

INSTALLATION INSTRUCTIONS

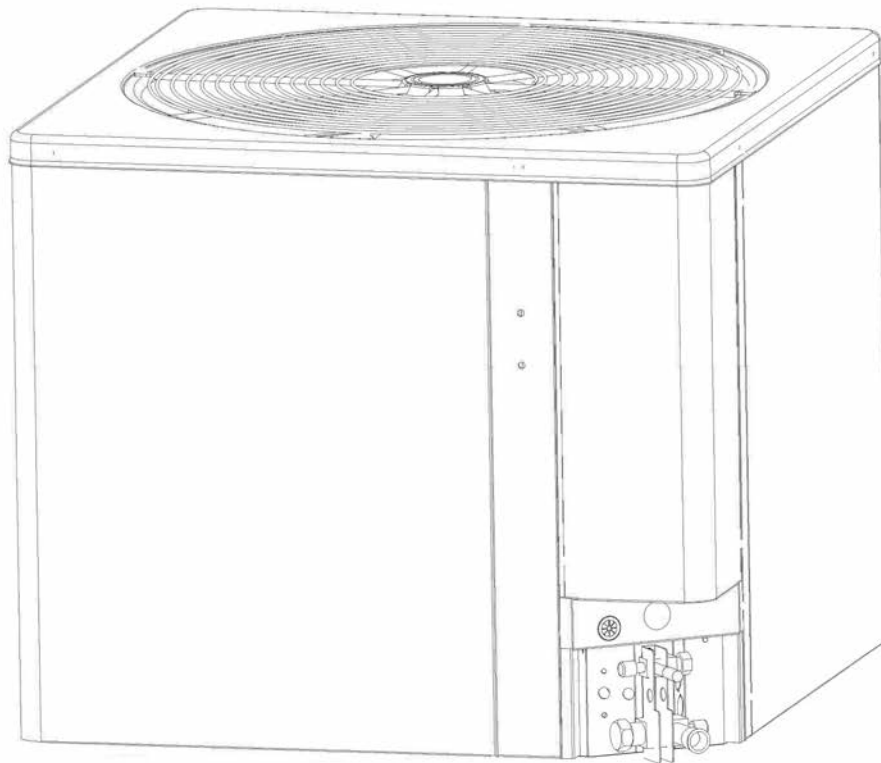
R410A/60HZ CONDENSING UNITS

*AGN – SERIES

*AHM – SERIES

R410A/50HZ CONDENSING UNITS

*AGL-SERIES



*S or V

NOTE: Appearance of unit may vary.



RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

▲ WARNING

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.



ISO 9001:2008

Certificate Number: 3064

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 SAFETY INFORMATION

WARNING

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WARNING

THE MANUFACTURER'S WARRANTY DOES NOT COVER ANY DAMAGE OR DEFECT TO THE HEAT PUMP 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.

WARNING

DISCONNECT ALL POWER TO UNIT BEFORE STARTING MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

WARNING

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.

WARNING

THE UNIT MUST BE PERMANENTLY GROUNDED. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

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.

CAUTION

The filter drier is located inside the control box. The filter drier must be installed externally in the liquid line or the Warranty will be VOID!

CAUTION

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

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

WARNING

THE MANUFACTURER'S WARRANTY DOES NOT COVER ANY DAMAGE OR DEFECT TO THE AIR CONDITIONER 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 AIR CONDITIONER. YOU SHOULD BE AWARE THAT THE USE OF UNAUTHORIZED COMPONENTS, ACCESSORIES OR DEVICES MAY ADVERSELY AFFECT THE OPERATION OF THE AIR CONDITIONER 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.

2.0 GENERAL

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

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

To achieve optimum efficiency and capacity, the indoor cooling coils listed in the condensing unit specification sheet should be used.

IMPORTANT: We recommend replacement of any HVAC equipment that has been subjected to flooding in order to avoid any risk of injury or harm.

IMPORTANT: Use all available safety precautions during the installation and servicing of any HVAC equipment.

Reference the model nameplate and brand label on the unit for the following product information:

- Model Number
- Serial Number
- Country of Origin
- Rated Voltage and Frequency

SAGN, SAHM ONLY:

-Rated T1 and T3 conditions for:

- Rated Current
- Rated Power (kW)
- Rated Capacity
- Rated EER

The Estimated Annual Energy Consumption of this product is calculated using the following formula:

Estimated Annual Energy Consumption = Rated Power (kW) at T1 conditions multiplied by 2700 working hours.

2.1 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 condensing unit model number, electrical characteristics and accessories to determine if they are correct and match the original order from the local distributor. Check system components (evaporator coil, condensing unit, evaporator blower, etc.) to make sure they are properly matched.

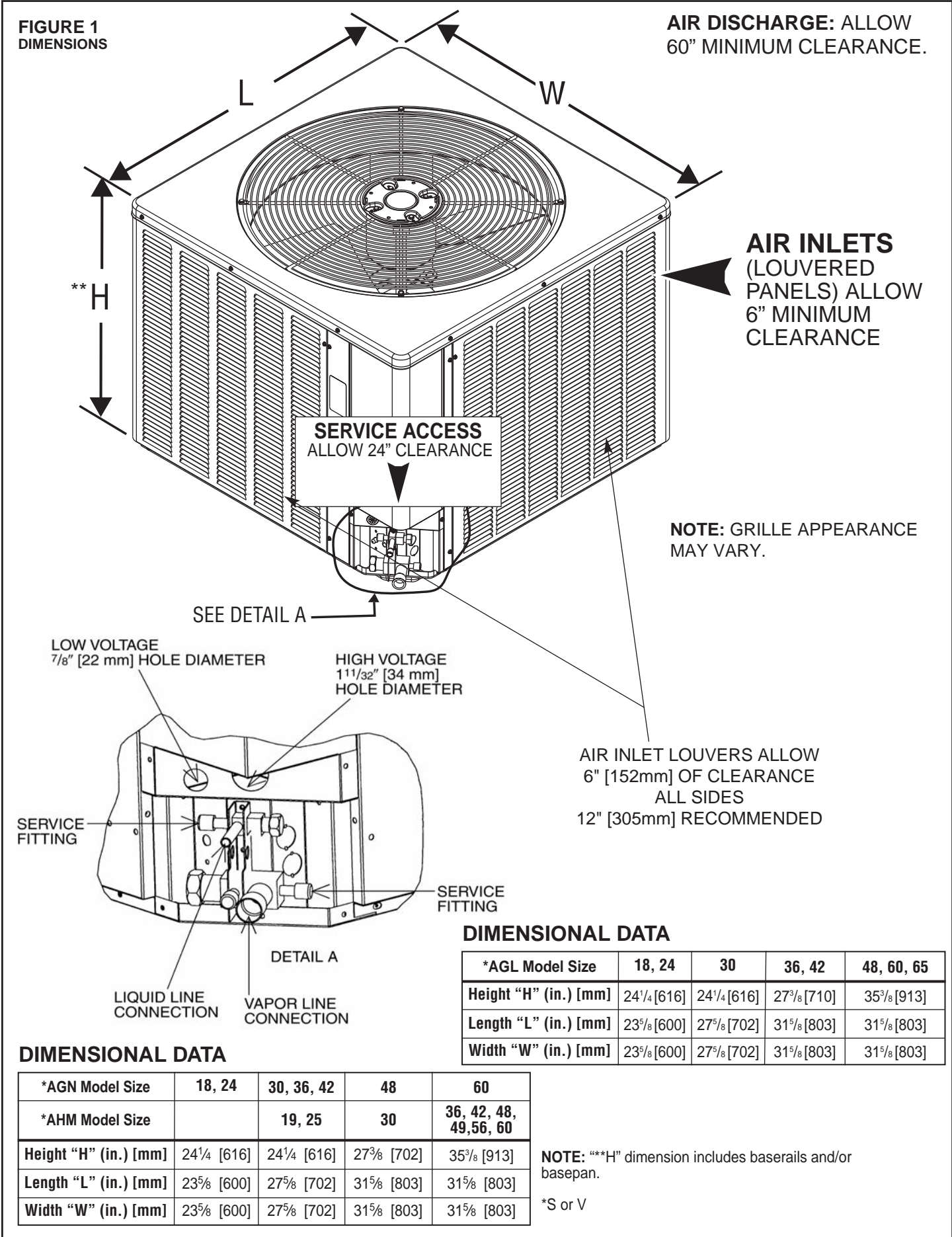
2.2 APPLICATION

Before installing any air conditioning equipment, a duct analysis of the structure and a heat gain calculation must be made. A heat gain calculation begins by measuring all external surfaces and openings that gain heat from the surrounding air and quantifying that heat gain. A heat gain calculation also calculates the extra heat load caused by sunlight and by humidity removal.

There are several factors that the installers must consider:

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

2.3 (SEE FIGURE 1)



2.4 ELECTRICAL & PHYSICAL DATA (SEE TABLE 1)

TABLE 1
ELECTRICAL AND PHYSICAL DATA – *AGN

Model Number 1-PHASE	Electrical							Physical					
	Phase Frequency (Hz) Voltage (Volts)	Compressor		Fan Motor Full Load Amperes (FLA)	Minimum Circuit Ampacity Amperes	Fuse or HACR Circuit Breaker		Outdoor Coil			Refrig. Per Circuit Oz. [kg]	Weight	
		Rated Load Amperes (RLA)	Locked Rotor Amperes (LRA)			Minimum Amperes	Maximum Amperes	Face Area Sq. Ft. [m²]	No. Rows	CFM [L/s]		Net Lbs. [kg]	Shipping Lbs. [kg]
Rev. 12/05/2013													
18	1-60-220-230	9/9	46	0.6	12/12	15/15	20/20	7.13 [0.66]	1	1415 [668]	67.4 [1911]	120 [54.4]	128 [58.1]
24	1-60-220-230	13.5/13.5	58.3	0.6	18/18	25/25	30/30	8.43 [0.78]	1	1665 [786]	67.8 [1922]	121 [54.9]	129 [58.5]
30	1-60-220-230	12.8/12.8	64	0.8	17/17	25/25	25/25	8.7 [0.81]	1	2075 [979]	75 [2126]	139 [63.1]	147 [66.7]
36	1-60-220-230	16.7/16.7	79	0.8	22/22	30/30	35/35	13.72 [1.27]	1	2540 [1199]	90.6 [2569]	149 [67.6]	157 [71.2]
42	1-60-220-230	17.9/17.9	112	1.2	24/24	30/30	40/40	13.72 [1.27]	1	2540 [1199]	106 [3005]	149 [67.6]	157 [71.2]
48	1-60-220-230	21.8/21.8	117	1.2	29/29	35/35	50/50	16.39 [1.52]	1	3290 [1553]	116.1 [3291]	188 [85.3]	192 [87.1]
60	1-60-220-230	26.4/26.4	134	1.2	35/35	45/45	60/60	19.17 [1.78]	1	3380 [1595]	157.2 [4457]	223 [101.2]	234 [106.1]

NOTE: Factory Refrigerant Charge includes refrigerant for 15 feet of standard line set.

TABLE 1 - continued
ELECTRICAL AND PHYSICAL DATA – *AHM

Model Number	Electrical							Physical					
	Phase Frequency (Hz) Voltage (Volts)	Compressor		Fan Motor Full Load Amperes (FLA)	Minimum Circuit Ampacity Amperes	Fuse or HACR Circuit Breaker		Outdoor Coil			Refrig. Per Circuit Oz. [g]	Weight	
		Rated Load Amperes (RLA)	Locked Rotor Amperes (LRA)			Minimum Amperes	Maximum Amperes	Face Area Sq. Ft. [m²]	No. Rows	CFM [L/s]		Net Lbs. [kg]	Shipping Lbs. [kg]
Rev. 3/11/2010													
19	1-60-208/230	9/9	46	0.5	12/12	15/15	20/20	11.819 [1.10]	1	2805 [1324]	87 [2466]	154 [69.9]	171 [77.6]
25	1-60-208/230	13.5/13.5	58.3	0.36	18/18	25/25	30/30	8.5 [.78]	1	2805 [1324]	91 [2580]	154 [69.9]	171 [77.6]
30	1-60-208/230	12.8/12.8	64	1.4	18/18	25/25	30/30	16.39 [1.52]	1	2915 [979]	112 [2126]	157 [63.1]	175 [66.7]
36	1-60-208/230	16.7/16.7	79	1.9	23/23	30/30	35/35	21.85 [2.03]	1	3435 [1621]	130.4 [3697]	181 [82.1]	201 [91.2]
42	1-60-208/230	17.9/17.9	112	2.8	26/26	30/30	40/40	21.85 [2.03]	1	3550 [1675]	145.12 [4114]	205 [93]	225 [102.1]
48	1-60-208/230	21.8/21.8	117	2.8	31/31	40/40	50/50	21.85 [2.03]	2	4310 [2034]	216 [6124]	249 [112.9]	269 [122]
49	1-60-208/230	19.9/19.9	109	1.9	27/27	35/35	45/45	21.85 [2.03]	2	3615 [1706]	213 [6039]	249 [112.9]	269 [122]
56	1-60-208/230	21.4/21.4	135	1.9	29/29	35/35	50/50	21.85 [2.03]	2	3615 [1706]	241 [6832]	254 [115.2]	274 [124.3]
60	1-60-208/230	26.4/26.4	134	2.8	36/36	45/45	60/60	21.85 [2.03]	2	4105 [1937]	240 [6804]	254 [115.2]	274 [124.3]

TABLE 1 - continued
ELECTRICAL AND PHYSICAL DATA – *AGL

Model Number	Phase-Hertz- Voltage	Comp RLA	Comp LRA	Motor FLA	Minimum Circuit Ampacity	Calc. Fuse Sizes		Outdoor Coil		CFM [L/s]	R-410A Charge Weight (Oz.) [kg]
						Min. (Amps)	Max. (Amps)	Area Sq. Ft. [m²]	Rows		
*AGL-018T	1-50-220-240	7.9	44	0.6	12	15	15	11.06 [1.03]	1	1645 [776]	61 [1.73]
*AGL-024T	1-50-220-240	10	52	0.6	17	20	20	11.06 [1.03]	1	1700 [802]	70 [1.98]
*AGL-030T	1-50-220-240	12.5	60	0.8	19	25	25	13.72 [1.27]	1	2370 [1118]	78 [2.21]
*AGL-036T	1-50-220-240	15	67	0.8	23	30	30	16.39 [1.52]	1	2805 [1324]	95 [2.69]
*AGL-036N	3-50-380/415	6.4	38	1	10	15	15	16.39 [1.52]	1	2805 [1324]	102 [2.89]
*AGL-042T	1-50-220-240	17.9	87	1.2	2.9	35	35	16.39 [1.52]	1	2805 [1324]	101 [2.86]
*AGL-042N	3-50-380/415	6.6	44	1	12	15	15	16.39 [1.52]	1	2805 [1324]	104 [2.95]
*AGL-048T	1-50-220-240	17.7	98	1.2	29	35	35	21.85 [2.03]	1	3295 [1555]	149 [4.22]
*AGL-048N	3-50-380/415	6.9	41	1	12	15	15	21.85 [2.03]	1	3295 [1555]	142 [4.02]
*AGL-060N	3-50-380/415	8.9	52	1	15	20	20	21.85 [2.03]	1	3295 [1555]	172 [4.88]
*AGL-065N	3-50-380/415	11.8	75	1	15	20	20	21.85 [2.03]	1	3295 [1555]	180 [5.10]

*S or V

NOTE: Factory Refrigerant Charge includes refrigerant for 15 feet [4.5 m] of standard line set.

MATCH ALL COMPONENTS:

- OUTDOOR UNIT
- INDOOR COIL/METERING DEVICE
- INDOOR AIR HANDLER/FURNACE
- REFRIGERANT LINES

3.0 LOCATING UNIT

3.1 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.
- Elevating the unit off its slab or base enough to allow air circulation will help avoid holding water against the basepan.

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

WARNING

DISCONNECT ALL POWER TO UNIT BEFORE STARTING MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

- 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 an automobile polish will provide some protection.
- A liquid cleaner may be used several times a year to remove matter that will not wash off with water.

Several different types of protective coatings are offered in some areas. These coatings may provide some benefit, but the effectiveness of such coating materials cannot be verified by the equipment manufacturer.

3.2 CONDENSER LOCATION

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 condenser.

3.3 OPERATIONAL ISSUES

- **IMPORTANT:** Locate the condenser in a manner that will not prevent, impair or compromise the performance of other equipment horizontally installed in proximity to the unit. Maintain all required minimum distances to gas and electric meters, dryer vents, 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 condenser where water run off 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 water pouring into the unit from the junction of rooflines, without protective guttering.

3.4 FOR CONDENSERS WITH SPACE LIMITATIONS

In the event that a space limitation exists, we will permit the following clearances:

Single Unit Applications: One condenser inlet air grille side may be reduced to no less than a 6-inch clearance. Clearances below 6 inches will reduce unit capacity and efficiency. Do not reduce the 60-inch discharge, or the 24-inch service clearances.

Multiple Unit Applications: When multiple condenser grille sides are aligned, a 6-inch per unit clearance is recommended, for a total of 12 inches between two units. Two combined clearances below 12 inches will reduce capacity and efficiency. Do not reduce the 60-inch discharge, or 24-inch service, clearances.

3.5 CUSTOMER SATISFACTION ISSUES

- The condenser should be located away from the living, sleeping and recreational spaces of the owner and those spaces on adjoining property.
- To prevent noise transmission, the mounting pad for the outdoor unit should not be connected to the structure, and should be located sufficient distance above grade to prevent ground water from entering the unit.

3.6 PROPER INSTALLATION

Proper sizing and installation of equipment is critical to achieve optimal performance. Use the information in this Installation Instruction Manual and reference the applicable Engineering Specification Sheet when installing this product.

3.7 UNIT MOUNTING

If elevating the condensing unit, either on a flat roof or on a slab, observe the following guidelines.

- The base pan provided elevates the condenser coil 3/4" above the base pad.
- If elevating a unit on a flat roof, use 4" x 4" (or equivalent) stringers positioned to distribute unit weight evenly and prevent noise and vibration.

4.0 REFRIGERANT CONNECTIONS

All units are factory charged with Refrigerant 410A. All models are supplied with service valves. Keep tube ends sealed until connection is to be made to prevent system contamination.

5.0 TOOLS REQUIRED FOR INSTALLING & SERVICING R-410A 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
- Dept. of Transportation 4BA400 or BW400



CAUTION

R-410A systems operate at higher pressures than R-22 systems. Do not use R-22 service equipment or components on R-410A equipment.

5.1 SPECIFICATION OF R-410A:

Application: R-410A is not a drop-in replacement for R-22; equipment designs must accommodate its higher pressures. It cannot be retrofitted into R-22 condensing units.

Physical Properties: R-410A has an atmospheric boiling point of -62.9°F and its saturation pressure at 77°F is 224.5 psig.

Composition: R-410A is an azeotropic mixture of 50% by weight difluoromethane (HFC-32) and 50% by weight pentafluoroethane (HFC-125).

Pressure: The pressure of R-410A is approximately 60% (1.6 times) greater than R-22. Recovery and recycle equipment, pumps, hoses and the like need to have design pressure ratings appropriate for R-410A. *Manifold sets need to range up to 800 psig high-side and 250 psig low-side with a 550 psig low-side retard. Hoses need to have a service pressure rating of 800 psig. Recovery cylinders need to have a 400 psig service pressure rating. DOT 4BA400 or DOT BW400.*

Combustibility: At pressures above 1 atmosphere, mixture of R-410A and air can become combustible. R-410A and air should never be mixed in tanks or supply

lines, or be allowed to accumulate in storage tanks. Leak checking should never be done with a mixture of R-410A and air. Leak checking can be performed safely with nitrogen or a mixture of R-410A and nitrogen.

5.2 QUICK REFERENCE GUIDE FOR R-410A

- R-410A refrigerant operates at approximately 60% higher pressure (1.6 times) than R-22. Ensure that servicing equipment is designed to operate with R-410A.
- R-410A refrigerant cylinders are pink in color.
- R-410A, as with other HFC's is only compatible with POE oils.
- Vacuum pumps will not remove moisture from oil.
- R-410A systems are to be charged with liquid refrigerants. Prior to March 1999, R-410A refrigerant cylinders had a dip tube. These cylinders should be kept upright for equipment charging. Post March 1999 cylinders do not have a dip tube and should be inverted to ensure liquid charging of the equipment.
- Do not install a suction line filter drier in the liquid line.
- A liquid line filter drier is standard on every unit. Only manufacturer approved liquid line filter driers can be used. These are Sporlan (CW083S) and Alco (80K083S) driers. These filter driers are rated for minimum working pressure of 600 psig.
- Desiccant (drying agent) must be compatible for POE oils and R-410A.

6.0 REPLACEMENT UNITS

To prevent failure of a new condensing unit, the existing evaporator tubing system must be correctly sized and cleaned or replaced. Care must be exercised that the expansion device is not plugged. For new and replacement units, liquid line filter drier should be installed and refrigerant tubing should be properly sized. Test the oil for acid. If positive, a suction line filter drier is mandatory.

IMPORTANT: WHEN REPLACING AN R-22 UNIT WITH AN R-410A UNIT, EITHER REPLACE THE LINE SET OR ENSURE THAT THE EXISTING LINE SET IS THOROUGHLY CLEANED OF ANY OLD OIL OR DEBRIS.

7.0 EVAPORATOR COIL

REFER TO EVAPORATOR COIL MANUFACTURER'S INSTALLATION INSTRUCTIONS.

IMPORTANT: The manufacturer is not responsible for the performance and operation of a mismatched system, or for a match listed with another manufacturer's coil.

CAUTION

Only use evaporators approved for use on R-410A systems. Use of existing R-22 evaporators can introduce mineral oil into the R-410A refrigerant forming two different liquids and decreasing oil return to the compressor. This can result in compressor failure.

NOTE: All units must be installed with a TEV Evaporator.

The thermostat expansion valve is specifically designed to operate with R-410A. **DO NOT use an R-22 TEV or evaporator. The existing evaporator must be replaced with the factory specified TEV evaporator specifically designed for R-410A.**

LOCATION

Do not install the indoor evaporator coil in the return duct system of a gas or oil furnace. Provide a service inlet to the coil for inspection and cleaning. Keep the coil pitched toward the drain connection.

CAUTION

When coil is installed over a finished ceiling and/or living area, it is recommended that a secondary sheet metal condensate pan be constructed and installed under entire unit. Failure to do so can result in property damage.

8.0 INTERCONNECTING TUBING

The purpose of this section is to specify the best construction/sizing practices for installing interconnection tubing between the indoor and outdoor unit.

8.1 REFRIGERANT LEVEL ADJUSTMENT

All units are factory-charged with R-410A refrigerant to cover 15 feet of standard size interconnecting liquid and vapor lines with a required field installed filter drier. Adjustment of charge may be necessary even if the application has exactly 15 feet of line set due to other installation variables such as pressure drop, vertical lift, and indoor coil size. For different lengths, adjust the charge as indicated below. adjust the charge as indicated below.

- 1/4" ± .3 oz./foot [6.4 mm ± 8.5 g/.30 m]
- 5/16" ± .4 oz./foot [7.9 mm ± 11.3 g/.30 m]
- 3/8" ± .6 oz./foot [9.5 mm ± 17.0 g/.30 m]
- 1/2" ± 1.2 oz./foot [12.7 mm ± 34.0 g/.30 m]
- 6 oz. Required factory supplied field installed
- filter dry

Charge Adjustment = (Line Set (oz. /ft.) x Total Length) – Factory Charge for Line Set

Example: A three ton condensing unit with factory installed 3/8" liquid service valve requires 75 ft of line set with a liquid line diameter of 1/2".

Factory Charge for Line Set = 15ft x .6 oz. = 9 oz.

Charge Adjustment = (1.2 oz. x 75 ft.) – 9 oz. = +81 oz.

8.2 INTERCONNECTING TUBING 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 dryers. The table below references different commonly used equivalent lengths.

TABLE 2

Equivalent Length for Fittings (ft)							
Line Size (in)	90° Short Radius Elbow	90° Long Radius Elbow	45° Elbow	Solenoid Valve	Check Valve	Site Glass	Filter Dryer
3/8	1.3	0.8	0.3	6	4	0.4	6
1/2	1.4	0.9	0.4	9	5	0.6	6
5/8	1.5	1	0.5	12	6	0.8	6
3/4	1.9	1.3	0.6	14	7	0.9	6
7/8	2.3	1.5	0.7	15	8	1	6
1-1/8	2.7	1.8	0.9	22	12	1.5	6

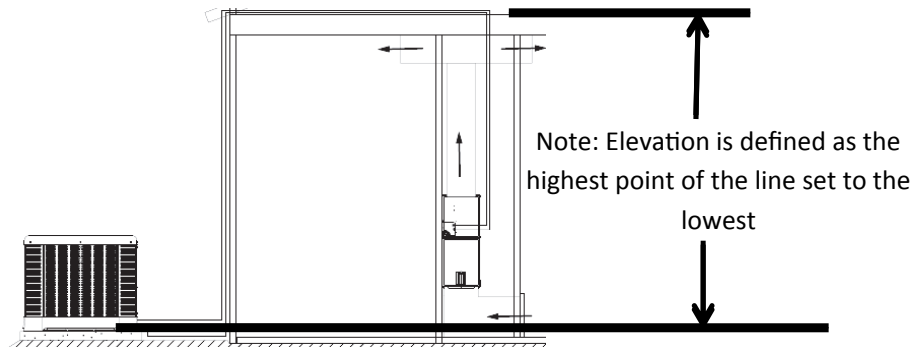
8.3 LIQUID LINE SELECTION

The purpose of the liquid line is to transport warm sub-cooled liquid refrigerant from the outdoor unit to the indoor unit. It is important not to allow the refrigerant to flash any 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 rise between the condenser and evaporator

Table 3 lists the equivalent length per 25' of liquid line at various diameters up to 300'. The total pressure drop allowed for the liquid line is 50 PSI. The procedure for selecting the proper liquid line is as follows:

- Measure the total amount of vertical rise
- Measure the total amount of liquid line needed
- Add all of the equivalent lengths associated with any fittings or accessories using Table 3.
- Add the total length and fitting pressure drop. This will equal your total equivalent length.
- Round-down the total equivalent length to the closest value in Table 3.
- Reference Table 3 to verify the round-down value of the calculated equivalent length is compatible with the required vertical rise and diameter of liquid line.



Example: A 3-Ton condensing unit is installed 50' below the ID unit, requires a 75' of 1/2" diameter liquid line, and 4 90° LR elbows.

- Fitting Equivalent Length (ft.) = $4 \times .9 = 3.6'$
- Total Equivalent Length (ft.) = $75' + 3.6' = 78.6'$
- Rounded-down value (ft.) = 75'

R-410A System Capacity Model	Liquid Line Size Connection Size (Inch I.D.) [mm]	Liquid Line Size (Inch O.D.) [mm]	Liquid Line Size											
			Elevation (Above or Below) Indoor Coil											
			Total Equivalent Length - Feet [m]											
			25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	125 [45.72]	150 [45.72]	175 [53.34]	200 [60.96]	225 [68.58]	250 [76.20]	275 [83.82]	300 [91.44]
			Maximum Vertical Separation - Feet [m]											
37	3/8" [9.53]	1/4 [6.35]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	60 [18.29]	45 [13.72]	35 [10.67]	20 [6.1]	5 [1.52]	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	80 [24.38]	80 [24.38]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]	45 [13.72]
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	95 [28.96]	90 [27.43]	90 [27.43]	85 [25.91]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	95 [28.96]	95 [28.96]	95 [28.96]	95 [28.96]	95 [28.96]	95 [28.96]	90 [27.43]	90 [27.43]	90 [27.43]

(excerpt from Table 3, page 16)

This application is acceptable because the 50' vertical rise is less than the maximum rise of 75' for this application. The application is also considered to have a long line set. Reference the long line set section of the I&O for detail.

8.4 LONG LINE SET APPLICATIONS

Long line set applications are defined as applications that require accessories or alternate construction methods. The following are special considerations that need to be addressed when installing a long line set application:

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

Table 3 is used to determine if the application is considered to have a long line set. **The region of the chart that is shaded grey is considered to be a long line set application.**

SAHM Model	PART NUMBER	Compressor	Name Plate Oil Charge (oz)	Factory Installed CCH
*AHM-019JA030	55-102045-82	ZP14K5E-PFV-130	25	N
*AHM-019JS030	55-102045-82	ZP14K5E-PFV-130	25	N
*AHM-025JA030	55-102045-97	ZP20KAE-PFV-130	21	N
*AHM-025JS030	55-102045-97	ZP20KAE-PFV-130	21	N
*AHM-030JA030	55-102045-31	ZP24K5E-PFV-130	25	N
*AHM-030JS030	55-102045-31	ZP24K5E-PFV-130	25	N
*AHM-036JA030	55-102045-03	ZP31K5E-PFV-130	25	N
*AHM-036JS030	55-102045-03	ZP31K5E-PFV-130	25	N
*AHM-042JA030	55-102045-15	ZP34K5E-PFV-130	42	N
*AHM-042JS030	55-102045-15	ZP34K5E-PFV-130	42	N
*AHM-048JA030	55-102045-09	ZP42K5E-PFV-130	42	Y
*AHM-048JS030	55-102045-09	ZP42K5E-PFV-130	42	Y
*AHM-060JA030	55-102045-26	ZP51K5E-PFV-130	42	y
*AHM-060JS030	55-102045-26	ZP51K5E-PFV-130	42	y

SAGL Model	PART NUMBER	Compressor	Name Plate Oil Charge (oz)	Factory Installed CCH
*AGL-018TA	55-102045-47	ZP16K5E-PFJ-130	25	N
*AGL-024TA	55-102045-48	ZP21K5E-PFJ-130	25	N
*AGL-024TS	55-102045-48	ZP21K5E-PFJ-130	25	Y
*AGL-030TA	55-102045-49	ZP25K5E-PFJ-130	25	N
*AGL-030TS	55-102045-49	ZP25K5E-PFJ-130	25	Y
*AGL-036NA	55-102045-04	ZP31K5E-TFD-130	25	N
*AGL-036TA	55-102045-50	ZP31K5E-PFJ-130	25	N
*AGL-036TS	55-102045--50	ZP31K5E-PFJ-130	25	Y
*AGL-042NA	55-102045-25	ZP42K5E-PFJ-130	42	N
*AGL-042NS	55-102045-25	ZP36K5E-TFD-130	42	Y
*AGL-042TA	55-102045-10	ZP42K5E-TFD-130	42	N
*AGL-048NA	55-102045-52	ZP42K5E-PFJ-130	42	N
*AGL-048NS	55-102045-52	ZP42K5E-PFJ-130	42	N
*AGL-048TA	55-102045-52	ZP42K5E-PFJ-130	42	N
*AGL-060NA	55-102471-16	ZP61KCE-TFD-130	56	N
*AGL-065NA	55-102045-45	ZP72KCE-TFD-130	60	N
*AGL-065NS	55-102045-45	ZP72KCE-TFD-130	60	Y

SAGN Model	PART NUMBER	Compressor	Name Plate Oil Charge (oz)	Factory Installed CCH
*AGN-018JA030	55-102045-82	ZP14K5E-PFV-130	25	N
*AGN-024JA030	55-102045-24	ZP20K5E-PFV-130	25	N
*AGN-030JA030	55-102045-31	ZP24K5E-PFV-130	25	N
*AGN-036JA030	55-102045-03	ZP31K5E-PFV-130	25	N
*AGN-042JA030	55-102045-15	ZP34K5E-PFV-130	42	N
*AGN-048JA030	55-102045-09	ZP42K5E-PFV-130	42	N
*AGN-060JA030	55-102045-26	ZP51K5E-PFV-130	42	N

* S or V

8.5 OIL LEVEL ADJUSTMENTS FOR LONG LINE SET APPLICATIONS

Additional oil will need to be added for long line set applications. Below is the equation for the oil level adjustment and the compressor name plate oil charge for the different od units.

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

Example: An application requires 125ft of line set with a liquid line diameter of 3/8", Charge Adjustment = 52.4 oz., Name Plate Charge = 107 oz., Name Plate Oil Charge = 25 oz., Oil to be Added = ((52.4 oz. +107 oz.) x .022) – (.10 x 25 oz.) = 1.0 oz.

8.6 SUCTION LINE SELECTION

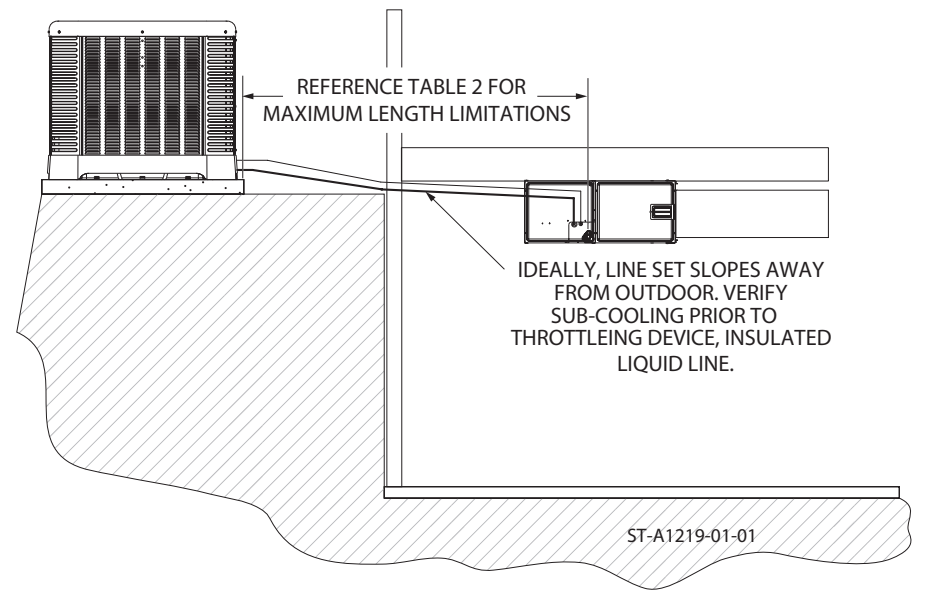
Purpose of the suction line is to return superheated vapor to the condensing unit from the evaporator. Proper suction line sizing is important because it plays an important role in returning oil to the compressor to prevent potential damage to the bearings, valves, and scroll sets. Also, an improperly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

- The total amount of suction line needed
- Add all of the equivalent lengths associated with any fittings or accessories using the table on previous page.
- Add the total length and fitting pressure drop. This will equal your total equivalent length.
- Reference Table 3 to verify that the calculated equivalent length falls within the compatibility region of the chart.
- Verify Table 3 to verify the capacity difference is compatible with the application.

8.7 REFRIGERANT MIGRATION DURING OFF CYCLE

Long line set applications can require a considerable amount of additional refrigerant. This additional refrigerant needs to be managed throughout the entire ambient operating envelope that the system will go through during its life cycle. Off-Cycle migration is where excess refrigerant condenses and migrates to the lowest part of the system. Excessive build-up of refrigerant at the compressor will result in poor reliability and noisy operation during startup. This section demonstrates the required accessories and unit configuration for different applications.

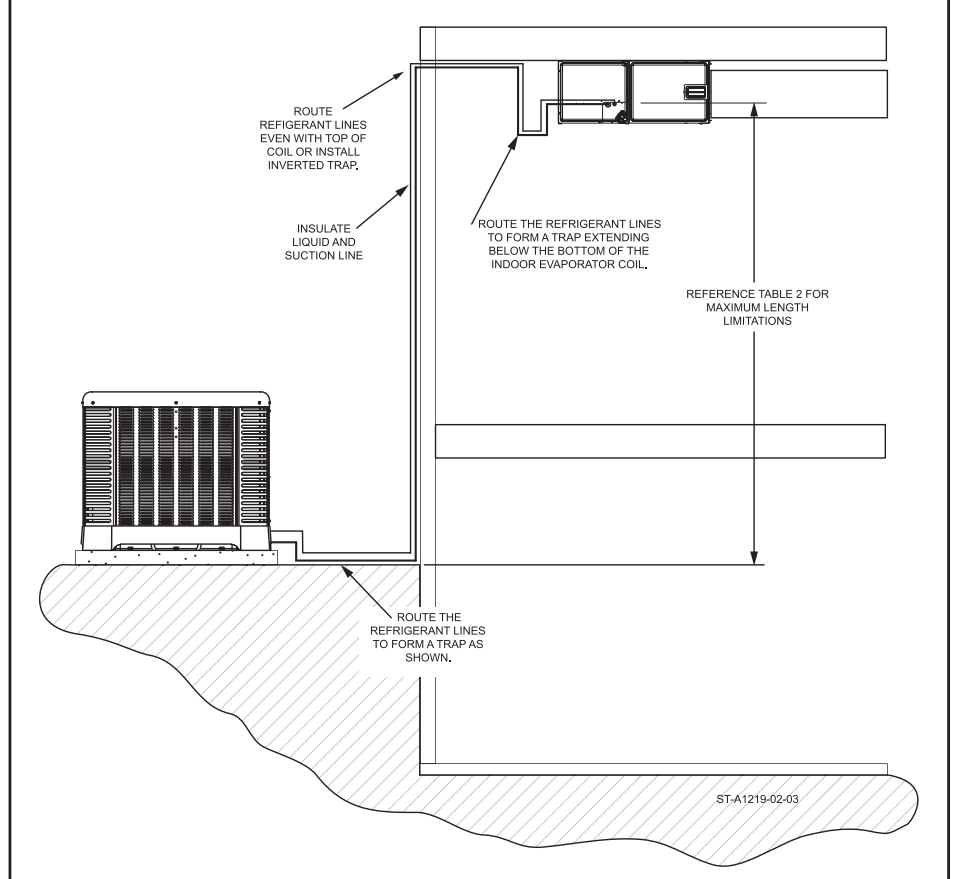
FIGURE 2
OUTDOOR UNIT LEVEL OR NEAR LEVEL TO INDOOR SECTION LINE SET



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

- TXV or EEV on the indoor unit
- Start components may be required depending upon quality of voltage (consistently <200vac at outdoor unit)
- Crankcase heater (Some models have factory installed CCH's. Refer to tables on pages 12 and 13.)
- Insulated liquid and vapor line in unconditioned space only
- Vapor line should slope toward the indoor unit
- Follow the proper line sizing, equivalent length, charging requirements, and oil level adjustments spelled out in this document and the outdoor units I&O
- Verify at least 5°F sub-cooling at the ID unit prior to throttling device

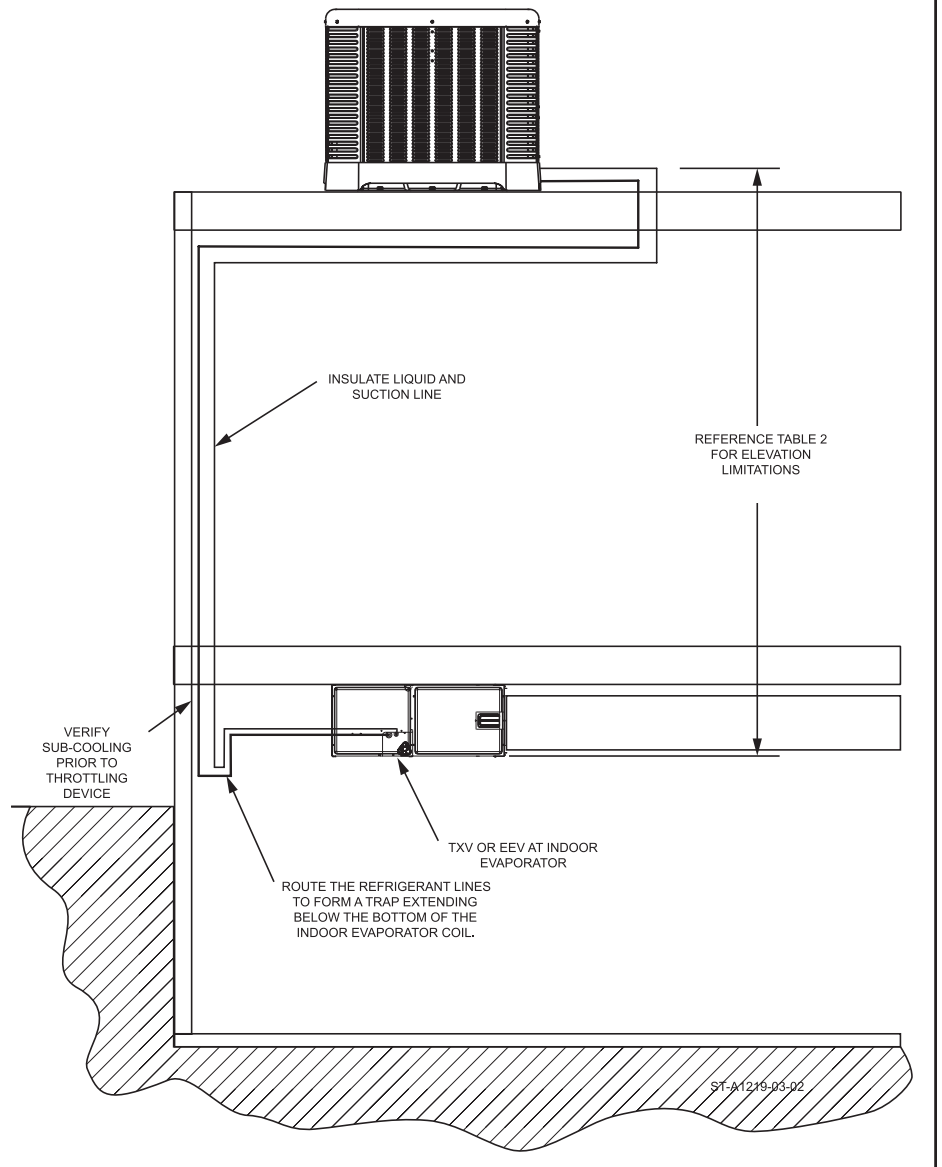
FIGURE 3
OUTDOOR UNIT BELOW INDOOR SECTION LINE SET



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

- TXV or EEV at the ID unit
- Crankcase heater (Some models come with factory installed CCH's. Refer to tables on page 12 & 13.)
- Start components may be required depending upon quality of voltage (consistently <200vac at outdoor unit)
- Refrigerant lines should be routed even with the top of the ID coil or an inverted trap is to be applied. (Reference Figure 3).
- Insulated liquid and suction line in unconditioned space only
- Follow the proper line sizing, equivalent length, charging requirements, and oil level adjustments spelled out in this document and the outdoor units I&O
- Measure pressure at the liquid line service valve and prior to expansion device. Verify that it is not greater than 50 PSI
- For elevations greater than 25' can expect a lower sub-cooling

FIGURE 4
OUTDOOR UNIT ABOVE INDOOR SECTION LINE SET



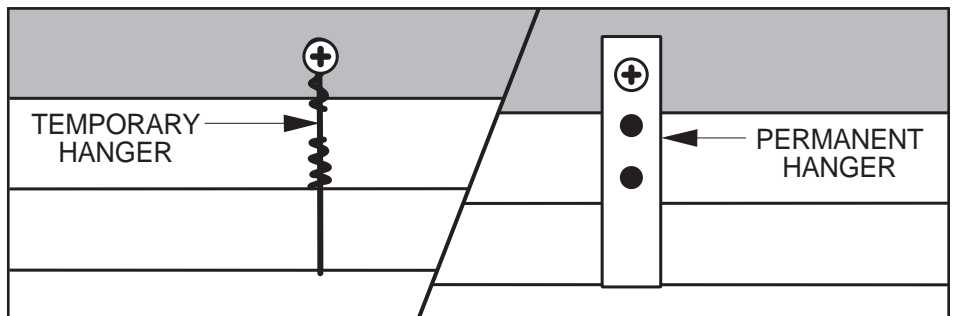
For applications that are considered to have a long line set with the outdoor unit above the indoor unit the following is required:

- TXV at the indoor unit
- Crankcase heater (some models have factory installed CCH's. Refer to tables on pages 12 & 13).
- Start components maybe required depending upon quality of voltage (consistently <200vac at outdoor unit)
- Insulated liquid and vapor line in uninsulated space only
- Follow the proper line sizing, equivalent length, charging requirements, and oil level adjustments spelled out in this document and the outdoor units I&O
- Verify at least 5°F sub-cooling at the ID unit prior to throttling device

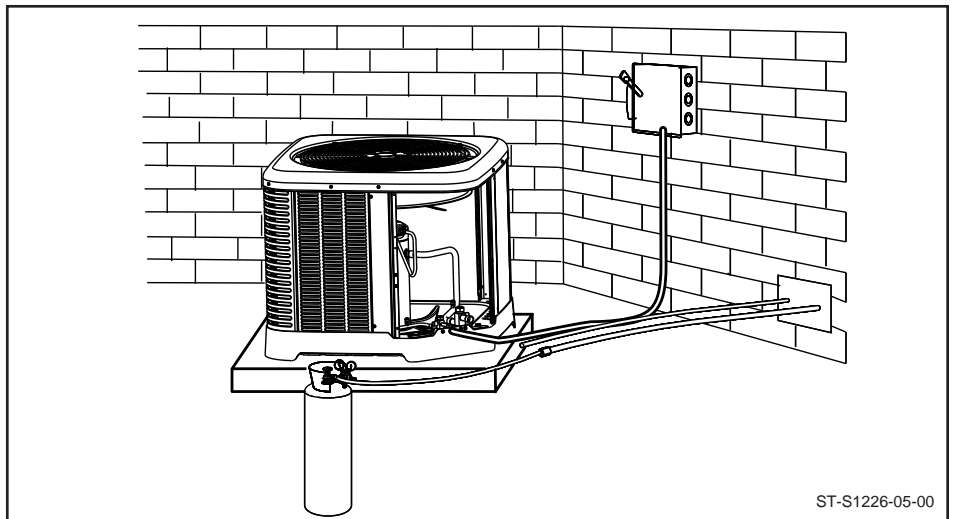
8.8 TUBING INSTALLATION

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

- Check the tables on pages 16 & 17 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 R-410A units and must be installed in the liquid line upon unit installation.
- When replacing an R-22 system with an R-410A system and the line set is not replaced, drain any oil that has pooled in low spots in the lineset. Commercially available flush kits are not recommended due to the risk of residual flushing agent being incompatible with POE oils or internal components. Up to 5% mineral oil is considered acceptable in R-410A systems.
- If tubing has been cut, make sure ends are deburred while holding 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 liquid line sizes.
- For best operation, keep tubing run as short as possible with a minimum number of elbows or bends.
- 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 housed to prevent damage.
- 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 tubing bender on the vapor line to prevent kinking.



- Route the tubing using temporary hangers; then straighten the tubing and install permanent hangers. Line must be adequately supported.
- 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.



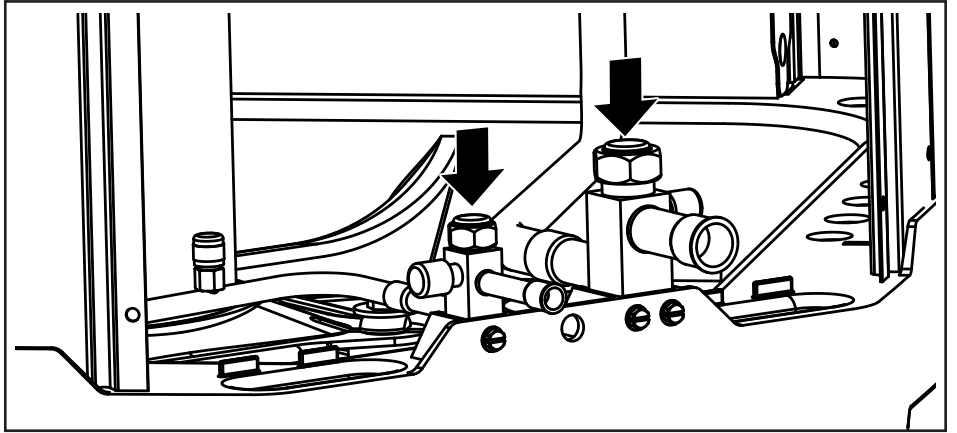
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Blow out the liquid and vapor lines with dry nitrogen before connecting to the outdoor unit and indoor coil. Any debris in the line set will end up plugging the expansion device.

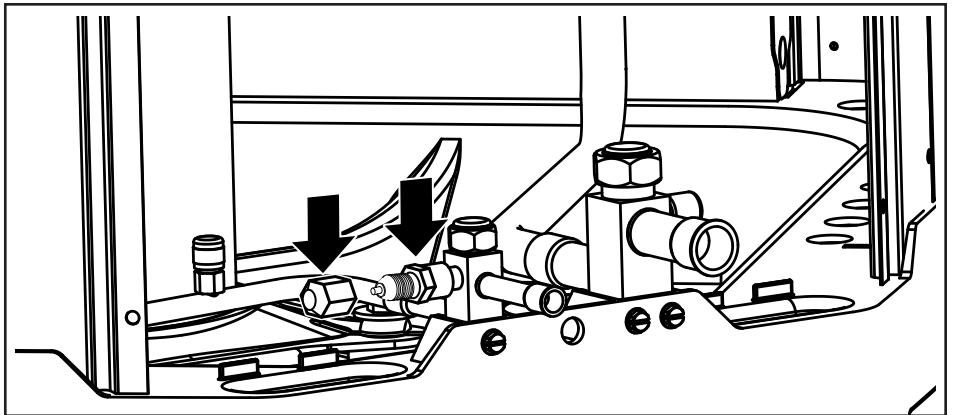
8.9 TUBING CONNECTIONS

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

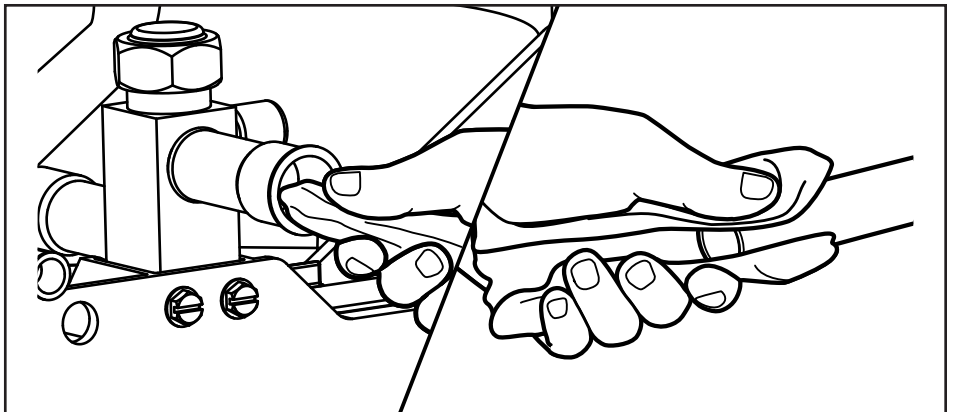
- Use type “L” copper refrigeration tubing. Braze the connections with the following alloys:
 - copper to copper, 5% silver minimum
 - copper to steel or brass, 15% silver minimum



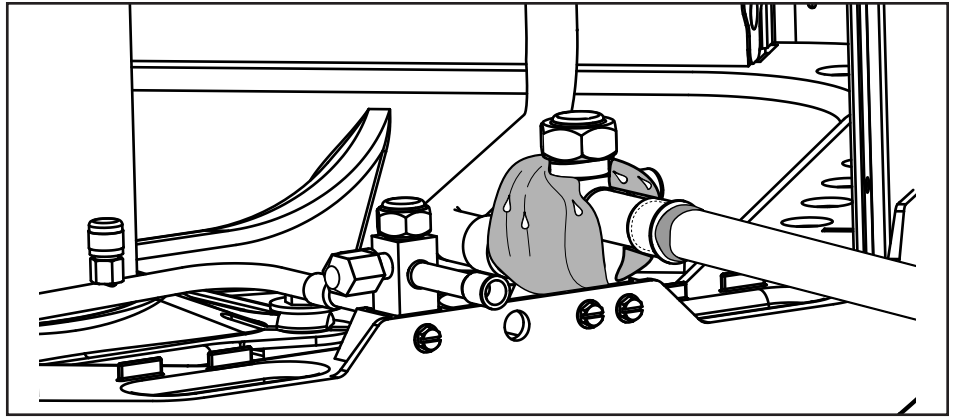
- Be certain both refrigerant shutoff valves at the outdoor unit are closed.



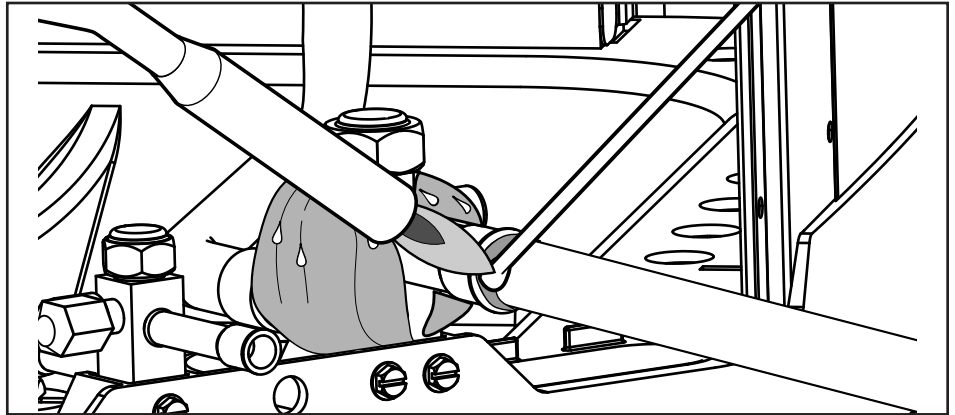
- Remove the caps and Schrader cores from the pressure ports to protect seals from heat damage. Both the Schrader valves and the service valves have seals that may be damaged by excessive heat.



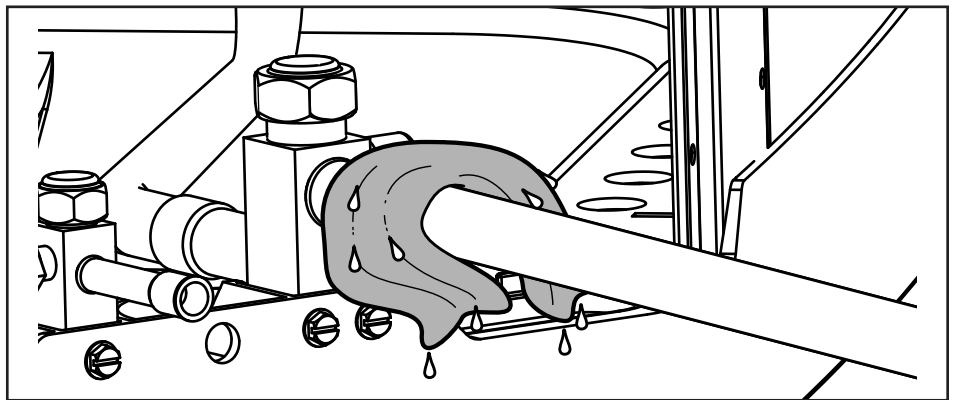
- Clean the inside of the fittings and outside of the tubing with a clean, dry cloth before soldering. Clean out debris, chips, dirt, etc., that enters tubing or service valve connections.



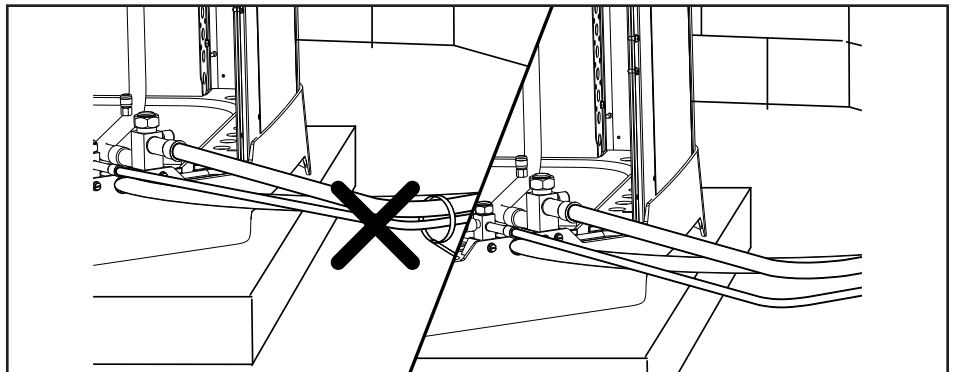
- Wrap valves with a wet rag or thermal barrier compound before applying heat.



- 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.



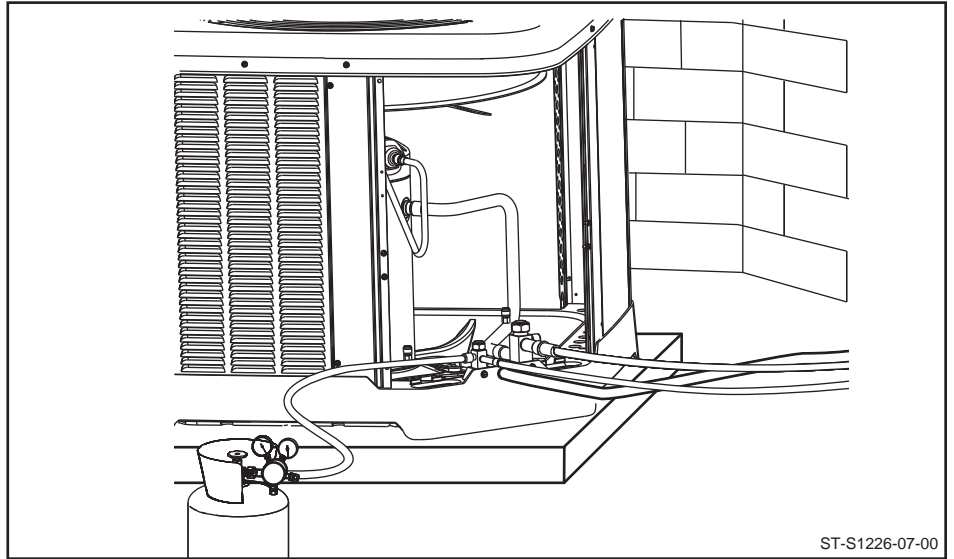
- Do not allow the vapor line and liquid line to be in contact with each other. This causes an undesirable heat transfer resulting in capacity loss and increased power consumption.

8.10 LEAK TESTING

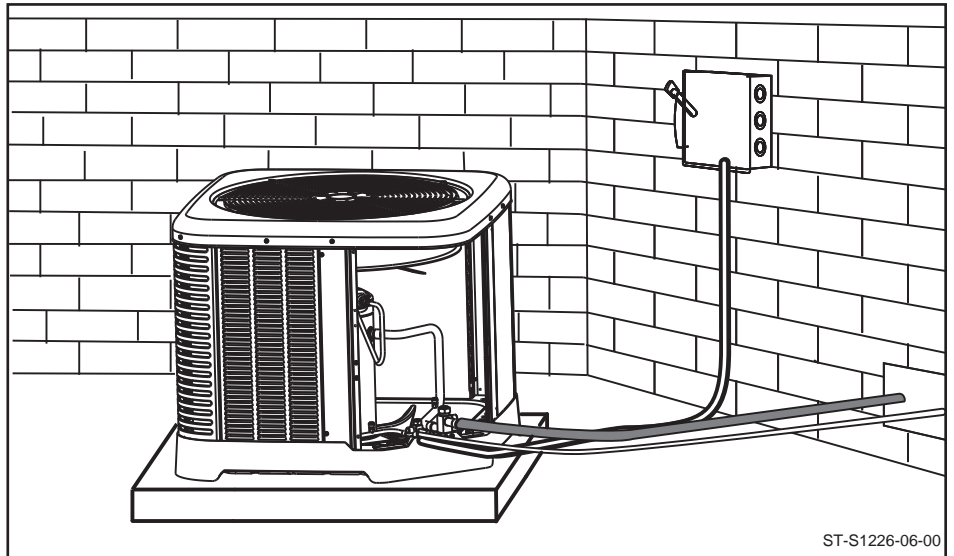
Indoor coils have only a holding charge of dry nitrogen. Keep all tube ends sealed until connections are to be made.

WARNING

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.



- Pressurize line set and coil through service fittings with dry nitrogen to 150 PSIG maximum. Close nitrogen tank valve, let system sit for at least 15 minutes, and check to see if the pressure has dropped. If the pressure has dropped, check for leaks at the line set braze joints with soap bubbles and repair leak as necessary. Repeat pressure test. If line set and coil hold pressure, proceed with line set and coil evacuation (see page 21).



- The vapor line must be insulated for its entire length to prevent dripping (sweating) and prevent performance losses. Closed-cell foam insulation such as Armaflex and Rubatex® are satisfactory insulations for this purpose. Use 1/2" [12.7 mm] minimum insulation thickness. Additional insulation may be required for long runs.

INSTALLATION - *AGN



Interconnecting Tubing

R-410A System Capacity Model	Liquid Line Connection Size (Inch I.D.) [mm]	Liquid Line Size (Inch O.D.) [mm]	Liquid Line Size Elevation (Above or Below) Indoor Coil															
			Total Equivalent Length - Feet [m]															
			Maximum Vertical Separation - Feet [m]															
			25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	125 [45.72]	150 [45.72]	175 [53.34]	200 [60.96]	225 [68.58]	250 [76.20]	275 [83.82]	300 [91.44]				
*AGN-018JA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	50 [15.24]	65 [19.81]	45 [13.72]	30 [9.14]	15 [4.57]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	75 [22.86]	95 [28.96]	90 [27.43]	85 [25.91]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]				
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	95 [28.96]	95 [28.96]	95 [28.96]	95 [28.96]	90 [27.43]				
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	100 [30.48]	100 [30.48]				
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]				
		1/4 [6.35]	25 [7.62]	50 [15.24]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
*AGN-024JA	3/8" [9.53]	5/16 [7.94]	25 [7.62]	50 [15.24]	75 [22.86]	80 [24.38]	75 [22.86]	65 [19.81]	60 [18.29]	55 [16.76]	45 [13.72]	40 [12.19]	30 [9.14]	25 [7.62]				
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	95 [28.96]	95 [28.96]	90 [27.43]	90 [27.43]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]				
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]				
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]				
		1/4 [6.35]	25 [7.62]	35 [10.67]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	65 [19.81]	55 [16.76]	45 [13.72]	35 [10.67]	25 [7.62]	15 [4.57]	10 [3.05]					
*AGN-030JA	3/8" [9.53]	3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	95 [28.96]	95 [28.96]	90 [27.43]	90 [27.43]	85 [25.91]	80 [24.38]	80 [24.38]	75 [22.86]	70 [21.34]				
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	95 [28.96]	95 [28.96]				
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]				
		1/4 [6.35]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	65 [19.81]	55 [16.76]	45 [13.72]	35 [10.67]	25 [7.62]	15 [4.57]	10 [3.05]					
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	95 [28.96]	95 [28.96]	90 [27.43]	90 [27.43]	85 [25.91]	80 [24.38]	80 [24.38]	75 [22.86]	70 [21.34]				
*AGN-036JA	3/8" [9.53]	7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	95 [28.96]	95 [28.96]				
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]				
		1/4 [6.35]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	65 [19.81]	55 [16.76]	45 [13.72]	35 [10.67]	25 [7.62]	15 [4.57]	10 [3.05]					
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	95 [28.96]	95 [28.96]	90 [27.43]	90 [27.43]	85 [25.91]	80 [24.38]	80 [24.38]	75 [22.86]	70 [21.34]				
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	95 [28.96]	95 [28.96]				
*AGN-042JA	3/8" [9.53]	1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	100 [30.48]	100 [30.48]	95 [28.96]	95 [28.96]	95 [28.96]	95 [28.96]				
		1/4 [6.35]	20 [6.1]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	40 [12.19]	20 [6.1]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	70 [21.34]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]	40 [12.19]	35 [10.67]	30 [9.14]	25 [7.62]	20 [6.1]				
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]	70 [21.34]	65 [19.81]	65 [19.81]	60 [18.29]	60 [18.29]				
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]	80 [24.38]	75 [22.86]	75 [22.86]	75 [22.86]	75 [22.86]				
*AGN-048JA	3/8" [9.53]	1/4 [6.35]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	70 [21.34]	65 [19.81]	55 [16.76]	45 [13.72]	40 [12.19]	30 [9.14]	25 [7.62]	15 [4.57]	5 [1.52]					
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	80 [24.38]	80 [24.38]	75 [22.86]	70 [21.34]	70 [21.34]	65 [19.81]	60 [18.29]	60 [18.29]	55 [16.76]				
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	90 [27.43]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]	80 [24.38]	75 [22.86]	75 [22.86]				
		1/4 [6.35]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
*AGN-060JA	3/8" [9.53]	5/16 [7.94]	25 [7.62]	50 [15.24]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	45 [13.72]	35 [10.67]	20 [6.1]	10 [3.05]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		7/16 [11.12]	25 [7.62]	50 [15.24]	50 [15.24]	45 [13.72]	45 [13.72]	40 [12.19]	35 [10.67]	30 [9.14]	25 [7.62]	20 [6.1]	15 [4.57]	10 [3.05]				
		1/2 [12.71]	25 [7.62]	50 [15.24]	60 [18.29]	55 [16.76]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]	35 [10.67]	30 [9.14]	25 [7.62]	20 [6.1]				
		1/4 [6.35]	25 [7.62]	50 [15.24]	75 [22.86]	80 [24.38]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]				
		5/16 [7.94]	25 [7.62]	50 [15.24]	75 [22.86]	80 [24.38]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]				

NOTES:

N/R = Application not recommended.
Grey = Considered a Long Line Set Application.
*S or V

Table 3

INSTALLATION - *AGN



Interconnecting Tubing (cont.)

R-410A System Capacity Model	Liquid Line Size Connection Size (Inch I.D.) [mm]	Vapor Line Size (Inch O.D.) [mm]	Suction Line Size Outdoor unit Below Indoor Coil													
			Total Equivalent Length - Feet [m]													
			25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	125 [45.72]	150 [45.72]	175 [53.34]	200 [60.96]	225 [68.58]	250 [76.20]	275 [83.82]	300 [91.44]		
*AGN-018JA	3/8" [9.53]	5/8 [15.88]	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.97	0.98	0.97	0.97	0.97	0.97
		3/4 [19.05]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		7/8 [22.23]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
*AGN-024JA	3/8" [9.53]	5/8 [15.88]	0.99	0.98	0.98	0.98	0.97	0.97	0.96	0.95	0.96	0.95	0.95	0.95	0.95	0.95
		3/4 [19.05]	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
		7/8 [22.23]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
*AGN-030JA	3/8" [9.53]	5/8 [15.88]	0.99	0.99	0.98	0.97	0.96	0.96	0.95	0.94	0.94	0.94	0.94	0.93	0.93	0.91
		3/4 [19.05]	1.00	1.01	0.99	1.00	0.99	1.00	0.99	0.98	0.99	0.99	0.99	0.98	0.98	0.98
		7/8 [22.23]	1.01	1.00	1.01	1.00	1.01	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00
		1 [25.4]	1.01	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
*AGN-036JA	3/8" [9.53]	5/8 [15.88]	0.98	0.96	0.95	0.93	0.92	0.91	0.91	0.9	0.89	0.88	0.88	0.86	0.87	0.87
		3/4 [19.05]	1.00	0.98	0.99	0.98	0.96	0.97	0.96	0.95	0.98	0.97	0.98	0.94	0.94	0.94
		7/8 [22.23]	0.99	1.00	1.00	1.00	1.00	0.98	0.98	1.00	0.99	0.97	0.97	0.97	0.97	0.97
		1 [25.4]	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.01	0.99	1.00	1.01	1.01	1.01	1.00
		1-1/8 [28.58]	0.99	1.00	0.99	0.99	1.00	1.01	1.01	1.01	1.01	1.00	1.00	0.99	0.99	0.99
*AGN-042JA	3/8" [9.53]	5/8 [15.88]	0.99	0.97	0.96	0.94	0.93	0.92	0.9	0.89	0.88	0.87	0.86	0.86	0.85	0.85
		3/4 [19.05]	1.00	1.00	0.99	0.99	0.98	0.97	0.97	0.96	0.96	0.95	0.95	0.95	0.95	0.95
		7/8 [22.23]	1.00	1.00	1.00	0.99	0.99	0.99	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99
		1 [25.4]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00
		1-1/8 [28.58]	1.00	1.00	1.00	1.00	1.00	1.01	1.01	1.00	1.00	1.01	1.01	1.01	1.01	1.01
*AGN-048JA	3/8" [9.53]	5/8 [15.88]	0.98	0.96	0.93	0.92	0.9	0.88	0.86	0.85	0.83	0.84	0.82	0.82	N/R	N/R
		3/4 [19.05]	0.99	0.99	0.98	0.97	0.96	0.95	0.95	0.94	0.93	0.92	0.92	0.92	N/R	N/R
		7/8 [22.23]	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.97	0.97	N/R	N/R
		1 [25.4]	1.00	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
*AGN-060JA	3/8" [9.53]	5/8 [15.88]	0.97	0.94	0.92	0.89	0.87	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/4 [19.05]	1.00	0.99	0.98	0.97	0.95	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		7/8 [22.23]	1.00	0.99	1.00	0.99	0.99	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1 [25.4]	1.01	0.99	1.00	0.99	0.99	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

NOTES:
N/R = Application not recommended.
*S or V

R-410A System Capacity Model	Liquid Line Size Connection Size (Inch I.D.) [mm]	Liquid Line Size (Inch O.D.) [mm]	Liquid Line Size Elevation (Above or Below) Indoor Coil											
			Total Equivalent Length - Feet [m]											
			25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	125 [45.72]	150 [45.72]	175 [53.34]	200 [60.96]	225 [68.58]	250 [76.20]	275 [83.82]	300 [91.44]
			Maximum Vertical Separation - Feet [m]											
*AHM-019JA	3/8" [9.53]	1/4 [6.35]	50 [15.24]	65 [19.81]	50 [15.24]	35 [10.67]	20 [6.1]	N/R	N/R	N/R	N/R	N/R	N/R	
		5/16 [7.94]	50 [15.24]	75 [22.86]	90 [27.43]	90 [27.43]	85 [25.91]	80 [24.38]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]		
		3/8 [9.53]	50 [15.24]	75 [22.86]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	95 [28.96]	95 [28.96]	95 [28.96]	90 [27.43]		
		7/16 [11.12]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	105 [32]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]		
		1/2 [12.71]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]	105 [32]		
*AHM-025JA	3/8" [9.53]	1/4 [6.35]	50 [15.24]	75 [27.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R		
		5/16 [7.94]	50 [15.24]	75 [22.86]	80 [24.38]	70 [21.34]	65 [19.81]	60 [18.29]	50 [15.24]	45 [13.72]	40 [12.19]	30 [9.14]		
		3/8 [9.53]	50 [15.24]	75 [22.86]	95 [28.96]	95 [28.96]	90 [27.43]	90 [27.43]	85 [25.91]	85 [25.91]	85 [25.91]	80 [24.38]		
		7/16 [11.12]	50 [15.24]	75 [22.86]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	95 [28.96]	95 [28.96]	95 [28.96]		
		1/2 [12.71]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	105 [32]	105 [32]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]		
*AHM-030JA	3/8" [9.53]	1/4 [6.35]	40 [12.19]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R		
		5/16 [7.94]	50 [15.24]	75 [22.86]	70 [21.34]	65 [19.81]	55 [16.76]	45 [13.72]	35 [10.67]	30 [9.14]	20 [6.1]	10 [3.05]		
		3/8 [9.53]	50 [15.24]	75 [22.86]	95 [28.96]	90 [27.43]	90 [27.43]	85 [25.91]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]		
		7/16 [11.12]	50 [15.24]	75 [22.86]	100 [30.48]	100 [30.48]	100 [30.48]	95 [28.96]	95 [28.96]	95 [28.96]	90 [27.43]	90 [27.43]		
		1/2 [12.71]	50 [15.24]	75 [22.86]	100 [30.48]	105 [32]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]	100 [30.48]		
*AHM-036JA	3/8" [9.53]	1/4 [6.35]	50 [15.24]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R		
		5/16 [7.94]	50 [15.24]	65 [19.81]	50 [15.24]	40 [12.19]	25 [7.62]	15 [4.57]	N/R	N/R	N/R	N/R		
		3/8 [9.53]	50 [15.24]	75 [22.86]	85 [25.91]	80 [24.38]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]		
		7/16 [11.12]	50 [15.24]	75 [22.86]	95 [28.96]	90 [27.43]	90 [27.43]	90 [27.43]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]		
		1/2 [12.71]	50 [15.24]	75 [22.86]	95 [28.96]	95 [28.96]	95 [28.96]	95 [28.96]	95 [28.96]	90 [27.43]	90 [27.43]	90 [27.43]		
*AHM-042JA	3/8" [9.53]	1/4 [6.35]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R		
		5/16 [7.94]	50 [15.24]	40 [12.19]	25 [7.62]	10 [3.05]	N/R	N/R	N/R	N/R	N/R	N/R		
		3/8 [9.53]	50 [15.24]	75 [22.86]	70 [21.34]	65 [19.81]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]	35 [10.67]	20 [6.1]		
		7/16 [11.12]	50 [15.24]	75 [22.86]	80 [24.38]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]	70 [21.34]	65 [19.81]	65 [19.81]		
		1/2 [12.71]	50 [15.24]	75 [22.86]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]	80 [24.38]		
*AHM-048JA	3/8" [9.53]	1/4 [6.35]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R		
		5/16 [7.94]	50 [15.24]	30 [9.14]	10 [3.05]	N/R	N/R	N/R	N/R	N/R	N/R	N/R		
		3/8 [9.53]	50 [15.24]	70 [21.34]	65 [19.81]	60 [18.29]	50 [15.24]							

***S or V**

INSTALLATION - *AHM



Interconnecting Tubing (cont.)

R-410A System Capacity Model	Liquid Line Size Connection Size (Inch I.D.) [mm]	Vapor Line Size (Inch O.D.) [mm]	Suction Line Size Outdoor unit Above or Below Indoor Coil														
			Total Equivalent Length - Feet [m]														
			25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	125 [45.72]	150 [45.72]	175 [53.34]	200 [60.96]	225 [68.58]	250 [76.20]	275 [83.82]	300 [91.44]			
*AHM-019JA	3/8" [9.53]	5/8 [15.88]	0.99	0.99	0.99	0.98	0.98	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.95	0.95
		3/4 [19.05]	1.00	1.00	1.00	0.99	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98
		7/8 [22.23]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
*AHM-025JA	3/8" [9.53]	1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/8 [15.88]	1.00	0.99	0.98	0.98	0.97	0.97	0.97	0.95	0.94	0.95	0.94	0.95	0.94	0.94	0.94
		3/4 [19.05]	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98
		7/8 [22.23]	1.01	1.00	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
*AHM-030JA	3/8" [9.53]	1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/8 [15.88]	0.99	0.98	0.97	0.97	0.96	0.96	0.95	0.93	0.93	0.92	0.92	0.91	0.91	0.9	0.9
		3/4 [19.05]	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.96	0.96
*AHM-036JA	3/8" [9.53]	7/8 [22.23]	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
		1 [25.4]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/8 [15.88]	0.98	0.95	0.94	0.92	0.91	0.91	0.9	0.88	0.87	0.85	0.85	0.85	0.85	0.84	0.84
*AHM-042JA	3/8" [9.53]	3/4 [19.05]	1.00	0.98	0.96	0.96	0.95	0.95	0.95	0.94	0.93	0.94	0.92	0.92	0.92	0.92	0.92
		7/8 [22.23]	0.98	1.00	0.99	0.99	0.99	0.99	0.98	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
		1 [25.4]	0.99	0.98	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98
		1-1/8 [28.58]	0.99	0.99	0.99	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	1.00	0.99	0.99
*AHM-048JA	3/8" [9.53]	5/8 [15.88]	0.99	0.97	0.96	0.94	0.92	0.92	0.91	0.88	0.87	0.86	0.85	0.85	0.85	0.84	0.84
		3/4 [19.05]	1.00	0.99	0.99	0.98	0.97	0.97	0.97	0.96	0.95	0.94	0.94	0.94	0.94	0.94	0.94
		7/8 [22.23]	1.00	1.00	1.00	1.00	0.99	0.99	1.00	0.99	0.98	0.98	0.98	0.98	0.98	0.97	0.97
		1 [25.4]	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99
*AHM-060JA	3/8" [9.53]	1-1/8 [28.58]	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.00	1.00
		5/8 [15.88]	0.97	0.95	0.93	0.92	0.89	0.89	0.87	0.84	0.82	0.82	0.82	0.81	0.81	0.82	0.82
		3/4 [19.05]	1.00	0.99	0.97	0.97	0.95	0.95	0.95	0.94	0.92	0.92	0.92	0.92	0.92	0.9	0.9
		7/8 [22.23]	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.97	0.97	0.96	0.96	0.96	0.96	0.95	0.95
*AHM-060JA	3/8" [9.53]	1 [25.4]	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/8 [15.88]	0.98	0.94	0.91	0.89	0.87	0.87	0.85	0.84	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/4 [19.05]	0.99	0.99	0.98	0.96	0.95	0.94	0.94	0.93	N/R	N/R	N/R	N/R	N/R	N/R	N/R
*AHM-060JA	3/8" [9.53]	7/8 [22.23]	1.00	1.00	0.99	1.00	0.99	0.99	0.98	0.98	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1 [25.4]	1.01	1.00	1.00	1.00	0.99	0.99	0.99	0.99	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	1.01	1.01	1.01	1.00	0.99	0.99	0.99	0.99	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/8 [15.88]	1.01	1.01	1.01	1.00	0.99	0.99	0.99	0.99	N/R	N/R	N/R	N/R	N/R	N/R	N/R

NOTES:
N/R = Application not recommended.
*S or V

INSTALLATION



Interconnecting Tubing

Table 5

R-410A System Capacity Model	Liquid Line Size Connection Size (Inch I.D.) [mm]	Liquid Line Size (Inch O.D.) [mm]	Liquid Line Size Elevation Above or Below Indoor Coil											
			Total Equivalent Length - Feet [m]											
			25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	125 [45.72]	150 [45.72]	175 [53.34]	200 [60.96]	225 [68.58]	250 [76.20]	275 [83.82]	300 [91.44]
			Maximum Vertical Separation - Feet [m]											
SAGL-018TA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	50 [15.24]	50 [15.24]	35 [10.67]	20 [6.1]	10 [3.05]	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	70 [21.34]	70 [21.34]	65 [19.81]	60 [18.29]	60 [18.29]	55 [16.76]	50 [15.24]	50 [15.24]
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]	80 [24.38]	75 [22.86]	75 [22.86]	75 [22.86]
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	90 [27.43]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]
SAGL-024TA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	30 [9.14]	10 [3.05]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	60 [18.29]	55 [16.76]	50 [15.24]	40 [12.19]	35 [10.67]	30 [9.14]	25 [7.62]	20 [6.1]	15 [4.57]	10 [3.05]
		3/8 [9.53]	25 [7.62]	50 [15.24]	70 [21.34]	65 [19.81]	65 [19.81]	65 [19.81]	60 [18.29]	60 [18.29]	60 [18.29]	55 [16.76]	55 [16.76]	50 [15.24]
		7/16 [11.12]	25 [7.62]	50 [15.24]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	65 [19.81]	65 [19.81]	65 [19.81]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	75 [22.86]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]
SAGL-030TA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	15 [4.57]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	50 [15.24]	45 [13.72]	35 [10.67]	30 [9.14]	25 [7.62]	15 [4.57]	10 [3.05]	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	65 [19.81]	65 [19.81]	60 [18.29]	60 [18.29]	55 [16.76]	55 [16.76]	50 [15.24]	50 [15.24]	45 [13.72]	45 [13.72]
		7/16 [11.12]	25 [7.62]	50 [15.24]	70 [21.34]	70 [21.34]	65 [19.81]	65 [19.81]	65 [19.81]	65 [19.81]	65 [19.81]	60 [18.29]	60 [18.29]	60 [18.29]
		1/2 [12.71]	25 [7.62]	50 [15.24]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	70 [21.34]	65 [19.81]	65 [19.81]
SAGL-036TA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	65 [19.81]	60 [18.29]	50 [15.24]	40 [12.19]	30 [9.14]	20 [6.1]	15 [4.57]	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	80 [24.38]	80 [24.38]	75 [22.86]	70 [21.34]	70 [21.34]	65 [19.81]	65 [19.81]	60 [18.29]	55 [16.76]
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	90 [27.43]	90 [27.43]	85 [25.91]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]	80 [24.38]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	85 [25.91]	85 [25.91]
SAGL-036NA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	70 [21.34]	60 [18.29]	50 [15.24]	45 [13.72]	35 [10.67]	25 [7.62]	15 [4.57]	10 [3.05]	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]	60 [18.29]	60 [18.29]
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	80 [24.38]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	85 [25.91]
SAGL-042TA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	50 [15.24]	40 [12.19]	25 [7.62]	15 [4.57]	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]	35 [10.67]
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]	70 [21.34]	70 [21.34]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]
SAGL-042NA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	50 [15.24]	40 [12.19]	25 [7.62]	15 [4.57]	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]	35 [10.67]
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]	70 [21.34]	70 [21.34]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]
SAGL-042TA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	50 [15.24]	40 [12.19]	25 [7.62]	15 [4.57]	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	70 [21.34]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]	35 [10.67]
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]	70 [21.34]	70 [21.34]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	80 [24.38]
SAGL-048NA	3/8" [9.53]	1/4 [6.35]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	50 [15.24]	45 [13.72]	30 [9.14]	10 [3.05]	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	75 [22.86]	75 [22.86]	65 [19.81]	60 [18.29]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]	30 [9.14]	25 [7.62]
		7/16 [11.12]	25 [7.62]	50 [15.24]	75 [22.86]	85 [25.91]	85 [25.91]	80 [24.38]	80 [24.38]	75 [22.86]	75 [22.86]	70 [21.34]	70 [21.34]	65 [19.81]
		1/2 [12.71]	25 [7.62]	50 [15.24]	75 [22.86]	90 [27.43]	90 [27.43]	90 [27.43]	90 [27.43]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]	85 [25.91]
SAGL-060NA	3/8" [9.53]	1/4 [6.35]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	15 [4.57]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	50 [15.24]	45 [13.72]	35 [10.67]	25 [7.62]	15 [4.57]	N/R	N/R	N/R	N/R	N/R	N/R
		7/16 [11.12]	25 [7.62]	50 [15.24]	60 [18.29]	55 [16.76]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]	35 [10.67]	30 [9.14]	25 [7.62]	25 [7.62]
		1/2 [12.71]	25 [7.62]	50 [15.24]	70 [21.34]	65 [19.81]	65 [19.81]	60 [18.29]	60 [18.29]	60 [18.29]	55 [16.76]	55 [16.76]	50 [15.24]	50 [15.24]
SAGL-065NA	3/8" [9.53]	1/4 [6.35]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		5/16 [7.94]	25 [7.62]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/8 [9.53]	25 [7.62]	45 [13.72]	30 [9.14]	15 [4.57]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		7/16 [11.12]	25 [7.62]	50 [15.24]	55 [16.76]	50 [15.24]	45 [13.72]	40 [12.19]	30 [9.14]	25 [7.62]	20 [6.1]	15 [4.57]	10 [3.05]	N/R
		1/2 [12.71]	25 [7.62]	50 [15.24]	65 [19.81]	65 [19.81]	60 [18.29]	55 [16.76]	55 [16.76]	50 [15.24]	50 [15.24]	45 [13.72]	45 [13.72]	40 [12.19]

NOTES:

N/R = Application not recommended.

Grey = This application is acceptable, but the long line guidelines must be followed. Reference Long Line Set section in the I&O.

INSTALLATION



Interconnecting Tubing (cont.)

Table 5 cont.

R-410A System Capacity Model	Vapor Line Connection Size (Inch I.D.) [mm]	Vapor Line Size (Inch O.D.) [mm]	Vapor Line Selection Chart Capacity Multiplier Table											
			Total Equivalent Length - Feet [m]											
			25 [7.62]	50 [15.24]	75 [22.86]	100 [30.48]	125 [45.72]	150 [45.72]	175 [53.34]	200 [60.96]	225 [68.58]	250 [76.20]	275 [83.82]	300 [91.44]
SAGL-018TA	3/4" [19.06]	5/8 [15.88]	0.99	1.00	0.98	0.98	0.98	0.97	0.96	0.96	0.95	0.95	0.95	0.94
		3/4 [19.05]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		7/8 [22.23]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-024TA	3/4" [19.06]	5/8 [15.88]	1.01	0.98	0.97	0.97	0.96	0.96	0.95	0.95	0.94	0.94	0.94	0.93
		3/4 [19.05]	1.00	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.97
		7/8 [22.23]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-030TA	3/4" [19.06]	5/8 [15.88]	1.00	0.98	0.98	0.97	0.97	0.95	0.94	0.94	0.94	0.91	0.92	0.92
		3/4 [19.05]	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.97	0.97	0.97	0.96
		7/8 [22.23]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-036TA	3/4" [19.06]	5/8 [15.88]	0.99	0.98	0.97	0.96	0.95	0.95	0.94	0.93	0.91	0.91	0.9	0.89
		3/4 [19.05]	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.97	0.97	0.97	0.96	0.96
		7/8 [22.23]	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.98
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-036NA	3/4" [19.06]	5/8 [15.88]	1.00	0.97	0.95	0.95	0.93	0.92	0.9	0.89	0.88	0.87	0.87	0.86
		3/4 [19.05]	1.00	1.00	1.00	0.98	0.97	0.96	0.96	0.95	0.95	0.96	0.95	0.95
		7/8 [22.23]	1.00	1.00	1.00	1.01	0.99	0.98	0.98	0.98	0.98	0.97	0.97	0.97
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-042TA	3/4" [19.06]	5/8 [15.88]	0.98	0.97	0.96	0.94	0.93	0.91	0.9	0.89	0.88	0.87	0.86	0.85
		3/4 [19.05]	0.99	0.99	0.98	0.97	0.97	0.96	0.96	0.96	0.95	0.94	0.94	0.94
		7/8 [22.23]	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.97	0.97	0.97
		1 [25.4]	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-042NA	3/4" [19.06]	5/8 [15.88]	0.99	0.96	0.95	0.94	0.91	0.9	0.89	0.88	0.86	0.85	0.84	0.84
		3/4 [19.05]	1.00	0.99	0.99	0.98	0.97	0.97	0.97	0.95	0.95	0.95	0.94	0.93
		7/8 [22.23]	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.97	0.97
		1 [25.4]	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	0.99	1.00
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-048TA	3/4" [19.06]	5/8 [15.88]	0.98	0.95	0.94	0.92	0.9	0.88	0.86	0.86	0.85	0.83	N/R	N/R
		3/4 [19.05]	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.94	0.94	0.93	N/R	N/R
		7/8 [22.23]	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.97	N/R	N/R
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-048NA	3/4" [19.06]	5/8 [15.88]	0.98	0.95	0.94	0.92	0.9	0.88	0.86	0.86	0.85	0.83	0.84	0.82
		3/4 [19.05]	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.94	0.94	0.93	0.92	0.91
		7/8 [22.23]	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.97	0.97	0.96
		1 [25.4]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-060NA	3/4" [19.06]	5/8 [15.88]	0.96	0.93	0.89	0.88	0.87	0.9	N/R	N/R	N/R	N/R	N/R	N/R
		3/4 [19.05]	0.99	0.97	0.95	0.95	0.92	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		7/8 [22.23]	1.00	0.99	0.99	0.98	0.97	0.97	N/R	N/R	N/R	N/R	N/R	N/R
		1 [25.4]	0.98	0.98	0.98	0.97	0.97	1.00	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
SAGL-065NA	3/4" [19.06]	5/8 [15.88]	0.96	0.92	0.89	0.91	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		3/4 [19.05]	0.99	0.97	0.96	0.95	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		7/8 [22.23]	1.00	0.99	0.98	0.97	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1 [25.4]	1.00	1.00	1.00	1.00	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
		1-1/8 [28.58]	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

NOTES:

N/R = Application not recommended.

All calculations assume a 3/8" liquid line

9.0 START-UP – CHECKING AIRFLOW

The air distribution system has the greatest effect on airflow. The duct system is totally controlled by the contractor. For this reason, the contractor should use only industry-recognized procedures. The correct air quantity is critical to air conditioning systems. Proper operation, efficiency, compressor life, and humidity control depend on the correct balance between indoor load and outdoor unit capacity. Excessive indoor airflow increases the possibility of high humidity problems. Low indoor airflow reduces total capacity and causes coil icing. Serious harm can be done to the compressor by low airflow, such as that caused by refrigerant flooding. Each ton of cooling requires between 375 and 450 cubic feet of air per minute (CFM). See the manufacturer's spec sheet for rated airflow for the system being installed. Duct design and construction should be carefully done. System performance can be lowered dramatically through bad planning or workmanship. Air supply diffusers must be selected and located carefully. They must be sized and positioned to deliver treated air along the perimeter of the space. If they are too small for their intended airflow, they become noisy. If they are not located properly, they cause drafts. Return air grilles must be properly sized to carry air back to the blower. If they are too small, they also cause noise. The installers should balance the air distribution system to ensure proper quiet airflow to all rooms in the home. This ensures a comfortable living space.

These simple mathematical formulas can be used to determine the CFM in a residential or light commercial system. Electric resistance heaters can use:

$$CFM = \frac{\text{volts} \times \text{amps} \times 3.413}{SHC \times \text{temp rise}}$$

Gas furnaces can use:

$$CFM = \frac{\text{Output Capacity in BTUH}^*}{SHC \times \text{temp rise}}$$

*Refer to furnace data plate for furnace output capacity. SHC = Sensible Heat Constant (see table below). An air velocity meter or airflow hood can give a more accurate reading of the system CFM. The measurement for temperature rise should be performed at the indoor coil inlet and near the outlet, but out of direct line of sight of the heater element or heat exchanger. For best results, measure air temperature at multiple points and average the measurements to obtain coil inlet and outlet temperatures.

Altitude (feet)	SENSIBLE HEAT CONSTANT (SHC)	ALTITUDE (FEET)	SENSIBLE HEAT CONSTANT (SHC)
Sea Level	1.08	6000	0.87
500	1.07	7000	0.84
1000	1.05	8000	0.81
2000	1.01	9000	0.78
3000	0.97	10000	0.75
4000	0.94	15000	0.61
5000	0.90	20000	0.50

10.0 EVACUATION AND LEAK TESTING

10.1 EVACUATION PROCEDURE

Evacuation is the most important part of the entire service procedure. The life and efficiency of the equipment is dependent upon the thoroughness exercised by the serviceman when evacuating air and moisture from the system.

Air or nitrogen in the system causes high condensing temperatures and pressure, resulting in increased power input and non-verifiable performance.

Moisture chemically reacts with the refrigerant and oil to form corrosive hydrofluoric acid. This attacks motor windings and parts, causing breakdown.

- After the system has been leak-checked and proven sealed, connect the vacuum pump and evacuate system to 500 microns and hold 500 microns or less for at least 15 minutes. The vacuum pump must be connected to both the high and low sides of the system by connecting to the two pressure ports. Use the largest size connections available since restrictive service connections may lead to false readings because of pressure drop through the fittings.
- After adequate evacuation, open both service valves by removing both brass service valve caps with an adjustable wrench. Insert a 3/16" [5 mm] or 5/16" [8 mm] hex wrench into the stem and turn counterclockwise until the wrench stops.

- At this time gauges must be connected to the access fitting on the liquid line (small) service valve and the common suction port connected to the common suction line between the reversing valve and compressor to check and adjust charge.

IMPORTANT: Compressors (especially scroll type) should never be used to evacuate the air conditioning system because internal electrical arcing may result in a damaged or failed compressor. Never run a scroll compressor while the system is in a vacuum or compressor failure will occur.

10.2 FINAL LEAK TESTING

After the unit has been properly evacuated and service valves opened, a halogen leak detector should be used to detect leaks in the system. If a leak is detected, the refrigerant should be recovered before repairing the leak. The Clean Air Act prohibits releasing refrigerant into the atmosphere.

11.0 CHECKING REFRIGERANT CHARGE

WARNING

The top of the scroll compressor shell is hot. Touching the compressor top may result in serious personal injury.

Charge for all systems should be checked against the Charging Chart inside the access panel cover.

IMPORTANT: Use factory-approved charging method as outlined on the next 4 pages to ensure proper system charge.

NOTICE

The optimum refrigerant charge for any outdoor unit matched with a CFL/CFM/H*L indoor coil/air handler is affected by the application. Therefore, charging data has been developed to assist the field technician in optimizing the charge for all mounting configurations (UF – Upflow, DF – downflow, LH – Left Hand Discharge, and RH – Right Hand Discharge). Refer to the charging chart inside the access panel cover on the unit and choose the appropriate column for the specific application being installed or serviced. New installations utilizing either a CFL/CFM indoor coil installed on a gas furnace or an H*L air handler in the downflow or horizontal right hand discharge may require removal of refrigerant since the factory charge could result in an overcharge condition.

11.1 CHARGING UNITS WITH R-410A REFRIGERANT

CAUTION

R-410A pressures are approximately 60% higher (1.6 times) than R-22 pressures. Use appropriate care when using this refrigerant. Failure to exercise care may result in equipment damage or personal injury.

Charge for all systems should be checked against the Charging Chart inside the access panel cover.

IMPORTANT: Do not operate the compressor without charge in the system.

Addition of R-410A will raise high-side pressures (liquid, and discharge).

WARNING

THE UNIT MUST BE PERMANENTLY GROUNDED. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

The following method is used for charging systems in the cooling and heating mode. All steps listed should be performed to insure proper charge has been set. For measuring pressures, the service valve port on the liquid valve (small valve) and the service port on the suction line between the reversing valve and compressor are to be used.

CONFIRM ID AIR FLOW & COILS ARE CLEAN

Confirm adequate Indoor supply air flow prior to starting the system. See the Technical Specification sheet for rated air flow for each ID/OD unit match. Air filter(s) and coils (indoor & outdoor) are to be clean and free of frost prior to starting the system. Supply Air flow must be between 375 and 450 cfm per rated cooling ton prior to adjusting system charge. If a humidification system is installed disengage it from operating prior to charge adjustment. Refer to the "Checking Airflow" section of this manual for further instruction.

NOTICE

Verify system components are matched according to the outdoor unit Specification Sheet.

11.2 MEASUREMENT DEVICE SETUP

- Step 1. With an R410A gauge set, attach the high pressure hose to the access fitting on the liquid line (small) service valve at the OD unit.
- Step 2. Attach the low pressure hose to the common suction port connected to the common suction line between the reversing valve and compressor.
- Step 3. Attach a temperature probe within 6" outside of the unit on the copper liquid line (small line). For more accurate measurements clean the copper line prior to measurement and use a calibrated clamp on temperature probe or an insulated surface thermocouple.

11.3 CHARGING BY WEIGHT

NOTICE

ADJUST THE SYSTEM CHARGE BY WEIGHT FOR THE STRAIGHT LENGTH OF THE REFRIGERANT LINE SET.

For a new installation, evacuation of interconnecting tubing and indoor coil is adequate; otherwise, evacuate the entire system. Use the factory charge shown in "Electrical and Physical Data" on page 6 of these instructions or on the unit data plate. Note that the charge value includes charge required for 15 ft. [4.6 m] of standard-size inter-connecting liquid line without a filter drier. Calculate actual charge required with installed liquid line size and length using:

1/4" [6.4 mm] O.D. = .3 oz./ft. [8.5 g/.30 m]

5/16" [7.9 mm] O.D. = .4 oz./ft. [11.3 g/.30 m]

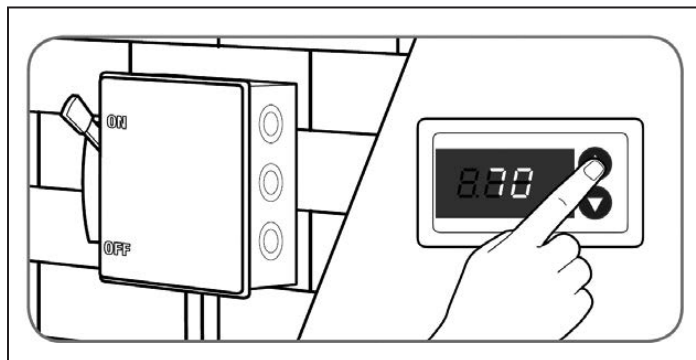
3/8" [9.5 mm] O.D. = .6 oz./ft. [17.0 g/.30 m]

1/2" [12.7 mm] O.D. = 1.2 oz./ft. [34.0 g/.30 m]

Add 6 oz. for field-installed filter drier.

With an accurate scale (+/- 1 oz. [28.3 g]) or volumetric charging device, adjust charge difference between that shown on the unit data plate and that calculated for the new system installation. If the entire system has been evacuated, add the total calculated charge.

IMPORTANT: Charging by weight is not always accurate since the application can affect the optimum refrigerant charge. Charging by weight is considered a starting point ONLY. Always check the charge by using the charging chart and adjust as necessary. CHARGING BY LIQUID SUB-COOLING MUST BE USED FOR FINAL CHARGE ADJUSTMENT.



With thermostat in the "Off" position, turn the power on to the furnace or air handler. Start the furnace or air handler with the thermostat.

11.4 GROSS CHARGING BY PRESSURES

Step 1. Following air flow verification and charge weigh in, run the unit for a minimum of 15 minutes prior to noting pressures and temperature.

IMPORTANT: Indoor conditions as measured at the indoor coil must be within 2°F of the following during gross charge (pressure) evaluation:

Cooling Mode: 80°F Dry Bulb

NOTICE

If the Indoor temperature is above or below this range, run the system to bring the temperature down or run the electric heat/furnace to bring the temperature within this range. System pressure values provided in the Charge Chart for outdoor dry bulbs corresponding to conditions outside of ranges listed below, are provided as reference ONLY.

Step 2. Note the Outdoor Dry Bulb Temperature, ODDB°F = _____°F. Unit charging is recommended under the following outdoor conditions ONLY:

Cooling Mode ONLY: 55°F outdoor dry bulb and above

Step 3. Locate and note the design pressures. The correct liquid and vapor pressures are found at the intersection of the Installed system and the outdoor ambient temperature on the Charging Chart located on the inside of the control box cover of the outdoor unit.

Liquid Pressure = _____psig; Vapor Pressure = _____psig

NOTICE

The refrigerant pressures provided are for gross charge check ONLY. These pressure values are typical, but may vary due to application. Evaporator (indoor coil in cooling mode) load will cause pressures to deviate. Notice that all systems have unique pressure curves. The variation in the slope and value is determined by the component selection for that indoor/outdoor matched system. The variation from system to system seen in the table is normal. The values listed are for the applicable indoor coil match ONLY!

Step 4. If the measured liquid pressure is below the listed requirement for the given outdoor and indoor conditions, add charge. If the measured liquid pressure is above the listed requirement for the given Outdoor and Indoor conditions remove charge.

11.5 FINAL CHARGE BY SUB-COOLING

Step 1. After gross charging note the designed Sub-Cool value. The correct sub-cooling value is found at the intersection of the Installed system and the outdoor ambient temperature on the Charging Chart located on the inside of the control box cover of the outdoor unit.

SC° from Charging Chart = _____°F.

IMPORTANT: Indoor conditions as measured at the indoor coil are required to be between 70°F and 80°F dry bulb for fine tune unit charge adjustment. Unit charging is recommended under the following outdoor conditions ONLY:

Cooling Mode ONLY: 55°F outdoor dry bulb and above

NOTICE

If the Indoor temperature is above or below the recommended range, run the system to bring the temperature down or run the electric heat/furnace to bring the temperature up. System sub-cooling values provided in the Charge Chart for outdoor dry bulbs corresponding to conditions outside of the above range, are provided as reference ONLY.

Step 2. Note the measured Liquid Pressure, P_{liq} = _____psig, as measured from the liquid (small) service valve. Use the pressure temperature chart below to note the corresponding saturation temperature for R410A at the measured liquid pressure.

Liquid Saturation Temperature, SAT°F = _____°F.

- Step 3. Note the liquid line temperature, $Liq^{\circ} = \text{_____}^{\circ}\text{F}$, as measured from a temperature probe located within 6" outside of the unit on the copper liquid line (small line). It is recommended to use a calibrated clamp on temperature probe or an insulated surface thermocouple.
- Step 4. Subtract the liquid line temperature (Step 3) from the saturation temperature (Step 2) to calculate Sub-Cooling. $SAT^{\circ}\text{F} \text{_____} - Liq^{\circ} \text{_____} = SC^{\circ} \text{_____}$
- Step 5. Adjust Charge to obtain the specified sub-cooling value. If the measured sub-cool is below the listed requirement for the given outdoor and indoor conditions, add charge. If the measured sub-cool is above the listed requirement for the given outdoor and indoor conditions remove charge.

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 preformed by trained and qualified HVAC professionals. For technical assistance contact your Distributor Service Coordinator.

11.6 FINISHING UP INSTALLATION

- Disconnect pressure gauges from pressure ports; then replace the pressure port caps and tighten adequately to seal caps. **Do not over tighten.**
- Replace the service valve caps finger-tight and then tighten with an open-end wrench adequately to seal caps. **Do not over tighten.**
- Replace control box cover and service panel and install screws to secure service panel.
- Restore power to unit at disconnect if required.
- Configure indoor thermostat per the thermostat installation instructions and set thermostat to desired mode and temperature.

12.0 ELECTRICAL WIRING

Field wiring must comply with any applicable national and local codes.

12.1 GROUNDING

A grounding lug is provided near the line voltage power entrance for a ground wire.

WARNING

THE UNIT MUST BE PERMANENTLY GROUNDED. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

12.2 POWER WIRING

It is important that proper electrical power from a commercial utility is available at the condensing unit contactor. Required voltage is shown on the unit rating name-plate.

Power wiring must be run in a rain-tight conduit. Conduit must be run through the connector panel below the control box and attached to the bottom of the control box. An electrical reducing washer similar to the one shown below may be needed to reduce the size of the conduit access hole to accommodate different sizes of conduit. A Conduit-Reducing Washer is designed to reduce the size of the knockout in a steel outlet box or other metal enclosure. It is made of galvanized steel and can be used for indoor or exterior applications.



Consult national and local electrical codes to determine the required field wiring physical characteristics. A recommended typical field provided power wiring is an

Armored Insulated Stranded Copper Cable that follows the typical specifications outlined below:

Manufacturing standard: BS 5467

Conductors: Stranded plain annealed copper wire (class 2) to BS EN 60228

Insulation: XLPE

Bedding: PVC

Armor: Galvanized Steel Wire Armor

Sheath: PVC

Following is from IEC Standard 60335-1. The table provides information for the minimum nominal cross-sectional area required for the field provided power conductors based on the rated current. Again consult national and local electrical codes for proper power wire conductor size.

Rated Current of Appliance A			Nominal Cross-Sectional Area mm ²
		≤0.2	Tinsel cord ^a
>0.2	and	≤3	0.5 ^a
>3	and	≤6	0.75
>6	and	≤10	1.0 (0.75) ^b
>10	and	≤16	1.5 (1.0) ^b
>16	and	≤25	2.5
>25	and	≤32	4
>32	and	≤40	6
>40	and	≤63	10

Connect the power wiring to the contactor line voltage terminals located in the outdoor condensing unit control box (See wiring diagram attached to unit control box access panel).

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.

12.3 CONTROL WIRING (24 VAC)

If the low voltage control wiring is run in the same conduit with the power wiring Class 1 insulation is required on the control wiring. Class II insulation is required if run separate from the power wiring. Control wiring may be run through the insulated bushing provided in the 7/8" (22mm) hole in the base panel and up to and attached to the factory pigtail control wires in the control box. Conduit can be run to the base panel if desired by removing the bushing and attaching to the 7/8" (22mm) hole.

A zone thermostat and a 24VAC, 40VA minimum transformer is required for the control circuit of the system. Determine if a 24VAC transformer is provided in the indoor unit. See the unit wiring diagram for connection references. Use a minimum 18 gage flexible color coded thermostat wire.

13.0 FIELD INSTALLED ACCESSORIES

13.1 COMPRESSOR CRANKCASE HEAT (CCH)

While scroll compressors usually do not require crankcase heaters, there are instances when a heater should be added. Refrigerant migration during the off cycle can result in a noisy start up. Add a crankcase heater to minimize refrigerate migration, and to help eliminate any start up noise or bearing "wash out."

NOTE: The installation of a crankcase heater is recommended if the system charge exceeds the values listed in Table 10.

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 on and wall thermostat off.)

TABLE 10
MAXIMUM SYSTEM CHARGE VALUES – *AGN (1-PHASE)

13 SEER Model Size	Compressor Model Number	System Charge Limit Without Crankcase Heat (1 Phase)
18	ZP14K5E	9.6 lbs.
24	ZP20K5E	9.6 lbs.
30	ZP24K5E	9.6 lbs.
36	ZP34K5E	9.6 lbs.
42	ZP36K5E	12 lbs.
48	ZP42K5E	12 lbs.
60	ZP51K5E	12 lbs.

NOTE: Model sizes 48, 49, 56 and 60 have a factory installed crankcase heater.

TABLE 10 - continued
MAXIMUM SYSTEM CHARGE VALUES – *AGL

Model Size	Compressor Manufacturer	Compressor Model Number	System Charge Limit Without Crankcase Heat
18T	Copeland	ZP16K5E-PFJ	8 lbs.
24T	Copeland	ZP21K5E-PFJ	8 lbs.
30T	Copeland	ZP25K5E-PFJ	8 lbs.
36T	Copeland	ZP31K5E-PFJ	8 lbs.
36N	Copeland	ZP31K5E-TFD	8 lbs.
42T	Copeland	ZP36K5E-PFJ	10 lbs.
42N	Copeland	ZP36K5E-TFD	10 lbs.
48T	Copeland	ZP42K5E-PFJ	10 lbs.
48N	Copeland	ZP42K5E-TFD	10 lbs.
60N	Copeland	ZP61KCE-TFD	12 lbs.
65N	Copeland	ZP72KCE-TFD	12 lbs.

TABLE 10 - continued
MAXIMUM SYSTEM CHARGE VALUES – *AHM

14.5 SEER Model Size	Compressor Model Number	Charge Limit Without Crankcase Heat (1 Phase)
18	ZP16K5E	9.6 lbs.
24	ZP20K5E	9.6 lbs.
30	ZP24K5E	9.6 lbs.
36	ZP31K5E	9.6 lbs.
42	ZP34K5E	12 lbs.

NOTE: Model sizes 48, 49, 56 and 60 have a factory installed crankcase heater.

13.2 TIME DELAY CONTROL RXMD-B01 (TDC)

The time delay (TDC) is in the low voltage control circuit. When the compressor shuts off due to a power failure or thermostat operation, this control keeps it off at least 5 minutes which allows the system pressure to equalize, thus not damaging the compressor or blowing fuses on start-up.

14.0 SERVICE

14.1 OPERATION

Single phase units are operated PSC (no starting components). It is important that such systems be off for a minimum of 5 minutes before restarting to allow equalization of pressure. The thermostat should not be moved to cycle unit without waiting 5 minutes. To do so may cause the compressor to go off on an automatic overload device or blow a fuse. Poor electrical service can also cause nuisance tripping on overloads, trip a breaker, or cause light dimming. This generally can be corrected by adding start components. Check with factory for recommended start components, if required. For PSC type operation, refrigerant metering must be done with fixed orifice, cap tubes or bleed type expansion valves because of low starting torque. If non-bleed expansion valve coils (supplied by factory) are used, start components are required.

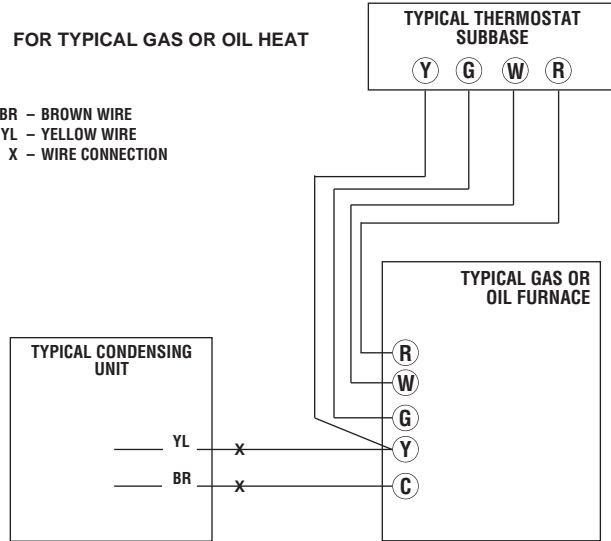
14.2 SINGLE-POLE COMPRESSOR CONTACTOR (CC)

Single-pole contactors are used on all standard single phase units up through 5 tons. Caution must be exercised when servicing as only one leg of the power supply is broken with the contactor.

FIGURE 5
CONTROL WIRING FOR GAS OR OIL FURNACE

FOR TYPICAL GAS OR OIL HEAT

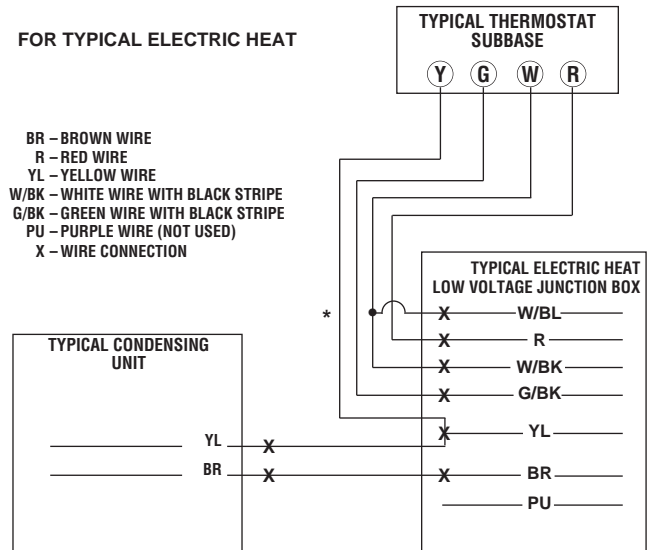
BR - BROWN WIRE
YL - YELLOW WIRE
X - WIRE CONNECTION



*IF MAXIMUM OUTLET TEMPERATURE RISE IS DESIRED, IT IS RECOMMENDED THAT W1 (W/BK) AND W2 (W/BL) BE JUMPED TOGETHER.

FOR TYPICAL ELECTRIC HEAT

BR - BROWN WIRE
R - RED WIRE
YL - YELLOW WIRE
W/BK - WHITE WIRE WITH BLACK STRIPE
G/BK - GREEN WIRE WITH BLACK STRIPE
PU - PURPLE WIRE (NOT USED)
X - WIRE CONNECTION

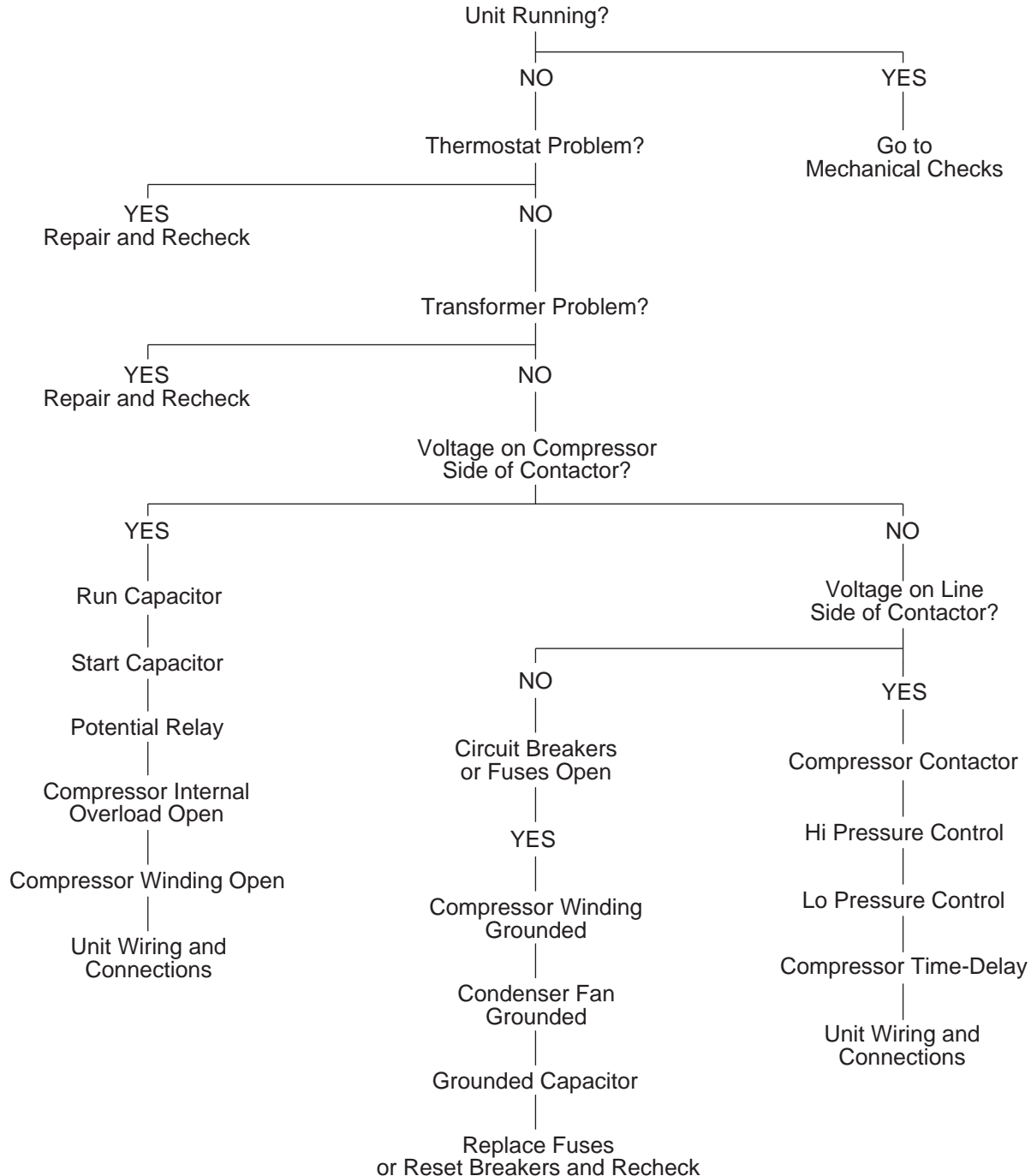


15.0 TROUBLE SHOOTING

In diagnosing common faults in the air conditioning system, it is useful to present the logical pattern of thought that is used by experienced technicians. The charts which follow are not intended to be an answer to all problems, but only to guide your thinking as you attempt to decide on your course of action. Through a series of yes and no answers, you will follow the logical path to a likely conclusion.

Use these charts as you would a road map, if you are a beginning technician. As you gain experience, you will learn where to establish the shortcuts. Remember that the chart will help clarify the logical path to the problem.

15.1 ELECTRICAL CHECKS FLOW CHART



15.2 MECHANICAL CHECKS FLOW CHART

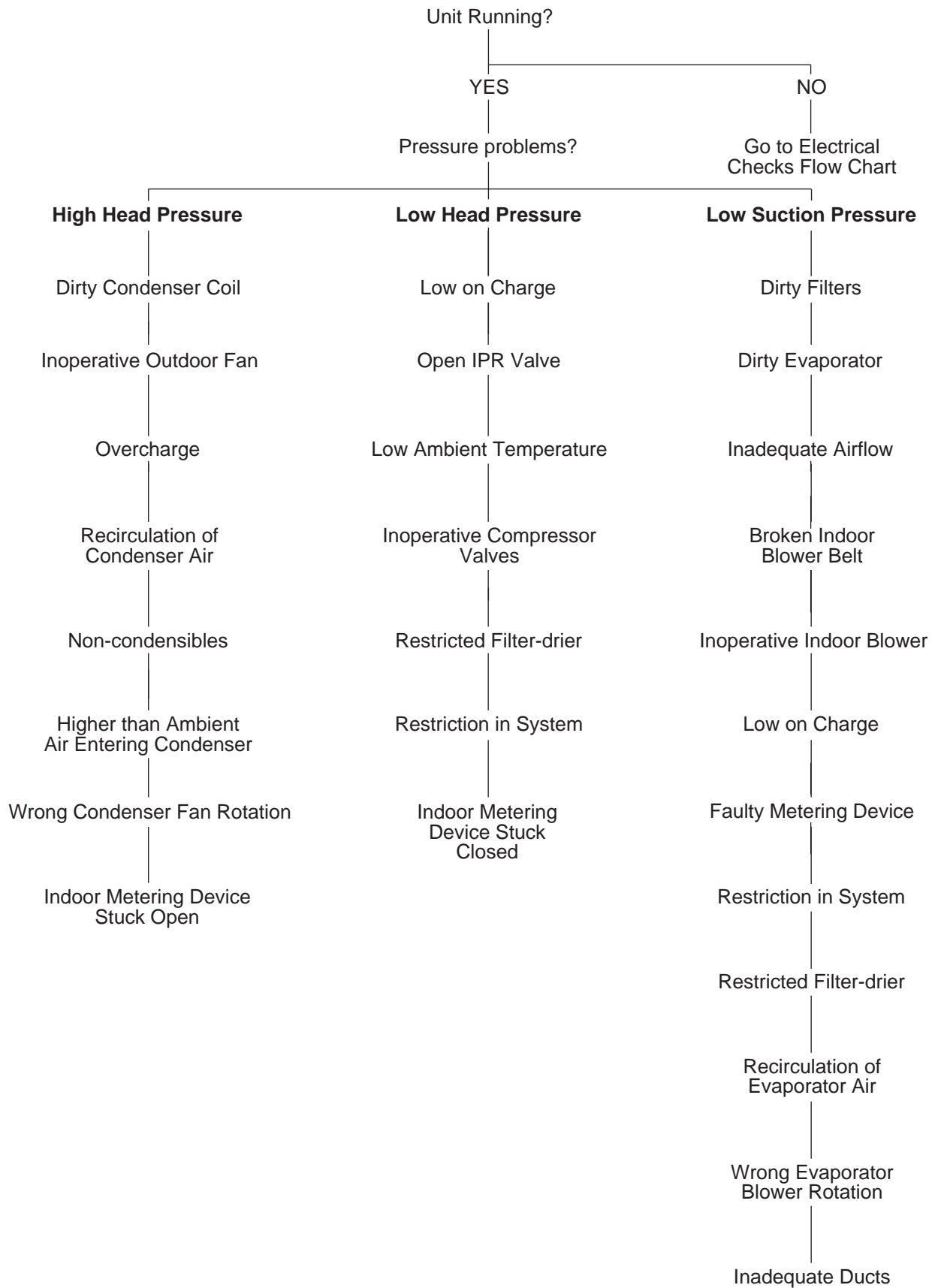


TABLE 11
TEMPERATURE PRESSURE CHART

TEMP (Deg. F)	R-410A PSIG
-150	—
-140	—
-130	—
-120	—
-110	—
-100	—
-90	—
-80	—
-70	—
-60	0.4
-50	5.1
-40	10.9
-35	14.2
-30	17.9
-25	22.0
-20	26.4
-15	31.3
-10	36.5
-5	42.2
0	48.4
5	55.1
10	62.4
15	70.2
20	78.5
25	87.5
30	97.2
35	107.5
40	118.5
45	130.2
50	142.7
55	156.0
60	170.1
65	185.1
70	201.0
75	217.8
80	235.6
85	254.5
90	274.3
95	295.3
100	317.4
105	340.6
110	365.1
115	390.9
120	418.0
125	446.5
130	476.5
135	508.0
140	541.2
145	576.0
150	612.8

15.3 SUPERHEAT CALCULATION

1. Measure the suction pressure at the suction line service valve.
2. Convert the suction pressure to saturated temperature. See Table 12.
3. Measure the temperature of the suction line at the suction line service valve.
4. Compare the temperature of the suction line to the saturated temperature.
5. The difference between saturated temperature and suction line temperature is the superheat. Superheat normal range 12° to 15°.

15.4 SUBCOOLING CALCULATION

1. Measure the liquid pressure at the liquid line service valve.
2. Convert the liquid line pressure to saturated temperature. See Table 12.
3. Measure the liquid line temperature at the liquid line service valve.
4. Compare the liquid line temperature to the saturated temperature.
5. The difference between saturated temperature and liquid line temperature is the subcooling. Subcooling normal range 9° to 12°.

TABLE 12
AIR CONDITIONING SYSTEM TROUBLESHOOTING TIPS

AIR CONDITIONING SYSTEM TROUBLESHOOTING TIPS					
SYSTEM PROBLEM	INDICATORS				
	DISCHARGE PRESSURE	SUCTION PRESSURE	SUPERHEAT	SUBCOOLING	COMPRESSOR AMPS
Overcharge	High	High	Low	High	High
Undercharge	Low	Low	High	Low	Low
Liquid Restriction (Drier)	Low	Low	High	High	Low
Low Evaporator Airflow	Low	Low	Low	Low	Low
Dirty Condenser	High	High	Low	Low	High
Low Outside Ambient Temperature	Low	Low	High	High	Low
Inefficient Compressor	Low	High	High	High	Low
TXV Feeler Bulb Charge Lost	Low	Low	High	High	Low
Poorly Insulated Sensing Bulb	High	High	Low	Low	High

TROUBLE SHOOTING CHART

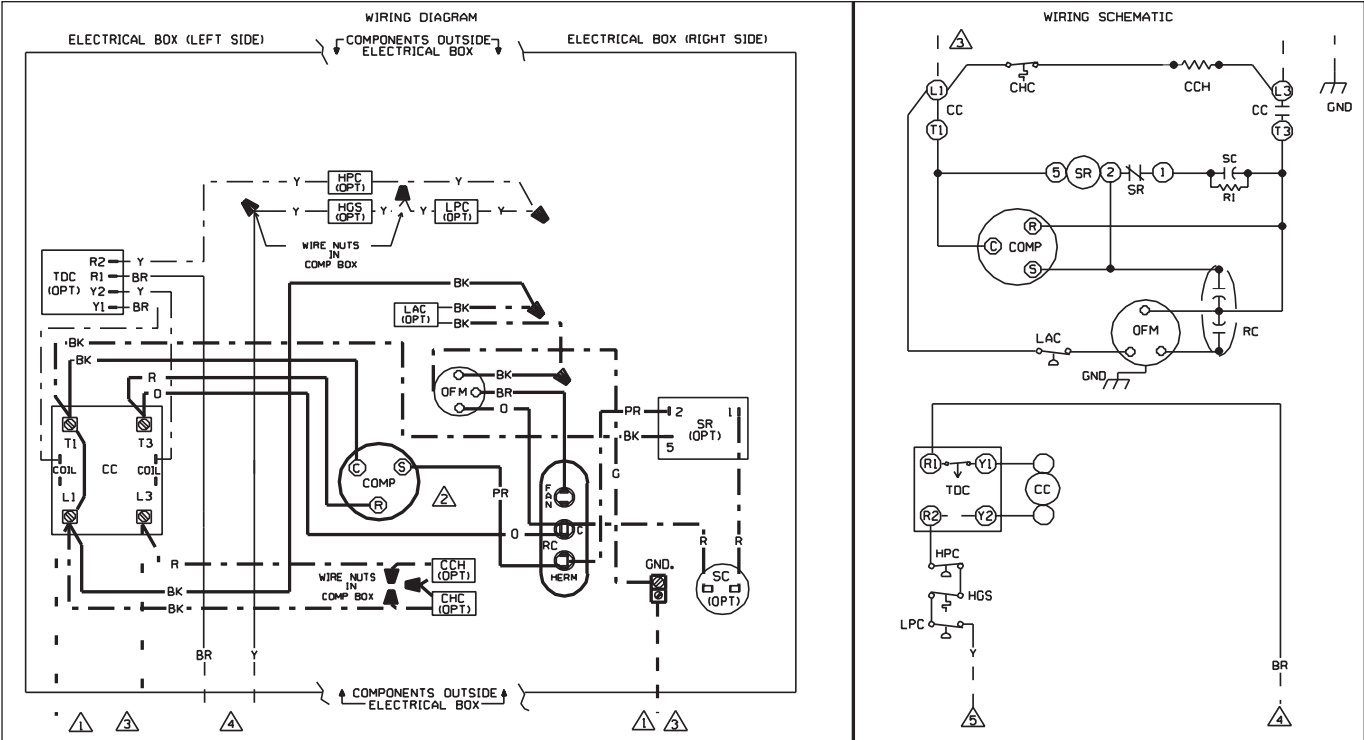
▲ WARNING

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	<ul style="list-style-type: none"> Power off or loose electrical connection Thermostat out of calibration-set too high Defective contactor Blown fuses / tripped breaker Transformer defective High pressure control open (if provided) 	<ul style="list-style-type: none"> Check for correct voltage at contactor in condensing unit Reset Check for 24 volts at contactor coil - replace if contacts are open Replace fuses / reset breaker Check wiring-replace transformer Reset-also see high head pressure remedy-The high pressure control opens at 450 PSIG
Outdoor fan runs, compressor doesn't	<ul style="list-style-type: none"> Run or start capacitor defective Start relay defective Loose connection Compressor stuck, grounded or open motor winding, open internal overload. Low voltage condition 	<ul style="list-style-type: none"> Replace Replace Check for correct voltage at compressor - check & tighten all connections Wait at least 2 hours for overload to reset. If still open, replace the compressor. Add start kit components
Insufficient cooling	<ul style="list-style-type: none"> Improperly sized unit Improper indoor airflow Incorrect refrigerant charge Air, non-condensibles or moisture in system 	<ul style="list-style-type: none"> Recalculate load Check - should be approximately 400 CFM per ton. Charge per procedure attached to unit service panel Recover refrigerant, evacuate & recharge, add filter drier
Compressor short cycles	<ul style="list-style-type: none"> Incorrect voltage Defective overload protector Refrigerant undercharge 	<ul style="list-style-type: none"> At compressor terminals, voltage must be $\pm 10\%$ of nameplate marking when unit is operating. Replace - check for correct voltage Add refrigerant
Registers sweat	<ul style="list-style-type: none"> Low indoor airflow 	<ul style="list-style-type: none"> Increase speed of blower or reduce restriction - replace air filter
High head-low vapor pressures	<ul style="list-style-type: none"> Restriction in liquid line, expansion device or filter drier Flowcheck piston size too small Incorrect capillary tubes 	<ul style="list-style-type: none"> Remove or replace defective component Change to correct size piston Change coil assembly
High head-high or normal vapor pressure - Cooling mode	<ul style="list-style-type: none"> Dirty outdoor coil Refrigerant overcharge Outdoor fan not running Air or non-condensibles in system 	<ul style="list-style-type: none"> Clean coil Correct system charge Repair or replace Recover refrigerant, evacuate & recharge
Low head-high vapor pressures	<ul style="list-style-type: none"> Flowcheck piston size too large Defective Compressor valves Incorrect capillary tubes 	<ul style="list-style-type: none"> Change to correct size piston Replace compressor Replace coil assembly
Low vapor - cool compressor - iced indoor coil	<ul style="list-style-type: none"> Low indoor airflow Operating below 65°F outdoors Moisture in system 	<ul style="list-style-type: none"> Increase speed of blower or reduce restriction - replace air filter Add Low Ambient Kit Recover refrigerant - evacuate & recharge - add filter drier
High vapor pressure	<ul style="list-style-type: none"> Excessive load Defective compressor 	<ul style="list-style-type: none"> Recheck load calculation Replace
Fluctuating head & vapor pressures	<ul style="list-style-type: none"> TXV hunting Air or non-condensibles in system 	<ul style="list-style-type: none"> Check TXV bulb clamp - check air distribution on coil - replace TXV Recover refrigerant, evacuate & recharge
Gurgle or pulsing noise at expansion device or liquid line	<ul style="list-style-type: none"> Air or non-condensibles in system 	<ul style="list-style-type: none"> Recover refrigerant, evacuate & recharge

16.0 WIRING DIAGRAMS

FIGURE 6
16.1 PSC OD FAN MOTOR
SINGLE-PHASE WIRING DIAGRAM



COMPONENT CODE

CC COMPRESSOR CONTACTOR
CCH CRANKCASE HEATER
CHC CRANKCASE HEATER CONTROL
COMP COMPRESSOR
GND GROUND, CHASSIS
HPC HIGH PRESSURE CUT-OUT CONTROL
LAC LOW AMBIENT COOLING CONTROL
LPC LOW PRESSURE CUT-OUT CONTROL
OFM OUTDOOR FAN MOTOR
OPT OPTIONAL
RC RUN CAPACITOR
SC START CAPACITOR
SR START RELAY
TDC TIME DELAY CONTROL
HGS HOT GAS SENSOR
PTCR POSITIVE TEMPERATURE COEFFICIENT RELAY

NOTES: ⚠

1. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
2. MOTOR COMPRESSOR THERMALLY PROTECTED AND ALL 3 PHASE ARE PROTECTED UNDER PRIMARY SINGLE PHASE CONDITIONS.
3. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HERTZ DISCONNECT, VOLTAGE AND PHASE PER RATING PLATE. USE 60° C WIRE.
4. LOW VOLTAGE CIRCUIT TO BE N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 60 HERTZ.
5. TO THERMOSTAT SUB-BASE, REFER TO SYSTEM SCHEMATICS OR SCHEMATICS ON INDOOR SECTION FOR LOW VOLTAGE CONTROL WIRING.

WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED
LOW VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED
REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105° C MIN.)
WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C. AND LOCAL CODES AS APPLICABLE.

WIRE COLOR CODE

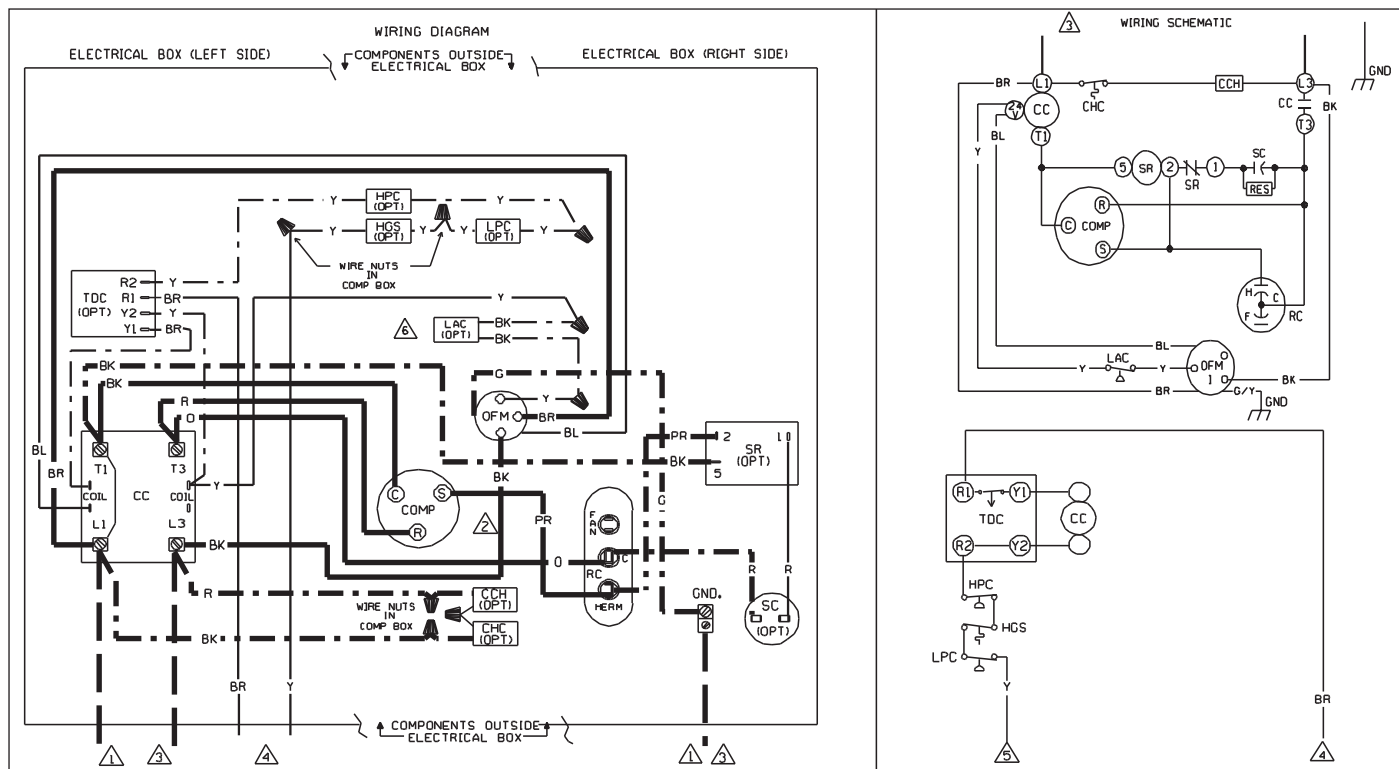
BK__BLACK
BR__BROWN
BL__BLUE
G__GREEN
GY__GRAY
O__ORANGE
PR__PURPLE
R__RED
W__WHITE
Y__YELLOW

WIRING DIAGRAM
REMOTE AIR CONDITIONER
208/230 VOLT SINGLE PHASE



DR. BY JHB DATE 01-19-04 DWG. NO. 90-101229-01 REV 04

FIGURE 7
16.2 ECM OD FAN MOTOR







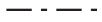
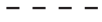
COMPONENT CODE

CC COMPRESSOR CONTACTOR
CCH CRANKCASE HEATER
CHC CRANKCASE HEATER CONTROL
COMP COMPRESSOR
GND GROUND, CHASSIS
HPC HIGH PRESSURE CUT-OUT CONTROL
LAC LOW AMBIENT COOLING CONTROL
LPC LOW PRESSURE CUT-OUT CONTROL
OFM OUTDOOR FAN MOTOR
OPT OPTIONAL
RC RUN CAPACITOR
SC START CAPACITOR
SR START RELAY
TDC TIME DELAY CONTROL
HGS HOT GAS SENSOR
PTCR POSITIVE TEMPERATURE COEFFICIENT RELAY

NOTES:

1. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
2. MOTOR COMPRESSOR THERMALLY PROTECTED AND ALL 3 PHASE ARE PROTECTED UNDER PRIMARY SINGLE PHASE CONDITIONS.
3. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HERTZ DISCONNECT, VOLTAGE AND PHASE PER RATING PLATE. USE 60° C WIRE.
4. LOW VOLTAGE CIRCUIT TO BE N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 60 HERTZ.
5. TO THERMOSTAT SUB-BASE, REFER TO SYSTEM SCHEMATICS OR SCHEMATICS ON INDOOR SECTION FOR LOW VOLTAGE CONTROL WIRING.
6. IF LAC/LAR IS NOT USED, CONNECT YELLOW WIRE FROM OFM TO 24V CC.

WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD 
-FACTORY OPTION 
-FIELD INSTALLED 
LOW VOLTAGE
-FACTORY STANDARD 
-FACTORY OPTION 
-FIELD INSTALLED 
REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105° C MIN.)
WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C. AND LOCAL CODES AS APPLICABLE.

WIRE COLOR CODE

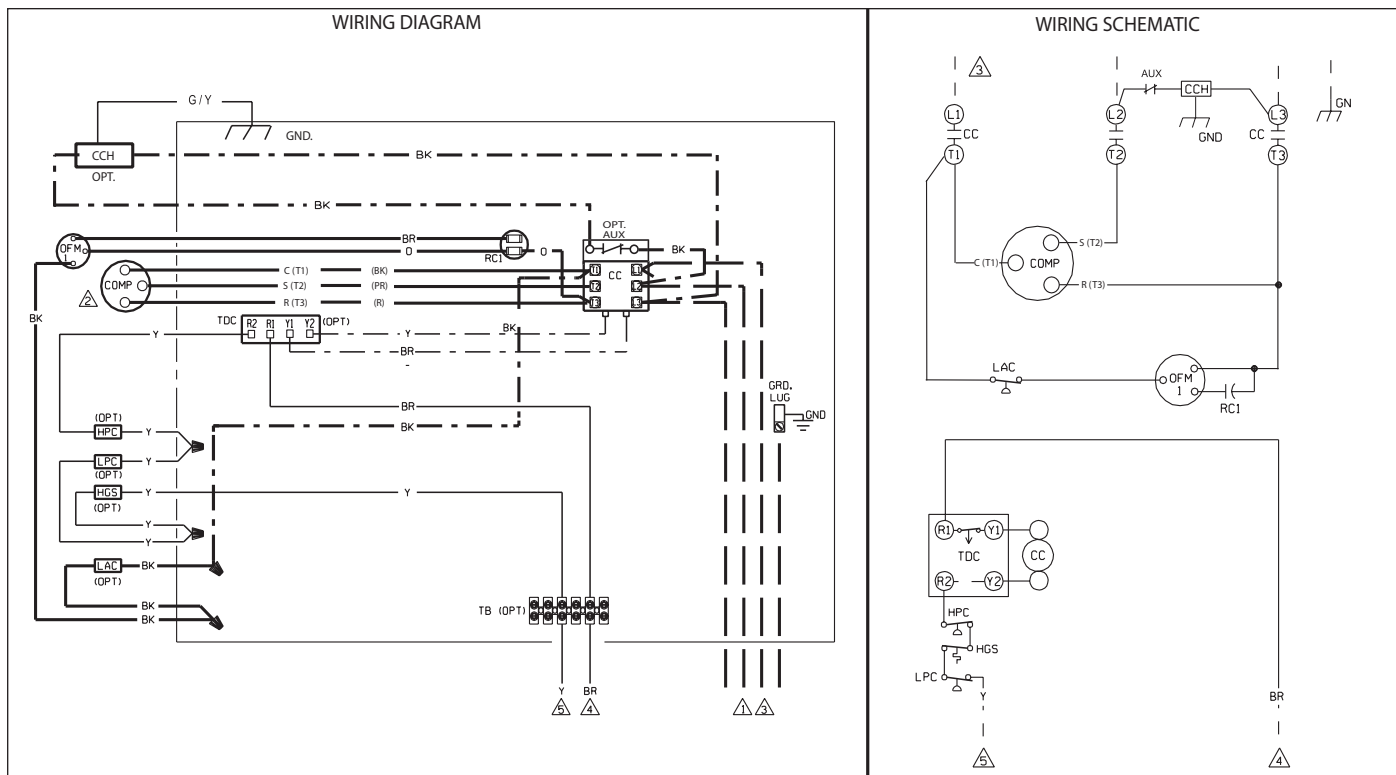
BK__BLACK
BR__BROWN
BL__BLUE
C__GREEN
GY__GRAY
O__ORANGE
PR__PURPLE
R__RED
W__WHITE
Y__YELLOW

WIRING DIAGRAM
REMOTE AIR CONDITIONER
WITH OUTDOOR ECM MOTOR
208/230 VOLT SINGLE PHASE



DR. BY MGR	DATE 10-8-08	DWG. NO. 90-101229-21	REV 03
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FIGURE 8
16.3 PSC OD FAN MOTOR
THREE-PHASE WIRING DIAGRAM



COMPONENT CODE		NOTES:	
CC CCH COMP GND HGS HPC LAC LPC OFM OPT RC RES SC SR TB TDC	COMPRESSOR CONTACTOR CRANKCASE HEATER COMPRESSOR GROUND, CHASSIS HOT GAS SENSOR HIGH PRES. CUT-OUT CONTROL LOW AMBIENT COOLING CONTROL LOW PRESSURE CONTROL OUTDOOR FAN MOTOR OPTIONAL RUN CAPACITOR RESISTOR START CAPACITOR START RELAY TERMINAL BLOCK TIME DELAY CONTROL	1. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY. 2. COMPRESSOR MOTOR THERMALLY PROTECTED AND ALL 3 PHASE ARE PROTECTED UNDER PRIMARY SINGLE PHASE CONDITIONS. 3. CONNECT FIELD WIRING IN GROUND RAIN TIGHT CONDUIT TO FUSED DISCONNECT, VOLTAGE, HERTZ AND PHASE PER RATING PLATE. 4. LOW VOLTAGE CIRCUIT TO BE N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 50 OR 60 HERTZ. 5. TO THERMOSTAT SUB-BASE, REFER TO SYSTEM SCHEMATICS OR SCHEMATICS ON INDOOR SECTION FOR LOW VOLTAGE CONTROL WIRING.	
WIRING INFORMATION		WIRE COLOR CODE	
LINE VOLTAGE -FACTORY STANDARD _____ -FACTORY OPTION - - - - - -FIELD INSTALLED - - - - - LOW VOLTAGE -FACTORY STANDARD _____ -FACTORY OPTION - - - - - -FIELD INSTALLED - - - - - REPLACEMENT WIRE -MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105° C MIN.) WARNING -CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C. AND LOCAL CODES AS APPLICABLE.		BK__BLACK BR__BROWN BL__BLUE G__GREEN GY__GRAY O__ORANGE PR__PURPLE R__RED W__WHITE Y__YELLOW	
ELECTRICAL WIRING DIAGRAM		REMOTE AIR CONDITIONER THREE PHASE	
DR. BY JHB		APP. BY DATE 6-01-07	DWG. NO. 90-101229-11
		REV 07	