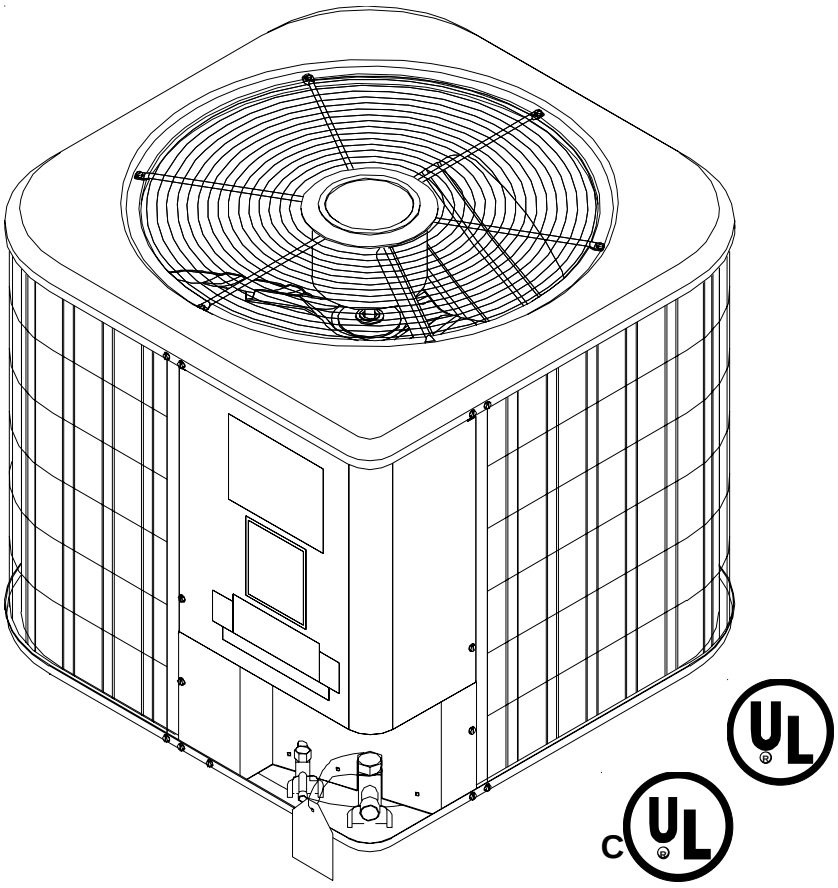
R-410A Remote Unit
Installation Instructions

Heating & Air Conditioning
Amana®
LASTS AND LASTS AND LASTS.™

COVERAGE
RSC, RSG, RTC, RTG



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*NOTE: Please contact your distributor or our website for the applicable product data book referred to in this manual.

These installation instructions cover the **outdoor** installation of remote condensing units. See the outdoor unit Product Data Book applicable to your model* for information regarding accessories. **Local codes usually require that a disconnect switch be located near the unit. Do NOT locate the disconnect switch on the unit itself.**

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Safety Instructions

Recognize Safety Symbols, Words, and Labels

The following symbols and labels are used throughout this manual to indicate immediate or potential safety hazards. It is the owner's and installer's responsibility to read and comply with all safety information and instructions accompanying these symbols. Failure to heed safety information increases the risk of personal injury, property damage, and/or product damage.

WARNING

WARNING - Hazards or unsafe practices which COULD result in severe personal injury or death.

CAUTION

CAUTION - Hazards or unsafe practices which COULD result in minor or moderate personal injury, product damage, property damage.

WARNING

To avoid personal injury, shock, or death, ensure the electrical disconnect switch(es) is (are) in the OFF position before installing, modifying, or servicing the unit. Lock out and tag the switch with a suitable warning label. Wiring must conform with NEC or CEC and all local codes.

Safety Guidelines

1. Allow only qualified, experienced technicians to install or service this unit.
2. Install the system in accordance with all local codes. If no local codes exist, follow National Codes (NEC in the U.S., CEC in Canada).
3. Open the electrical disconnect switch(es) before electrically connecting the unit.
4. Before operating the unit, be certain it is properly grounded.
5. The unit contains refrigerant gas under pressure. Avoid puncturing or breaking any tubing.
6. Before operating the unit, complete the refrigerant connections.

General Information

Shipping and Handling

Units are securely packed in shipping containers approved by the International Safe Transit Association. Check the carton upon arrival for external damage. If damage is found, file a request in writing for inspection by the carrier agent immediately. The carrier is responsible for making prompt inspection of damage and for a thorough investigation of each claim. The distributor or manufacturer will not accept claims from dealers for transportation damage. If no damage is found, carefully remove all shipping material and properly dispose of it.

Keep the unit as upright as possible. Laying the unit on its side or top could cause equipment damage.

Clearances and Accessibility

DO NOT locate the unit:

- Directly under a vent termination for a gas appliance.
- Within three feet of a clothes drier vent.
- Where water may rise into the unit.
- Where the noise would prove to be a nuisance to the customer (i.e. windows, patios, decks, etc.)

AVOID:

- Direct tubing contact with water pipes, ductwork, floor joists, wall studs, floors, and walls.
- Suspending refrigerant tubing from joists and studs with rigid wire or straps that would come in contact with tubing.

DO locate the unit:

- In accordance with the minimum clearances described in Figure 1.
- To minimize the length of refrigerant piping required.
- To provide adequate service clearances.
- On a level concrete pad (or other sturdy, weather resistant platform).
- Isolated from the building structure to avoid transmission of vibrations.

DO:

- Leave slack between structure and unit to absorb vibration.
- When passing refrigerant tubes through the wall, seal the opening with RTV or a pliable silicon-based caulk.
- Ensure that the vapor and liquid line tube diameters are appropriate for unit capacity.
- Avoid unnecessary turns and bends by running refrigerant tubing as directly as possible.

In general, short runs of refrigerant piping are better than long runs. If practical, locate the unit accordingly.

Locate the unit to provide safe access for future maintenance and service. If possible, discuss unit location with the owner before proceeding.

This unit is for outdoor installation only. It cannot be completely enclosed. Refer to Figure 1 for clearances from the sides of the unit to full walls and other objects.

Minimum clearances are required to avoid air recirculation and keep the unit operating at peak efficiency. A minimum six inch clearance is required on one side of the unit, and a minimum of twelve on two other sides. The remaining side of the unit must be unrestricted. Ensure that there is at least five feet clearance above the unit. These minimum clearances do not guarantee adequate service access. Sufficient clearances for servicing the unit(s) must be provided.

If installing two or more units at the same location, allow at least 24 inches between the units when using the 6”-12”-12” guidelines in Figure 1. The space between two units may be reduced to 12” if the clearances in Figure 1 are increased to 12”-24”-24”.

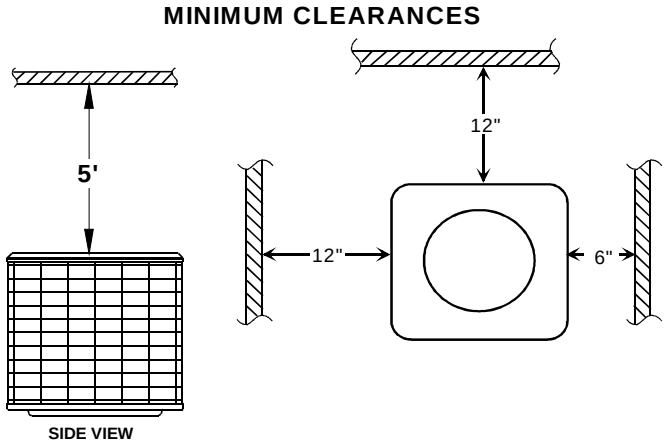


Figure 1 - Clearances

Refrigerant Piping

Rooftops Installations Only

Place the unit on a level, weather resistant platform. Be sure the roof will support the weight of the unit and platform. For approximate unit weight, see the Product Data Book applicable to your model*. If in doubt about the adequacy of the roof, it is your responsibility to contact a qualified architect or structural engineer before installing the unit.

TXV Installation

Install only the factory-approved TXV kit specified on the service label. **DO NOT USE AN R-22 TXV.** Install the TXV according to the instructions included in the kit.

With Factory-Matched Indoor Coils

Install factory-recommended evaporator coils as listed in the sales literature and ARI.

IMPORTANT: If the unit is to be installed on a system with a TXV metering device, remove indoor coil piston (orifice) to avoid damaging the unit.

Application Note

For proper performance, the indoor equipment and ductwork must be adequate for moving about 400 CFM of indoor air for every ton of cooling capacity to be installed. If they are not, modify the ductwork or indoor equipment accordingly.

Refrigerant Vapor Line Sizing

See the outdoor unit Product Data Book applicable to your model* for required tubing sizes. Using smaller vapor lines may decrease performance up to 10%. These sizes are suitable for line lengths of fifty feet or less. It also assumes that the indoor coil will not be more than forty feet above or below the outdoor unit for single stage units and not more than 25 feet below the condenser for two-stage units. Longer runs and greater lifts are not recommended. If a run of more than fifty feet is required, refer to the Remote Cooling Service Manual or contact your distributor for assistance.

R-410A Installation Considerations

Drain any residual mineral oil from the existing system and line sets. Pay particular attention to low areas where oil may collect. Traps must be drained of oil. R-410A systems tolerate only a small amount of mineral oil.

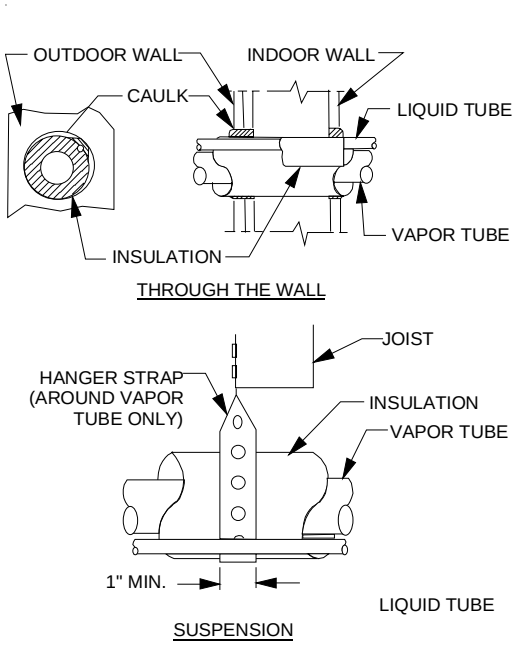


Figure 2 - Connecting Tubing Installation

Refrigerant Vapor and Liquid Lines Routing

All of the vapor line must be insulated. The insulation must include a vapor barrier.

The liquid line must be outside the vapor line insulation.

If part of the liquid line must run through an area that will be hotter than 120°F, then that portion of the liquid line must be insulated.

Avoid burying refrigerant lines. If you must bury them, first dig the trench so it gradually slopes toward the compressor (at least 1 inch per 10 feet). Then, insulate the liquid and suction lines separately. Enclose all underground portions of the refrigerant lines in waterproof material (conduit or pipe). If the lines must pass under or through a concrete slab, be sure they are adequately protected.

- Seal the holes where the refrigerant piping enters the building.
- Be careful not to kink or dent the refrigerant lines. Kinked or dented lines will cause poor performance or compressor damage.

NOTE: The service valve connections are oriented at a 45° angle to the unit. Either side of the unit adjacent to the valves can be conveniently located toward the house.

*NOTE: Please contact your distributor or our website for the applicable product data book referred to in this manual.

Refrigerant Piping

Filter Drier

The liquid line filter drier is factory-installed. Any time the refrigeration system has been opened for service, a new properly-sized filter drier rated for R-410A must be installed.

⚠ CAUTION

Do not leave system open to atmosphere any longer than necessary for installation. The compressor POE oil is extremely susceptible to moisture absorption and could cause compressor failure. Ensure ends of tubing are sealed before and during installation.

Sweat Connections

IMPORTANT: To avoid overheating the service valve, TXV valve, or filter drier while brazing, wrap the component with a wet rag, or use a thermal heat trap compound as recommended by the compound manufacturer. Use a brazing alloy of 2% minimum silver content. Do not use flux.

1. The ends of the refrigerant lines must be cut square, deburred, cleaned, and be round and free from nicks or dents. Any other condition increases the chance of a refrigerant leak.

2. During brazing, wrap the component with a wet rag, or use a thermal heat trap compound recommended by the compound manufacturer, to avoid overheating the service valve, TXV valve, or filter drier while brazing. “Sweep” the refrigerant line with nitrogen or inert gas during brazing to prevent the formation of copper-oxide inside the refrigerant lines. The POE oils used in R-410A applications will clean any copper-oxide present from the inside of the refrigerant lines and spread it throughout the system, this may cause a blockage or failure of the TXV.

3. After brazing, quench the joints with water or a wet cloth. This will also help prevent overheating of the service valve.

4. The paint finish of a filter drier must remain intact after brazing. If the paint of the steel filter drier has been burned or chipped, repaint or treat with a rust preventative. This is especially important on suction line filter driers which are continually wet when the unit is operating.

Safe Refrigerant Handling

While these items will not cover every conceivable situation, they should serve as a useful guide.

WARNING

To avoid possible explosion, injury or death, practice safe handling of refrigerants.

WARNING

Refrigerants are heavier than air. They can “push out” the oxygen in your lungs or in any enclosed space. To avoid possible death or difficulty in breathing:

- Never sniff a refrigerant.
- Never purge refrigerant into an enclosed room or space. In fact, all refrigerants must, BY LAW, be reclaimed.
- If an indoor leak is suspected, thoroughly ventilate the area before beginning work.
- Liquid refrigerant can be very cold. To avoid possible frostbite or blindness, avoid contact and wear gloves and goggles. If liquid refrigerant does contact your skin or eyes, get medical help immediately.
- Always follow EPA regulations. Never burn refrigerant, as poisonous gas will be produced.

WARNING

To avoid possible explosion:

- Never apply flame or steam to a refrigerant cylinder. If you must heat a cylinder for faster charging, partially immerse it in warm water.
- Never fill a cylinder more than 80% full of liquid refrigerant.
- Never add anything other than R-410A to an R-410A cylinder. R-410A operates at a 50 to 70% higher than standard R-22 systems. Service equipment used must be listed or certified for R-410A.
- Store cylinders in a cool, dry place. Never use a cylinder as a platform or a roller.

WARNING

To avoid possible explosion, use only returnable (not disposable) service cylinders when removing refrigerant from a system.

- Ensure the cylinder is free of damage which could lead to a leak or explosion.
- Ensure the hydrostatic test date does not exceed 5 years.
- Ensure the pressure rating meets or exceeds 400 lbs.

When in doubt, do not use cylinder.

Safe Refrigerant Handling

Frontseating Service Valves

WARNING

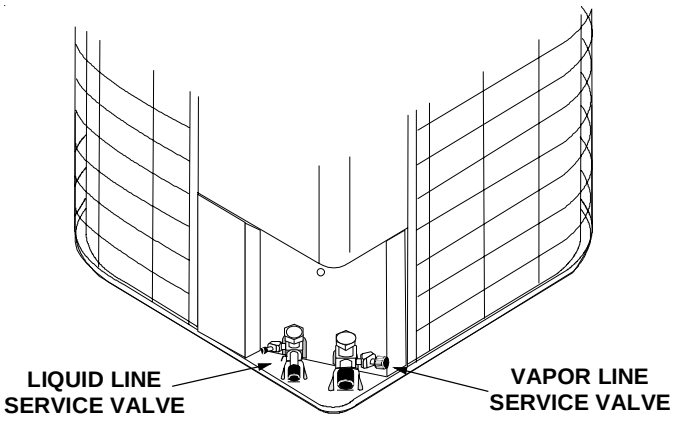
The gauge ports have a standard hose connection size. Hoses must be rated to 800 psig. R-410A manifold gauge set must be used.

Leak Testing

WARNING

To avoid the risk of fire or explosion, never use oxygen, high pressure air or flammable gasses for leak testing of a refrigeration system.

1. Before testing ensure both hand valves on the gauge manifold are closed relative to the center port (i.e., turned IN all the way.)



WARNING

To avoid possible explosion, the line from the nitrogen cylinder must include a pressure regulator and a pressure relief valve. The pressure relief valve must be set to open at no more than 150 psig.

2. Connect a dry nitrogen cylinder to the center port on the gauge manifold.

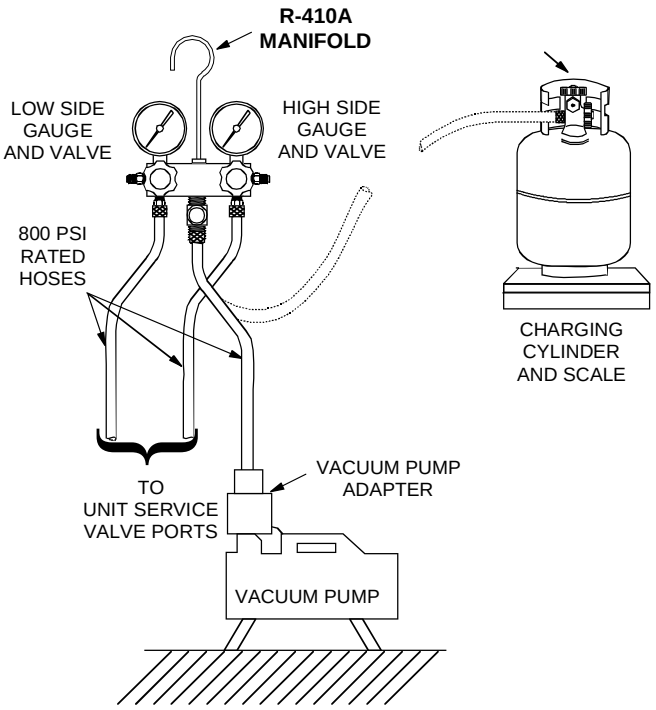


Figure 4
Deep Evacuation Method

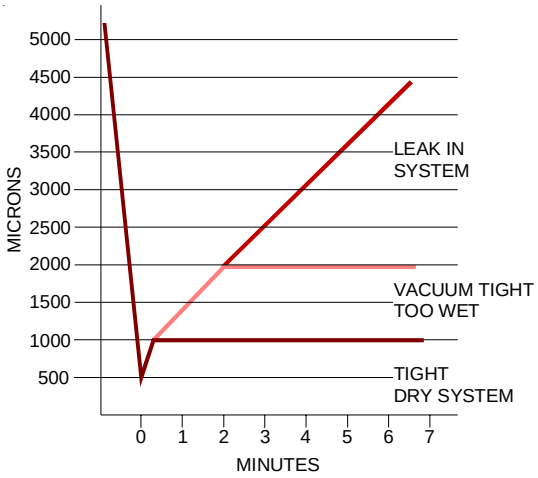


Figure 5
Deep Vacuum Graph

3. Open the hand valve a minimal amount on the line coming from the nitrogen cylinder.
4. Open the high pressure valve on the gauge manifold. Pressurize the refrigerant lines and the indoor coil to 150 psig (1034 kPA). To reach 150 psig, you may need to further open the hand valve on the nitrogen cylinder.

WARNING

To avoid possible explosion or equipment damage, do not exceed 150 psig when pressure testing.

5. Close the valve on the nitrogen cylinder and disconnect it from the gauge manifold.
6. Check for leaks. Apply a soap solution on all connections and joints. If you see bubbles, you have a leak. Mark these locations.

   NOTE: If you use an electronic leak detector to test for leaks, ensure the electronic leak detector used is capable of sensing HFC-type refrigerants. Also, add a trace of R-410A to the system (if permitted by current EPA regulations) before testing.
7. Using the gauge manifold, carefully release the nitrogen from the system. If leaks are found, repair them. After repair, repeat the above pressure test. If no leaks exist, proceed to system evacuation.

System Evacuation

Your system is shipped with the valve stems closed and caps installed. Do not open these valves until the system is completely evacuated. There are two ways that your system can be evacuated: the Deep Vacuum Method or the Triple Evacuation Method. Use the Triple Evacuation Method when the vacuum pump being used will only pump down 28 inches of mercury vacuum and your system does not contain liquid water; otherwise, use the following method.

Deep Vacuum Method

1. Connect the vacuum pump, R-410A manifold set with vacuum hoses, and charging cylinder as shown. Ensure the vacuum pump used is capable of pulling a vacuum of 250 microns. Begin with all valves fully closed.
2. Confirm proper pump and gauge operation. Open the shutoff valve which leads to the high vacuum gauge manifold. Start the pump. When the compound gauge (low side) reading drops approximately 29 inches of vacuum, open the valve to the thermocouple vacuum gauge and evacuate until the gauge reads 250 microns or less.
3. Close the valve to the thermocouple vacuum gauge. This avoids potential gauge damage from "pegging the meter".
4. Open the high and low side valves on the gauge manifold. Keeping the valve on the charging cylinder closed, open the valve on the gauge manifold that leads to the cylinder.
5. Evacuate the system to about 29 inches Hg as measured by the compound (low side) gauge.

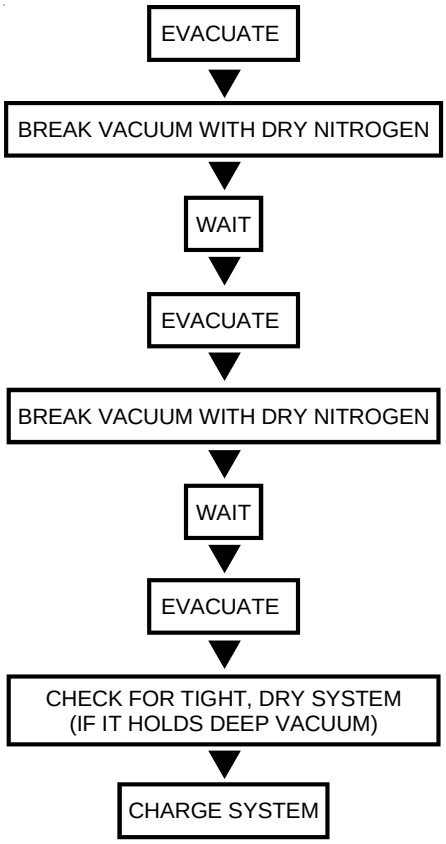


Figure 6 - Triple Evacuation Method

6. Open the valve to the thermocouple vacuum gauge. Evacuate until the gauge reads 250 microns or less.
7. Close the valve to the vacuum pump. Wait five minutes, then check the pressure on the thermocouple vacuum gauge (Figure 5).
   a. If the pressure is not more than 1000 microns, the system is leak-free and properly evacuated. Proceed to Step 9.
   b. If the pressure rises, but holds at about 2000+ microns, moisture and noncondensibles are still present. Open the valve to the vacuum pump, and go back to Step 7.
   c. If the pressure rises above 5000 microns, a leak is present. Go back to "Leak Testing" section above.
8. Close the valve to the thermocouple vacuum gauge. Close the valve to the vacuum pump. Shut off the pump.

Triple Evacuation Method

1. Pump system down to 28 inches of mercury and allow pump to continue operating for an additional 15 minutes.
2. Close manifold gauge valves and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.
4. Close manifold valves and allow system to stand for one hour. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.
5. Repeat this procedure as indicated in Figure 6. System will then be free of any contaminants and water vapor.

Safe Refrigerant Handling

Line Set Refrigerant Charge

Following evacuation of the low side, add additional R-410A to the line set, if needed. The unit is factory-charged to include a system with a 3/8" x 15' liquid line. This is an 8 oz. allowance. If additional charge is needed, add this prior to releasing the factory charge into the low side. If less charge is needed, recover the excess R-410A during final charge adjustment. Use the factors below to determine the installed liquid line charge needed.

1/4" OD LIQUID LINE = .20 oz. per foot

5/16" OD LIQUID LINE = .36 oz. per foot

3/8" OD LIQUID LINE = .55 oz. per foot

1/2" OD LIQUID LINE = 1.07 oz. per foot

IMPORTANT: Use only refrigerant which is certified to meet ARI Standard 700. Used refrigerant may cause compressor damage, and will void the warranty. (Most portable machines cannot clean used refrigerant well enough to meet this ARI Standard.)

NOTE: R-410A refrigerant cylinders contain a dip tube which allows liquid refrigerant to flow with the cylinder in an upright position. R-410A refrigerant should be charged in the upright position with the liquid gradually metered into the unit.

Factory Charge Release Into System

1. Remove the service port caps and valve bonnets.
2. Use a male hex head wrench (3/16" for liquid, 5/16" for suction) to carefully open the suction and liquid valve stem on the unit. These valves do not back seat. OPEN EACH VALVE ONLY UNTIL THE TOP OF THE STEM IS 1/8" FROM THE RETAINER. TO AVOID LOSS OF REFRIGERANT, DO NOT APPLY PRESSURE TO THE RETAINER.

Once electrical connections are made, the sytem is ready for startup.

Electrical Connections

WARNING

To avoid personal injury or death due to electrical shock, disconnect the electrical power before servicing or connecting the unit. Wiring must conform with NEC or CEC and all local codes.

WARNING

To avoid the risk of fire or equipment damage, use only 75°C minimum-rated copper conductors.

WARNING

Consult the National Electrical Code or a qualified electrician for proper wire size. Undersized wires could cause poor equipment performance, equipment damage, or fire.

WARNING

To avoid personal injury or death due to electrical shock, wiring to the unit must be properly polarized and grounded.

Local codes will usually require that a disconnect switch be located near the unit. Do not locate the disconnect switch on the unit itself.

The wiring diagram for this unit can be found on the control box door. Refer to Figures 7 and 7a for field wiring connections.

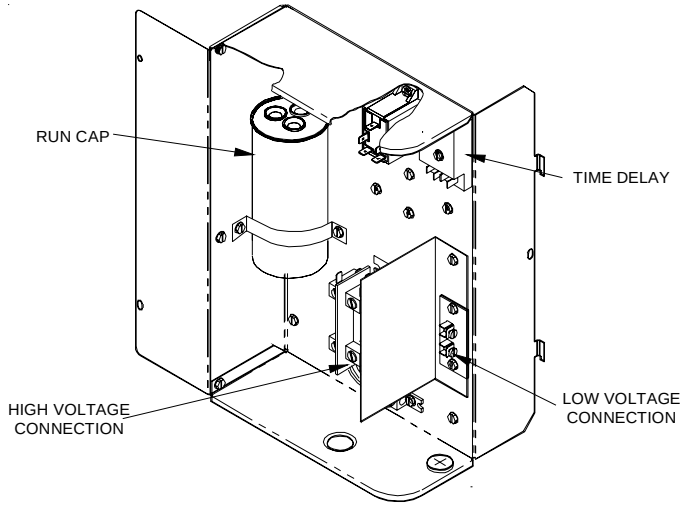


Figure 7
RSC/RSG Unit Control Panel

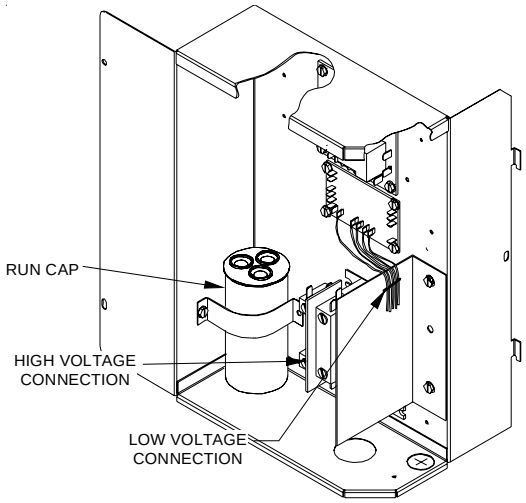


Figure 7a
RTC/RTG Unit Control Panel

Electrical Connections

Wiring

Wire size is important to ensure proper unit operation. The size must be sufficient to carry the minimum circuit ampacity listed on the unit serial data plate. We recommend sizing the wires to limit the voltage drop to a maximum of 2% from the main breaker or fuse panel to the outdoor unit. Consult the NEC, CEC, and all local codes to determine the correct wire gauge and necessary length of run for proper wiring.

1. To connect unit to power supply, route the power supply and ground wires through the high voltage entrance in the unit.
2. Connect the ground wire to the ground lug and power supply wires to the contactor.

LOW VOLTAGE WIRING CONNECTIONS

Low voltage wiring for the two-stage remote air conditioner depends on the thermostat used and the number of thermostat wires run between the indoor unit (furnace or blower) and the remote. For kit requirements, see Table 1; for low voltage wiring with kits see Figures 10, 11, and 12.

Thermostat	Number of Wires to Remote	Kit	Quantity
Single-Stage	2	TSRK01	2
	3	TSRK01	1
Two-Stage	2	TSTWK01	1
	3	none	none

Table 1

VARIABLE SPEED APPLICATIONS

Refer to the Installation Instructions supplied with the indoor furnace/air handler unit for specific wiring connections and indoor unit configuration.

Consult the instructions packaged with the thermostat for mounting and location instructions. RSG unit wiring connections for a two-stage thermostat with three wires to remote are shown in Figures 8 and 9. Figures 10, 11, and 12 refer to the conditions described in Table 1. **NOTE:** The instructions included with your thermostat may include “typical wiring” for other types of indoor equipment.

Electrical Connections

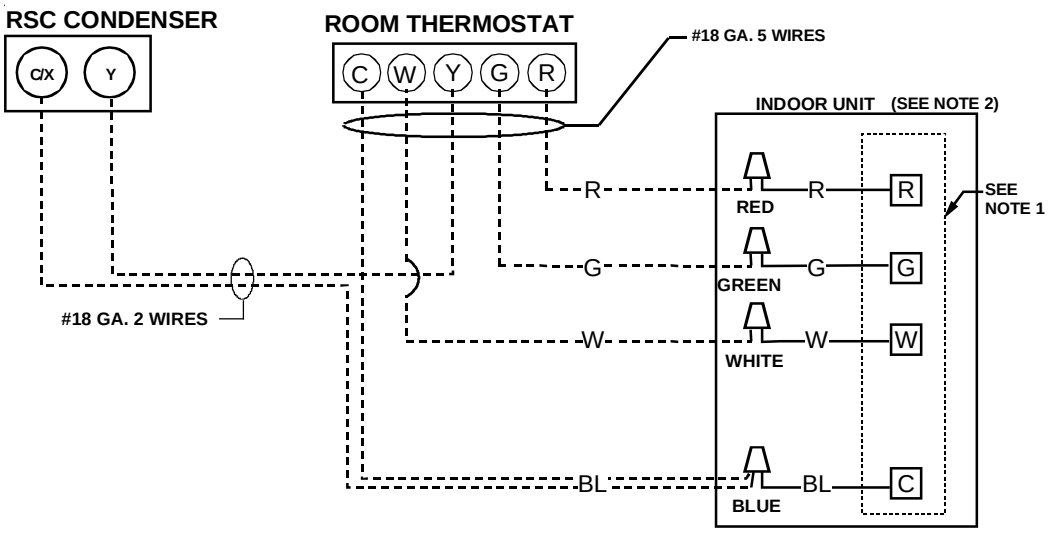


Figure 8
Low Voltage Wiring Diagram for Cooling Unit with One Stage Heat and One Stage Cool Thermostat

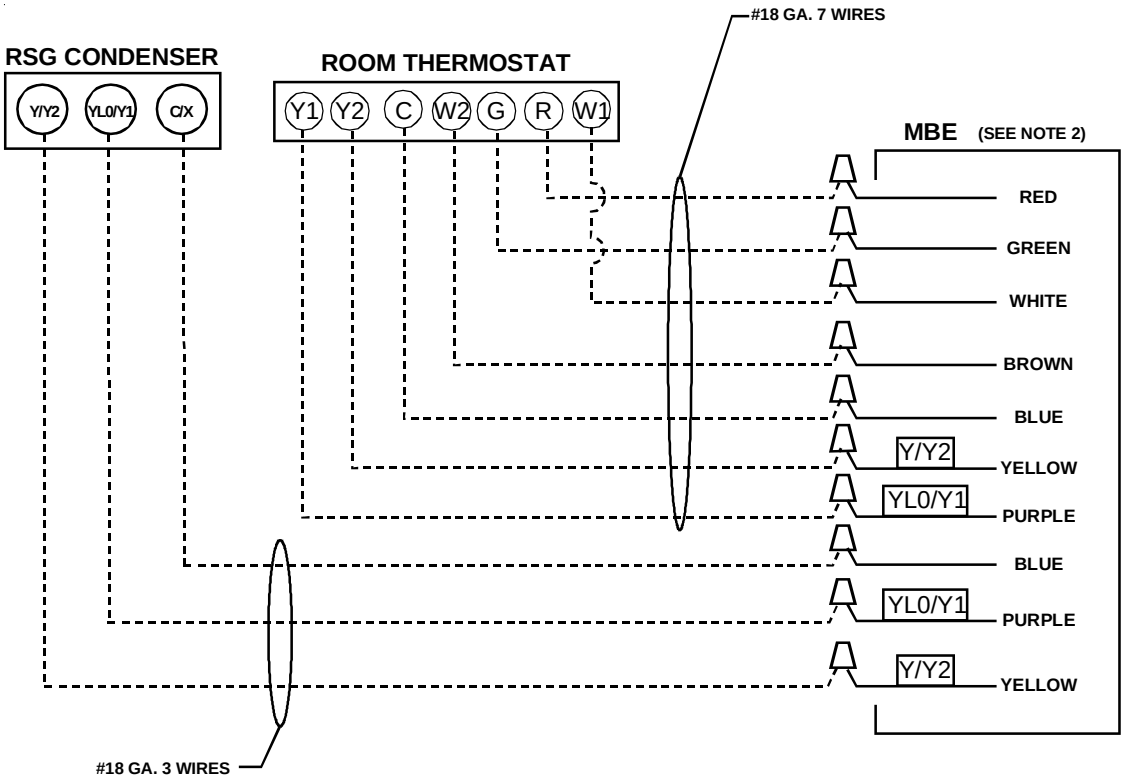


Figure 9
Low Voltage Wiring Diagram for Cooling Unit with Two-Stage Heat and Two-Stage Cool Thermostat

NOTES:

1) TERMINAL BLOCK MARKINGS ARE FOR AMANA® BRAND AIRHANDLERS.
2) REFER TO INSTALLATION INSTRUCTIONS SUPPLIED WITH THE INDOOR FURNACE/AIR HANDLER UNIT FOR SPECIFIC WIRING CONNECTIONS AND INDOOR UNIT CONFIGURATION.

COLOR CODES

R - RED
Y - YELLOW
BL-BLUE
BR-BROWN
O - ORANGE
W - WHITE
G - GREEN
P - PURPLE

Electrical Connections

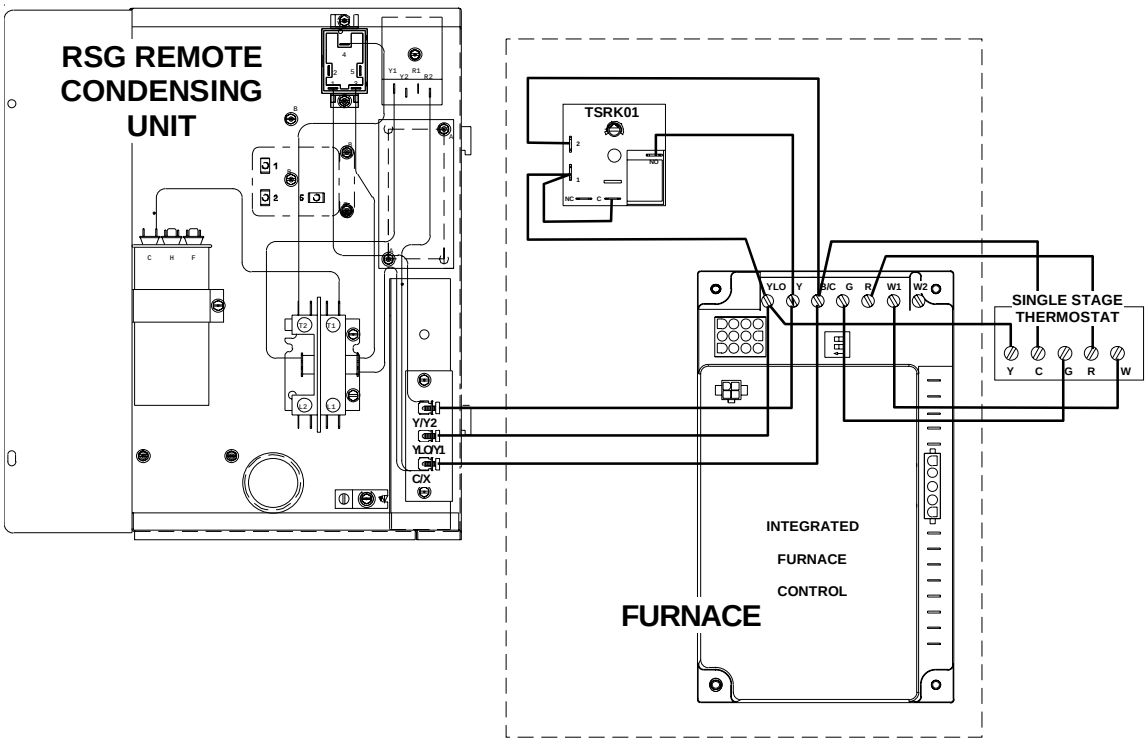


Figure 10
Single-Stage Thermostat with Three Low Voltage Wires to Remote (One [1] TSRK01 Kit Required)

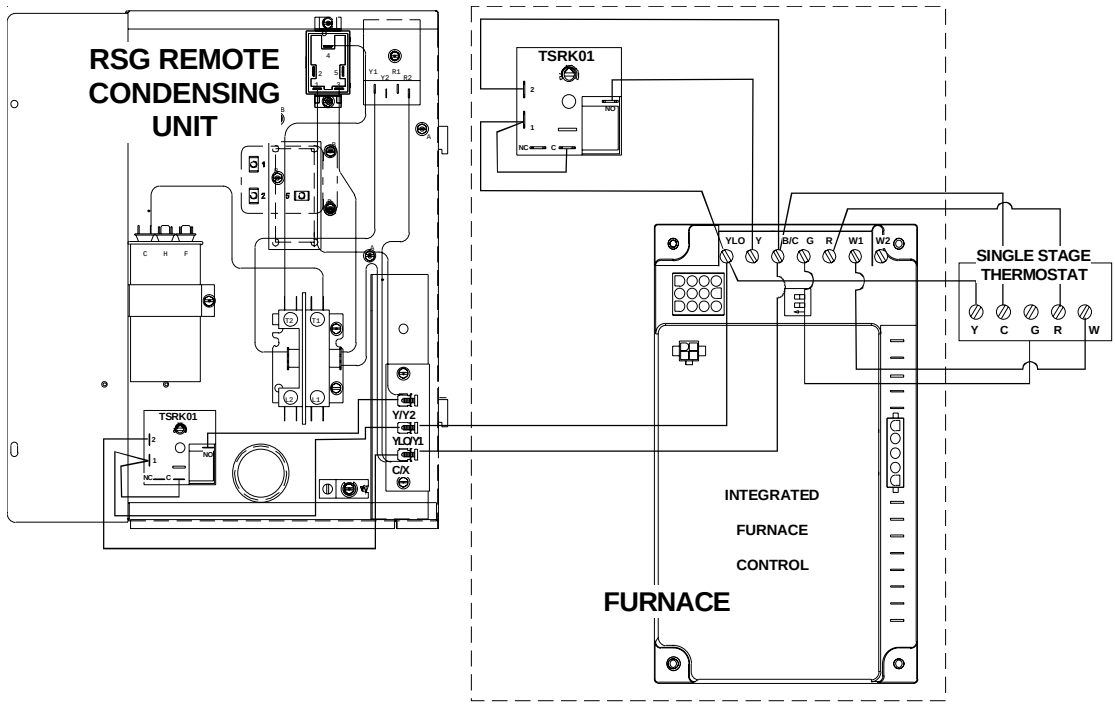


Figure 11
Single-Stage Thermostat with Two Low Voltage Wires to Remote (Two [2] TSRK01 Kits Required)

⚠ WARNING

The TSRK01 adjustable DELAY ON timer settings in the Figure 11 configuration (above) **MUST** be set the same for proper operation. Failure to do so will lead to improper operation and premature failure.

Electrical Connections

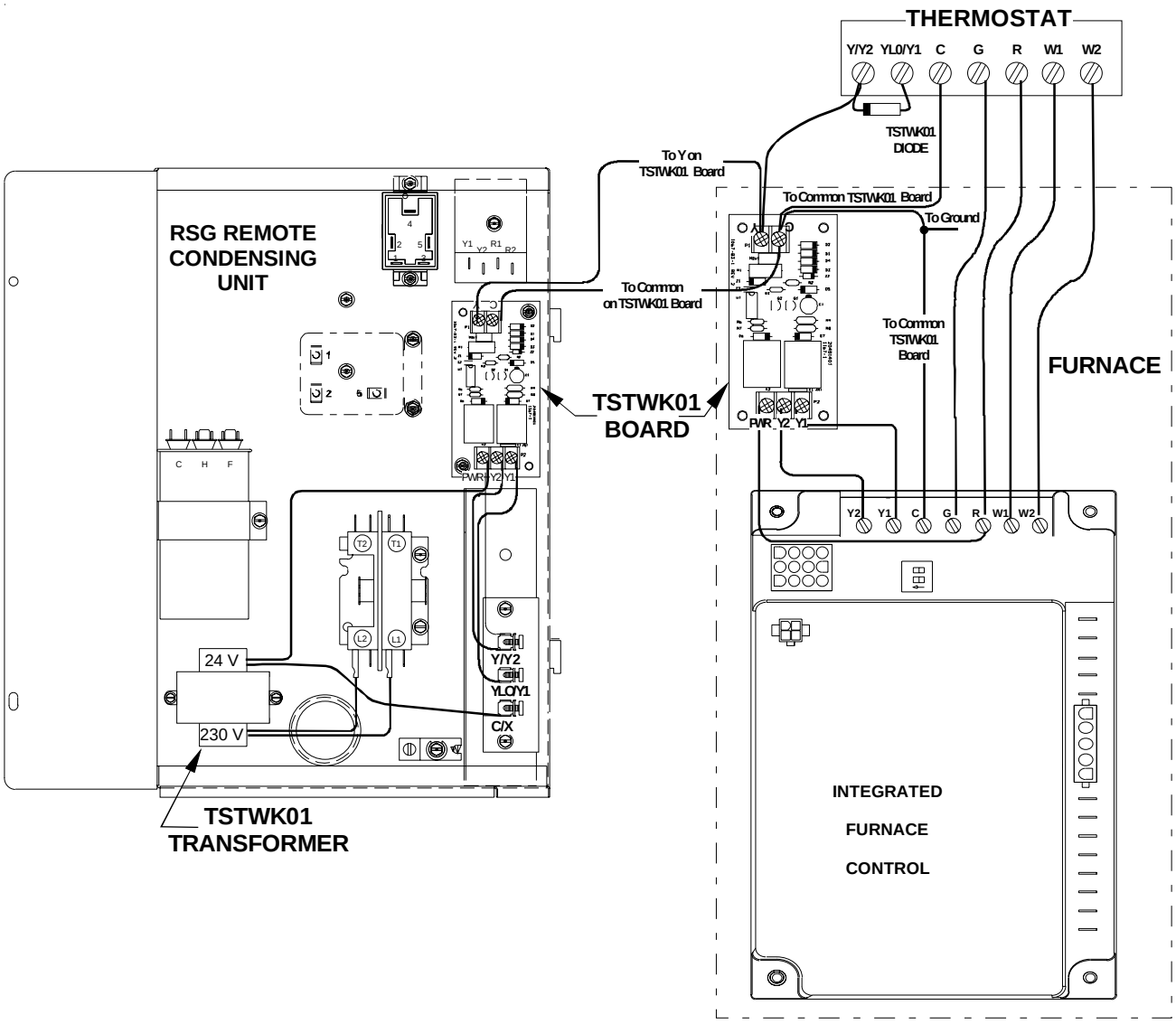


Figure 12
Two-Stage Thermostat with Two Low Voltage Wires to Remote (One [1] TSTWK01 Kit Required)

Typical wiring for a gas furnace is shown in Figure 13. The thermostat instructions may include "typical wiring" for other types of indoor equipment. Consult the instruction packaged with the thermostat for mounting and location instructions.

6. Check all factory wiring connections to ensure none were loosened during shipping and handling.

NOTE: Some indoor furnaces for cooling operation will require that fan relay and/or a 40VA transformer be added. For proper cooling performance, the indoor equipment and ductwork must be capable of moving 400 CFM of indoor air for every ton of cooling capacity to be installed. If it is not, modify the ductwork or indoor equipment accordingly.

For best performance, low stage cooling airflow should be 60%-75% of high stage cooling speed.

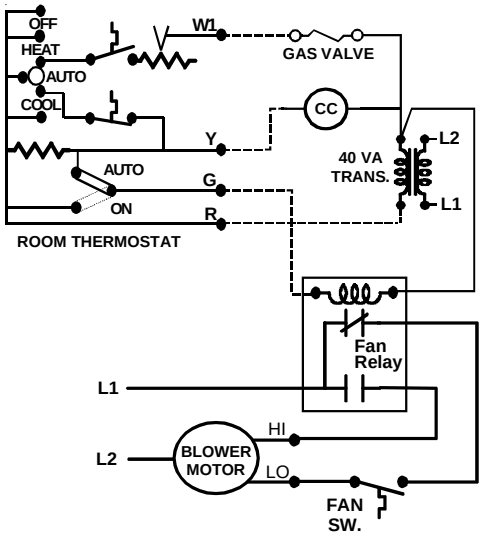


Figure 13 - Gas Furnace Wiring (typ.)

Electrical Connections

Figure 14 Low Voltage Wiring Diagram for Heat Pump with Single-Stage Cool and Two-Stage Heat Thermostat

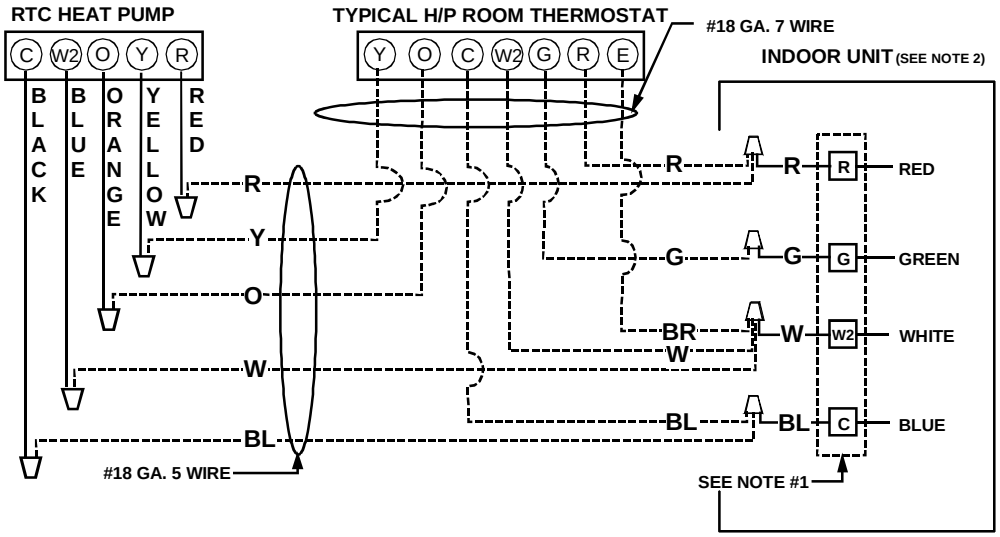
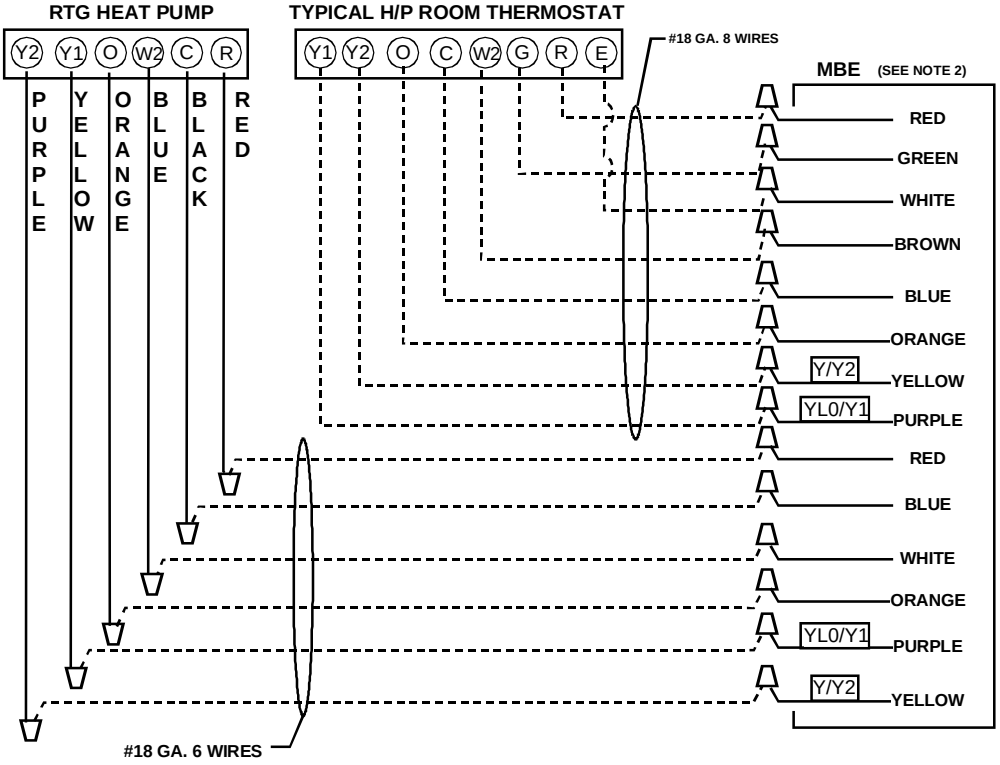


Figure 15 Low Voltage Wiring Diagram for Heat Pump with Two-Stage Cool and Three-Stage Heat Thermostat



NOTES:

1) TERMINAL BLOCK MARKINGS ARE FOR AMANA® BRAND AIRHANDLERS.
2) REFER TO INSTALLATION INSTRUCTIONS SUPPLIED WITH THE INDOOR FURNACE/AIR HANDLER UNIT FOR SPECIFIC WIRING CONNECTIONS AND INDOOR UNIT CONFIGURATION.

COLOR CODES

R - RED
Y - YELLOW
BL-BLUE
BR-BROWN
O - ORANGE
W - WHITE
G - GREEN
P - PURPLE

System Startup

CAUTION

To prevent compressor damage or personal injury:

- Do not overcharge system with refrigerant.
- Do not operate unit in a vacuum or at negative pressure.
- Do not disable the low pressure switch.
- Use care when handling scroll compressors, dome temperatures could be hot.

CAUTION

To prevent personal injury, wear safety glasses, protective clothing, and gloves when handling refrigerant.

CAUTION

To prevent personal injury, carefully connect and disconnect manifold gauge hoses. Escaping liquid refrigerant can cause burns. Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal

IMPORTANT!

During all installation and service work, follow all regulations of the Environmental Protection Agency (EPA). This system uses R-410A - an HFC [Hydrofluorocarbon]. Violation of EPA regulations may result in fines or other penalties.
Never operate the compressor with the suction valve closed to "test the compressor's pumping efficiency". In some cases, this can result in serious compressor damage and loss of warranty coverage. The TSTWK01 kit requires both low voltage and high voltage wiring connections be made.

1. If manifold gauge set hoses are not connected, connect the gauge hoses.
2. Close electrical disconnects to energize system.
3. If the outdoor temperature is 60°F or higher, set room thermostat to COOL and fan control to ON or AUTO.

   *For the **Two-Stage Thermostat,*** set temperature control until the low stage cooling is activated (Typically 1°F below room temperature).

   *For the **Single-Stage Thermostat,*** set the adjustable ON DELAY timer on all adjustable time relays to 15 minutes. The adjustable time relay is shipped with the TSRK01 kit.
4. Operate unit for 10 minutes.
5. Check and record low stage liquid pressure at the service valve.
6. ***Two-Stage Thermostat*** - adjust thermostat set point well below room temperature.

   Single-Stage Thermostat - wait for the delay relay to activate.
7. Wait 10 minutes and record high stage liquid pressure at the service valve. The high stage liquid pressure should be noticeably higher than the low stage liquid pressure at the service valve.

   If the pressures are identical, the compressor did not switch from low to high stage. Verify thermostat differential on low stage, wiring, etc. and recheck unit again.

System Startup

Low Stage Final Charge Adjustment

Run the remote on low stage cooling for 10 minutes until refrigerant pressures stabilize. Follow the guidelines and methods below to check unit operation and ensure that the refrigerant charge is within limits:

- Obtain the service data table for the outdoor unit located on the label inside the control box cover.
- Measure the suction and liquid pressures at the service valves, the liquid line temperature at the outdoor unit, and the outdoor unit amps. Measure the outdoor ambient temperature, and the indoor wet and dry bulb temperatures (see Product Data Book applicable to your model* expanded performance data).
- Determine the required subcooling from the data label. See the service manual for the proper subcooling adjustments required for long line sets or coil elevations (*systems with a TXV only).*
- *Add* R-410A charge when the liquid subcooling is more than two (2) degrees **below** requirement, and *recover* charge when two degrees **above** the requirement. See the subcooling reference table in the appendix to determine the liquid temperature needed to obtain the target subcooling at the liquid pressure reading.
- Compare suction pressure with performance data. (Suction pressure depends on which coil model is installed, and the indoor air flow and wet bulb).

NOTE: Do **NOT** adjust refrigerant based on suction pressure, unless there is a gross undercharge.

- Compare the low stage liquid pressure to the specification data. Liquid pressure depends on the suction pressure, outdoor temperature, and the liquid subcooling. Make charge adjustments based on the required subcooling determined above.
- Compare the low stage outdoor unit amps to the specification data. The amp reading tracks with the liquid pressure.

  Adjust set point of two-stage thermostat to activate high stage cooling or, in the case of a single -stage thermostat, wait for the time delay relay to activate high stage cooling.

  Measure the liquid pressures at the service valve, the liquid line temperature at the outdoor unit and the amperage of the outdoor unit. For high stage cooling, the subcooling, liquid pressure, and amps should be all be higher on high stage cooling when compared to low stage cooling. **Do not adjust charge to change the subcooling on high stage. Charge adjustments must only be made under low stage cooling.**

If the system is performing properly, reinstall the service port caps and the valve bonnets. With the valve opened, the valve bonnet is the primary seal against refrigerant leaks. Apply two (2) drops of clean oil to the cap threads, allowing the oil to run down to the inner cap seal surface. Close caps finger-tight then tighten cap an additional two to three hex flats. **NOTE:** Subsequent opening and replacing of the cap will require only 1/2 to 1 hex flat. See the table below for the torque required for an effective seal on the valve bonnet (1/6 turn past finger-tight).

Tubing Size	Torque (Foot-Pounds)
3/8	10.0
3/4, 7/8	16.0

After closing the valve bonnet, perform a final refrigerant leak test on the valves and sweat connections. Return the room thermostat to the desired settings.

Final Checks

- Ensure all wiring and tubing are secure in the unit before adding panels and covers.
- Securely fasten all panels and covers.
- Leave Owner's Manual with owner. Explain system operation and periodic maintenance requirements outlined in manual.
- Fill out dealer installation checklist and place in customer file.

Troubleshooting

(QUALIFIED SERVICER ONLY)

When troubleshooting, check for clean coils, clean filter(s), and proper airflow. Indoor airflow should be 350 to 450 CFM per ton of cooling, based on the size of the outdoor unit. The most common way of establishing indoor airflow is heating temperature rise. Indoor airflow will then be (heating output of equipment) / (1.1 x temp. rise). In other cases, measurement of external static pressure is helpful. For details, see the Installation Manual for your indoor equipment.

If further information is needed, see the Remote Cooling Service Manual.

*NOTE: Please contact your distributor or our website for the applicable product data book referred to in this manual.

System Startup - RTG Units Only

Defrost System

To avoid electric shock or death, disconnect the power before changing the defrost time cycle or servicing the unit.

This unit is equipped with a time/temperature defrost board. Defrosting of the outdoor coil is determined by both coil temperature and compressor run time. Adjustment can be changed as required. There are 30, 60, and 90 minute settings available. Adjust only if geographical conditions, outdoor humidity, or other adverse conditions make it necessary. The maximum defrost time is 10 minutes. Most defrost cycles are shorter.

Run Time Adjustment

1. Disconnect power to outdoor unit.
2. Move the defrost time adjustment pin from 30 minutes to 60 minutes or 90 minutes as required.
3. Reconnect the electric power.

Rapid Advance

When servicing the unit, it may be necessary to rapidly advance the system through a defrost cycle. To perform a rapid advance:

1. Ensure the 24VAC power is ON.
2. Place the defrost time adjustment pin on “TEST”.

   NOTE: If the outdoor coil temperature is above 30°F, place a jumper wire between the “DFS” terminals (defrost sensor) on the defrost control before placing defrost time adjustment pin on “TEST”.
3. Reconnect electrical power to outside unit.
4. Place the system into heating operation.

The defrost board function will speed up when the test pins are connected. Time between defrosts will be 14 seconds. Defrost time will be 6.5 seconds.

After servicing is completed, disconnect the power, move the Defrost Time Select Tab back to 30, 60, or 90, remove jumper wire on DFS, and reconnect the power.

NOTES:

1. If the time select tab remains in TEST position for five (5) minutes, the control will ignore TEST mode and assume a normal defrost cycle. To override this, briefly remove and then replace the select tab.
2. When the unit starts the defrost cycle, quickly remove the time select tab to allow normal defrosting and defrost termination to proceed. The select tab can be reconnected to TEST to repeat the defrost cycle, or the tab can be placed in the desired time setting. (Jumping both test pins with a small insulated screw driver will also work.)

System Checklist

	1	Is the system clearly marked as containing R-410A refrigerant? (Labels are located on both the indoor coil case and remote unit.)
	2	Does the condenser fan blade rotate freely, and is it tight on the shaft?
	3	Does the refrigerant tubing flex freely and not touch another tube to cause rub through?
	4	Are both indoor and outdoor sections level?
	5	Are the units properly supported?
	6	Is outdoor section properly located on concrete base or equivalent?
	7	Are the refrigerant lines correctly installed according to the relative position of the outdoor and indoor sections?
	8	Is the refrigerant tubing properly supported by isolation hangers?
	9	Is the system completely free of refrigerant leaks?
	10	Has the system been properly evacuated?
	11	Does the system have the correct R-410A refrigerant charge?
	12	Is the outdoor unit protected by the correct size time delay type fuses or breakers in the indoor power box?
	13	Are the power supply wires to units the correct size?
	14	Are all electrical connections tight?
	15	Does the compressor sound normal?
	16	Check the amperage on the indoor blower motor. Is it within the limits shown on the nameplate of the motor?
	17	Are all access panels installed and secured?
	18	Do controls function properly?
	19	Check the voltage with unit running. Does it check within the tolerance of 207 to 253V for 230V, or 198 to 228V? If using 208V power indoors, have you modified the transformer wiring as necessary?
	20	Has the air flow across the indoor coil been checked and adjusted?
	21	Has the air distribution system been balanced? Are all grilles, diffusers, and dampers properly adjusted and locked?
	22	Has the system operated at least 30 minutes before leaving the job?
	23	Does the owner understand the operation of the unit and the thermostat?
	24	Does the owner know where the filters are located?
	25	Does the owner know when and how the filter(s) should be cleaned or changed?
	26	Have the registration cards been filled out and mailed?
	27	Does the owner know whom to call for service?
	28	Has the User's Guide been filled out and left with the owner?

R-410A QUICK REFERENCE GUIDE

- R-410A refrigerant operates at 50-70 percent higher pressures than R-22. Ensure that the servicing equipment and replacement components used are designed to operate with R-410A.
- R-410A refrigerant cylinders are rose colored.
- R-410A refrigerant cylinders have a dip tube which allows liquid to flow out of cylinder in upright position.

  NOTE: Recovery cylinder service pressure rating must be 400 psig, DOT RBA400 or DOT BW400.
- R-410A systems should be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose.
- Manifold sets should be 800 psig high side and 250 psig low side with 550 psig low side retard.
- Use hoses with 800 psig service pressure rating.
- R-410A requires a different set of gauges than those used for R-22.
- R-410A requires Amana®-brand matched indoor/outdoor systems.
- Leak detectors should be designed to detect HFC refrigerant.
- R-410A, as with other HFCs, is only compatible with POE oils.
- POE oils absorb moisture rapidly. Do not expose oil to atmosphere.
- Vacuum pumps will not remove moisture from oil.
- An R-410A listed liquid line filter drier is required on every unit.
- Do not use liquid line filter driers with rated working pressures less than 600 psig.
- Do not install a suction line filter drier in liquid line.
- Wrap all filter driers and service valves with wet cloth when brazing.
- Do NOT use an R-22 TXV.
- If indoor unit is equipped with an R-22 TXV, it must be changed to an R-410A TXV.
- Never open system to atmosphere while it is under a vacuum.
- When system must be opened for service, evacuate then break vacuum with dry nitrogen and replace filter driers.
- Do not vent R-410A into the atmosphere.
- Do not use capillary tube coils.
- Observe all **warnings, cautions,** and **bold** text.

Pressure vs. Temperature Chart

PSIG	°F	PSIG	°F	PSIG	°F	PSIG	°F	PSIG	°F	PSIG	°F
12	-37.7	114	37.8	216	74.3	318	100.2	420	120.7	522	137.6
14	-34.7	116	38.7	218	74.9	320	100.7	422	121.0	524	137.9
16	-32.0	118	39.5	220	75.5	322	101.1	424	121.4	526	138.3
18	-29.4	120	40.5	222	76.1	324	101.6	426	121.7	528	138.6
20	-36.9	122	41.3	224	76.7	326	102.0	428	122.1	530	138.9
22	-24.5	124	42.2	226	77.2	328	102.4	430	122.5	532	139.2
24	-22.2	126	43.0	228	77.8	330	102.9	432	122.8	534	139.5
26	-20.0	128	43.8	230	78.4	332	103.3	434	123.2	536	139.8
28	-17.9	130	44.7	232	78.9	334	103.7	436	123.5	538	140.1
30	-15.8	132	45.5	234	79.5	336	104.2	438	123.9	540	140.4
32	-13.8	134	46.3	236	80.0	338	104.6	440	124.2	544	141.0
34	-11.9	136	47.1	238	80.6	340	105.1	442	124.6	548	141.6
36	-10.1	138	47.9	240	81.1	342	105.4	444	124.9	552	142.1
38	-8.3	140	48.7	242	81.6	344	105.8	446	125.3	556	142.7
40	-6.5	142	49.5	244	82.2	346	106.3	448	125.6	560	143.3
42	-4.5	144	50.3	246	82.7	348	106.6	450	126.0	564	143.9
44	-3.2	146	51.1	248	83.3	350	107.1	452	126.3	568	144.5
46	-1.6	148	51.8	250	83.8	352	107.5	454	126.6	572	145.0
48	0.0	150	52.5	252	84.3	354	107.9	456	127.0	576	145.6
50	1.5	152	53.3	254	84.8	356	108.3	458	127.3	580	146.2
52	3.0	154	54.0	256	85.4	358	108.8	460	127.7	584	146.7
54	4.5	156	54.8	258	85.9	360	109.2	462	128.0	588	147.3
56	5.9	158	55.5	260	86.4	362	109.6	464	128.3	592	147.9
58	7.3	160	56.2	262	86.9	364	110.0	466	128.7	596	148.4
60	8.6	162	57.0	264	87.4	366	110.4	468	129.0	600	149.0
62	10.0	164	57.7	266	87.9	368	110.8	470	129.3	604	149.5
64	11.3	166	58.4	268	88.4	370	111.2	472	129.7	608	150.1
66	12.6	168	59.0	270	88.9	372	111.6	474	130.0	612	150.6
68	13.8	170	59.8	272	89.4	374	112.0	476	130.3	616	151.2
70	15.1	172	60.5	274	89.9	376	112.4	478	130.7	620	151.7
72	16.3	174	61.1	276	90.4	378	112.6	480	131.0	624	152.3
74	17.5	176	61.8	278	90.9	380	113.1	482	131.3	628	152.8
76	18.7	178	62.5	280	91.4	382	113.5	484	131.6	632	153.4
78	19.8	180	63.1	282	91.9	384	113.9	486	132.0	636	153.9
80	21.0	182	63.8	284	92.4	386	114.3	488	132.3	640	154.5
82	22.1	184	64.5	286	92.8	388	114.7	490	132.6	644	155.0
84	23.2	186	65.1	288	93.3	390	115.0	492	132.9	648	155.5
86	24.3	188	65.8	290	93.8	392	115.5	494	133.3	652	156.1
88	25.4	190	66.4	292	94.3	394	115.8	496	133.6	656	156.6
90	26.4	192	67.0	294	94.8	396	116.2	498	133.9	660	157.1
92	27.4	194	67.7	296	95.2	398	116.6	500	134.0	664	157.7
94	28.5	196	68.3	298	95.7	400	117.0	502	134.5	668	158.2
96	29.5	198	68.9	300	96.2	402	117.3	504	134.8	672	158.7
98	30.5	200	69.5	302	96.6	404	117.7	506	135.2	676	159.2
100	31.2	202	70.1	304	97.1	406	118.1	508	135.5	680	159.8
102	32.2	204	70.7	306	97.5	408	118.5	510	135.8	684	160.3
104	33.2	206	71.4	308	98.0	410	118.8	512	136.1	688	160.8
106	34.1	208	72.0	310	98.4	412	119.2	514	136.4	692	161.3
108	35.1	210	72.6	312	98.9	414	119.6	516	136.7	696	161.8
110	35.5	212	73.2	314	99.3	416	119.9	518	137.0		
112	36.9	214	73.8	316	99.7	418	120.3	520	137.3		

*Based on ALLIED SIGNAL Data

Required Liquid Line Temperature

LIQUID PRESSURE AT SERVICE VALVE (PSIG)	REQUIRED SUBCOOLING TEMPERATURE (°F)					
	8	10	12	14	16	18
189	58	56	54	52	50	48
195	60	58	56	54	52	50
202	62	60	58	56	54	52
208	64	62	60	58	56	54
215	66	64	62	60	58	56
222	68	66	64	62	60	58
229	70	68	66	64	62	60
236	72	70	68	66	64	62
243	74	72	70	68	66	64
251	76	74	72	70	68	66
259	78	76	74	72	70	68
266	80	78	76	74	72	70
274	82	80	78	76	74	72
283	84	82	80	78	76	74
291	86	84	82	80	78	76
299	88	86	84	82	80	78
308	90	88	86	84	82	80
317	92	90	88	86	84	82
326	94	92	90	88	86	84
335	96	94	92	90	88	86
345	98	96	94	92	90	88
354	100	98	96	94	92	90
364	102	100	98	96	94	92
374	104	102	100	98	96	94
384	106	104	102	100	98	96
395	108	106	104	102	100	98
406	110	108	106	104	102	100
416	112	110	108	106	104	102
427	114	112	110	108	106	104
439	116	114	112	110	108	106
450	118	116	114	112	110	108
462	120	118	116	114	112	110
474	122	120	118	116	114	112
486	124	122	120	118	116	114
499	126	124	122	120	118	116
511	128	126	124	122	120	118