Installation Operation Manual for models HP-1 thru 5 Split Heat Pumps (230V 3Ø only)

6-14-16



Remote condensing unit.



Model No. HX-36DXHP Heat Exchanger

AQUA LOGIC, INC., INC. 9558 Camino Ruiz, San Diego, CA 92126
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Check packing slip and product to see if they match. If not, contact Aqua Logic immediately!!

Important: Unpacking your outdoor condenser and indoor heat exchanger.



Both the condenser and heat exchanger was properly packed and accepted by the transportation company for shipment. It is the responsibility of the transportation company to deliver it to you in perfect condition.

APPARENT DAMAGE OR LOSS

If, upon delivery, the shipping container or equipment indicates DAMAGE IN TRANSIT, such damaged goods should not be accepted until the transportation company's agent has noted on the freight bill, which he will give you, the nature and extent of the damage. If any part of this shipment is LOST IN TRANSIT, have the shortage noted on the freight bill by the agent.

CONCEALED DAMAGE

Remove crate cover to inspect the unit for damage.

If, when this equipment is unpacked, shipping damage is discovered which was not apparent upon delivery, notify the transportation company IMMEDIATELY to inspect the damaged equipment. The inspector is REQUIRED to provide you with a DAMAGE INSPECTION report.

THIS INSPECTION MUST BE REQUESTED WITHIN FIFTEEN (15) DAYS OF DELIVERY. DO NOT MOVE DAMAGED SHIPMENTS FROM POINT OF DELIVERY. RETAIN ALL CONTAINERS AND PACKING FOR INSPECTION.

Protect yourself. File your claim immediately with the transportation company! Remember, Aqua logic Inc. is not responsible for any damage after the carrier accepts a shipment. Claim for FULL VALUE REIMBURSEMENT should be made by you against the transportation company. Replacement of the damaged equipment should be requested by the purchaser as a new order.

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Very Important!

1. The standard target fluid temperature is limited to a range of 40° F to 85° F on all heat exchangers (evaporator). Without special factory installed equipment, possible damage to the unit can occur when attempting to access fluid temperatures outside this range. Aqua Logic, Inc.'s warranty does not apply to application temperatures under 40°F or above 85° F without special factory modifications.

2. Water going to the heat exchanger should be protected by filters to keep debris from collecting in the evaporator PVC shell. Clogged shells lead to heat exchange problems and will void the warranty.

3. Improperly installed or out of adjustment rapid sand filters can put sand into the stream of water flowing into the heat exchanger. This condition is similar to "sand blasting" and may abrade holes in plumbing lines and or the evaporator titanium tubes. Conditions like these would void the Aqua Logic, Inc. warranty.

   40° F to 85° F Process Temperature Applications

   Wetted parts contain titanium, PVC plastic, rubber, and polymer. These materials are non-reactive with fresh and salt water. You must consult with Aqua Logic, Inc. if any other fluids are to be pumped through the chiller.

   If humid or wet conditions exist where the heat exchanger is to be located, care must be taken to prevent water from getting on electrical components.

4. Allow only qualified licensed HVAC personnel connect copper refrigerant plumbing and electric power to heat exchanger. Installation must be done in accordance with local and national codes.

5. Field install the provided interlock device (water flow switch) which prevents the chiller from energizing without the water pump being on. Follow the provided installation instructions on how to plumb this interlock in the correct matter.

6. **Fluid must flow through the heat exchanger at all times.** See specification sheet or product label for minimum and maximum flow rates. Flow rates less than specification may result in evaporator freeze-up and cracking of the evaporator shell. Aqua Logic Inc. does not warranty the evaporator shell operating under low flow conditions and compressor burn outs due to a condition called refrigerant "flood back".

7. Incoming water pressure to the evaporator must not exceed 50 PSIG. Over pressuring the evaporator may cause damage to the PVC shell, which is **not** covered under warranty.

WARNING:

The heat exchanger is filled with a high pressure charge of dry nitrogen. Care must be taken when installing this unit.

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Installation Instructions:

Warning: Heat exchanger comes with a high pressure dry nitrogen charge on the copper plumbing side. Care must be taken when installed.

1. Place the heat exchanger model HX-24 thru HX-60 mount on wall or shelve that can support the weight the unit with water in it. Have at least two (2) feet of space around the unit to allow room for access to the unit and for maintenance. Also, allow clearance above to remove the PVC shell for cleaning. If the unit is to be mounted outdoors, it must be placed in to a weather proof housing to protect from direct weather and rain.

2. Have qualified licensed HVAC personnel connect copper refrigerant plumbing and electric power to heat exchanger.

   Installation must be done in accordance with local and national codes.

3. Install the provided interlock device (water flow switch) which prevents the chiller from energizing without the water pump being on. Follow the provided installation instructions on how to plumb this interlock in the correct way.

4. Connect the plumbing from the pool to the heat exchanger PVC water fittings on the front of the heat exchanger. Be careful not to over tighten the plastic fittings. See "Heat Exchanger By-pass Plumbing"

5. Check for water leaks.

Installation must proceed in accordance with national building and electrical codes by qualified technicians only.

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HEAT EXCHANGER CLEANING
IMPORTANT SAFETY INSTRUCTIONS

WARNING:

SAVE THESE INSTRUCTIONS!!!

To guard against injury, basic safety precautions should be observed including the following:

- **DO** read and follow all safety instructions.
- **DO** read and observe all the notices in this instruction sheet.
- **DO** make sure unit is mounted securely before operating.
- **DO** carefully examine this unit after installation.
- **DO NOT** allow water to freeze in unit. Severe damage may result.
- **DO NOT** store unit in extremely hot or cold areas. Damage may result.
- **DO NOT** exceed the maximum rating of 40-psi for this unit or serious damage may result.
- **DO NOT** perform bleach [organic removal] flush with muriatic acid [mineral removal] at the same time. The resultant poisonous gas can be extremely dangerous or deadly.

Heat Exchanger Cleaning:

NOTE:

The heat exchanger should be cleaned approximately every 12 months or as needed to allow proper performance. On some models this process may be done without removal of the heat exchanger shell. (i.e., water flushing system)

WARNING:

When using bleach and acid special care should be observed.
Always wear hand, eye and body protection. Use rubber gloves.

DO NOT pour acid or bleach into the water. **DO** pour water into acid or bleach solution.
DO NOT perform acid and bleach flushing at the same time. The gas generated by the mixture is poisonous and can result in serious injury or death.

To remove organic deposits from titanium tube bundle without removing the shell:

- Isolate the heat exchanger. (see drawing below)
- Mix 1 part bleach to 3 parts distilled water in five gallon bucket or larger container.
- Circulate via pump the solution through heat exchanger for approximately one to two hours or as needed.
- Thoroughly rinse heat exchanger with clean water.

To remove mineral deposits from titanium tube bundle:

Use the same steps as above, but use muriatic acid instead of bleach. Be sure to follow the muriatic acid manufacturer's instructions for use and safety.

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HX-DX HEAT EXCHANGER TEMPERATURE CONTROLLER PROGRAMING

Step	Enunciator	Description	Display
1	F or C	Fahrenheit or Celsius	F
2	S1 (Blinking)	Setpoint Temperature	S1 77
3	DIF (Blinking)	Differential Temperature	DIF 1
4	C1 or H1	Cooling or Heating Mode	C1



Liquid Crystal Display (LCD)

The LCD display provides a constant readout of the sensor temperature and indicates if the output relay is energized. When the **S1** enunciator is constantly Illuminated during operation, the relay is energized. the display is also used in conjunction with the keypad to allow the user to adjust the set point temperature, differential and heating /cooling modes.

Programming Steps and Display

The control can be programmed in four simple steps using the LCD display and the three keys on the face of the control. (See photo for display and keys.)

1. To start programming, press the **SET** key once to access the Fahrenheit/Celsius mode. The display will show the current status, either **F** for degrees Fahrenheit or **C** for degrees Celsius. Then press either the up ⇧ arrow or down ⇩ arrow key to toggle between the **F** or **C** designation.
2. Press the **SET** key again to access the set point temperature. The LCD will display the current set point temperature and the set point enunciator will be blinking on and off to indicate that the control is in the set point mode. Then press either the up ⇧ key to increase or down ⇩ key to decrease the set point to the desired temperature.
3. Press the SET key again to access the differential. The LCD will display the current differential and the **DIF** enunciator will be blinking on and off to indicate that the control is in the differential mode. Then press either up ⇧ key to increase or the down ⇩ key to decrease the differential to the desired setting (minimum 1°F, maximum 30°F).
4. Press the **SET** key again to access the heating mode. The LCD will display the current mode, **C1** for chiller mode and **H1** is for heater mode. Press the **SET** key once more and programming is complete. Controller **MUST** in the **C1** mode for correct operation.

Controller will automatically drop out of "program mode" and return to "operating mode" 30 seconds after last key press.

Troubleshooting Controller Error Messages:

Display Messages

- **E1** - Appears when the up ⇧ or down ⇩key is pressed when not in the programming mode.
  To correct: If the E1 message appears even when no keys are being pressed, replace the control.
- **E2** - Appears if the control settings are not properly stored in memory.
  To correct: Check all settings and correct if necessary.
- **EP** - Appears when the probe and or flow switch is open , shorted or sensing a temperature that is out of range.
  To correct: Check to see if the sensed temperature is out of range. If not , check for probe damage by comparing it to a known ambient temperature between -30°F and 220°F. Replace the probe is necessary. Also check for proper water flow through heater. If water flow is correct, check flow switch.
- **EE** - Appears if the EEPROM data has been corrupted.
  To correct: This condition cannot be field repaired. Replace the control.
- **CL** - Appears if calibration mode has been entered.
  To correct: Remove power to the control for least five seconds. Reapply power. If the **CL** message still appears, replace the control.

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HX-DXHP HEAT PUMP TEMPERTURE CONTROLLER PROGRAMMING

STEP	ANNUCIATOR	DESCRIPTION	*DISPLAY*
1	***F*** *or* ***C***	Fahrenheit or Celsius Scale	***F***
2	**S1** (blinking)	Stage 1 Setpoint Temperature	**77** **S1**
3	**DIF1** (blinking)	Stage 1 Differential Temperature	**DIF1** **1**
4	***C1/H1***	Stage 1 Heating Mode	**H1**
5	**S2** (blinking)	Stage 2 Setpoint Temperature	**77** **S2**
6	**DIF2** (blinking)	Stage 2 Differential Temperature	**1** **DIF2**
7	***C2/H2***	Stage 2 Cooling Mode	**C2**



Liquid Crystal Display (LCD)

The LCD display provides a constant readout of the sensor temperature and indicates if the output relay is energized. When the **S1 or S2** annuciator is constantly illuminated during operation, the relay is energized. The display is also used in conjunction with the keypad to allow the user to adjust the setpoint temperature, differential and heating /cooling modes.

Programming Steps and Display

The control can be programmed in four simple steps using the LCD display and the three keys on the face of the control. (See photo for display and keys.)

NOTE: Stage 1 must be set for heat mode and Stage 2 for cool mode for correct operation.

5. To start programming, press the **SET** key once to access the Fahrenheit/Celsius mode. The display will show the current status, either **F** for degrees Fahrenheit or **C** for degrees Celsius. Then press either the up ⇧ arrow or down ⇩ arrow key to toggle between the **F** or **C** designation.
6. Press the **SET** key again to access the heat mode setpoint temperature. The LCD will display the current setpoint temperature and the **S1** annuciator will be blinking to indicate that the control is in the setpoint mode. Press either the up ⇧ key to increase or down ⇩ key to decrease the setpoint to the desired temperature.
7. Press the **SET** key again to access the heat mode differential temperature. The LCD will display the current differential and the **DIF 1** annuciator will be blinking to indicate that the control is in the differential mode. Then press either up ⇧ key to increase or the down ⇩ key to decrease the differential to the desired setting (minimum 1˚F, maximum 30˚F).
8. Press the **SET** key again to select heat mode. The LCD will display the current mode: **C1 or H1.** Then press either up ⇧ key to increase or the down ⇩ key to select the correct Stage 1 mode. Stage 1 **MUST** be in the **H1** mode for correct operation.
9. Press the **SET** key again to access the chill mode setpoint temperature. The LCD will display the current chill setpoint temperature and the **S2** annuciator will be blinking to indicate that the control is in the setpoint mode. Then press either the up ⇧ key to increase or down ⇩ key to decrease the setpoint to the desired temperature. **S1** and **S2** should both be set for the same temperature.
10. Press the SET key again to access the chill mode differential temperature. The LCD will display the current differential and the **DIF 2** annuciator will be blinking to indicate that the control is in the differential mode. Then press either up ⇧ key to increase or the down ⇩ key to decrease the differential to the desired setting (minimum 1°F, maximum 30˚F). **DIF1** and **DIF2** should both be set to the same value for best results.
11. Press the **SET** key again to access the heating mode. The LCD will display the current mode: **C2 or H2** . Stage 2 **MUST** be in the **C2** mode for correct operation.
12. Press the **SET** key again to exit programming mode. Controller will display current water temperature.

Controller will automatically drop out of “program mode” and return to “operating mode” 30 seconds after last key press.

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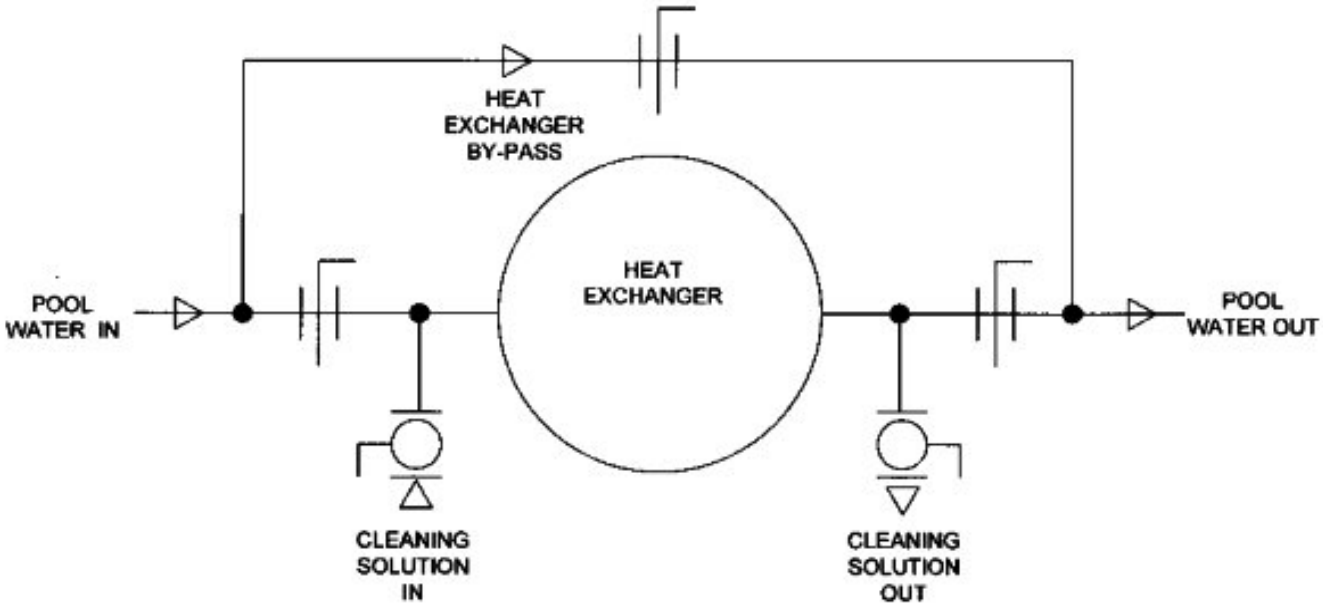
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Display Messages

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- **E2** - Appears if the control settings are not properly stored in memory.
  To correct: Check all settings and correct if necessary.
- **EP** - Appears when the probe and or flow switch is open , shorted or sensing a temperature that is out of range.
  To correct: Check to see if the sensed temperature is out of range. If not , check for probe damage by comparing it to a known ambient temperature between -30˚F and 220˚F. Replace the probe is necessary. Also, check for proper water flow through heater. If water flow is correct, flow switch.
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  To correct: Remove power to the control for least five seconds. Reapply power. If the **CL** message still appears, replace the control.

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Heat exchanger plumbing by-pass schematic



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Limited Warranty Terms (PLEASE READ CAREFULLY):

All Heat exchangers (evaporators) manufactured by ***Aqua Logic, Inc.*** (hereafter called ***Aqua Logic***) have a parts only warranty for a period of one (1) year from the date of purchase by the original purchaser. Any ***Aqua Logic*** product found to be defective within the warranty period will be repaired or replaced at the option of ***Aqua Logic***

Aqua Logic will not warrantee and be responsible for sizing and providing the refrigeration line set, connection of the outdoor condensing unit to the indoor heat exchanger, charging with refrigerant and startup of the system.

On split chiller and heat pump installations, ***Aqua Logic*** will not warranty refrigerate components and copper lines between condenser and heat exchanger.

Our warranty does not include the following:

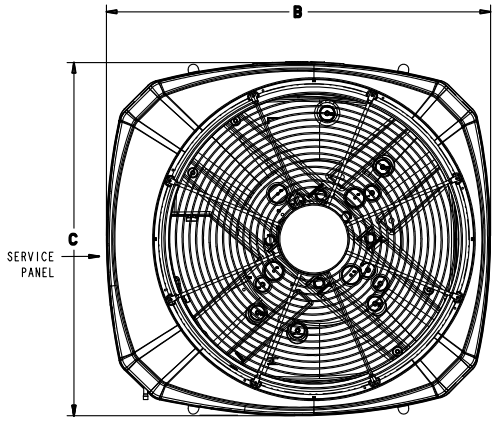
- Damage caused by freezing, inadequate or no water flow.
- Damage caused by improper installation or maintenance by user or their agent.
- Damage caused due to misapplication of the product.
- Damage caused by corrosion, abuse, accident, alteration or improper use.
- Damage caused by flood, fire, earthquake, tornado or other acts of God.
- Damage caused by electrical spikes, surges, brownouts or improper voltage or amperage.
- Damage caused by failure of any third party equipment (ie., controller, pump, etc.)
- Incidental damage to other equipment, property or livestock.
- Damage caused by a refrigeration technician in the field with poor installation technique ie., incorrect refrigerant copper line size between condensing unit and heat exchanger, bad brazed copper joints and dirty copper lines.

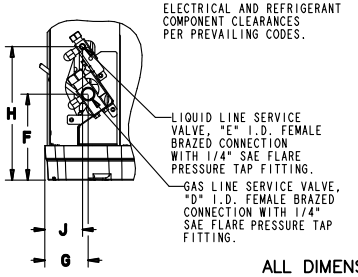
In the event of a defect or failure of the product, immediately contact ***Aqua Logic*** for assistance. ***Aqua Logic*** will at their discretion:

- Provide user-replaceable parts to restore the unit to proper operation.
- Provide a Return Authorization (RMA) number to return the unit with original packaging to Aqua Logic, Inc., 9558 Camino Ruiz, San Diego, CA 92126 by prepaid freight. You need to include the serial number as well as proof of purchase and /or a copy of the original bill of sale along with the RMA number. COD shipments will be refused

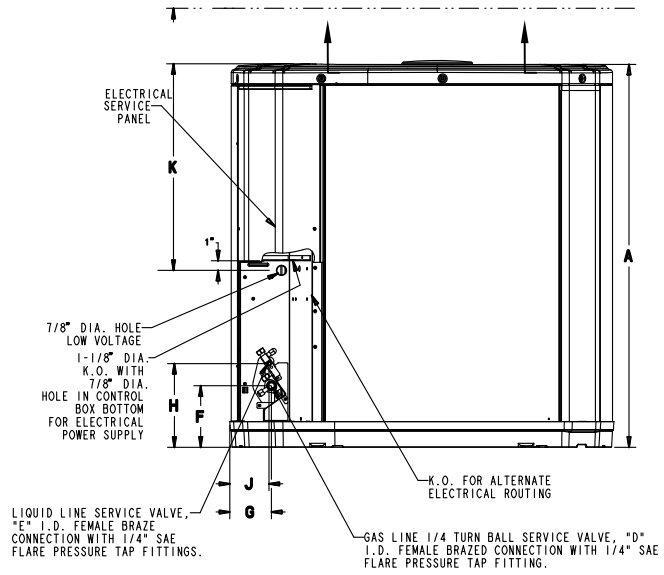
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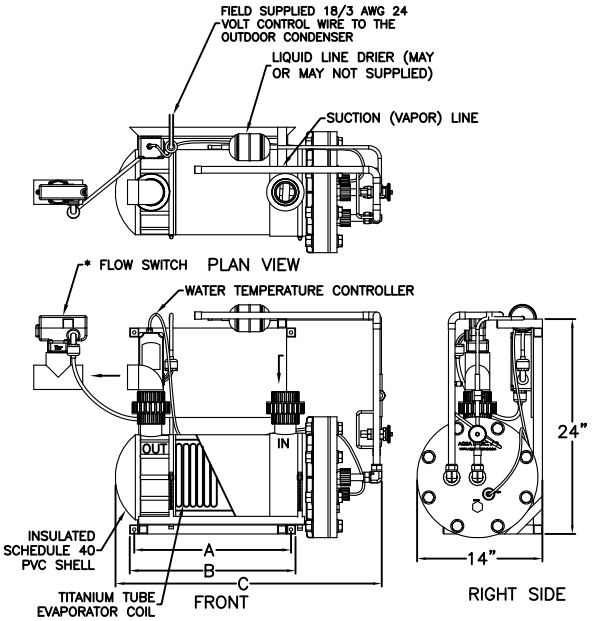
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TOP DISCHARGE AREA SHOULD BE UNRESTRICTED FOR AT LEAST 5 FEET ABOVE UNIT. UNIT SHOULD BE PLACED SO ROOF RUN-OFF WATER DOES NOT POUR DIRECTLY ON UNIT, AND SHOULD BE AT LEAST 12 INCHES FROM WALL AND ALL SURROUNDING SHRUBBERY ON TWO SIDES. OTHER TWO SIDES UNRESTRICTED.





INDOOR HEAT EXCHANGER / EVAPORATOR

ALL DIMENSIONS ARE IN INCHES

MODELS	BASE	A	B	C	D	E	F	G	H	J	K	WEIGHT (LBS)
HP-2	3	32 3/4	32 5/8	29 3/4	5/8	3/8	5	3 5/8	8 1/4	3 1/8	20	175
HP-3,33	4	33 1/8	37 1/4	34 1/4	3/4	3/8	6	3 7/8	8 5/8	3 3/8	20	200
HP-4,43	4	37 1/8	37 1/4	34 1/4	7/8	3/8	6	3 7/8	8 5/8	3 3/8	20	240
HP-5,53	4	45 1/8	37 1/4	34 1/4	7/8	3/8	6	3 7/8	8 5/8	3 3/8	32	300

UNIT SIZE	MINIMUM MOUNTING PAD DIMENSIONS
HP-2	36" X 34"
HP-3,4 & 5	41" X 38"

NOTE: RLA AMPS MAY VARY DUE THE CONDENSING UNIT MANUFACTURE CHANGES.

ALL SINGLE PHASE UNITS ARE SEER 14.5 AND THREE PHASE UNITS ARE SEER 13.

*USE OPTIONAL LOW AMBIENT HEAD PRESSURE FAN CONTROLS IF THE AMBIENT AIR TEMPERATURE FALLS BELOW 50 °F, THIS CONTROL IS GOOD DOWN TO 0°F.

*ALL DIMENSIONS ARE APPROXIMATE AND SUBJECT TO CHANGE WITHOUT NOTICE.

HEAT PUMP CONDENSING UNIT SPECIFICATIONS

SPLIT CHILLER PACKAGE MODEL #	TON	NOMINAL BTUH / KW	RATING EER	R-410A FREON CHARGE (lbs)	VOLTS/PHASE	NOMINAL AMPS RLA/LRA	MCA	MAX. FUSE or CKT BRK AMPS	AIR OUTLET (CFM)	STANDARD SOUND RATING (dBA)
HP-2 SPLIT	2	24K/7	12.2	6.5	200-230/1	11/63	14.1	25	1285	66
HP-3 SPLIT	3	36K/10.5	12.2	8.9	200-230/1	18/77	22	35	2615	71
HP-33 SPLIT	3	36K/10.5	12.2	8.9	200-230/3	10/71	12.5	20	2615	71
HP-33-460 SPLIT	3	36K/10.5	12.2	8.9	460/3	6/38	7.6	15	2615	71
HP-4 SPLIT	4	48K/14	11.7	9	200-230/1	23/124	28	50	2615	70
HP-43 SPLIT	4	48K/14	11.7	9	200-230/3	15/83	18.3	30	2615	70
HP-43-460 SPLIT	4	48K/14	11.7	9	460/3	7/41	8.4	15	2615	70
HP-5 SPLIT	5	60K/17.5	11.7	10.6	200-230/1	27/153	32	50	2785	73
HP-53 SPLIT	5	60K/17.5	11.7	10.6	200-230/3	17/110	21.4	35	2785	73
HP-53-460 SPLIT	5	60K/17.5	11.7	10.6	460/3	8/52	9.7	15	2785	73

HEAT EXCHANGER SPECIFICATIONS

HEX MODEL NO.	TON	NOMINAL HP/BTUH/KW	DIMENTIONS (IN) A	B	C	*PROCESS WATER MIN/MAX FLOW RATE (GPM)	REFRIGERANT CONNECTION SIZE HI/LOW (ODF)	DRY WEIGHT (LBS)
HX-24DXHP	2	24K / 7	18	19	28	20 / 40	3/8" / 3/4"	105
HX-36DXHP	3	36K / 10.5	25	26	35	20 / 40	3/8" / 3/4"	120
HX-48DXHP	4	48K / 14	33	34	43	30 / 60	3/8" / 7/8"	130
HX-60DXHP	5	60K / 17.5	40	41	50	30 / 60	3/8" / 7/8"	140

* VERY IMPORTANT. FOLLOW FLOW SWITCH INSTALLATION INSTRUCTIONS

OPTIONS:
SCH80 AND MATERIAL SHELL CONSTRUCTION, 316 SS STAND AND HARDWARE.

NOTE:
FOR WATER TEMPERATURE 55°F AND BELOW, WATER FLOW RATE MUST BE CLOSE TO THE MAXIMUM.

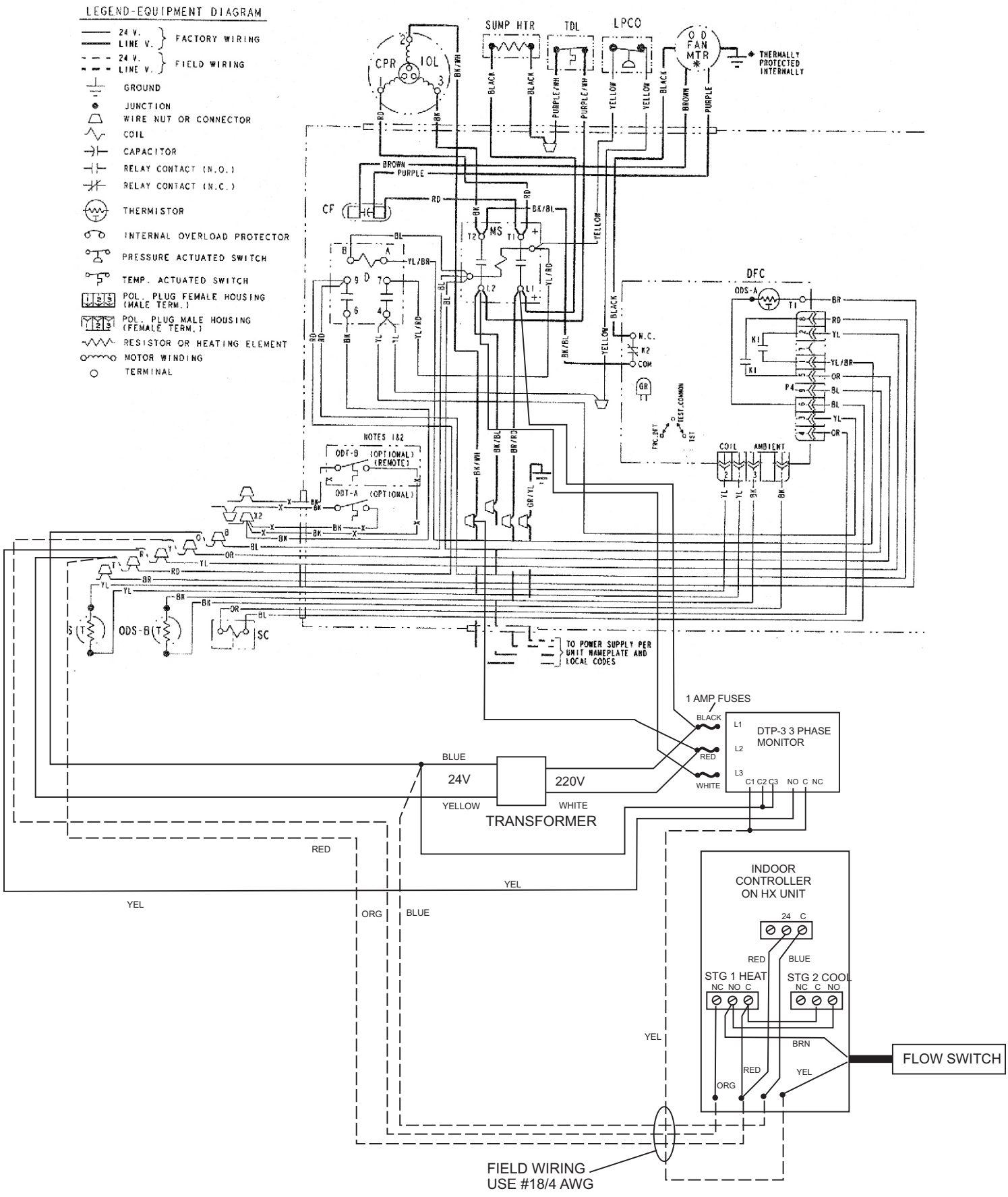
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		CLIENT	AQUA LOGIC			DRAWN BY	CEPPS	CREATED	3/16/2016	PAGE	1 of 1

AQUA LOGIC, INC
9558 CAMINO RUIZ.
SAN DIEGO, CA. 92126

Aquatic Design
Manufacturing & Integration
Ph: (858) 292-4773 Fax: (858) 279-0537

HP-33 (3 HP) thru HP-53 (5 HP) SPLIT HEAT PUMP TRANE UNITS 208-240V 3PH

1/1/11



Imbalance Voltage Tolerance in %
(% IMBALANCE flashes). The value may be adjusted by pressing the up and down arrows.

Lockout Time in seconds
(SECONDS flashes). The value may be adjusted by pressing the up and down arrows. (This is the delay on break timer value)

Delay time in seconds
(DELAY SECONDS flashes). The value may be adjusted by pressing the up and down arrows. This is the Random Start Delay value. (This is a delay on make timer)

Response time in seconds and tenths of seconds (RESP. SECONDS flashes) The value may be adjusted by pressing the up and down arrows. This is the time that a fault is allowed before shutdown occurs.

Control mode
(ON OFF AUTO flashes) The value may be adjusted to OFF (load will not turn on), ON (load will turn on whenever there are no faults and the timers are finished) and AUTO (load will turn on when there is a control input).

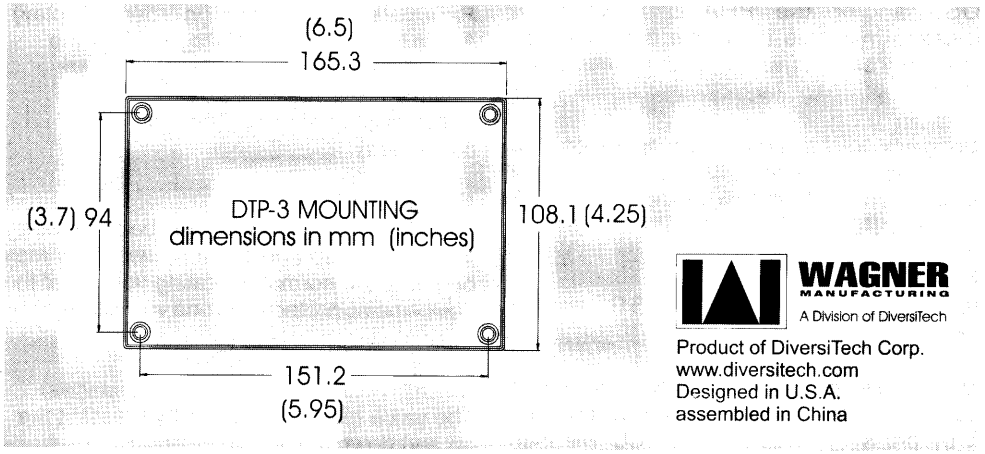
Contactor fault monitor mode
(CONTACTOR FAULT flashes) This option allows you to monitor the contactor and lock it out if the line voltage and load side varies by more than 5 volts. Pressing the up or down arrows selects off (default) or on. The load side of the contactor must be connected to the load terminals of the DTP-3 to use this option.

Display of fault memories
(MEM flashes) Pressing up or down displays the past fault conditions that took your unit off line. The first 25 faults are recorded. The top number displayed represents the fault memory. The middle number represents the total number of faults that have occurred since the fault memory was cleared.
To clear the memory, press and hold the up and down keys until the display is cleared.

Notes
If you press SELECT and do not change a parameter by pressing the up or down arrow keys, the DTP-3 automatically returns to displaying the line voltage in a few seconds.

The new settings are saved in permanent memory when the display returns to displaying the line voltage. The new settings may be verified by pressing the select button to sequence through the various parameters.

To prevent tripping on a 1 volt change, the DTP-3 automatically calculates cut-in voltages for return from undervoltage conditions. The cut-out voltage is always based on the user voltage and tolerance settings, while the cut-in voltage is 3% closer to the nominal voltage setting. This quality is sometimes referred to as hysterisis. This is to help reduce oscillation that may occur on weak power distribution systems. When the load is switched off due to undervoltage, the line voltage will increase. Without the hystersis, the monitor would switch the load back on, the line voltage would again drop, and cause a continuous on-off-on cycling.



WAGNER MANUFACTURING
A Division of DiversiTech

Product of DiversiTech Corp.
www.diversitech.com
Designed in U.S.A.
assembled in China

DTP-3
Digital Three Phase

Motor Protector / Power Monitor

Installation and Operation Instructions

WAGNER

KEY FEATURES

- ✓ Digital voltmeter displays instantaneous line voltage for all 3 phase pairs
- ✓ Contactor load side monitor checks for contactor closure
- ✓ One button contactor load side voltage measurement
- ✓ Automatic voltage tester adjusts from 160 to 600 volts
- ✓ Adjustable response timer (0.1 to 20 sec.) prevents nuisance tripping
- ✓ Adjustable delay on break (DOB) timer (0 to 720 sec.) prevents rapid re-starts
- ✓ Adjustable timer (0 to 30 sec.) allows sequencing of multiple units
- ✓ Off, Auto, On settings for operation with or without control inputs
- ✓ Selectable contactor test. Opens contactor if any one of 3 circuits fail
- ✓ Digital display makes for easy viewing and operation
- ✓ Fault memory records up to 25 fault causes

SPECIFICATIONS

✓ Voltmeter:	70 to 650 Volts: simultaneous display of AB BC CA voltages
✓ Accuracy	+ / - 2% of indicated average voltage
✓ Tolerance Limits:	6 to 18%
✓ Imbalance:	2 to 25%
✓ Response Timer:	0.1 to 20 seconds
✓ DOB Timer:	0 to 720 seconds
✓ Delay Timer:	0 to 30 seconds
✓ Contactor Test	Contactor opens and remains locked out if voltage difference is 5 volt for any phase pair.
✓ Output Relay:	10 Amps, 250 VAC resistive, single-pole/double-throw
✓ Control Input:	18 to 250 VAC with anticipator load for 24 volt thermostats

OVERVIEW

The DTP-3 Line Voltage Monitor provides continuous monitoring of the power and control signals used to operate any three phase load. Protected devices can include motors, pumps, fans, compressors and other devices.

The DTP-3 protects these devices by keeping a constant watch over the supplied voltage, and when the voltage goes outside of a voltage and tolerance that you select, the DTP-3 opens its control relay.

The time required to respond to the out-of-tolerance conditions is user adjustable and may be set for shorter times for sensitive devices or longer times to help eliminate nuisance tripping.

Each of the three line voltage pairs are checked for voltage level and phase to phase balance. Further testing of the system includes contactor-load-side monitoring. When enabled, the load side monitor checks the contactor for closure. If the contactor load side voltage does not match the line side voltage to 5 volts within 0.5 seconds after the control relay closes, the control relay is opened and remains locked out until power to the DTP-3 is cycled off and on.

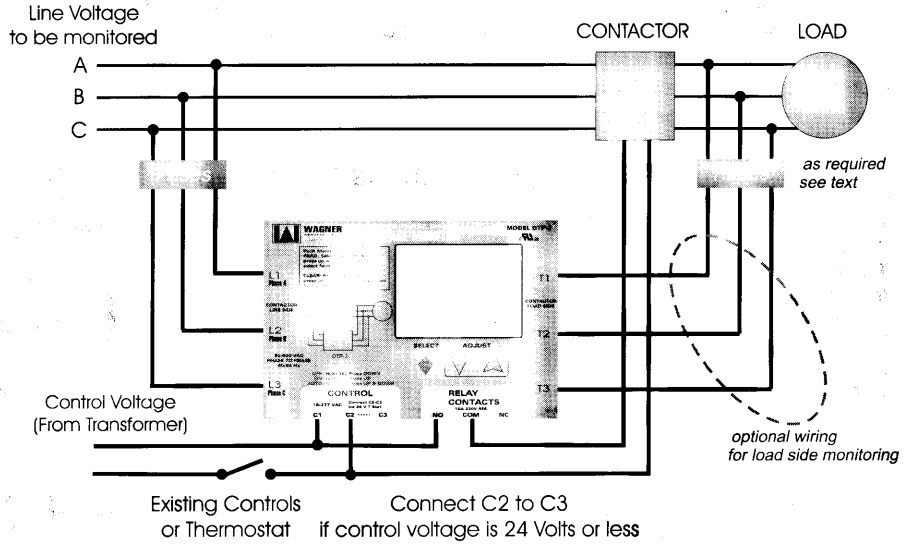
Additionally, phase rotation is tested. If the rotation is reversed, operation of the output relay is inhibited.

If any of the limits that you set are exceeded, the response timer will begin counting. You also have the flexibility to set the response timer -- a short time may be desired for a quick response or a long time may be desired to avoid nuisance tripping. If the voltage

remains outside the tolerance after the response time has elapsed, the DTP-3 will turn off its output relay and protect your device.

When the DTP-3's relay opens, the delay timer starts. This timer keeps track of the time since the output was turned off and prevents the protected equipment from restarting too soon. The delay is also user adjustable. It is particularly useful for the protection of compressors, where an attempted rapid restart can cause a stalled condition and motor burnout.

Typical Wiring Diagram



ALWAYS USE EXTREME CAUTION WHEN INSTALLING OR ADJUSTING EQUIPMENT UTILIZING HAZARDOUS VOLTAGES !

DISCONNECT ALL POWER BEFORE STARTING THE INSTALLATION OF THE DTP-3

INSTALLATION

Installation of the DTP-3 is simple and straight forward.

MOUNTING

Select a cool, dry location for the mounting of the DTP-3. Keep in mind that the front of the unit has the operator controls and the digital display. The front of the DTP-3 should be clear of obstructions and allow easy access to the control buttons. A suitable location may be in the control enclosure, near the motor starter or compressor contactor.

The DTP-3 should be mounted on a metal surface with four #8 sheet metal screws. Mounting on a metal surface helps dissipate heat and shield the DTP-3 from nearby equipment radiation.

WIRING

If the voltage being monitored is tapped from a high current source, branch circuit protection (fuse or circuit breaker as described in the National Electric Code) should be provided. Since the current drawn by the DTP-3 is a fraction of an Amp, the branch protection can be selected for the wire type used. Typically, fuses rated at 1 Amp will provide the required protection. If the load side monitor option is utilized, it's wiring must also be current limited.

PINOUT DESCRIPTION

L1, L2 and L3

Connect the voltage being monitored to the DTP-3's L1, L2, and L3 terminals. This voltage will also power the DTP-3 and should come from a source such as the line side of the contactor being controlled.

T1, T2 and T3

If your application requires contactor load side monitoring, you should connect the contactor load side to the DTP-3's T1, T2 and T3 terminals. Note that the load side monitoring should also include the required fusing to meet the branch circuit protection requirements of the National Electric Code or locale equivalent. If installed, the contactor fault option should be set to "ON".

NC, NO and COM

These terminals connect to the relay output. The relay closes when the line voltage is within the selected tolerance, the control voltage is on and the delay timer has expired. Typically you would connect the COM and NO terminals in series with the control circuit, motor starter or contactor coil.

C1, C2 and C3

Connect a control voltage to C1 and C2. The DTP-3 responds to voltage between 18 and 250 Volts and draws only a fraction of an Amp. An internal anticipator load is provided by connecting C2 to C3 to allow the use of a 24 Volt thermostat. Be sure to only connect C3 for 24 Volt or lower operation.

SETUP

The DTP-3 may be setup at a shop or other location prior to installation by simply applying power to any of the three line-side phase pairs. The DTP-3 will power up on single phase power and allow the setting of user parameters prior to installation in a three phase system.
After completing the installation (or for stand-alone setup), apply power to the DTP-3. The DTP-3 display will show a brief display test followed by the firmware revision number. The DTP-3 will then indicate the remaining time on any active timers. If the timers are expired the incoming line voltage will be displayed. The OVERVOLTAGE, UNDERVOLTAGE, PHASE LOSS and/or the PHASE REVERSAL indicators may also be visible depending on the factory settings versus your incoming line voltage.

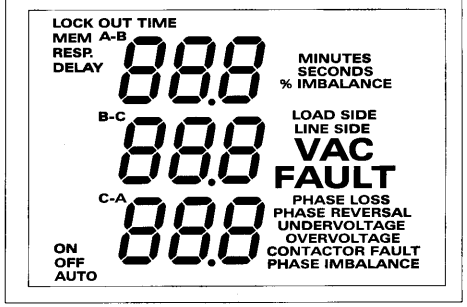
During any point in the DTP-3's operation, you may read the incoming voltage by pressing the SELECT button to return to the AB BC CA voltmeter. (Normal Display)

THE DISPLAY

The display normally shows the AB BC and CA line voltages.

If the unit is waiting on a timer, that timer will be displayed. The timer display may be switched off by pressing SELECT. The LCD will then

The DTP3's
LCD DISPLAY



display the normal AB BC CA voltage pairs.

Pressing the SELECT button once shows the contactor load side voltages. (if the load side option is connected) The display automatically returns to the display of line side voltage after a few seconds.

Press the Select button to step through the parameters. As you step through the parameters, the selected parameter will flash. Use the up and down arrow keys to adjust to the desired operating value.

Line side voltage
Load side voltage
Voltage set point
Under/over voltage tolerance in %
Imbalance voltage tolerance in %
Lockout time in seconds
Delay time in seconds
Response time in seconds
Control mode
Contactor fault monitor
Fault Memory Display

Parameters adjustment (in order of display)
Active display of *Line Voltage* (this is the default normal display)

Active display of *Load Side Voltage* (if connected)

Voltage Set Point
(VAC Flashes) The value may be adjusted by pressing the up and down arrows. This may be set to the normal operating voltage of the device being protected in one volt increments.

Under/over Voltage Tolerance in %
(UNDERVOLTAGE/OVERVOLTAGE flashes) The value may be adjusted by pressing the up and down arrows.

Installer's Guide

Heat Pumps

4TWR4

ALL phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES

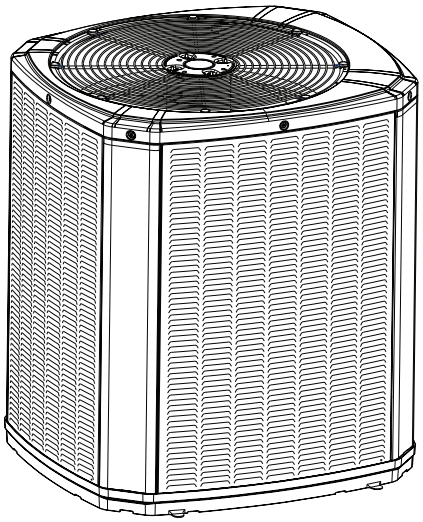
IMPORTANT — This Document is customer property and is to remain with this unit. Please return to service information pack upon completion of work.

These instructions do not cover all variations in systems or provide for every possible contingency to be met in connection with the installation. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to your installing dealer or local distributor.

Note: The manufacturer recommends installing only approved matched indoor and outdoor systems. All of the manufacture's split systems are AHRI rated only with TXV/EEV indoor systems. Some of the benefits of installing approved matched indoor and outdoor split systems are maximum efficiency, optimum performance and the best overall system reliability.

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Section 1. Safety

⚠ WARNING

This information is intended for use by individuals possessing adequate backgrounds of electrical and mechanical experience. Any attempt to repair a central air conditioning product may result in personal injury and/or property damage. The manufacture or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.

⚠ WARNING

These units use R-410A refrigerant which operates at 50 to 70% higher pressures than R-22. Use only R-410A approved service equipment. Refrigerant cylinders are painted a “Rose” color to indicate the type of refrigerant and may contain a “dip” tube to allow for charging of liquid refrigerant into the system. All R-410A systems use a POE oil that readily absorbs moisture from the atmosphere. To limit this “hygroscopic” action, the system should remain sealed whenever possible. If a system has been open to the atmosphere for more than 4 hours, the compressor oil must be replaced. Never break a vacuum with air and always change the driers when opening the system for component replacement. For specific handling concerns with R-410A and POE oil reference Retrofit Bulletins SS-APG006-EN and APP-APG011-EN or APP-APG012-EN.

⚠ WARNING

UNIT CONTAINS R-410A REFRIGERANT!
R-410A operating pressures exceed the limit of R-22. Proper service equipment is required. Failure to use proper service tools may result in equipment damage or personal injury.

SERVICE

USE ONLY R-410A REFRIGERANT AND APPROVED POE COMPRESSOR OIL.

⚠ WARNING

Extreme caution should be exercised when opening the Liquid Line Service Valve. Turn counterclockwise until the valve stem just touches the rolled edge. No torque is required. Failure to follow this warning will result in abrupt release of system charge and may result in personal injury and /or property damage.

⚠ WARNING

LIVE ELECTRICAL COMPONENTS!
During installation, testing, servicing, and troubleshooting of this product, it may be necessary to work with live electrical components. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

⚠ CAUTION

If using existing refrigerant lines make certain that all joints are brazed, not soldered.

⚠ CAUTION

Scroll compressor dome temperatures may be hot. Do not touch the top of compressor; it may cause minor to severe burning.

Section 2. Unit Location Considerations

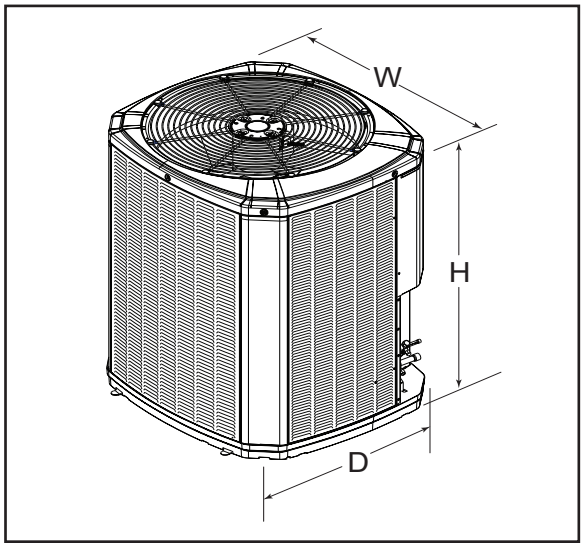
2.1 Unit Dimensions and Weight

Table 2.1

Unit Dimensions and Weight		
Models	H x D x W (in)	Weight* (lb)
4TWR4018D	29 x 30 x 33	176
4TWR4024D	33 x 30 x 33	208
4TWR4030D	33 x 34 x 37	239
4TWR4036D	33 x 34 x 37	198
4TWR4042D	33 x 34 x 37	219
4TWR4048D	37 x 34 x 37	234
4TWR4060D	45 x 34 x 37	295
* Weight values are estimated.		

When mounting the outdoor unit on a roof, be sure the roof will support the unit's weight.

Properly selected isolation is recommended to alleviate sound or vibration transmission to the building structure.



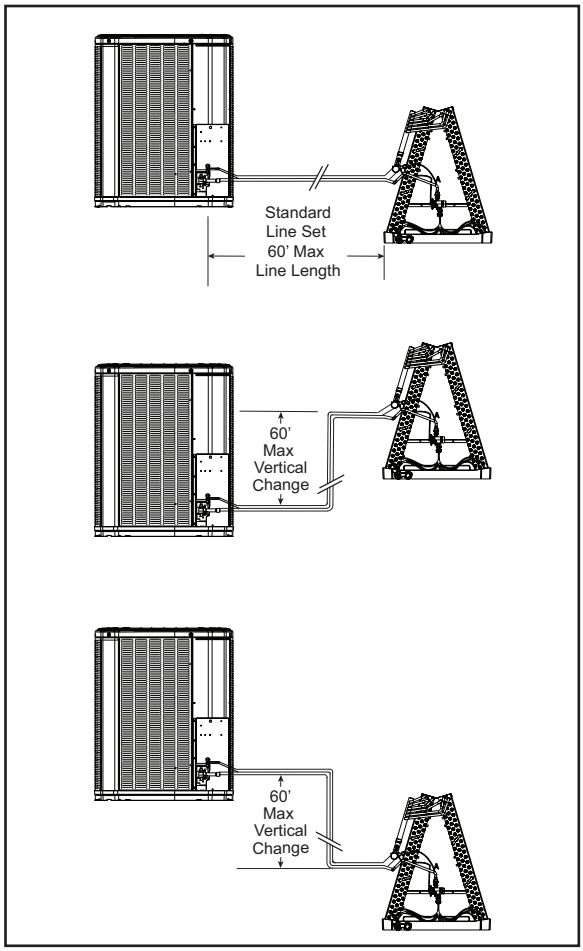
2.2 Refrigerant Piping Limits

1. The maximum length of refrigerant lines from outdoor to indoor unit should NOT exceed sixty (60) feet.

2. The maximum vertical change should not exceed sixty (60) feet.

3. Service valve connection diameters are shown in Table 5.1.

Note: For line lengths greater than sixty (60) feet, Refer to Refrigerant Piping Application Guide, SS-APG006-EN or Refrigerant Piping Software Program, 32-3312-03 (or latest revision).

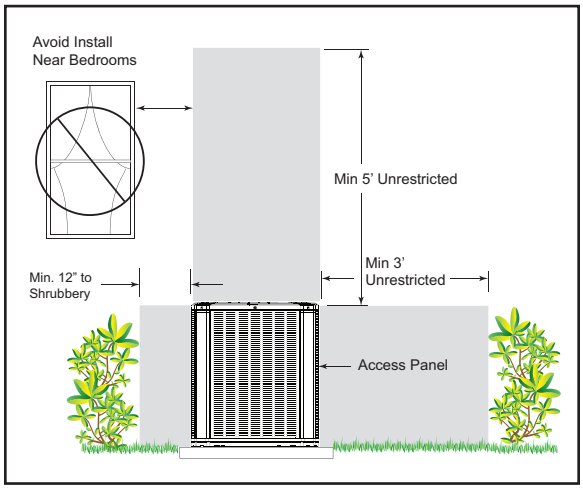


2.3 Suggested Locations for Best Reliability

Ensure the top discharge area is unrestricted for at least five (5) feet above the unit.

Three (3) feet clearance must be provided in front of the control box (access panels) and any other side requiring service.

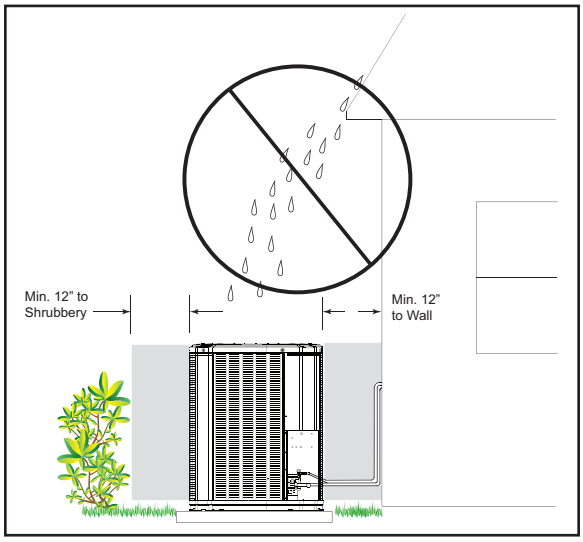
It is not recommended to install in a location where noise may distract the building occupants. Some examples of these types of locations are sleeping quarters and by windows of a living area. Please discuss location with the building owner prior to installation.



Avoid locations such as near windows where condensation and freezing defrost vapor can annoy a customer.

Position the outdoor unit a minimum of 12” from any wall or surrounding shrubbery to ensure adequate airflow.

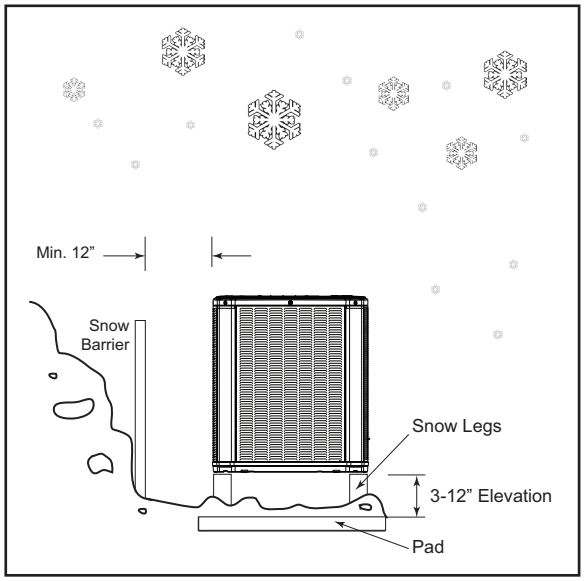
Outdoor unit location must be far enough away from any structure to prevent excess roof runoff water or icicles from falling directly on the unit.



2.4 Cold Climate Considerations

NOTE: It is recommended that these precautions be taken for units being installed in areas where snow accumulation and prolonged below freezing temperatures occur.

- Units should be elevated 3-12 inches above the pad or rooftop, depending on local weather. This additional height will allow drainage of snow and ice melted during defrost cycle prior to its refreezing. Ensure that drain holes in unit base pan are not obstructed preventing draining of defrost water.
- If possible, avoid locations that are likely to accumulate snow drifts. If not possible, a snow drift barrier should be installed around the unit to prevent a build-up of snow on the sides of the unit.



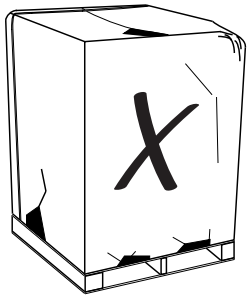
2.5 Coastal Considerations

If installed within one mile of salt water, including seacoasts and inland waterways, models without factory supplied Seacoast Salt Shields require the addition of BAYSEAC001 (Seacoast Kit) at installation time.

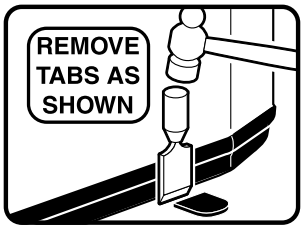
Section 3. Unit Preparation

3.1 Prepare The Unit For Installation

STEP 1 - Check for damage and report promptly to the carrier any damage found to the unit.



STEP 2 - To remove the unit from the pallet, remove tabs by cutting with a sharp tool.

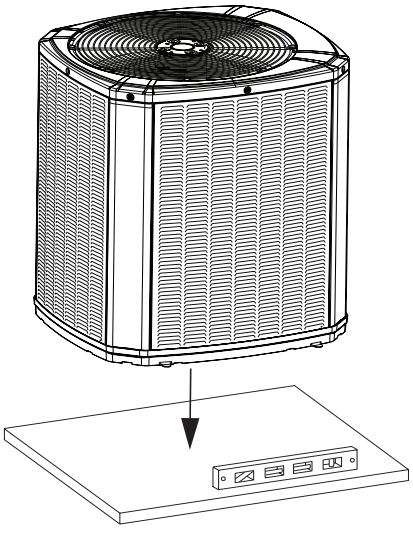


Section 4. Setting the Unit

4.1 Pad Installation

When installing the unit on a support pad, such as a concrete slab, consider the following:

- The pad should be at least 1” larger than the unit on all sides.
- The pad must be separate from any structure.
- The pad must be level.
- The pad should be high enough above grade to allow for drainage.
- The pad location must comply with National, State, and Local codes.



Section 5. Refrigerant Line Considerations

5.1 Refrigerant Line and Service Valve Connection Sizes

Table 5.1

Model	Line Sizes		Service Valve Connection Sizes	
	Vapor Line	Liquid Line	Vapor Line Connection	Liquid Line Connection
4TWR4018D	5/8	3/8	5/8	3/8
4TWR4024D	5/8	3/8	5/8	3/8
4TWR4030D	3/4	3/8	3/4	3/8
4TWR4036D	3/4	3/8	3/4	3/8
4TWR4042D	3/4	3/8	3/4	3/8
4TWR4048D	7/8	3/8	7/8	3/8
4TWR4060D	1-1/8	3/8	1-1/8	3/8

5.2 Factory Charge

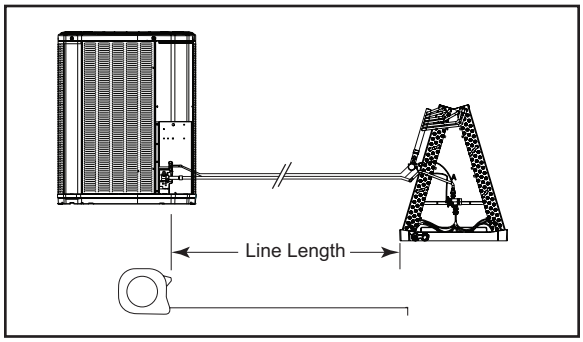
Trane outdoor condensing units are factory charged with the system charge required for the outdoor condensing unit, fifteen (15) feet of tested connecting line, and the smallest indoor evaporative coil match. **If connecting line length exceeds fifteen (15) feet and/or a larger indoor evaporative coil is installed, then final refrigerant charge adjustment is necessary.**

5.3 Required Refrigerant Line Length

Determine required line length and lift. You will need this later in STEP 2 of Section 14.

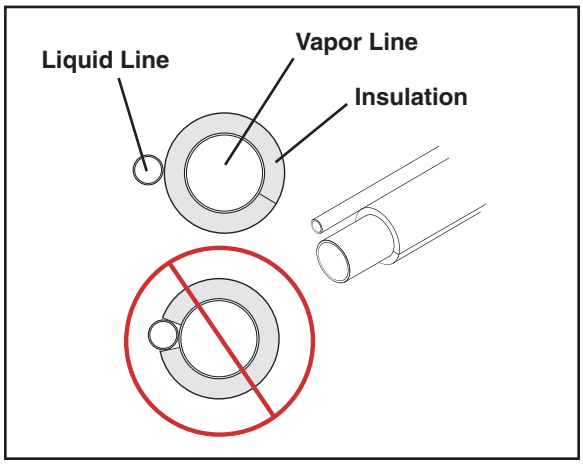
Total Line Length = _____ Ft.

Total Vertical Change (lift) = _____ Ft.



5.4 Refrigerant Line Insulation

Important: *The Vapor Line must always be insulated. DO NOT allow the Liquid Line and Vapor Line to come in direct (metal to metal) contact.*



5.5 Reuse Existing Refrigerant Lines

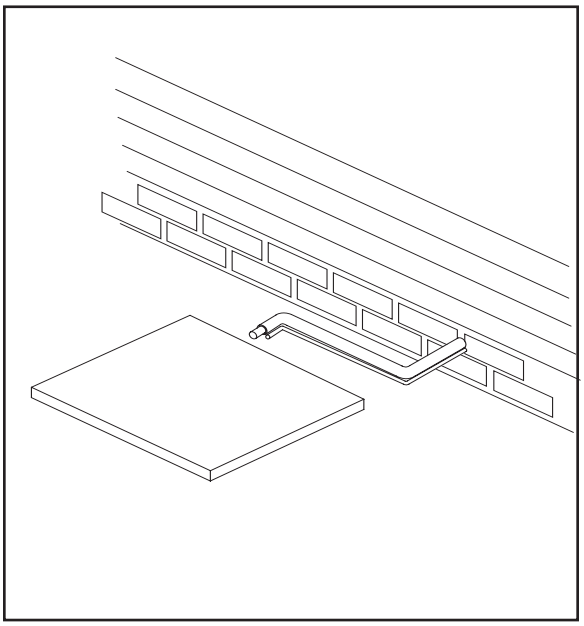
⚠ CAUTION

If using existing refrigerant lines make certain that all joints are brazed, not soldered.

For retrofit applications, where the existing indoor evaporator coil and/or refrigerant lines will be used, the following precautions should be taken:

- Ensure that the indoor evaporator coil and refrigerant lines are the correct size.
- Ensure that the refrigerant lines are free of leaks, acid, and oil.

Important: *For more information see publication number SS-APG006-EN.*



Section 6. Refrigerant Line Routing

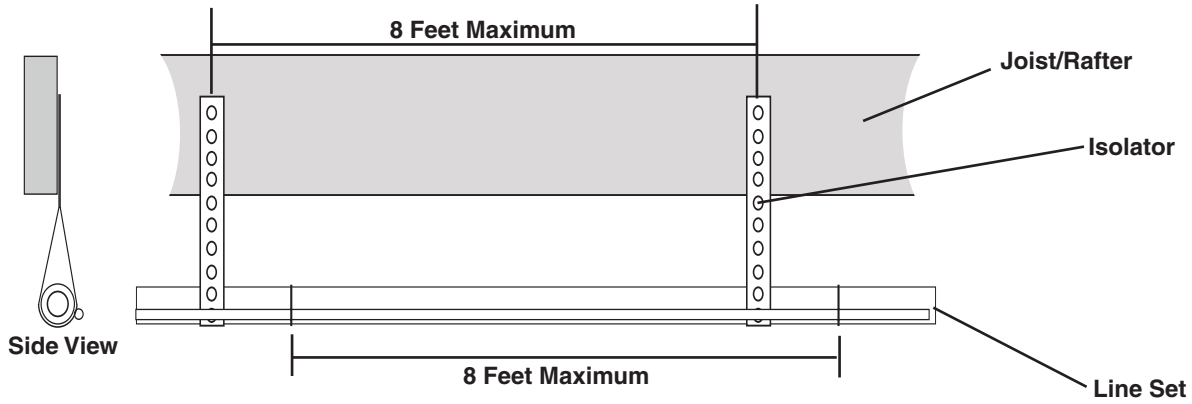
6.1 Precautions

Important: *Take precautions to prevent noise within the building structure due to vibration transmission from the refrigerant lines.*

Comply with National, State, and Local Codes when isolating line sets from joists, rafters, walls, or other structural elements.

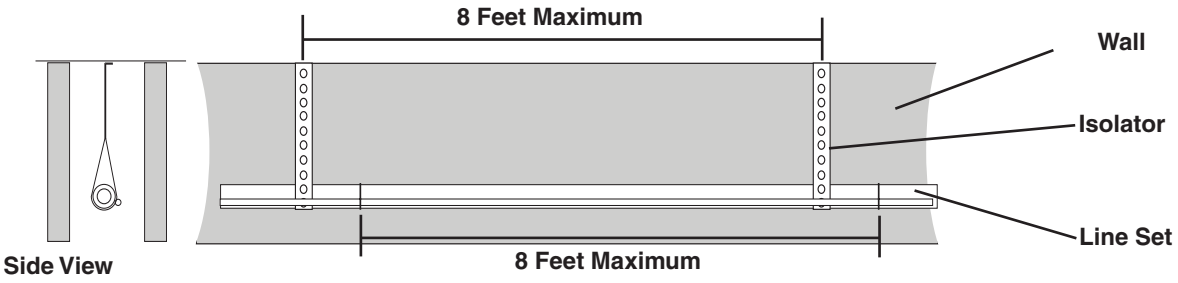
For Example:

- When the refrigerant lines have to be fastened to floor joists or other framing in a structure, use isolation type hangers.
- Isolation hangers should also be used when refrigerant lines are run in stud spaces or enclosed ceilings.
- Where the refrigerant lines run through a wall or sill, they should be insulated and isolated.
- Isolate the lines from all ductwork.
- Minimize the number of 90° turns.



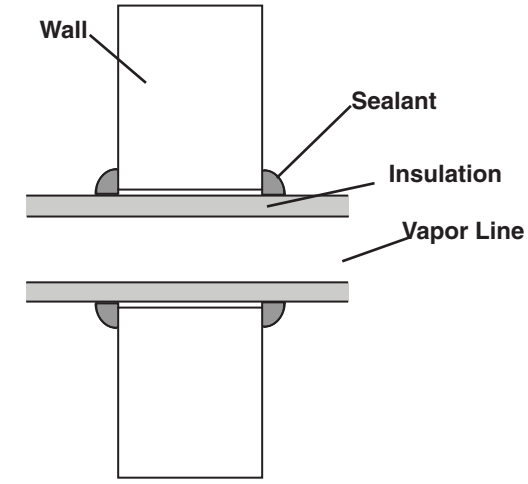
Secure Vapor line from joists using isolators every 8 ft. Secure Liquid Line directly to Vapor line using tape, wire, or other appropriate method every 8 ft.

Isolation From Joist/Rafter

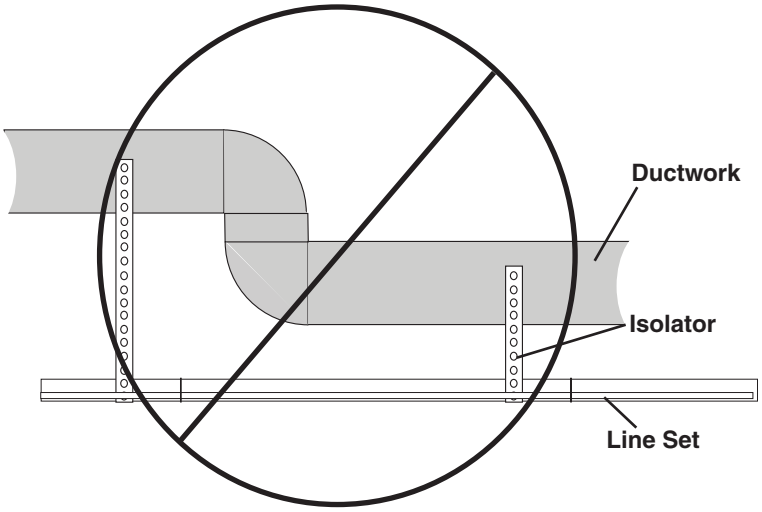


Secure Vapor Line using isolators every 8 ft. Secure Liquid Line directly to Vapor Line using tape, wire, or other appropriate method every 8 ft.

Isolation In Wall Spaces



Isolation Through Wall

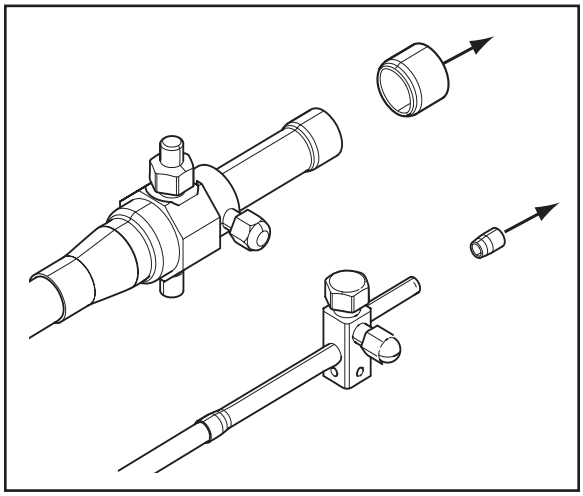


DO NOT hang line sets from ductwork

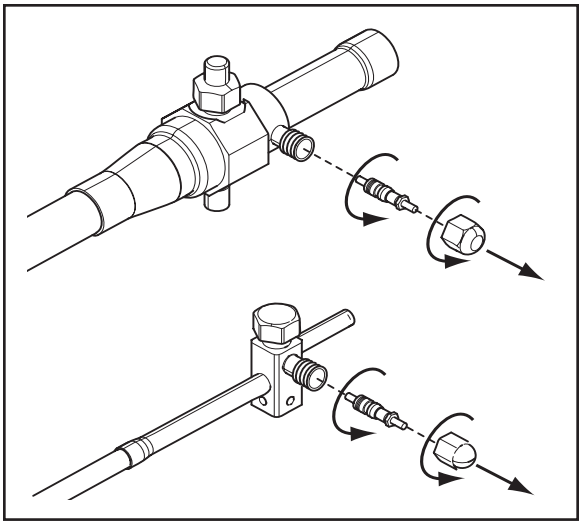
Section 7. Refrigerant Line Brazing

7.1 Braze The Refrigerant Lines

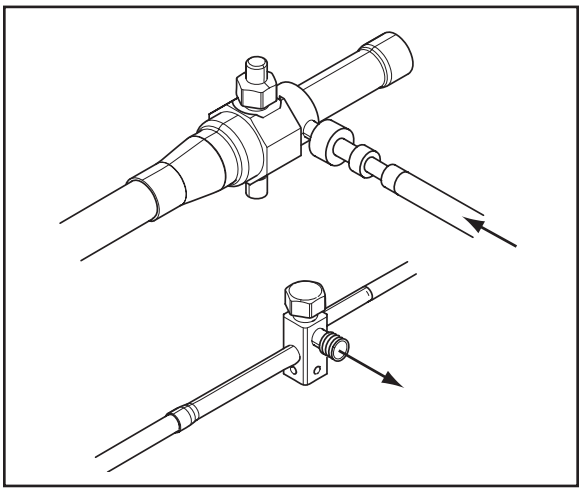
STEP 1 - Remove caps or plugs. Use a deburing tool to debur the pipe ends. Clean both internal and external surfaces of the tubing using an emery cloth.



STEP 2 - Remove the pressure tap cap and valve cores from both service valves.



STEP 3 - Purge the refrigerant lines and indoor coil with dry nitrogen.



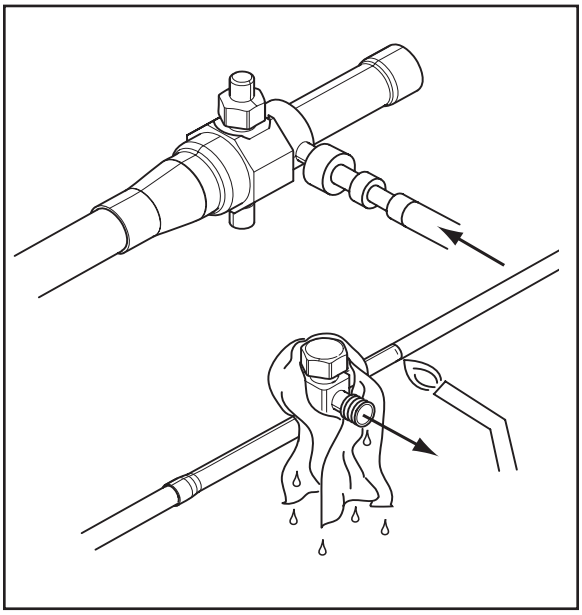
STEP 4 - Wrap a wet rag around the valve body to avoid heat damage and continue the dry nitrogen purge.

Braze the refrigerant lines to the service valves.

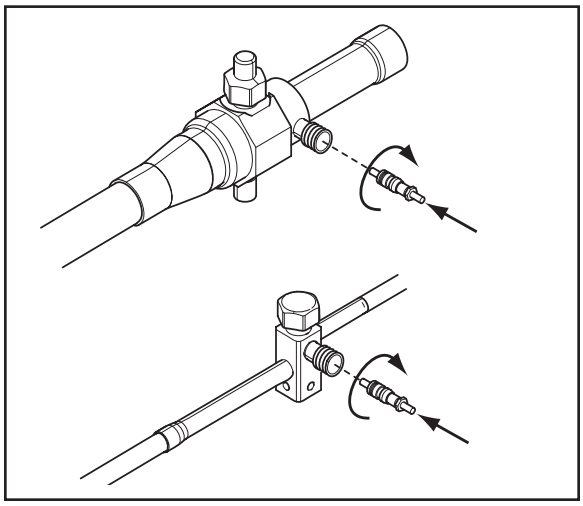
Continue the dry nitrogen purge. Do not remove the wet rag until all brazing is completed.

Important: Remove the wet rag before stopping the dry nitrogen purge.

NOTE: **Precautions should be taken to avoid heat damage to basepan during brazing. It is recommended to keep the flame directly off of the basepan.**



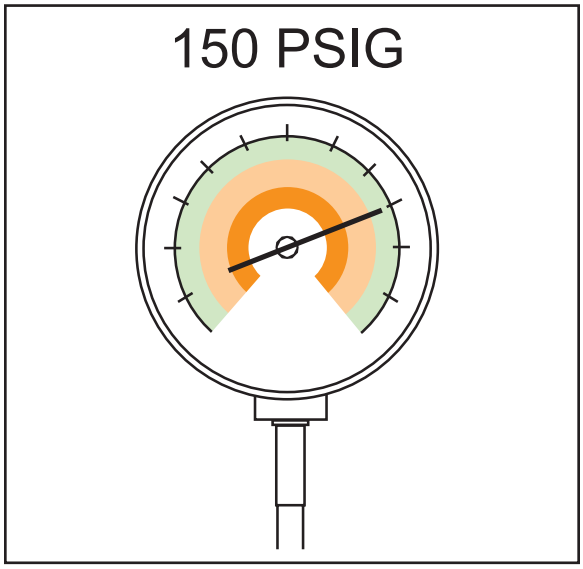
STEP 5 - Replace the pressure tap valve cores after the service valves have cooled.



Section 8. Refrigerant Line Leak Check

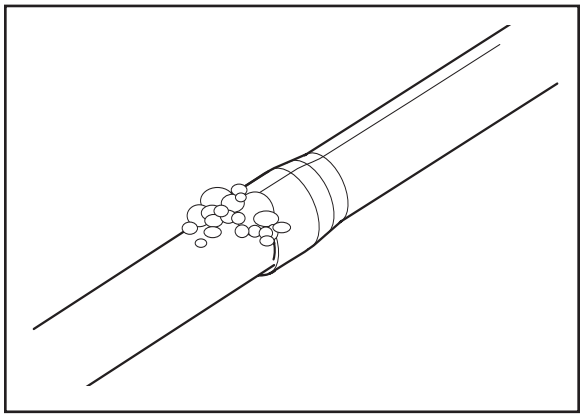
8.1 Check For Leaks

STEP 1 - Pressurize the refrigerant lines and evaporator coil to 150 PSIG using dry nitrogen.



STEP 2 - Check for leaks by using a soapy solution or bubbles at each brazed location.

Remove nitrogren pressure and repair any leaks before continuing.

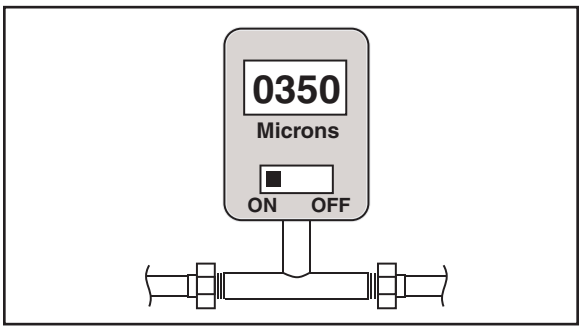


Section 9. Evacuation

9.1 Evacuate the Refrigerant Lines and Indoor Coil

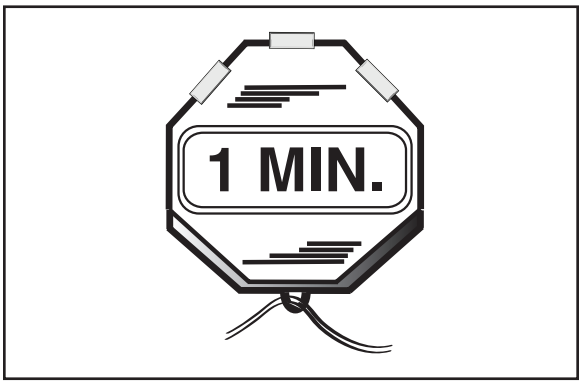
Important: *Do not open the service valves until the refrigerant lines and indoor coil leak check and evacuation are complete.*

STEP 1 - Evacuate until the micron gauge reads no higher than 350 microns, then close off the valve to the vacuum pump.



STEP 2 - Observe the micron gauge. Evacuation is complete if the micron gauge does not rise above 500 microns in one (1) minute.

Once evacuation is complete blank off the vacuum pump and micron gauge, and close the valves on the manifold gauge set.



Section 10. Service Valves

10.1 Open the Gas Service Valve

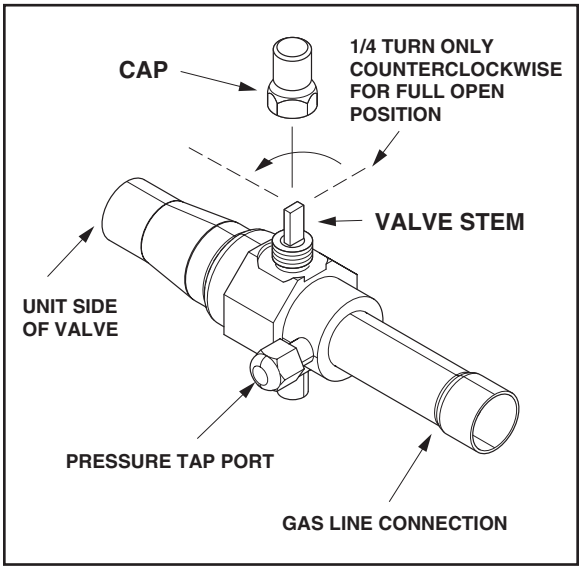
Important: *Leak check and evacuation must be completed before opening the service valves.*

NOTE: Do not vent refrigerant gases into the atmosphere.

STEP 1 - Remove valve stem cap.

STEP 2 - Using an adjustable wrench, turn valve stem 1/4 turn counterclockwise to the fully open position.

STEP 3 - Replace the valve stem cap to prevent leaks. Tighten finger tight plus an additional 1/6 turn.



10.1 Open the Liquid Service Valve

⚠ WARNING

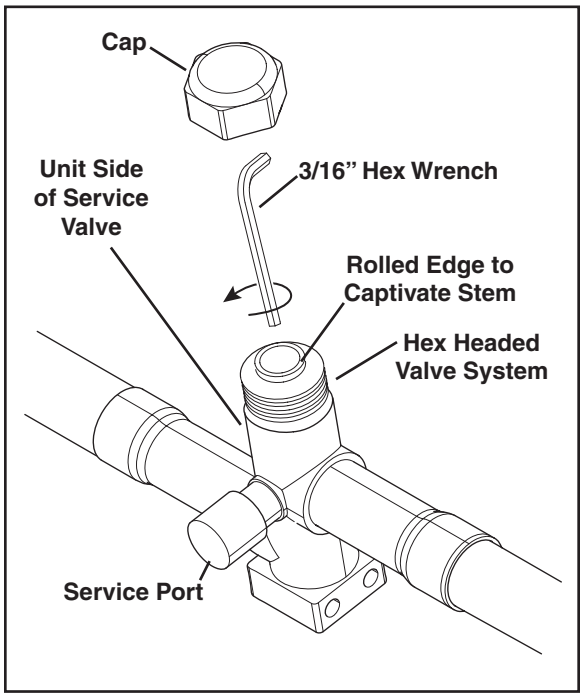
Extreme caution should be exercised when opening the Liquid Line Service Valve. Turn counterclockwise until the valve stem just touches the rolled edge. No torque is required. Failure to follow this warning will result in abrupt release of system charge and may result in personal injury and /or property damage.

Important: *Leak check and evacuation must be completed before opening the service valves.*

STEP 1 - Remove service valve cap.

STEP 2 - Fully insert 3/16" hex wrench into the stem and back out counterclockwise until valve stem just touches the rolled edge (approximately five (5) turns.)

STEP 3 - Replace the valve cap to prevent leaks. Tighten finger tight plus an additional 1/6 turn.



Section 11. Electrical - Low Voltage

11.1 Low Voltage Maximum Wire Length

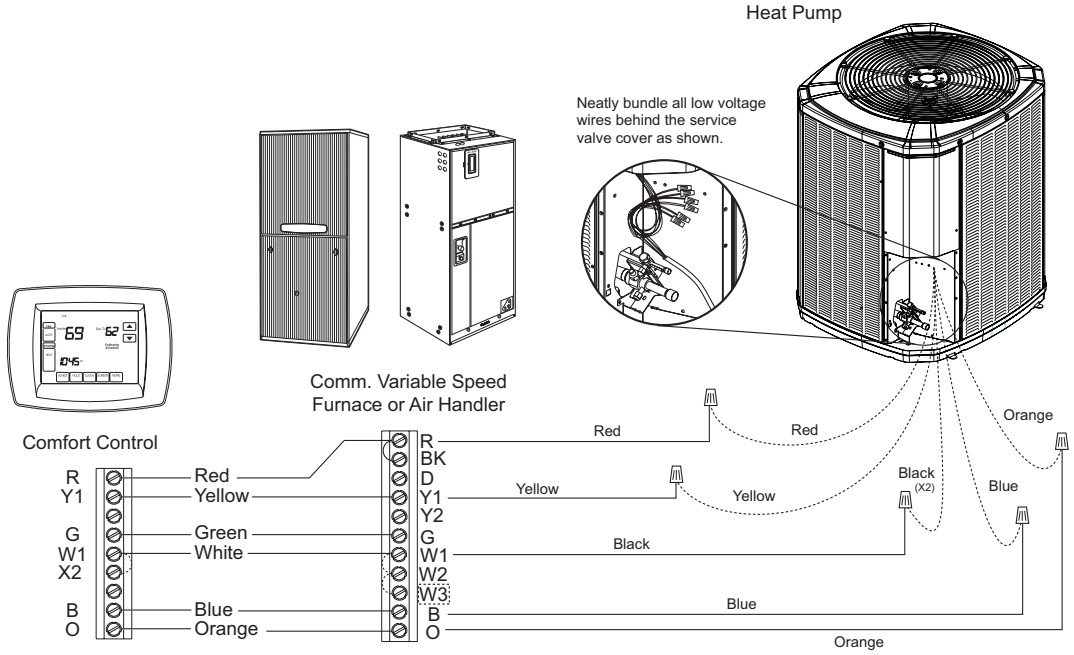
Table 11.1 defines the maximum total length of low voltage wiring from the outdoor unit, to the indoor unit, and to the thermostat.

Table 11.1

24 VOLTS	
WIRE SIZE	MAX. WIRE LENGTH
18 AWG	150 Ft.
16 AWG	225 Ft.
14 AWG	300 Ft.

11.2 Low Voltage Hook-up Diagrams

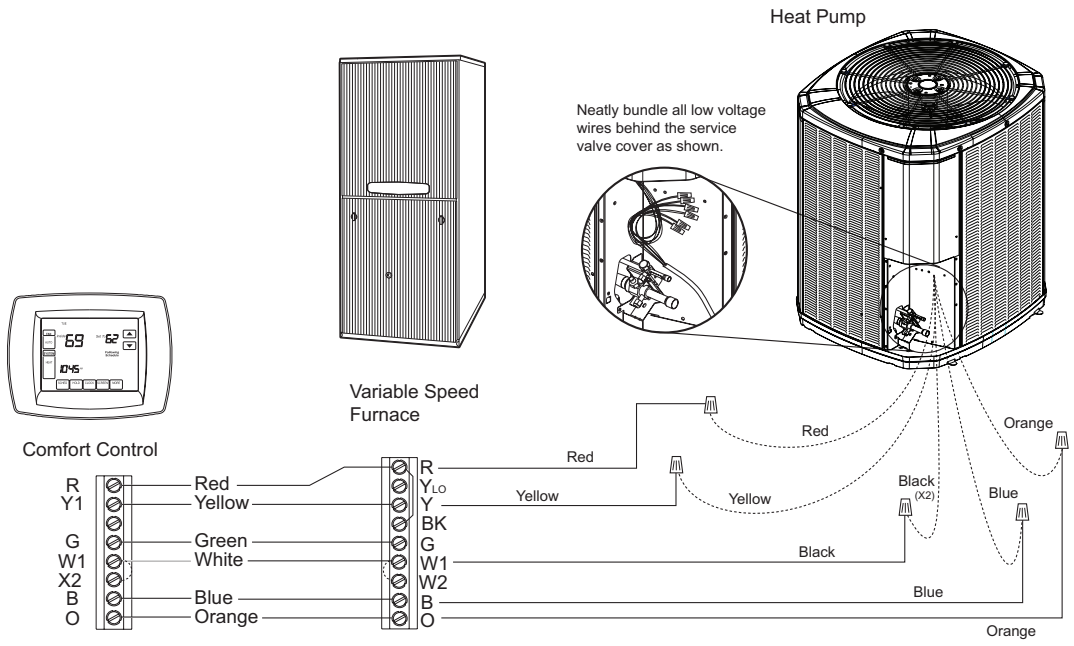
Communicating Indoor Unit with 24 V Control Hook-up Diagram



Notes:

1. See User Interface 24 V Mode setup menu for control mode and cooling CFM options.
2. W3 terminal may not be present on unit.
3. (Air Handlers only) If electric heat does not have 3rd contactor (CH), connect a jumper wire from W3 to W2. If electric heat does not have 2nd contactor (BH), connect a jumper wire from W2 to W1.
4. W1 - X2 is a field installed jumper.

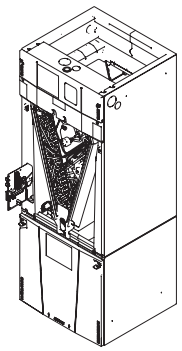
Variable Speed Furnace Hook-up Diagram



Notes:

1. Comfort control must be dual fuel capable or use accessory TAYPLUS103A.
2. Ylo and BK may not be present on unit.
3. W1 - X2 is a field installed jumper.

TAM7 Air Handler Hook-up Diagram

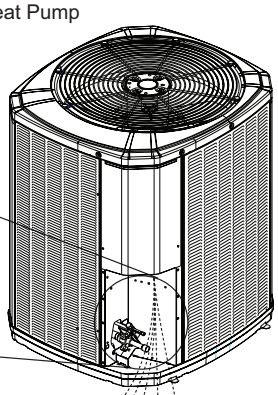


Air Handler

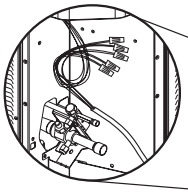


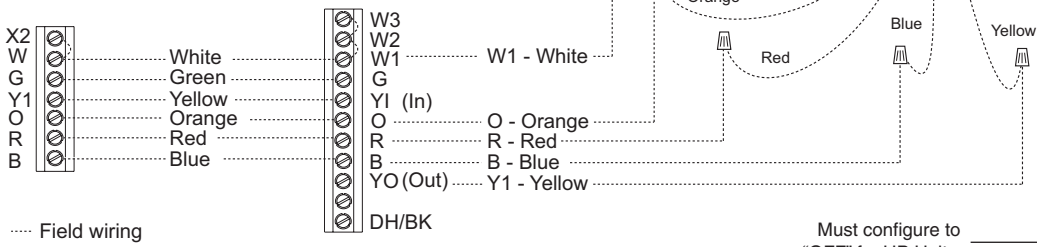
Comfort Control

Heat Pump



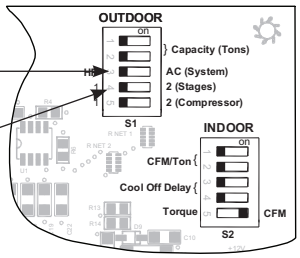
Neatly bundle all low voltage wires behind the service valve cover as shown.





Field wiring

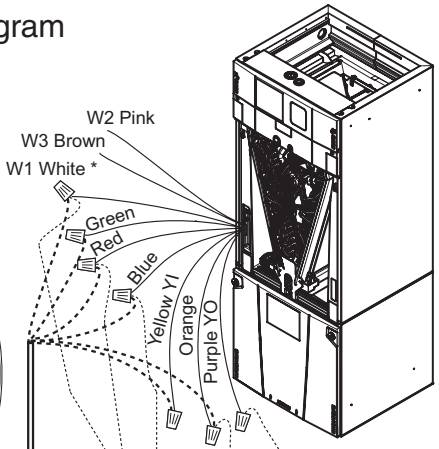
Control Board



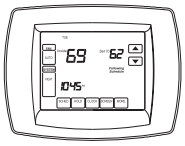
Must configure to "OFF" for HP Units.

Must configure to "OFF" for single-stage compressors.

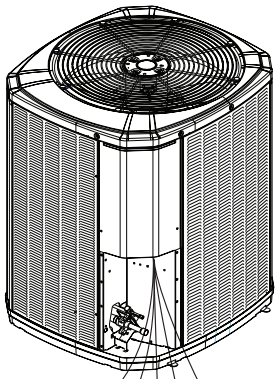
TAM4 Air Handler Hook-up Diagram



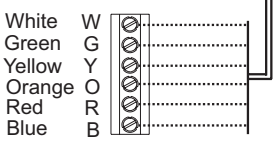
Air Handler



Comfort Control



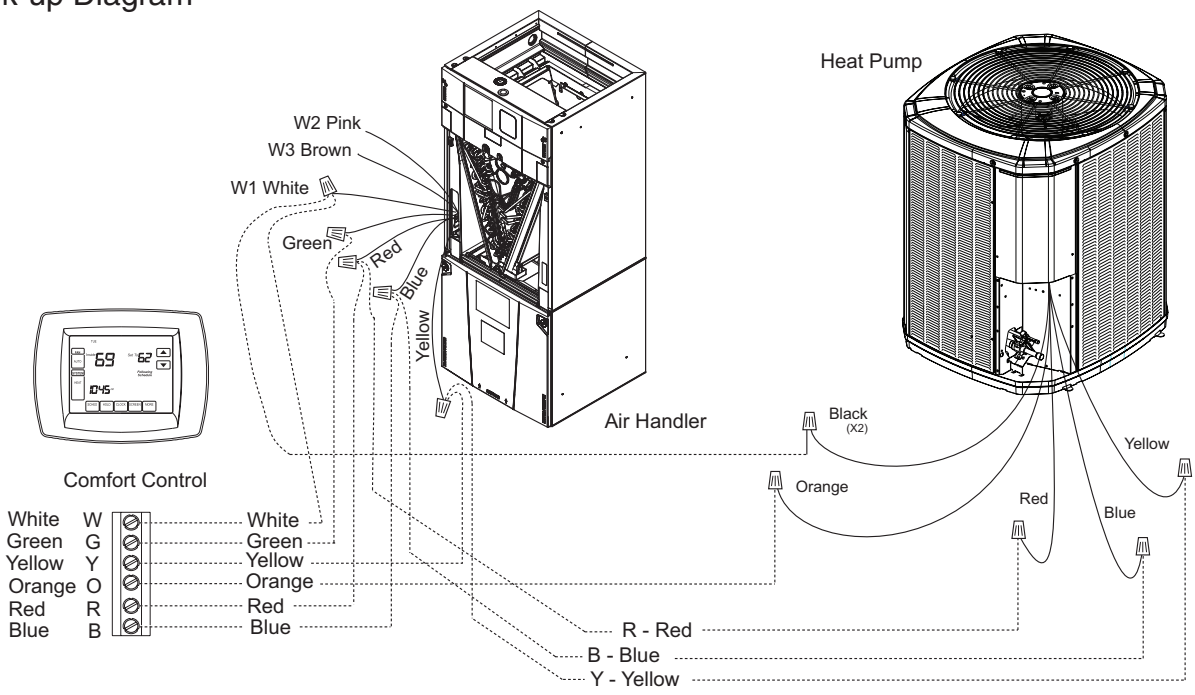
Heat Pump



Field wiring

- * For multiple stages of electric heat, jumper W1, W2, and W3 together if comfort control has only one stage of heat
- YI and YO connections must be made as shown for proper operation, freeze protection, and internally mounted condensate overflow circuits to work properly
- Internally mounted condensate switch is optional and must be ordered separately
- If a 3rd party condensate overflow switch is installed, it should be wired between Y of the thermostat and YI of the EEV control.
- Some models have a terminal strip. Refer to air handler Installer's Guide

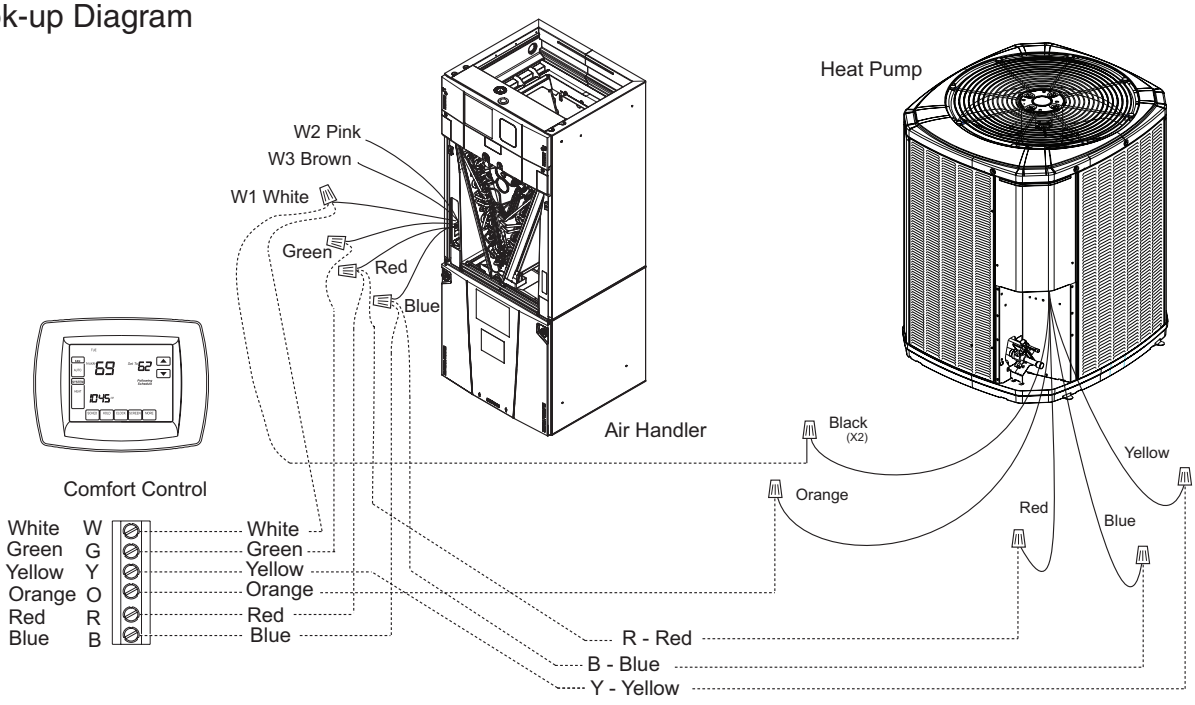
GAM5 Air Handler Hook-up Diagram



····· Field wiring

- * For multiple stages of electric heat, jumper W1, W2, and W3 together if comfort control has only one stage of heat
- Some models have a terminal strip. Refer to air handler Installer's Guide.

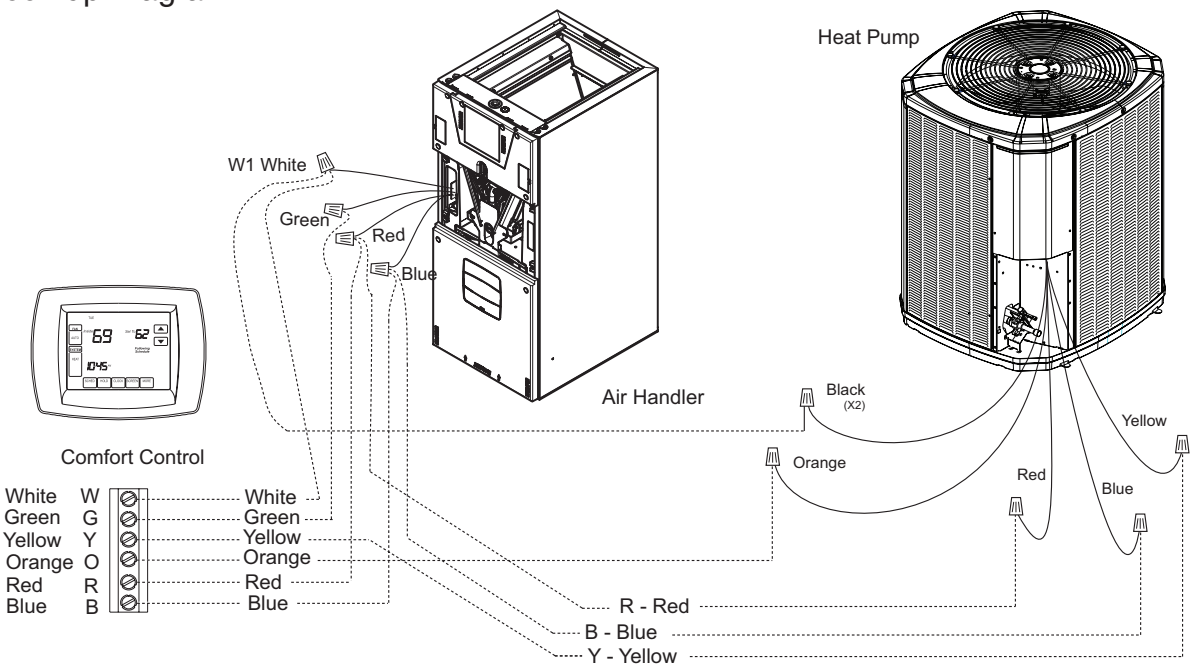
GAM2 Air Handler Hook-up Diagram



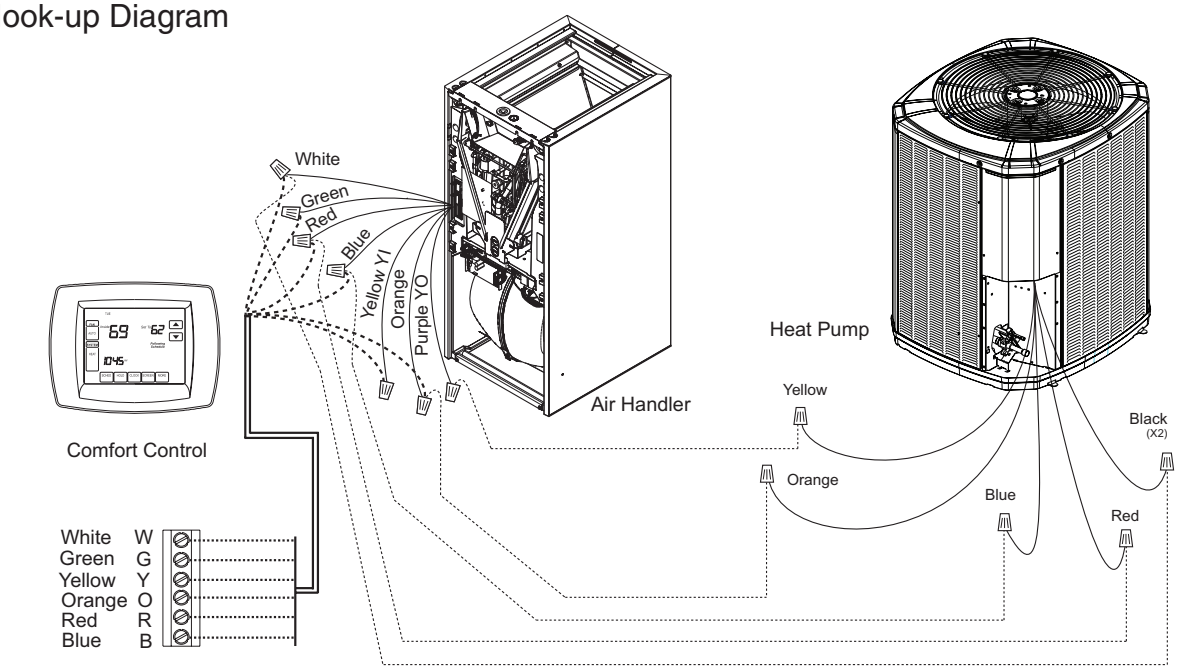
····· Field wiring

- * For multiple stages of electric heat, jumper W1, W2, and W3 together if comfort control has only one stage of heat

GAF2 (and TEM3/TEM4) Air Handler Hook-up Diagram



GAF2-36M Air Handler Hook-up Diagram



- YI and YO connections must be made as shown
- Internally mounted condensate switch is optional and must be ordered separately
- If a 3rd party condensate overflow switch is installed, it should be wired between Y of the thermostat and YI of the EEV control.

11.3 Defrost Control

Defrost controls have a selectable termination temperature. As shipped, defrost will terminate at 47°F. For a higher termination temperature, cut Jumper J2 to achieve 70°F when at or below 30°F ambient. See Service Facts shipped in the outdoor unit for more information.

Pin Identification (See Illustration at right)

1. TEST_COMMON (Shorting any of the other pins to this pin causes the function of the other pin to be executed. Leaving this pin open results in the normal mode of operation.)
2. TST = Test (Shorting TEST_COMMON to this pin speeds up all defrost board timings.)
3. FRC_DFT = Forced Defrost (Short TEST_COMMON to this pin for two (2) seconds to initiate a forced defrost. Remove the short after defrost initiates.)

Defrost Control Checkout

Normal operation requires:

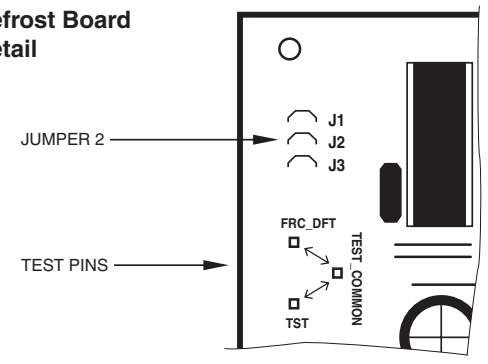
- LED on board flashing 1 time/second.
- 24V AC between R & B.
- 24V AC between Y & B with unit operating.
- Defrost initiation when FRC_DFT pin is shorted to TEST_COMMON pin.

If a defrost control problem is suspected, refer to the service information in control box.

Defrost Termination Temperatures

	Outdoor Temperature	Termination Temperature
As Shipped	>22°F	47°F
	10°F–22°F	ODT + 25°F
	6°F–10°F	35°F
Cut Jumper 2	>30°F	47°F
	6°F–30°F	70°F
All	< 6°F	12 min. or 35°F every 3 hrs.

Defrost Board Detail



Section 12. Electrical - High Voltage

12.1 High Voltage Power Supply

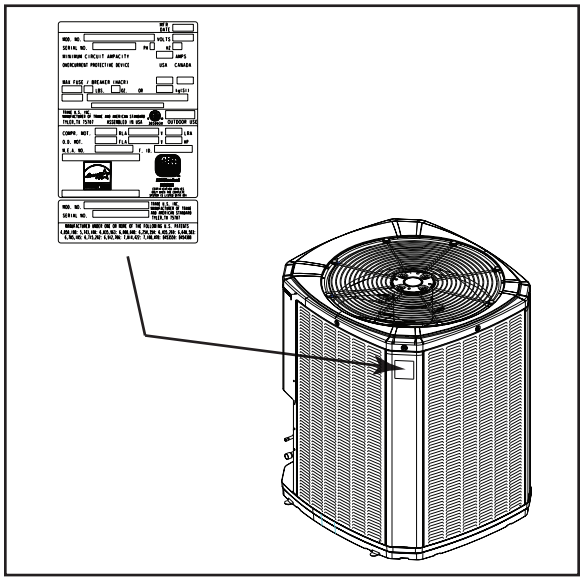
⚠ WARNING

LIVE ELECTRICAL COMPONENTS!
During installation, testing, servicing, and troubleshooting of this product, it may be necessary to work with live electrical components. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

The high voltage power supply must agree with the equipment nameplate.

Power wiring must comply with national, state, and local codes.

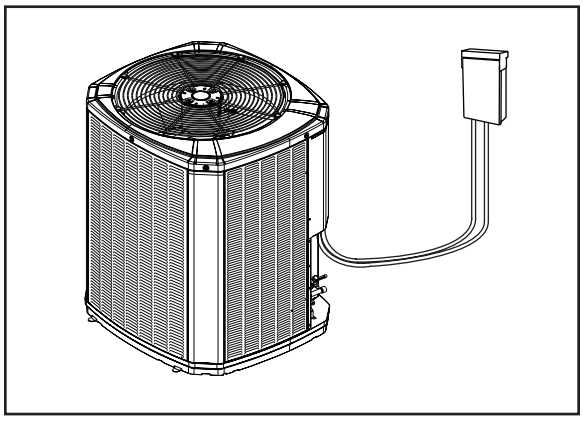
Follow instructions on unit wiring diagram located on the inside of the control box cover and in the Service Facts document included with the unit.



12.2 High Voltage Disconnect Switch

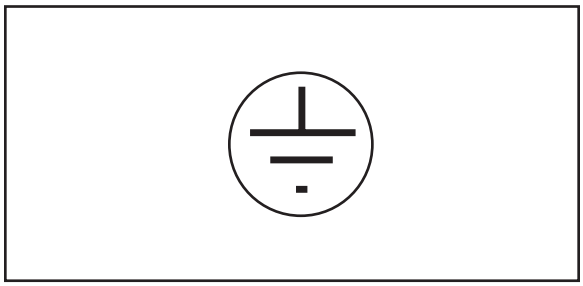
Install a separate disconnect switch at the outdoor unit.

For high voltage connections, flexible electrical conduit is recommended whenever vibration transmission may create a noise problem within the structure.



12.3 High Voltage Ground

Ground the outdoor unit per national, state, and local code requirements.

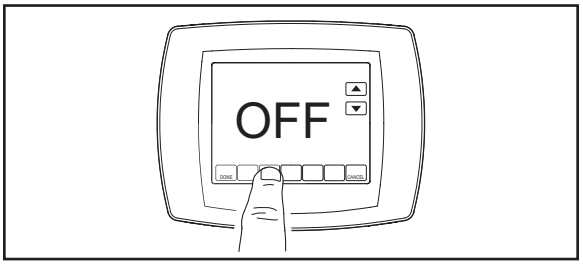


Section 13. Start Up

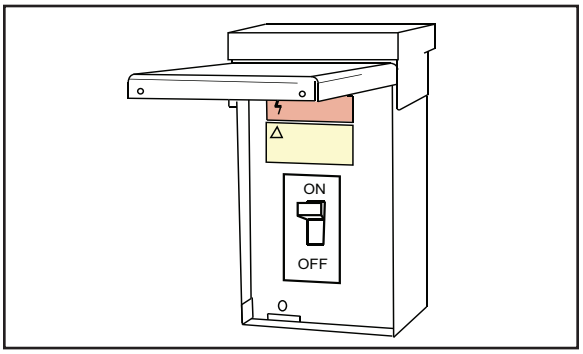
13.1 System Start Up

STEP 1 - Ensure Sections 7 through 12 have been completed.

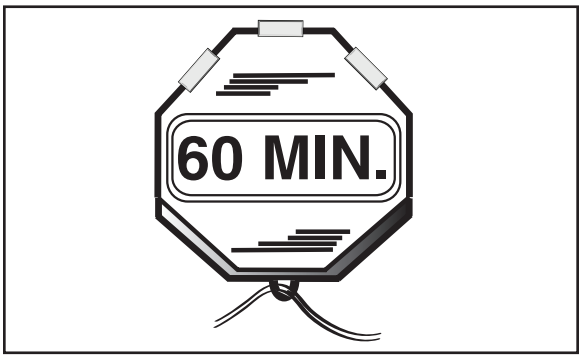
STEP 2 - Set System Thermostat to OFF.



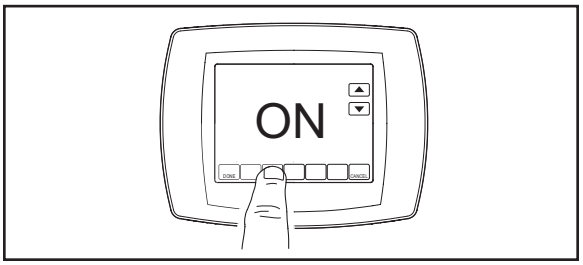
STEP 3 - Turn on disconnect(s) to apply power to the indoor and outdoor units.



STEP 4 - Wait one (1) hour before starting the unit if compressor crankcase heater accessory is used and the Outdoor Ambient is below 70ºF.



STEP 5 - Set system thermostat to ON.



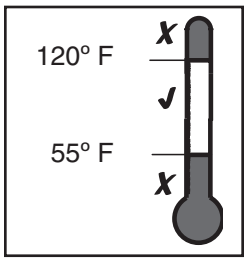
Section 14. System Charge Adjustment

14.1 Temperature Measurements

STEP 1 - Check the outdoor temperatures.

Subcooling (in cooling mode) is the only recommended method of charging above 55° F ambient outdoor temperature. See Section 14.2.

See Section 14.2 for Outdoor Temperatures Above 55° F

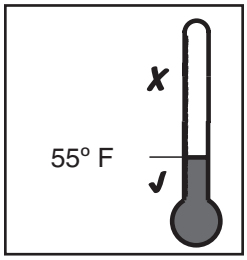


Outdoor Temp 1

For outdoor temperatures below 55° F, see Section 14.3.

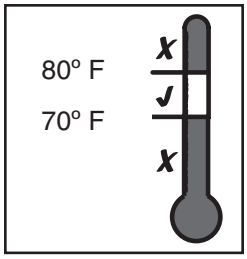
Note: It is important to return in the spring or summer to accurately charge the system in the cooling mode when outdoor ambient temperature is above 55° F.

See Section 14.3 for Outdoor Temperatures Below 55° F



Outdoor Temp 2

For best results the indoor temperature should be kept between 70° F to 80° F.



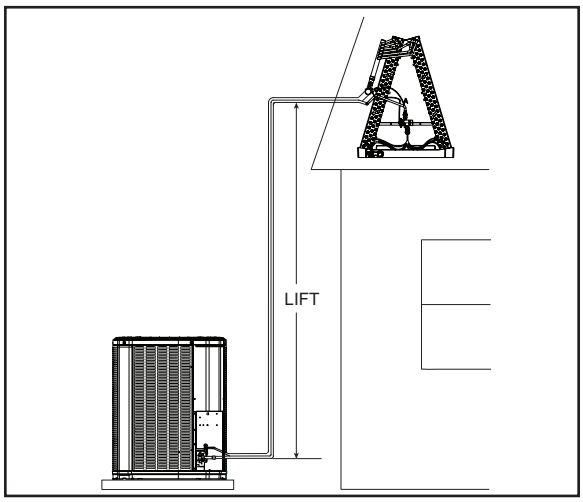
Indoor Temp

14.2 Subcooling Charging in Cooling (Above 55° F Outdoor Temp.)

STEP 1 - Use the refrigerant line total length and lift measurements from Section 5.3.

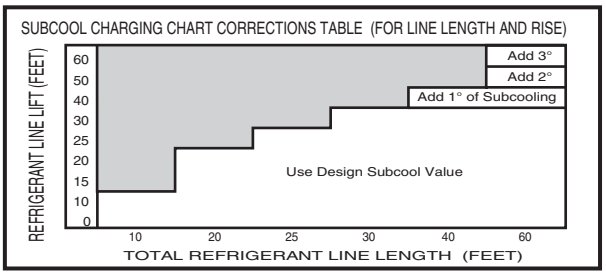
Total Line Length = _____ Ft.

Vertical Change (Lift) = _____ Ft.

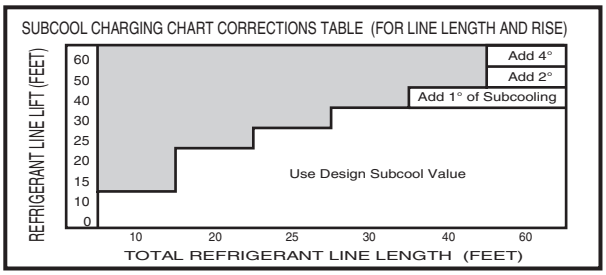


STEP 2 - Determine the final subcooling value using total Line Length and Lift measured in STEP 1 and the charts below.

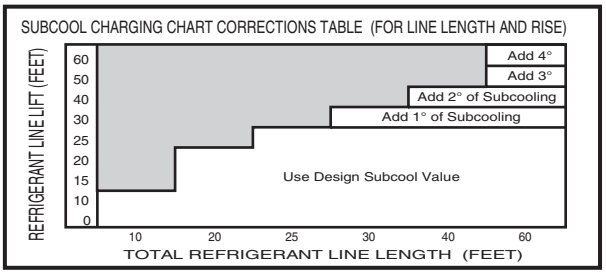
1 1/2 Ton Heat Pump



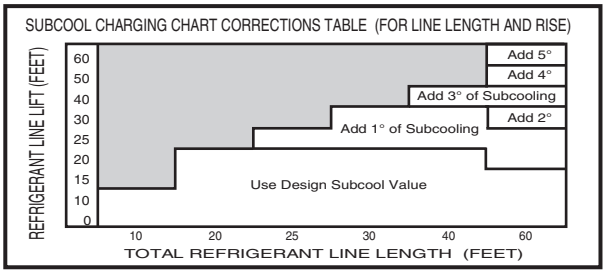
2 Ton Heat Pump



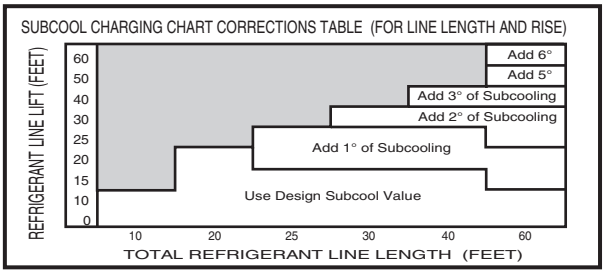
2 1/2 Ton Heat Pump



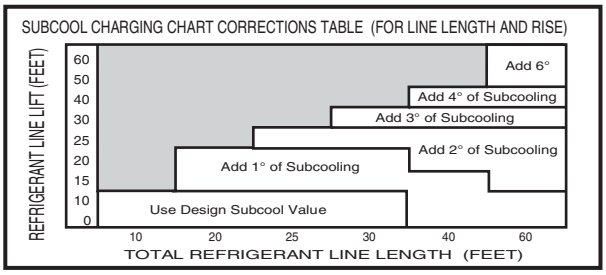
3 Ton Heat Pump



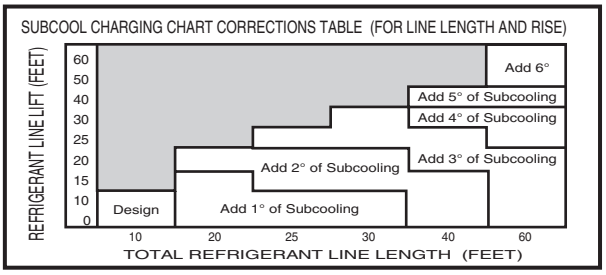
3 1/2 Ton Heat Pump



4 Ton Heat Pump



5 Ton Heat Pump



Design Subcooling Value = _____° F
(from nameplate or Service Facts)

Subcooling Correction = _____° F

Final Subcooling Value = _____° F

STEP 3 - Stabilize the system by operating for a minimum of 20 minutes.

At startup, or whenever charge is removed or added, the system must be operated for a minimum of 20 minutes to stabilize before accurate measurements can be made.

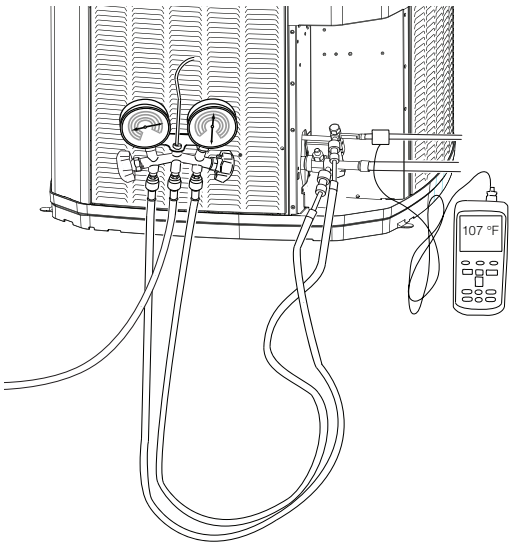


STEP 4 - Measure the liquid line temperature and pressure at the outdoor unit's service valve.

Measured Liquid Line Temp = _____ ° F

Liquid Gage Pressure = _____ PSIG

Final Subcooling Value = _____ ° F



STEP 5 - Use the final subcooling value, refrigerant temperature and pressure from STEP 4, to determine the proper liquid gage pressure using Table 14.2.

Example: Assume a 12° F Final Subcooling value and liquid temp of 90° F.

1. Locate 12° F Final Subcooling in Table 14.2.
2. Locate the Liquid Temperarature (90° F) in the left column.
3. The Liquid Gage Pressure should be approximately 327 PSIG. (This is the shown as the intersection of the Final Subcooling column and the Liquid Temperature row.

Table 14.2

R-410A REFRIGERANT CHARGING CHART							
LIQUID TEMP (°F)	FINAL SUBCOOLING (°F)						
	8	9	10	11	12	13	14
	LIQUID GAGE PRESSURE (PSI)						
55	179	182	185	188	191	195	198
60	195	198	201	204	208	211	215
65	211	215	218	222	225	229	232
70	229	232	236	240	243	247	251
75	247	251	255	259	263	267	271
80	267	271	275	279	283	287	291
85	287	291	296	300	304	309	313
90	309	313	318	322	327	331	336
95	331	336	341	346	351	355	360
100	355	360	365	370	376	381	386
105	381	386	391	396	402	407	413
110	407	413	418	424	429	435	441
115	435	441	446	452	458	464	470
120	464	470	476	482	488	495	501
125	495	501	507	514	520	527	533

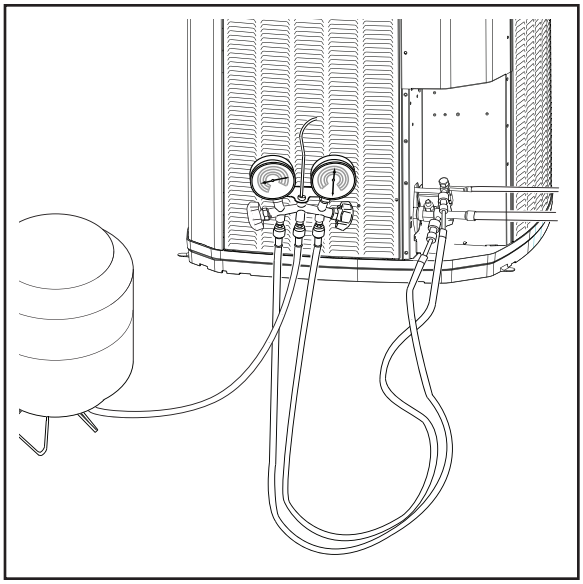
From Dwg. D154557P01 Rev. 3

STEP 6 - Adjust refrigerant level to attain proper gage pressure.

Add refrigerant if the Liquid Gage Pressure is lower than the chart value.

1. Connect gages to refrigerant bottle and unit as illustrated.
2. Purge all hoses.
3. Open bottle.
4. Stop adding refrigerant when liquid line temperature and Liquid Gage Pressure matches the charging chart Final Subcooling value.

Recover refrigerant if the Liquid Gage Pressure is higher than the chart value.



STEP 7 - Stabilize the system.

1. Wait 20 minutes for the system condition to stabilize between adjustments.

Note: When the Liquid Line Temperature and Gage Pressure approximately match the chart, the system is properly charged.

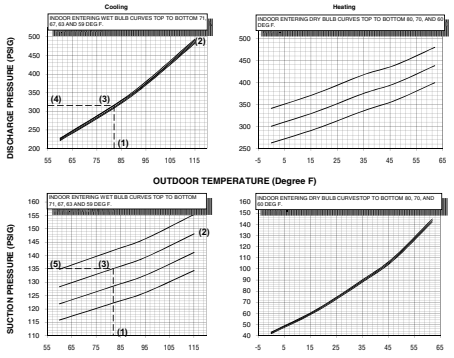
2. Remove gages.
3. Replace service port caps to prevent leaks. Tighten finger tight plus an additional 1/6 turn.



STEP 8 - Verify typical performance.

Refer to System Pressure Curves in the Service Facts to verify typical performance.

(Example only - see Service Facts)



STEP 9 - Record System Information for reference.

Record system pressures and temperatures after charging is complete.

Outdoor model number = _____

Measured Outdoor Ambient = _____ ° F

Measured Indoor Ambient = _____ ° F

Measured Liquid Line Temp = _____ ° F

Measured Suction Line Temp = _____ ° F

Liquid Gage Pressure = _____ PSIG

Suction Gage Pressure = _____ PSIG

14.3 Subcooling Charging Below 55º F Outdoor Temp. (In Heating Only)

The Subcooling Charging method in cooling is **not** recommended below 55º F outdoor temperature.

The only recommended method of charging at outdoor temperatures below 55º F is weighing in the charge in **heating mode**.

STEP 1 - Determine additional charge.

From the nameplate label (shown in Section 12.1), record namplate charge below.

Note: The nameplate charge value represents the amount of refrigerant shipped in the outdoor unit and is compatible with 15 feet of AHRI rated refrigerant lines and the smallest AHRI rated coil.

Using Table 14.3, find the charge associated with the additional length of tubing above 15 ft. and record it below.

Namplate charge = _____ Oz.

Charge adder = _____ Oz.
(from Table 14.2)

Table 14.3

TUBING INFORMATION							
	LINE TYPE		REFRIGERANT TO ADD AT SPECIFIED ADDITIONAL LENGTH				
Tonnage	**Suction Line**	**Liquid Line**	**20 ft**	**30 ft**	**40 ft**	**50 ft**	**60 ft**
1.5 – 2 Ton	5/8"	3/8"	3 oz	8 oz	14 oz	20 oz	25 oz
2.5 - 3.5 Ton	3/4"	3/8"	3 oz	9 oz	15 oz	21 oz	27 oz
4 Ton	7/8"	3/8"	3 oz	9 oz	16 oz	22 oz	28 oz
5 Ton	1-1/8"	3/8"	4 oz	11 oz	18 oz	25 oz	32 oz

STEP 2 - Stabilize the system by operating for a minimum of 20 minutes.

At startup, or whenever charge is removed or added, the system must be operated for a minimum of 20 minutes to stabilize before accurate measurements can be made.



STEP 3 - Check the liquid line temperature and liquid gage pressure to obtain a minimum of 10º subcooling in heating mode.

Measured Liquid Line Temp = _____ º F

Liquid Gage Pressure = _____ PSIG

STEP 4 - Add charge if a minimum of 10º subcooling is not obtained with the namplate charge plus additional charge previously added.

STEP 5 - Return to site for adjustment.

Important: Return in the spring or summer to accurately charge the system in the cooling mode with outdoor ambient **above 55º F**.

Section 15. Checkout Procedures and Troubleshooting

15.1 Operational And Checkout Procedures

Final phases of this installation are the unit Operational and Checkout Procedures. To obtain proper performance, all units must be operated and charge adjustments made.

Important: *Perform a final unit inspection to be sure that factory tubing has not shifted during shipment. Adjust tubing if necessary so tubes do not rub against each other when the unit runs. Also be sure that wiring connections are tight and properly secured.*

CHECKOUT PROCEDURE

After installation has been completed, it is recommended that the entire system be checked against the following list:

1. Leak check refrigerant lines. ..... [ ]
2. Properly insulate suction lines and fittings..... [ ]
3. Properly secure and isolate all refrigerant lines..... [ ]
4. Seal passages through masonry.
   If mortar is used, prevent mortar from coming into direct contact with copper tubing. ..... [ ]
5. Verify that all electrical connections are tight..... [ ]
6. Observe outdoor fan during on cycle for clearance and smooth operation..... [ ]
7. Be sure that indoor coil drain line drains freely. Pour water into drain pan..... [ ]
8. Be sure that supply registers and return grilles are open and unobstructed..... [ ]
9. Be sure that a return air filter is installed. ..... [ ]
10. Be sure that the correct airflow setting is used. (Indoor blower motor) ..... [ ]
11. Operate complete system in each mode to ensure safe operation..... [ ]

15.2 Troubleshooting

SYSTEM FAULTS		WHAT TO CHECK MODE	POWER SUPPLY	HIGH VOLTAGE WIRING	COMPRESSOR IOL	RUN CAPACITOR	START CAPACITOR	START RELAY	CONTACTOR CONTACTS	LOW VOLTAGE WIRING	CONTROL TRANSFORMER	THERMOSTAT	CONTACTOR COIL	LOW VOLTAGE FUSE	STUCK COMPRESSOR	INEFFICIENT COMP.	REF. UNDERCHARGE	REF. OVERCHARGE	EXCESSIVE EVAP. LOAD	NONCONDENSABLES	O.D. AIR RECIRCULATION	RES. O.D. AIRFLOW	TXV/EEV STUCK OPEN	SUPERHEAT	REF. C/R. RESTRICTIONS	RES. I.D. AIRFLOW	SOV LEAKING	SOV COIL DEFECTIVE	CHECK VALVE LEAKING	*DEFROST RELAY DEF.	DEFROST CONTROL DEF.	
REFRIGERANT CIRCUIT																																
Head Pressure Too High	C																	P	P	S	P	S					S					
	H																	P	P	S						P	S					
Head Pressure Too Low	C															S	P						S	S		S		S	S	P		
	H															S	P						S	S		S	S		P			
Suction Pressure Too High	C															S		P	P					S			P		P			
	H															S								S			P					
Suction Pressure Too Low	C																P							S	P	S		S				
	H																P				S	S		S		S						
Liquid Refrig. Floodback (TXV/EEV)	C																						P						P			
	H																						P						P			
Liquid Refrig. Floodback (Cap. Tube)	C																	P			S	S		S	P							
	H																	P			S	S		S				S				
I.D. Coil Frosting	C																P				S	S										
	H																															
Compressor Runs Inadequate or No Cooling/Htg	C															S	P		S	S				S	P	S	S	S	S			
	H															S	P			S				S	P	S	S		S			
ELECTRICAL																																
Compressor & O.D. Fan Won't Start	C	P	P						S	P	S	P	P																			
	H	P	P						S	P	S	P	P																			
Compressor Will Not Start But O.D. Fan Runs	C		P	S	P	S	S	S						P																		
	H		P	S	P	S	S	S						P																		
O.D. Fan Won't Start	C		P		P			S																								
	H		P		P			S																								
Compressor Hums But Won't Start	C				P	S	S	S						P																		
	H				P	S	S	S						P																		
Compressor Cycles on IOL	C		P	S	P	S	S	S						P	S	P	P	S		S	S		S			S					
	H		P	S	P	S	S	S						P	S	P	P	S		S			S	P		S					
I.D. Blower Won't Start	C	P	P						S	P	S		S																			
	H	P	P						S	P	S		S																			
DEFROST																																
Unit Won't Initiate Defrost	C																															
	H																												P		P	P
Defrost Terminates on Time	C																															
	H																P															P
Unit Icing Up	C																															
	H																P				S	S			S				P			P

C - Cooling H - Heating P - Primary Causes S - Secondary Causes * - 3 Phase Only