Fan Auto”, and the temperature is higher than the thermostat setting, the thermostat “Y1” circuit closes and energizes the first speed of the compressor contactor (CC). Power to the crankcase heater (CCH) will be de-energized by the auxiliary contacts (AUX).
2. Simultaneously, the “G” circuit provides power to the indoor blower motor circuit and starts indoor air circulation through the evaporator coil.
3. When the discharge pressure increases to 450 psig, the contacts on the low ambient control (LAC) (if installed) will allow supply power to start the outdoor fan motors (OFM) which begins to pull air through the condenser coils. The system is now in the first-stage cooling, operating at near 60 percent of full load capacity.
4. If the temperature at the thermostat continues to increase, the thermostat “Y2” circuit closes and energizes both speeds of the compressor which is now full load capacity.
5. The system will continue cooling at maximum capacity, as long as the room thermostat is demanding full load and all safety device contacts are closed. The low ambient control (LAC) (if installed) will open and close, allowing the outdoor fans to maintain discharge pressure between 250 and 450 psig.
6. As the temperature at the thermostat drops enough to satisfy “Y2”, the circuit will open and de-energize the second compressor speed and continues operating on the first speed of the compressor.
7. When continued cooling satisfies the “Y1” circuit, it will open and de-energize the compressor contactor (CC), stopping compressor operation and closing the auxiliary contacts (AUX), which energizes the crankcase heater (CCH).
8. The thermostat “G” circuit will stop blower operation.

6.2 Sequence of Operation for Tandem Compressors

1. When the room thermostat is set on “Cool”, “Fan Auto”, and the temperature is higher than the thermostat setting, the thermostat “Y1” circuit closes and energizes the number one compressor contactor (CC1) through the closed cooling relay (RL) contacts. Power to the crankcase heater (CCH1) will be de-energized by the auxiliary contacts (AUX1).
2. Simultaneously, the “G” circuit provides power to the indoor blower motor circuit and starts indoor air circulation through the evaporator coil.
3. When the discharge pressure increases to 450 psig, the contacts on the low ambient control (LAC) (if installed) will allow supply power to start the outdoor fan motors (OFM) which begin to pull air through the condenser coils. The system is now in first stage cooling, operating at near fifty percent of full load capacity.
4. If the temperature at the thermostat continues to increase, the thermostat “Y2” circuit closes and after a full 30 second delay, power passes through the time delay control (TDC) and energizes the number two compressor contactor (CC2) through the second set of closed cooling relay (RL) contacts. Power to the crankcase heater (CCH2) will be de-energized by the auxiliary contacts (AUX2).
5. The system will continue cooling at maximum capacity, as long as the room thermostat is demanding full load and all safety device contacts are closed. The low ambient control (LAC) (if installed) will open and close, allowing the outdoor fans to maintain discharge pressure between 250 and 450 psig.
6. As the temperature at the thermostat drops enough to satisfy “Y2”, the circuit will open and de-energize the compressor contactor (CC2), stopping compressor operation and closing the auxiliary contacts (AUX2), which energizes the crankcase heater (CCH2).
7. When continued cooling satisfies the “Y1” circuit, it will open and de-energize the compressor contactor (CC1), stopping compressor operation and closing the auxiliary contacts (AUX1), which energizes the crankcase heater (CCH1).
8. The thermostat “G” circuit will stop blower operation.

7.0 COMPONENTS & CONTROLS

7.1 Compressor

A single 2-stage 3-phase scroll compressor is used in 7.5, & 10 ton models.

7.2 Fan Motor

All models utilize ECM or PSC motors.

7.3 Outdoor Fan

All models use 'paddle-style' four-blade fans.

7.4 Compressor Contactor

All models utilize 3-pole contactors to power the compressors and fan motors. Field power is connected directly to the terminal lugs on the line side of the contactor.

7.5 Compressor Crankcase Heater (CCH)

Each compressor is equipped with a belly-band style crankcase heater that is energized anytime electrical power is supplied to the unit. Crankcase heater wattages for each model are shown in the following table.

MODEL	CRANKCASE HEATER(S)
(-)PCY2090	(1) 70W
(-)PCY2120	(1) 70W

All heaters are located on the lower half of the compressor shell. Its purpose is to drive refrigerant from the compressor shell during long off cycles, thus preventing damage to the compressor during start-up.

At initial start-up or after extended shutdown periods, make sure the heater is energized for at least 12 hours before the compressor is started. (Disconnect switch is on and wall thermostat is off.)

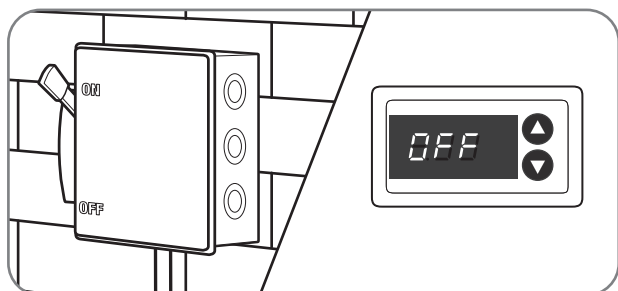
7.6 High- and Low-Pressure Controls

High and low pressure controls are standard on all models.

The high-pressure control (HPC) is an automatic-reset which opens near 610 PSIG [4206 kPa] and closes near 420 PSIG [2896 kPa].

The low-pressure control (LPC) is an automatic-reset which opens near 50 PSIG [345 kPa] and closes near 95 PSIG [655 kPa].

⚠ CAUTION: The compressor has an internal overload protector. Under some conditions, it can take up to 2 hours for this overload to reset. Make sure overload has had time to reset before condemning the compressor.



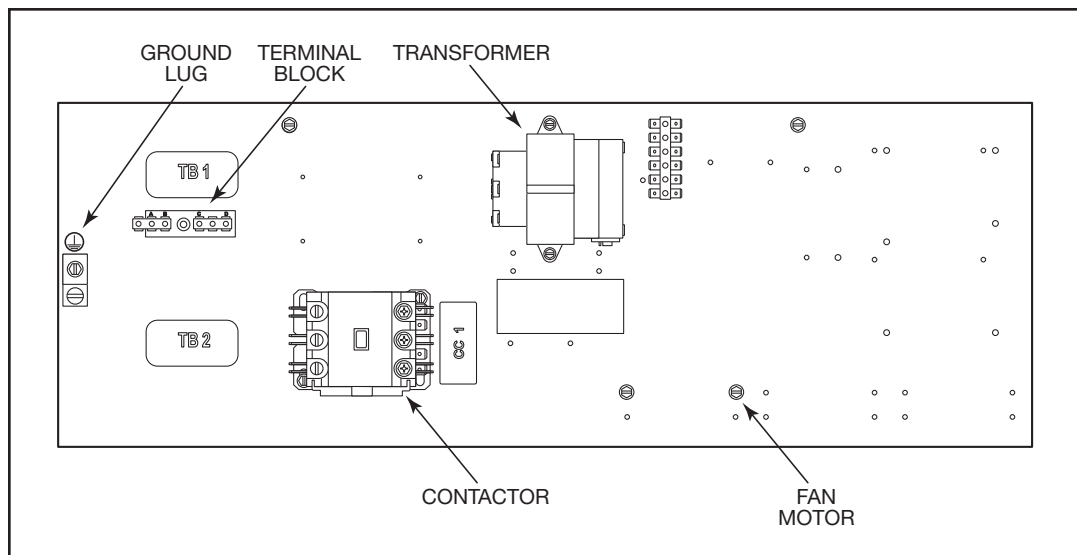
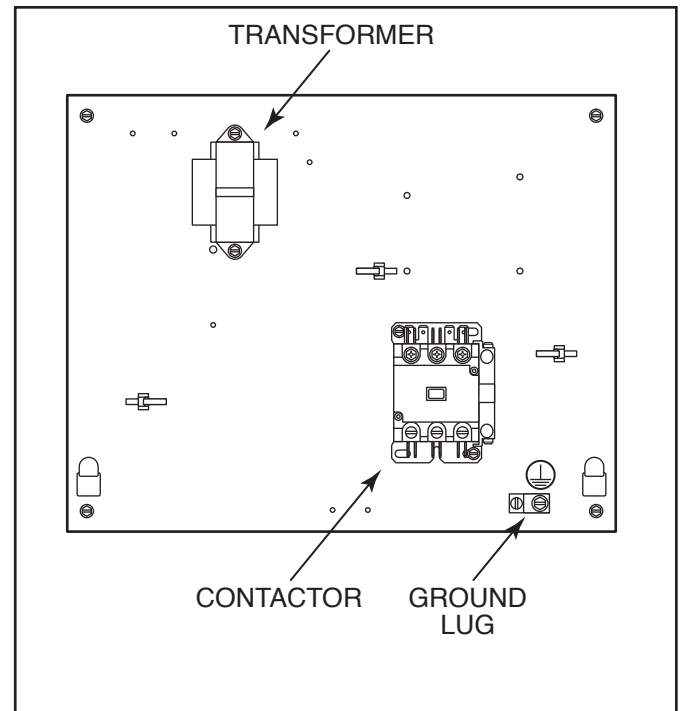
7.0 COMPONENTS & CONTROLS

7.7 Line Voltage Terminal Block for Field Connections

Line voltage supply wiring is connected to the compressor contactor lugs on 7.5 & 10 ton models.

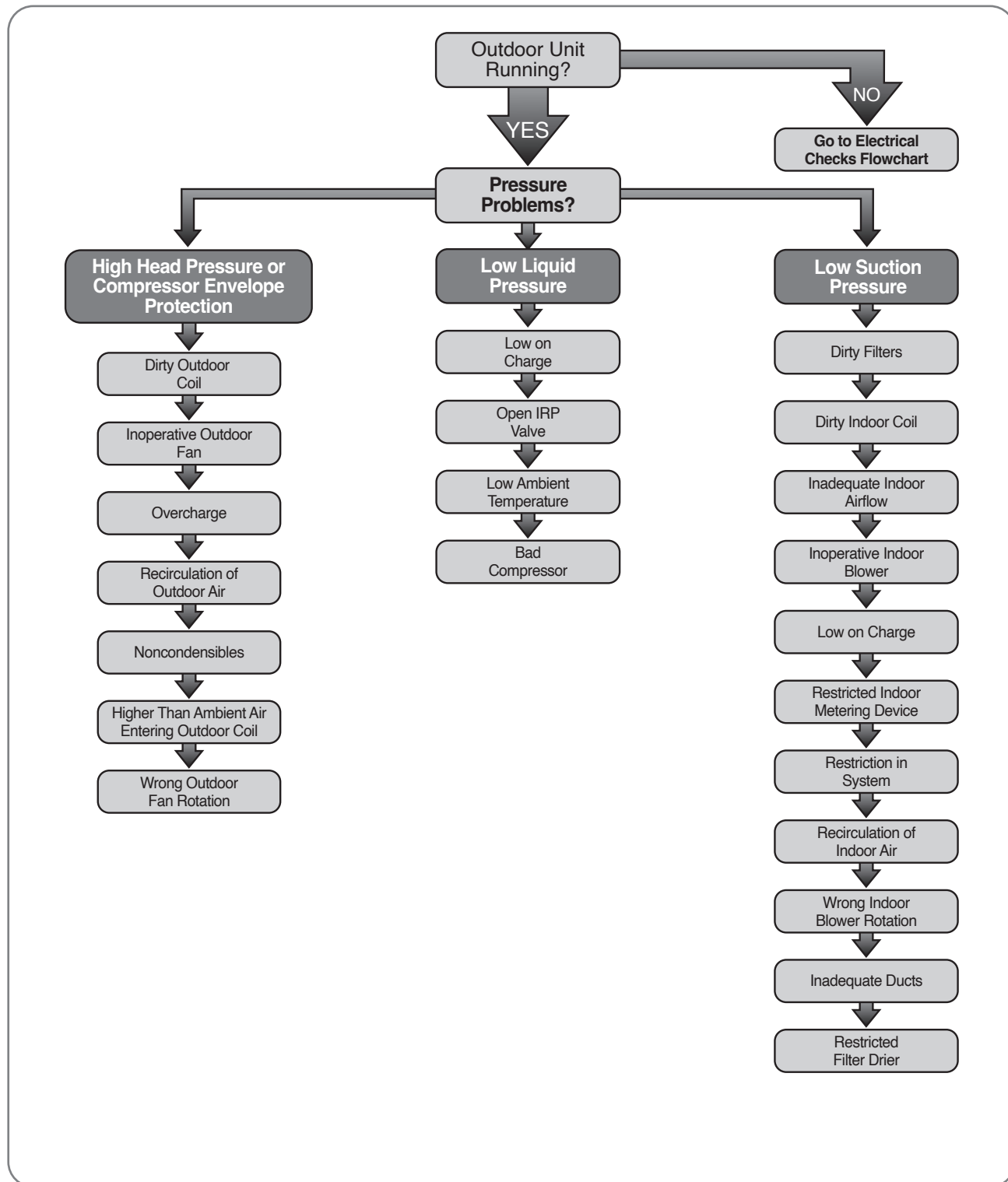
7.8 Transformer

A 75VA transformer is provided inside the unit control box for supplying 24V AC for both the outdoor and indoor unit control system. 208V applications require the transformer to be reconfigured upon installation. **See Section 4.11.**



8.0 DIAGNOSTICS & TROUBLESHOOTING

8.1 Cooling Mechanical Checks Flowchart



8.0 DIAGNOSTICS & TROUBLESHOOTING

8.2 General Troubleshooting Guide

⚠️WARNING: Disconnect all power to unit before servicing. Contactor may break only one side. Failure to shut off power can cause electrical shock resulting in personal injury or death.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Unit will not run	- Power off or loose electrical connection - Thermostat out of calibration – set too low or high - Blown fuses/tripped breaker - Transformer defective - High-pressure control open - Low pressure control open - Miswiring of thermostat - Refrigerant leak detected	- Check for correct voltage at line voltage connections in condensing unit. - Adjust thermostat. - Replace fuses/reset breaker. - Check wiring. Replace transformer. - See high head pressure remedy. - See low suction pressure remedy. - Check thermostat wiring. 1) Unit will reset in 5 minutes. 2) Repair the leak.
Outdoor fan runs, compressor doesn't	- Loose connection - Compressor stuck, grounded or open motor winding, open internal overload.	- Check for correct voltage at compressor. Check and tighten all connections. - Wait at least 3 hours for overload to reset. If still open, replace the compressor.
Insufficient cooling	- Improperly sized unit - Improper indoor airflow - Incorrect refrigerant charge - Air, noncondensibles, or moisture in system - Restricted refrigerant circuit	- Recalculate building load. - Check. Should be approximately 350-400 CFM [165-189 L/s] per ton. - Charge per procedure attached to unit service panel. - Recover refrigerant. Evacuate and recharge. - Locate restriction and clear. Add or replace filter drier.
Compressor short cycles	- Incorrect voltage - Defective overload protector - Refrigerant undercharge or overcharge (HPC or LPC cycling)	- At compressor terminals, voltage must be $\pm 10\%$ of nameplate marking when unit is operating. - Replace compressor. Check for correct voltage. - Adjust charge per charging chart.
Registers sweat	Low indoor airflow	Increase speed of blower or reduce restriction. Replace air filter.
High head, low suction pressures	- Restriction in liquid line, expansion device, or filter drier - Bad TXV	- Remove or replace defective component. - Replace TXV.
High head, high or normal suction pressure	- Dirty outdoor coil - Refrigerant overcharge - Outdoor fan not running - Air or noncondensibles in system	- Clean coil. - Correct system charge. - Repair or replace. - Recover refrigerant. Evacuate and recharge.
Low head, high vapor pressures	- Bad TXV - Bad compressor	- Replace TXV. - Replace compressor.
Low suction pressure, iced indoor coil	- Low indoor airflow - Operating below 65°F [18°C] outdoors - Moisture in system - Low refrigerant charge	- Increase speed of blower or reduce restriction. Replace air filter. - Add Low Ambient Kit. - Recover refrigerant. Evacuate and recharge. Add filter drier. - Check refrigerant charge and check for leaks.
High suction pressure	- Excessive load - Defective compressor	- Recheck load calculation. - Replace.
Fluctuating head and suction pressures	- TXV hunting - Air or noncondensibles in system	- Check TXV bulb clamp. Check air distribution on coil. Replace TXV. - Recover refrigerant. Evacuate and recharge.
Gurgle or pulsing noise at expansion device or liquid line	- Air or noncondensibles in system - Undercharged system	- Recover refrigerant. Evacuate and recharge. - Adjust charge per charging chart.

8.0 DIAGNOSTICS & TROUBLESHOOTING

8.3 Service Analyzer Charts

COMPRESSOR OVERHEATING		
SYMPTOM	POSSIBLE CAUSE	CHECK/REMEDY
High superheat (greater than 15°F [8.3°C] at coil)	Low charge	Check system charge.
	Faulty metering device	Restricted cap tube, TXV
		Power element superheat out of adjustment internally
		Foreign matter stopping flow
	High internal load	Hot air (attic) entering return
		Heat source on; miswired or faulty control
	Restriction in liquid line	Drier plugged.
		Line kinked.
	Low head pressure	Low charge
		Operating in low ambient temperatures
	Suction or liquid line subjected to high heat source	Hot attic
		Hot water line
Low line voltage	Loose wire connections	Check wiring.
	Power company problem, transformer	Report Problem.
	Undersized wire feeding unit	Correct and complete diagnosis.
High line voltage	Power company problem	Report problem.
High head pressure	Overcharge	Check system charge.
	Dirty outdoor coil	Clean coil.
	Faulty or wrong size outdoor fan motor	Replace fan motor.
	Faulty fan blade or wrong rotation	Replace fan blade.
		Replace with correct rotation motor.
	Recirculation of air	Correct installation.
	Additional heat source	Check for dryer vent near unit.
		Check for recirculation from other equipment.
	Noncondensibles	Recover refrigerant. Evacuate and recharge system.
	Equipment not matched	Correct mismatch.
Short cycling of compressor	Cycling or faulty pressure control	Check pressure and address cause of high or low pressure. Replace pressure control if faulty.
	Loose wiring	Check unit wiring.
	Thermostat	Located in supply air stream
		Differential setting too close
		Customer misuse
	Indoor coil TXV / Distributor Restriction	Internal foreign matter
		Power element failure
		TXV too small
		Equalizer tube plugged
	Indoor coil distributor tube restricted	Restricted with foreign matter
		Kinked
		Inside diameter reduced from previous compressor failure

8.0 DIAGNOSTICS & TROUBLESHOOTING

8.3 Service Analyzer Charts (cont.)

COMPRESSOR OVERHEATING (cont.)		
SYMPTOM	POSSIBLE CAUSE	CHECK OR REMEDIES
Short cycling of compressor (cont.)	Low charge	Check system charge.
	Low evaporator airflow	Dirty coil
		Dirty filter
		Duct too small or restricted
	Faulty run capacitor	Replace.
	Faulty internal overload	Replace compressor.
Faulty Compressor Valves or scrolls	Fast equalization/Low pressure difference	Replace compressor and examine system to locate reason.
ELECTRICAL		
SYMPTOM	POSSIBLE CAUSE	CHECK OR REMEDIES
Voltage present on load side of compressor contactor and compressor won't run	Internal overload	Allow time to reset.
	Compressor windings	Check for correct ohms.
Voltage present on line side of compressor contactor only	Thermostat	Check for control voltage to contactor coil.
	Compressor control circuit	High-pressure switch
		Low-pressure switch
		Ambient thermostat
		Solid-state protection control or internal thermal sensors
		Compressor timed off/on control or interlock
No voltage on line side of compressor contactor	Blown fuses or tripped circuit breaker	Check for short in wiring or unit.
	Improper wiring	Recheck wiring diagram.
Improper voltage	High voltage	Wrong unit
		Power supply problem
	Low voltage	Wrong unit
		Power supply problem
		Wiring undersized
		Loose connections
	Single Phasing (3 phase)	Check incoming power and fusing.
FLOODED STARTS		
SYMPTOM	POSSIBLE CAUSE	CHECK OR REMEDIES
Liquid in the compressor shell	Faulty or missing crankcase heater	Replace crankcase heater.
Too much liquid in system	Incorrect piping	Check piping guidelines.
	Overcharge	Check and adjust charge.

8.0 DIAGNOSTICS & TROUBLESHOOTING

8.3 Service Analyzer Charts (cont.)

CONTAMINATION		
SYMPTOM	POSSIBLE CAUSE	REMEDY
Moisture	Poor evacuation on installation or during service	In each case, the cure is the same. Recover refrigerant. Add filter drier, evacuate, and recharge.
High head pressure	Noncondensibles air	
Unusual head and suction readings	Wrong refrigerant or mixed refrigerants	
Foreign matter – copper filings	Copper tubing cuttings	
Copper oxide	Dirty copper piping or nitrogen not used when brazing	
Welding scale	Nitrogen not used during brazing	
Soldering flux	Adding flux before seating copper partway	
Excess soft solder	Wrong solder material	
LOSS OF LUBRICATION		
SYMPTOM	POSSIBLE CAUSE	REMEDY
Compressor failures	Vapor line tubing too large	Reduce pipe size to improve oil return.
Low suction pressure	Low charge	Check system charge.
	Refrigerant leaks	Repair and recharge.
Cold, noisy compressor – Slugging	Dilution of oil with refrigerant	Observe piping guidelines.
Noisy compressor	Refrigerant migration in off-cycle	Check or add crankcase heater.
Cold, sweating compressor	Flooding	Check system charge.
Low load	Reduced indoor airflow	Dirty filter
		Dirty indoor coil
		Wrong duct size
		Restricted duct
	Thermostat setting	Advise customer.
Short cycling of compressor	Cycling or faulty high- or low-pressure control	Check pressure and address cause of high or low pressure. Replace pressure control if faulty.
	Loose wiring	Check all control wires.
	Thermostat	In supply air stream, out of calibration
		Customer misuse
SLUGGING		
SYMPTOM	POSSIBLE CAUSE	REMEDY
On start-up	Incorrect piping	Review pipe size guidelines.
TXV hunting when running	Faulty indoor TXV	Replace TXV.

8.0 DIAGNOSTICS & TROUBLESHOOTING

8.3 Service Analyzer Charts (cont.)

FLOODING		
SYMPTOM	POSSIBLE CAUSE	REMEDY
Poor system control using a TXV	Loose sensing bulb	Secure the bulb and insulate.
	Bulb in wrong location	Relocate bulb.
	Wrong size TXV	Use correct replacement.
	Improper superheat setting (less than 5°F [2.8°C])	Replace TXV.
THERMOSTATIC EXPANSION VALVE (TXV)		
SYMPTOM	POSSIBLE CAUSE	REMEDY
High Superheat, Low Suction Pressure (superheat over 15°F [8.3°C])	Moisture freezing and blocking valve	Recover charge, install filter-drier, evacuate system, recharge.
	Dirt or foreign material blocking valve	Recover charge, install filter-drier, evacuate system, recharge.
	Low refrigerant charge	Correct the charge.
	Vapor bubbles in liquid line	Remove restriction in liquid line. Correct the refrigerant charge.
		Remove noncondensable gases.
		Size liquid line correctly.
	Misapplication of internally equalized valve	Use correct TXV.
	Plugged external equalizer line	Remove external equalizer line restriction.
	Undersized TXV	Replace with correct valve.
	Loss of charge from power head sensing bulb	Replace power head or complete TXV.
	Charge migration from sensing bulb to power head (Warm power head with warm, wet cloth. Does valve operate correctly now?)	Ensure TXV is warmer than sensing bulb.
Valve feeds too much refrigerant, with low superheat and higher than normal suction pressure	Moisture causing valve to stick open.	Recover refrigerant, replace filter-drier, evacuate system, and recharge.
	Dirt or foreign material causing valve to stick open	Recover refrigerant, replace filter drier, evacuate system, and recharge.
	TXV seat leak (a gurgling or hissing sound is heard AT THE TXV during the off cycle, if this is the cause). NOT APPLICABLE TO BLEED PORT VALVES.	Replace the TXV.
	Oversized TXV	Install correct TXV.
	Incorrect sensing bulb location	Install bulb with two mounting straps, in 2:00 or 4:00 position on suction line, with insulation.
	Low superheat adjustment	Replace TXV.
	Incorrectly installed, or restricted external equalizer line	Remove restriction, or relocate external equalizer.

8.0 DIAGNOSTICS & TROUBLESHOOTING

8.3 Service Analyzer Charts (cont.)

THERMOSTATIC EXPANSION VALVES (cont.)		
SYMPTOM	POSSIBLE CAUSE	REMEDY
Compressor flood back upon start-up	Refrigerant drainage from flooded evaporator	Install trap riser to the top of the evaporator coil.
	Inoperable crankcase heater or crankcase heater needed	Replace or add crankcase heater.
Superheat is low to normal with low suction pressure	Unequal evaporator circuit loading	Ensure airflow is equally distributed through evaporator.
		Check for blocked distributor tubes.
	Low load or airflow entering evaporator coil	Ensure blower is moving proper air-flow.
		Remove/Correct any airflow restriction.
Superheat and suction pressure fluctuate (valve is hunting)	TXV is oversized	Install correct TXV.
	Sensing bulb is affected by liquid refrigerant or refrigerant oil flowing through suction line	Relocate sensing bulb in another position around the circumference of the suction line.
	Unequal refrigerant flow through evaporator circuits	Ensure sensing bulb is located properly.
		Check for blocked distributor tubes.
Valve does not regulate at all	Moisture freezing and partially blocking TXV	Recover refrigerant, change filter-drier, evacuate system, and recharge.
	External equalizer line not connected or line plugged	Connect equalizer line in proper location, or remove any blockage.
	Sensing bulb lost its operating charge	Replace TXV.
	Valve body damaged during soldering or by improper installation	Replace TXV.

8.0 DIAGNOSTICS & TROUBLESHOOTING

8.4 Troubleshooting Tips

COOLING MODE TROUBLESHOOTING TIPS					
SYSTEM PROBLEM	INDICATORS				
	DISCHARGE PRESSURE	SUCTION PRESSURE	SUPERHEAT Normal: 5°–15°F [2.8° – 8.3°C]	SUBCOOLING Normal: See Charging Chart	COMPRESSOR AMPS
Overcharge	High	High	Low	High	High
Undercharge	Low	Low	High	Low	Low
Liquid Restriction (Filter Drier)	Low	Low	High	High	Low
Low Indoor Airflow	Low	Low	Low	Low	Low
Dirty Outdoor Coil	High	High	Low	Low	High
Low Outdoor Ambient Temperature	Low	Low	High	High	Low
Inefficient Compressor	Low	High	High	High	Low
Indoor TXV Sensing Bulb Charge Lost	Low	Low	High	High	Low
Poorly Insulated Indoor Sensing Bulb	High	High	Low	Low	High

9.0 DECOMMISSIONING

9.1 Before Beginning Decommissioning

Before carrying out decommissioning, the technician performing decommissioning must be familiar with the equipment and its safety procedures, and ensure electrical power is available to the unit. See Section **4.1.2 Working Personnel** for more information.

Before recovering the refrigerant, an oil and refrigerant sample must be taken if the technician intends to reuse the recovered refrigerant to have a record.

Before beginning any work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. See **4.1.6 No Ignition Sources**.

Before beginning any work on the system or conducting any hot work, ensure that the area is in the open or that it is adequately ventilated. Ventilation must continue while the unit is being worked on. Ventilation is required to safely disperse any released refrigerant into the atmosphere.

Work shall be undertaken under a controlled procedure so as to minimize the risk of flammable gas or vapor being present while work is being performed. See **2.2 Importance of a Quality Installation**.

All maintenance staff and others working in the local area shall be instructed on the nature of the work being performed. Work in confined spaces shall be avoided.

The area shall be checked with an appropriate refrigerant detector before and during work to ensure the technician is aware of potentially toxic or flammable atmospheres.

9.2 Decommissioning Procedure

Follow the decommissioning procedure outlined below:

READ ALL STEPS BEFORE BEGINNING.

1. Become familiar with the equipment, its operation, and its safety procedures.
2. Isolate the system electrically.
3. Ensure that mechanical handling equipment for the refrigerant cylinders is at hand, if required.
4. Ensure personal, protective equipment is being used correctly.

5. A competent supervisor must be present during the refrigerant recovery process. Ensure such a person is available on site.
6. Confirm that the recovery equipment and cylinders are correct for the equipment and its refrigerant.
7. Follow the steps outlines in Section **4.6 Leak Testing** and Section **4.7 Removal and Evacuation**.
8. If possible, pump down the refrigerant system.
9. If a vacuum is not possible, make a manifold so that the refrigerant can be removed from various parts of the system.
10. Make sure that the recovery cylinder is situated on the scale before recovery begins.
11. Start the recovery machine and operate it in accordance with its instructions.
12. Do not overflow the cylinders. No more than 80% volume liquid charge is allowed.
13. Do not exceed the maximum working pressure of the cylinder, even temporarily.
14. When the cylinders have been filled correctly and the process is complete, make sure that the cylinders and the recovery equipment are removed from the site promptly.
15. Verify all isolation valves on the unit are closed (off).
16. Recovered refrigerant shall not be charged into another unit unless a sample was taken prior to recovering the refrigerant and its been cleaned and checked.

When performing any maintenance or troubleshooting on the refrigerating equipment or associated parts, a dry powder or CO2 fire extinguisher shall be nearby for emergency use. Equipment must be labelled stating that it has been decommissioned and emptied of refrigerant. The label must be dated and signed. Ensure that there are label(s) on the unit stating that this equipment contains **flammable refrigerant**.

10.0 INFORMATION FOR THE OWNER

10.1 Outdoor Coil Cleaning

The outdoor fan draws air across the coil during operation which results in contaminants collecting on and between the aluminum fins. These contaminants restrict the air-flow through the coil resulting in reduced capacity and efficiency and increases the temperature of the components that can reduce their life. Therefore, it is recommended that the outdoor coil be cleaned at least annually by a qualified service technician using a non-corrosive coil cleaner and low pressure water hose sprayer. Care must be taken not to damage or flatten out the fins by spraying the fins from an angle. Washing from the top of the coil down from the inside out is the most effective method of cleaning the coil. The exterior louver panels and unit top are easily removable to facilitate the coil cleaning task.

WARNING: Disconnect electrical power to the unit before removing the top panel or any electrical panel as the fan motor could start at any time and live electrical connections will be exposed.

10.2 Cabinet Cleaning and Care

Annual cleaning of the exterior cabinet is recommended using a mild detergent, water, and cloth/sponge to remove dust, mold, and potentially corrosive contaminants that have collected on the cabinet. Do not apply wax to the cabinet since the painted surface is textured which will result in a white wax build-up.

10.3 Motor Lubrication

The bearings in the outdoor motor are pre-lubricated by the motor manufacturer and do not have oiling ports. The motor will run for an indefinite period of time without additional lubrication.

10.4 Replacement Parts

Any replacement part used to replace parts originally supplied on equipment must be the same as or an approved alternate to the original part supplied. The manufacturer will not be responsible for replacement parts not designed to physically fit or operate within the design parameters the original parts were selected for.

10.5 Checking Electrical Components

Repair and maintenance of electrical components must include safety checks and component inspections.

If a fault exists that could compromise safety, then no electrical supply can be connected to the unit until the error causing the fault is repaired. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution must be used. The temporary solution must be communicated to the owner.

Initial safety checks include:

- Confirming that the capacitors are discharged. This must be done safely to avoid the possibility of sparking.
- Ensure that no live electrical components or wiring are exposed while charging, recovering, or purging the system.
- Confirm that the unit grounding is constant

10.6 Refrigerant Recovery

When removing refrigerant from a unit, either for service or decommissioning, the following practices are required to safely remove the refrigerant.

When transferring the refrigerant into cylinders, ensure that only the appropriate recovery cylinders are employed.

- Ensure that the correct number of recovery cylinders are available to hold the total system charge.
- All cylinders used must be designed for recovering R-454B refrigerant.
- Cylinders shall be complete with a pressure relief valve and shut-off valves, all in working order.
- Empty recovery cylinders must be evacuated and cooled before refrigerant recovery occurs.
- The following equipment is required to be on site and in good working condition prior to and during refrigerant recovery:
 - The technician's recovery equipment
 - The recovery equipment's instructions that details the proper recovery of flammable refrigerant.
 - A set of calibrated weighing scales
 - Hoses, which must be complete with leak free disconnect couplings.

10.0 INFORMATION FOR THE OWNER

10.6 Refrigerant Recovery (Cont.)

If in doubt, contact the manufacturer about recovering flammable refrigerant.

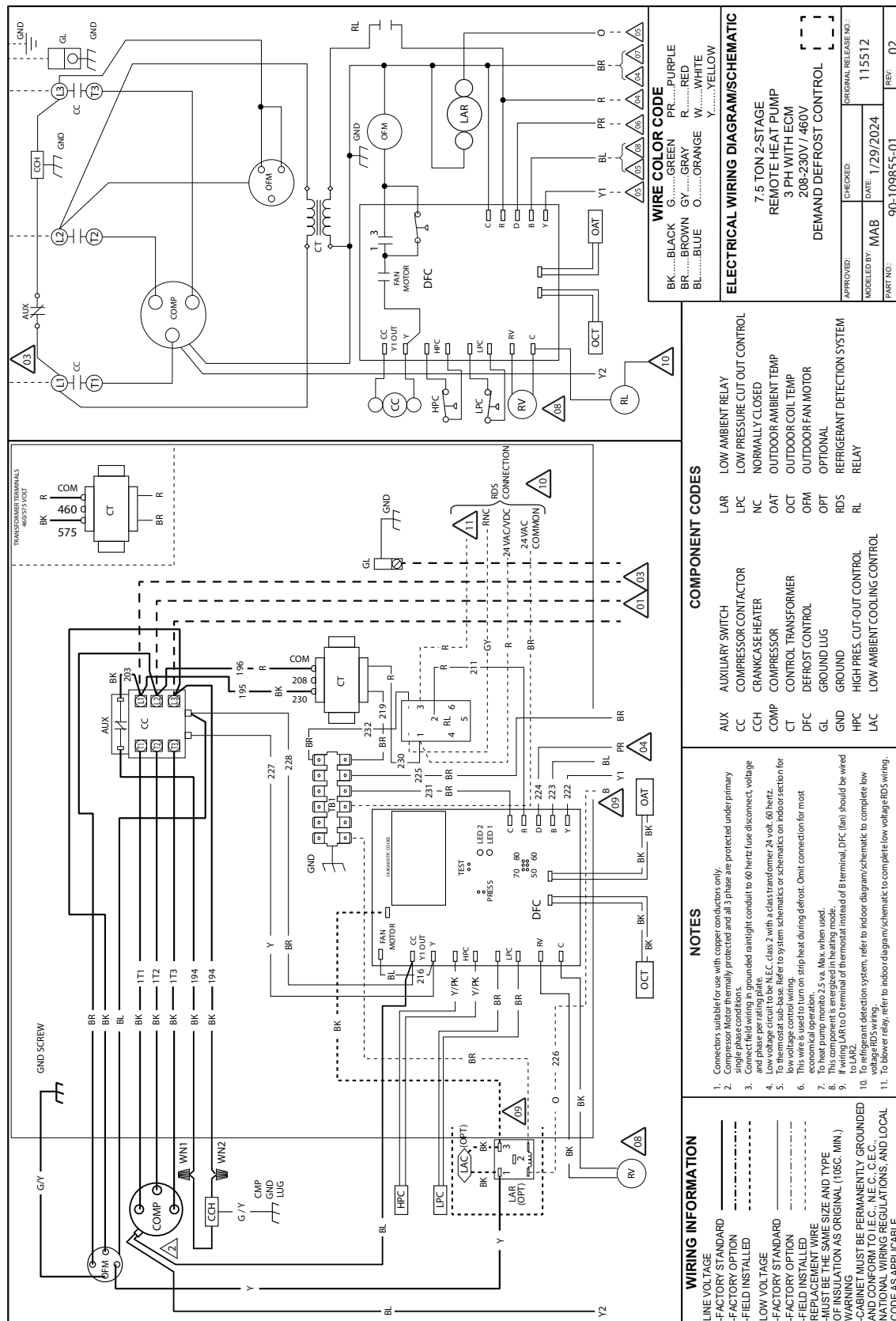
The recovered refrigerant must be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. **DO NOT MIX REFRIGERANTS IN RECOVERY UNITS OR RECOVERY CYLINDERS.**

If compressors or compressor oils are to be removed, ensure that they have been evacuated to make certain that the flammable refrigerant, R-454B, does not remain within the lubricant. The compressor body must not be heated by an open flame or other ignition sourced to accelerate this process. When oil is drained from a system, it shall be carried out safely.

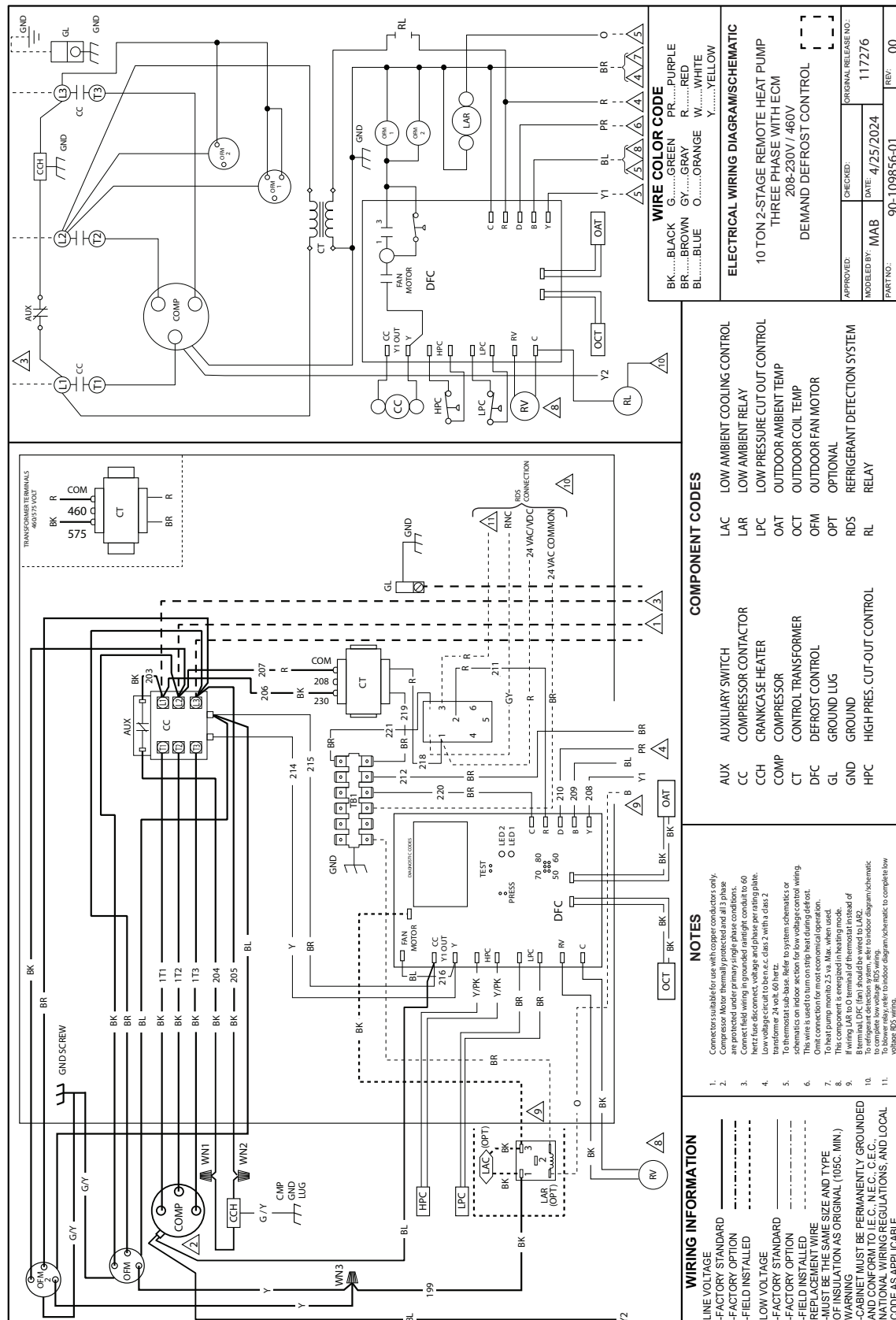
10.7 Warranty Information

For more information on this unit's factory warranty, see the warranty card shipped with the unit. The warranty card is also provided on the manufacturer's website.

11.1 Wiring Diagram/Schematic



11.1 Wiring Diagram/Schematic



12.0 COOLING DATA

COOLING PERFORMANCE (-)PCY2090											
ENTERING INDOOR AIR @ 80°F [26.7°C]											
wbE		71°F [21.7°C]			67°F [19.4°C]			63°F [17.2°C]			
CFM [L/s]		3200[1510]	2875[1357]	2300[1085]	3200[1510]	2875[1357]	2300[1085]	3200[1510]	2875[1357]	2300[1085]	
DR		0.05	0.09	0.12	0.05	0.09	0.12	0.05	0.09	0.12	
Outdoor Dry Bulb Temperature	75°F [23.9°C]	Total BTUH [kW] Sens BTUH [kW] Power	97.2[28.5] 53.7[15.7] 6	95.2[27.9] 51.1[15] 5.9	91.8[26.9] 46.3[13.6] 5.8	88.2[25.8] 64.7[19] 5.9	86.5[25.4] 61.5[18] 5.8	83.3[24.4] 55.7[16.3] 5.7	79.3[23.2] 75.7[22.2] 5.7	77.7[22.8] 71.9[21.1] 5.7	74.8[21.9] 65.2[19.1] 5.6
	80°F [26.7°C]	Total BTUH [kW] Sens BTUH [kW] Power	96.9[28.4] 54.2[15.9] 6.5	95[27.8] 51.5[15.1] 6.4	91.5[26.8] 46.7[13.7] 6.3	87.9[25.8] 65.2[19.1] 6.4	86.2[25.3] 61.9[18.1] 6.3	83[24.3] 56.1[16.4] 6.2	79[23.2] 76.1[22.3] 6.3	77.4[22.7] 72.3[21.2] 6.2	74.6[21.9] 65.9[19.2] 6.1
	85°F [29.4°C]	Total BTUH [kW] Sens BTUH [kW] Power	96.6[28.3] 54.6[16] 7	94.7[27.8] 51.9[15.2] 7	91.2[26.7] 47[13.8] 6.9	87.7[25.7] 65.6[19.2] 6.9	85.9[25.2] 62.3[18.3] 6.9	82.8[24.3] 56.5[16.6] 6.8	78.7[23.1] 76.6[22.5] 6.8	77.1[22.6] 72.7[21.3] 6.8	74.3[21.8] 65.9[19.3] 6.6
	90°F [32.2°C]	Total BTUH [kW] Sens BTUH [kW] Power	96.3[28.2] 55[16.1] 7.6	94.4[27.7] 52.3[15.3] 7.5	91[26.7] 47.4[13.9] 7.4	87.4[25.6] 66[19.3] 7.5	85.6[25.1] 62.7[18.4] 7.4	82.5[24.2] 56.9[16.7] 7.3	78.4[23] 77[22.6] 7.4	76.8[22.5] 73.1[21.4] 7.3	74[21.7] 66.3[19.4] 7.2
	95°F [35.0°C]	Total BTUH [kW] Sens BTUH [kW] Power	96.1[28.2] 55.5[16.3] 8.1	94.1[27.6] 52.7[15.4] 8	90.7[26.6] 47.8[14] 7.9	87.1[25.5] 66.5[19.5] 8	85.3[25] 63.1[18.5] 7.9	82.2[24.1] 57.2[16.8] 7.8	78.1[22.9] 77.4[22.7] 7.9	76.6[22.5] 73.5[21.5] 7.8	73.8[21.6] 66.7[19.5] 7.7
	100°F [37.8°C]	Total BTUH [kW] Sens BTUH [kW] Power	95.8[28.1] 55.9[16.4] 8.7	93.8[27.5] 53.1[15.6] 8.6	90.4[26.5] 48.2[14.1] 8.4	86.8[25.4] 66.9[19.6] 8.6	85.1[24.9] 63.5[18.6] 8.5	82[24] 57.6[16.9] 8.3	77.8[22.8] 77.8[22.8] 8.4	76.3[22.4] 74[21.7] 8.4	73.5[21.5] 67.1[19.7] 8.2
	105°F [40.6°C]	Total BTUH [kW] Sens BTUH [kW] Power	95.5[28] 56.3[16.5] 9.2	93.6[27.4] 53.5[15.7] 9.1	90.2[26.4] 48.5[14.2] 9	86.5[25.4] 67.3[19.7] 9.1	84.8[24.9] 63.9[18.7] 9	81.7[23.9] 58[17] 8.9	77.6[22.7] 77.6[22.7] 9	76[22.3] 74.4[21.8] 8.9	73.2[21.5] 67.4[19.8] 8.7
	110°F [43.3°C]	Total BTUH [kW] Sens BTUH [kW] Power	95.2[27.9] 56.8[16.6] 9.7	93.3[27.3] 53.9[15.8] 9.6	89.9[26.3] 48.9[14.3] 9.5	86.2[25.3] 67.8[19.9] 9.6	84.5[24.8] 64.4[18.9] 9.6	81.4[23.9] 58.3[17.1] 9.4	77.3[22.7] 77.3[22.7] 9.5	75.7[22.2] 74.8[21.9] 9.4	73[21.4] 67.8[19.9] 9.3
	115°F [46.1°C]	Total BTUH [kW] Sens BTUH [kW] Power	94.9[27.8] 57.2[16.8] 10.3	93[27.3] 54.3[15.9] 10.2	89.6[26.3] 49.3[14.4] 10	86[25.2] 68.2[20] 10.2	84.2[24.7] 64.8[19] 10.1	81.2[23.8] 58.7[17.2] 9.9	77[22.6] 77[22.6] 10.1	75.4[22.1] 75.2[22] 10	72.7[21.3] 68.2[20] 9.8
	120°F [48.9°C]	Total BTUH [kW] Sens BTUH [kW] Power	94.6[27.7] 57.6[16.9] 10.8	92.7[27.2] 54.8[16.1] 10.7	89.4[26.2] 49.6[14.5] 10.5	85.7[25.1] 68.6[20.1] 10.7	83.9[24.6] 65.2[19.1] 10.6	80.9[23.7] 59.1[17.3] 10.4	76.7[22.5] 76.7[22.5] 10.6	75.2[22] 75.2[22] 10.5	72.4[21.2] 68.5[20.1] 10.3
	125°F [51.7°C]	Total BTUH [kW] Sens BTUH [kW] Power	94.4[27.7] 58.1[17] 11.4	92.5[27.1] 55.2[16.2] 11.3	89.1[26.1] 50[14.7] 11.1	85.4[25] 69[20.2] 11.3	83.7[24.5] 65.6[19.2] 11.2	80.6[23.6] 59.5[17.4] 11	76.4[22.4] 76.4[22.4] 11.1	74.9[22] 74.9[22] 11	72.2[21.2] 68.9[20.2] 10.8

12.0 COOLING DATA

COOLING PERFORMANCE (-)PCY2120											
ENTERING INDOOR AIR @ 80°F [26.7°C]											
wbE			71°F [21.7°C]			67°F [19.4°C]			63°F [17.2°C]		
CFM [L/s]			4425[2088]	4000[1888]	3200[1510]	4425[2088]	4000[1888]	3200[1510]	4425[2088]	4000[1888]	3200[1510]
DR			0.05	0.09	0.12	0.05	0.09	0.12	0.05	0.09	0.12
Outdoor Dry Bulb Temperature	75°F [23.9°C]	Total BTUH [kW] Sens BTUH [kW] Power	129.1[37.8] 77.5[22.7] 7.2	126.7[37.1] 73.8[21.6] 7.2	122.1[35.8] 66.9[19.6] 7	121[35.5] 91.3[26.8] 7.1	118.7[34.8] 87[25.5] 7.1	114.4[33.5] 78.9[23.1] 6.9	112.9[33.1] 105.1[30.8] 7	110.7[32.4] 100.1[29.3] 7	106.7[31.3] 90.8[26.6] 6.9
	80°F [26.7°C]	Total BTUH [kW] Sens BTUH [kW] Power	128.9[37.8] 77.8[22.8] 7.9	126.4[37] 74.1[21.7] 7.8	121.8[35.7] 67.2[19.7] 7.7	120.8[35.4] 91.6[26.8] 7.8	118.5[34.7] 87.3[25.6] 7.7	114.2[33.5] 79.1[23.2] 7.6	112.6[33] 105.4[30.9] 7.7	110.5[32.4] 100.4[29.4] 7.6	106.5[31.2] 91[26.7] 7.5
	85°F [29.4°C]	Total BTUH [kW] Sens BTUH [kW] Power	128.6[37.7] 78.1[22.9] 8.5	126.2[37] 74.4[21.8] 8.4	121.6[35.6] 67.5[19.8] 8.3	120.5[35.3] 91.9[26.9] 8.4	118.2[34.6] 87.5[25.6] 8.3	113.9[33.4] 79.4[23.3] 8.2	112.4[32.9] 105.7[31] 8.3	110.3[32.3] 100.7[29.5] 8.2	106.3[31.2] 91.3[26.8] 8.1
	90°F [32.2°C]	Total BTUH [kW] Sens BTUH [kW] Power	128.4[37.6] 78.4[23] 9.1	126[36.9] 74.7[21.9] 9.1	121.4[35.6] 67.7[19.8] 8.9	120.3[35.3] 92.2[27] 9.1	118[34.6] 87.8[25.7] 9	113.7[33.3] 79.6[23.3] 8.8	112.2[32.9] 106[31.1] 9	110[32.2] 101[29.6] 8.9	106[31.1] 91.5[26.8] 8.7
	95°F [35.0°C]	Total BTUH [kW] Sens BTUH [kW] Power	128.1[37.5] 78.7[23.1] 9.8	125.7[36.8] 75[22] 9.7	121.1[35.5] 68[19.9] 9.5	120[35.2] 92.5[27.1] 9.7	117.8[34.5] 88.1[25.8] 9.6	113.5[33.3] 79.9[23.4] 9.4	111.9[32.8] 106.3[31.2] 9.6	109.8[32.2] 101.3[29.7] 9.5	105.8[31] 91.8[26.9] 9.4
	100°F [37.8°C]	Total BTUH [kW] Sens BTUH [kW] Power	127.9[37.5] 79[23.2] 10.5	125.5[36.8] 75.3[22.1] 10.4	120.9[35.4] 68.2[20] 10.2	119.8[35.1] 92.8[27.2] 10.4	117.5[34.4] 88.4[25.9] 10.3	113.3[33.2] 80.1[23.5] 10.1	111.7[32.7] 106.6[31.2] 10.3	109.6[32.1] 101.5[29.7] 10.2	105.6[30.9] 92.1[27] 10
	105°F [40.6°C]	Total BTUH [kW] Sens BTUH [kW] Power	127.7[37.4] 79.3[23.2] 11.1	125.3[36.7] 75.5[22.1] 11	120.7[35.4] 68.5[20.1] 10.8	119.6[35.1] 93.1[27.3] 11	117.3[34.4] 88.7[26] 10.9	113[33.1] 80.4[23.6] 10.7	111.4[32.6] 106.9[31.3] 10.9	109.3[32] 101.8[29.8] 10.8	105.4[30.9] 92.3[27.1] 10.6
	110°F [43.3°C]	Total BTUH [kW] Sens BTUH [kW] Power	127.4[37.3] 79.6[23.3] 11.8	125[36.6] 75.8[22.2] 11.7	120.5[35.3] 68.7[20.1] 11.5	119.3[35] 93.4[27.4] 11.7	117.1[34.3] 89[26.1] 11.6	112.8[33.1] 80.7[23.7] 11.4	111.2[32.6] 107.2[31.4] 11.6	109.1[32] 102.1[29.9] 11.5	105.1[30.8] 92.6[27.1] 11.3
	115°F [46.1°C]	Total BTUH [kW] Sens BTUH [kW] Power	127.2[37.3] 79.9[23.4] 12.5	124.8[36.6] 76.1[22.3] 12.3	120.2[35.2] 69[20.2] 12.1	119.1[34.9] 93.7[27.5] 12.4	116.8[34.2] 89.2[26.1] 12.3	112.6[33] 80.9[23.7] 12	111[32.5] 107.5[31.5] 12.3	108.9[31.9] 102.4[30] 12.2	104.9[30.7] 92.8[27.2] 12
	120°F [48.9°C]	Total BTUH [kW] Sens BTUH [kW] Power	127[37.2] 80.2[23.5] 13.1	124.5[36.5] 76.4[22.4] 13	120[35.2] 69.3[20.3] 12.8	118.8[34.8] 94[27.5] 13.1	116.6[34.2] 89.5[26.2] 12.9	112.3[32.9] 81.2[23.8] 12.7	110.7[32.4] 107.8[31.6] 13	108.6[31.8] 102.7[30.1] 12.8	104.7[30.7] 93.1[27.3] 12.6
125°F [51.7°C]	Total BTUH [kW] Sens BTUH [kW] Power	126.7[37.1] 80.5[23.6] 13.8	124.3[36.4] 76.7[22.5] 13.7	119.8[35.1] 69.5[20.4] 13.5	118.6[34.8] 94.3[27.6] 13.7	116.4[34.1] 89.8[26.3] 13.6	112.1[32.9] 81.4[23.9] 13.4	110.5[32.4] 108.1[31.7] 13.6	108.4[31.8] 103[30.2] 13.5	104.5[30.6] 93.3[27.3] 13.3	

13.0 HEATING DATA

HEATING PERFORMANCE DATA - (-) PCY2090											
Entering Indoor Air @ 80°F [26.7°C] dbE											
wbE		60°F [15.6°C]			70°F [21.1°C]			80°F [26.7°C]			
CFM [L/s]		3350 [1581]	2875 [1357]	2425 [1144]	3350 [1581]	2875 [1357]	2425 [1144]	3350 [1581]	2875 [1357]	2425 [1144]	
0°F [-17.8°C]	Total BTUH [kW] Power	44.2 [13] 4.8	43.7 [12.8] 4.9	43.2 [12.7] 5.0	41.7 [12.2] 5.6	41.2 [12.1] 5.8	40.8 [12] 5.9	39.2 [11.5] 6.5	38.8 [11.4] 6.6	38.3 [11.2] 6.7	
5°F [-15.0°C]	Total BTUH [kW] Power	49.4 [14.5] 4.9	48.8 [14.3] 5.1	48.3 [14.2] 5.2	46.9 [13.7] 5.8	46.3 [13.6] 5.9	45.8 [13.4] 6.0	44.4 [13] 6.6	43.9 [12.9] 6.8	43.4 [12.7] 6.9	
10°F [-12.2°C]	Total BTUH [kW] Power	54.6 [16] 5.1	53.9 [15.8] 5.2	53.3 [15.6] 5.3	52.1 [15.3] 5.9	51.5 [15.1] 6.1	50.9 [14.9] 6.2	49.6 [14.5] 6.8	49 [14.4] 6.9	48.5 [14.2] 7.1	
15°F [-9.4°C]	Total BTUH [kW] Power	59.8 [17.5] 5.3	59.1 [17.3] 5.4	58.4 [17.1] 5.5	57.3 [16.8] 6.1	56.6 [16.6] 6.2	56 [16.4] 6.3	54.8 [16.1] 6.9	54.2 [15.9] 7.1	53.5 [15.7] 7.2	
20°F [-6.7°C]	Total BTUH [kW] Power	65 [19.1] 5.4	64.2 [18.8] 5.5	63.5 [18.6] 5.6	62.5 [18.3] 6.2	61.7 [18.1] 6.4	61.1 [17.9] 6.5	60 [17.6] 7.1	59.3 [17.4] 7.2	58.6 [17.2] 7.4	
25°F [-3.9°C]	Total BTUH [kW] Power	70.1 [20.5] 5.6	69.3 [20.3] 5.7	68.6 [20.1] 5.8	67.7 [19.8] 6.4	66.9 [19.6] 6.5	66.1 [19.4] 6.7	65.2 [19.1] 7.2	64.4 [18.9] 7.4	63.7 [18.7] 7.5	
30°F [-1.1°C]	Total BTUH [kW] Power	75.3 [22.1] 5.7	74.5 [21.8] 5.8	73.6 [21.6] 5.9	72.9 [21.4] 6.6	72 [21.1] 6.7	71.2 [20.9] 6.8	70.4 [20.6] 7.4	69.5 [20.4] 7.5	68.8 [20.2] 7.7	
35°F [1.7°C]	Total BTUH [kW] Power	80.5 [23.6] 5.9	79.6 [23.3] 6.0	78.7 [23.1] 6.1	78 [22.9] 6.7	77.1 [22.6] 6.8	76.3 [22.4] 7.0	75.6 [22.2] 7.5	74.7 [21.9] 7.7	73.8 [21.6] 7.9	
40°F [4.4°C]	Total BTUH [kW] Power	85.7 [25.1] 6.0	84.7 [24.8] 6.1	83.8 [24.6] 6.3	83.2 [24.4] 6.9	82.3 [24.1] 7.0	81.4 [23.9] 7.1	80.8 [23.7] 7.7	79.8 [23.4] 7.9	78.9 [23.1] 8.0	
45°F [7.2°C]	Total BTUH [kW] Power	90.9 [26.6] 6.2	89.9 [26.3] 6.3	88.9 [26.1] 6.4	88.4 [25.9] 7.0	87.4 [25.6] 7.2	86.4 [25.3] 7.3	85.9 [25.2] 7.9	84.9 [24.9] 8.0	84 [24.6] 8.2	
50°F [10.0°C]	Total BTUH [kW] Power	96.1 [28.2] 6.3	95 [27.8] 6.5	93.9 [27.5] 6.6	93.6 [27.4] 7.2	92.5 [27.1] 7.3	91.5 [26.8] 7.5	91.1 [26.7] 8.0	90.1 [26.4] 8.2	89.1 [26.1] 8.3	

Outdoor Dry Bulb Temperature

13.0 HEATING DATA

HEATING PERFORMANCE DATA - (-) PCY2120											
Entering Indoor Air @ 80°F [26.7°C] dbE											
w/E		60°F [15.6°C]			70°F [21.1°C]			80°F [26.7°C]			
CFM [L/s]		3975 [1876]	4000 [1888]	2875 [1357]	3975 [1876]	4000 [1888]	2875 [1357]	3975 [1876]	4000 [1888]	2875 [1357]	
0°F [-17.8°C]	Total BTUH [kW] Power	43.9 [12.9] 6.8	44 [12.9] 6.8	43.1 [12.6] 7.0	40.4 [11.8] 7.5	40.4 [11.8] 7.5	39.6 [11.6] 7.8	36.9 [10.8] 8.3	36.9 [10.8] 8.3	36.2 [10.6] 8.6	
5°F [-15.0°C]	Total BTUH [kW] Power	51 [14.9] 6.9	51 [14.9] 6.9	50 [14.7] 7.1	47.4 [13.9] 7.7	47.4 [13.9] 7.7	46.5 [13.6] 7.9	43.9 [12.9] 8.4	43.9 [12.9] 8.4	43 [12.6] 8.7	
10°F [-12.2°C]	Total BTUH [kW] Power	58 [17] 7.0	58 [17] 7.0	56.8 [16.6] 7.3	54.4 [15.9] 7.8	54.5 [16] 7.8	53.4 [15.7] 8.1	50.9 [14.9] 8.5	50.9 [14.9] 8.5	49.9 [14.6] 8.8	
15°F [-9.4°C]	Total BTUH [kW] Power	65 [19.1] 7.2	65 [19.1] 7.1	63.7 [18.7] 7.4	61.4 [18] 7.9	61.5 [18] 7.9	60.2 [17.6] 8.2	57.9 [17] 8.7	57.9 [17] 8.7	56.8 [16.6] 9.0	
20°F [-6.7°C]	Total BTUH [kW] Power	72 [21.1] 7.3	72 [21.1] 7.3	70.6 [20.7] 7.5	68.4 [20] 8.1	68.5 [20.1] 8.0	67.1 [19.7] 8.3	64.9 [19] 8.8	64.9 [19] 8.8	63.6 [18.6] 9.1	
25°F [-3.9°C]	Total BTUH [kW] Power	79 [23.2] 7.4	79 [23.2] 7.4	77.4 [22.7] 7.7	75.4 [22.1] 8.2	75.5 [22.1] 8.2	74 [21.7] 8.5	71.9 [21.1] 8.9	72 [21.1] 8.9	70.5 [20.7] 9.2	
30°F [-1.1°C]	Total BTUH [kW] Power	86 [25.2] 7.5	86 [25.2] 7.5	84.3 [24.7] 7.8	82.5 [24.2] 8.3	82.5 [24.2] 8.3	80.8 [23.7] 8.6	78.9 [23.1] 9.1	79 [23.2] 9.1	77.4 [22.7] 9.4	
35°F [1.7°C]	Total BTUH [kW] Power	93 [27.3] 7.7	93 [27.3] 7.7	91.2 [26.7] 7.9	89.5 [26.2] 8.4	89.5 [26.2] 8.4	87.7 [25.7] 8.7	85.9 [25.2] 9.2	86 [25.2] 9.2	84.2 [24.7] 9.5	
40°F [4.4°C]	Total BTUH [kW] Power	100 [29.3] 7.8	100 [29.3] 7.8	98 [28.7] 8.1	96.5 [28.3] 8.6	96.5 [28.3] 8.6	94.6 [27.7] 8.9	92.9 [27.2] 9.3	93 [27.3] 9.3	91.1 [26.7] 9.6	
45°F [7.2°C]	Total BTUH [kW] Power	107 [31.4] 7.9	107 [31.4] 7.9	104.9 [30.7] 8.2	103.5 [30.3] 8.7	103.5 [30.3] 8.7	101.4 [29.7] 9.0	99.9 [29.3] 9.5	100 [29.3] 9.4	98 [28.7] 9.8	
50°F [10.0°C]	Total BTUH [kW] Power	114 [33.4] 8.1	114.1 [33.4] 8.1	111.8 [32.8] 8.3	110.5 [32.4] 8.8	110.5 [32.4] 8.8	108.3 [31.7] 9.1	106.9 [31.3] 9.6	107 [31.4] 9.6	104.8 [30.7] 9.9	

Outdoor Dry Bulb Temperature









