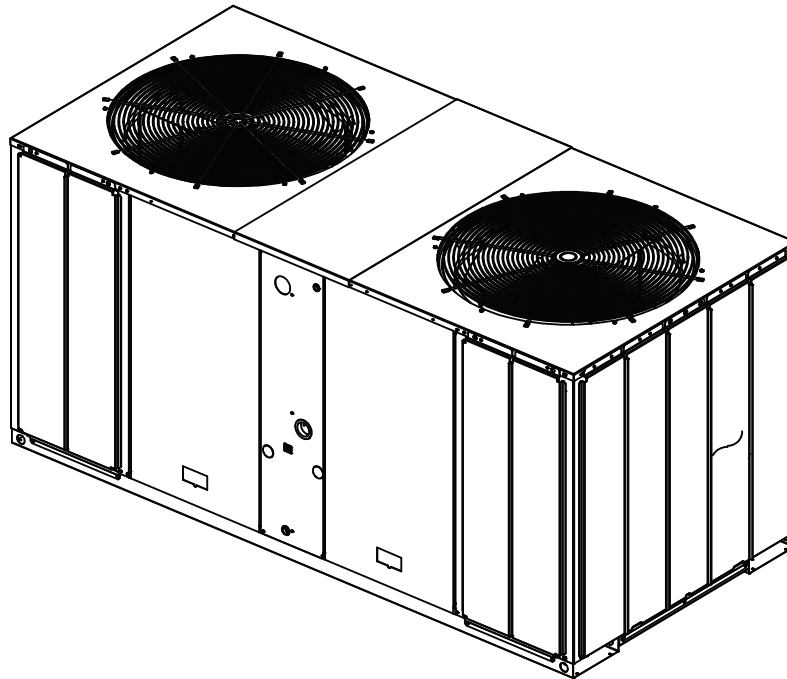


# Installation Operation Maintenance

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## Split System Heat Pump Condensers

*6-20 Tons (R-410A)*



**Model Numbers:**

**(60 Hz)**

TWA073D\*\*\*A  
TWA090D\*\*\*A  
TWA120D\*\*\*A  
TWA180E\*\*\*A  
TWA240E\*\*\*A

**(50 Hz)**

TWA061D\*\*\*A  
TWA076D\*\*\*A  
TWA101D\*\*\*A  
TWA156E\*\*\*A  
TWA201E\*\*\*A

# Warnings, Cautions and Notices

**Warnings, Cautions and Notices.** Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provided to alert installing contractors to potential hazards that could result in personal injury or death. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

**ATTENTION:** Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully.



**WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

**NOTICE:** Indicates a situation that could result in equipment or property-damage only accidents.

## Important Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

## Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.



### **WARNING**

## **R-410A Refrigerant under Higher Pressure than R-22!**

The unit described in this manual uses R-410A refrigerant which operates at higher pressures than R-22 refrigerant. Use **ONLY R-410A rated service equipment or components with this unit.** For specific handling concerns with R-410A, please contact your local Trane representative. Failure to use R-410A rated service equipment or components could result in equipment or components exploding under R-410A high pressures which could result in death, serious injury, or equipment damage.

### WARNING

#### Contains R-410A Refrigerant!

System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives. Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.

**Important:** *DO NOT release refrigerant to the atmosphere! If adding or removing refrigerant is required, the service technician must comply with all federal, state, and local laws.*

**Important:** *One copy of this document ships inside the control panel of each unit and is customer property. It must be retained by the unit's maintenance personnel.*

### WARNING

#### Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- Before installing/servicing this unit, technicians **MUST** put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. **ALWAYS** refer to appropriate MSDS and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to appropriate MSDS and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.
- If there is a risk of arc or flash, technicians **MUST** put on all Personal Protective Equipment (PPE) in accordance with NFPA70E for arc/flash protection **PRIOR** to servicing the unit.

**Failure to follow recommendations could result in death or serious injury.**

This booklet describes proper installation, operation, and maintenance procedures for air cooled systems. By carefully reviewing the information within this manual and following the instructions, the risk of improper operation and/or component damage will be minimized.

It is important that periodic maintenance be performed to help assure trouble free operation. A maintenance schedule is provided at the end of this manual. Should equipment failure occur, contact a qualified service organization with qualified, experienced HVAC technicians to properly diagnose and repair this equipment.

**Important:** *All phases of this installation must comply with the NATIONAL, STATE & LOCAL CODES. In addition to local codes, the installation must conform with National Electric Code -ANSI/NFPA NO. 70 LATEST REVISION.*

Any individual installing, maintaining, or servicing this equipment must be properly trained, licensed and qualified.

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# Model Number Description

<u>T W A</u>	<u>0 9 0</u>	<u>D</u>	<u>3</u>	<u>0 0</u>	<u>A</u>	<u>A</u>
1 2 3	4 5 6	7	8	9 10	11	12

## Model Number Description

All products are identified by a multiple-character model number that precisely identifies a particular type of unit. An explanation of the alphanumeric identification code is provided. Its use will enable the owner/operator, installing contractors, and service engineers to define the operation, specific components, and other options for any specific unit.

**Note:** When ordering replacement parts or requesting service, be sure to refer to the specific model number, serial number, and DL number (if applicable) stamped on the unit nameplate.

### Digits 1 - 3: Product Type

TWA = Split System Heat Pump Outdoor Unit

### Digits 4 - 6: Nominal Gross Cooling Capacity (MBh)

073 = 6 Tons (60 Hz)	061 = 5 Tons (50 Hz)
090 = 7½ Tons (60 Hz)	076 = 6.25 Tons (50 Hz)
120 = 10 Tons (60 Hz)	101 = 8.33 Tons (50 Hz)
180 = 15 Tons (60 Hz)	156 = 13 Tons (50 Hz)
240 = 20 Tons (60 Hz)	201 = 16.7 Tons (50 Hz)

### Digit 7: Major Development Sequence

D = Single Circuit  
E = Dual Circuit

### Digits 8: Electrical Characteristics

3 = 208-230/60/3	D = 380-415/50/3
4 = 460/60/3	K = 380/60/3
W = 575/60/3	

### Digits 9 - 10: Factory Installed Options

0R = ReliaTel, no LCI Board  
 0T = ReliaTel, no LCI Board with Black Epoxy Coated Coil  
 0U = ReliaTel, with LCI Board  
 0W = ReliaTel, with LCI Board and Black Epoxy Coated Coil  
 HR = Hailguard with ReliaTel, no LCI Board  
 HT = Hailguard with ReliaTel, no LCI Board with Black Epoxy Coated Coil  
 HU = Hailguard with ReliaTel, with LCI Board  
 HW = Hailguard with ReliaTel, with LCI Board and Black Epoxy Coated Coil

### Digits 11: Minor Design Sequence

A = Current Design Sequence

### Digits 12: Service Digit

A = Current Service Digit

# General Information

Installation procedures should be performed in the sequence that they appear in this manual. Do not destroy or remove the manual from the unit.

The manual should remain weather-protected with the unit until all installation procedures are complete.

**Note:** *It is not the intention of this manual to cover all possible variations in systems that may occur or to provide comprehensive information concerning every possible contingency that may be encountered during an installation. If additional information is required or if specific problems arise that are not fully discussed in this manual, contact your local sales office.*

## Installation Checklist

An "Installation Checklist" is provided at the end of the installation section of this manual. Use the checklist to verify that all necessary installation procedures have been completed. Do not use the checklist as a substitute for reading the information contained in the manual. Read the entire manual before beginning installation procedures.

## Unit Inspection

Inspect material carefully for any shipping damage. If damaged, it must be reported to, and claims made against the transportation company. Compare the information that appears on the unit nameplate with ordering and submittal data to ensure the proper unit was shipped. Available power supply must be compatible with electrical characteristics specified on component nameplates. Replace damaged parts with authorized parts only.

## Inspection Checklist

To protect against loss due to damage incurred in transit, complete the following checklist upon receipt of the unit.

1. Inspect individual pieces of the shipment before accepting the unit. Check for obvious damage to the unit or packing material.
2. Inspect the unit for concealed damage before it is stored and as soon as possible after delivery. Concealed damage must be reported within 15 days. If concealed damage is discovered, stop unpacking the shipment. Do not remove damaged material from the receiving location. Take photos of the damage if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
3. Notify the carrier's terminal of damage immediately by phone and by mail. Request an immediate joint inspection of the damage by the carrier and the consignee.
4. Notify the sales representative and arrange for repair. Do not repair the unit until the damage is inspected by the carrier's representative.

## Initial Leak Test

All **TWA** units are shipped with a holding charge of nitrogen in each circuit. Remove the service panel(s) shown in [Figure 3, p. 12](#) - [Figure 5, p. 14](#). Locate the liquid line or suction line service valve for each circuit. Install gauges to determine if the circuits are still pressurized. If not, the charge has escaped. Repair as required to obtain a leak-free circuit.

## Lifting Recommendations

### **NOTICE**

### **Equipment Damage!**

Use spreader bars to prevent lifting straps from damaging the unit. Install bars between lifting straps. This will prevent the straps from crushing the unit cabinet or damaging the unit finish.



### WARNING

#### Improper Unit Lift!

Each of the cables (chains or slings) used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift. Other lifting arrangements may cause equipment or property-only damage. Failure to properly lift unit could result in death or serious injury. Refer to [Table 1](#) and [Table 2](#) for unit weight.

Before preparing the unit for lifting, estimate the approximate center of gravity for lifting safety. Because of placement of internal components, the unit weight may be unevenly distributed. Approximate unit weights are given in [Table 1](#) and [Table 2](#).

**Table 1. TWA Unit & Corner Weights — kg (50 Hz)**

Tons	Model No.	Shipping Max (kg)	Net Max (kg)	Corner Weights			
				1	2	3	4
5	TWA061D	172	148	51	37	25	34
6.25	TWA076D	177	153	53	39	26	36
8.33	TWA101D	229	197	57	54	32	53
13	TWA156E	404	344	91	86	81	86
16.7	TWA201E	441	382	114	120	66	81

**Table 2. TWA Unit & Corner Weights — lbs (60 Hz)**

Tons	Model No.	Shipping Max (lbs)	Net Max (lbs)	Corner Weights			
				1	2	3	4
6	TWA073D	382	328	113	83	56	76
7.5	TWA090D	394	340	117	86	58	79
10	TWA120D	509	438	127	121	72	118
15	TWA180E	898	765	202	192	181	190
20	TWA240E	981	848	254	266	147	181

The crated unit can be moved using a forklift of suitable capacity. For lifting the unit, attach lifting straps or slings securely to the lifting holes at each corner. Use spreader bars to protect the unit casing from damage. Test lift the unit to determine proper balance and stability.



# Pre-Installation

## Clearances

Provide enough space around the unit to allow unrestricted access to all service points. Refer to [Figure 3, p. 12](#) through [Figure 5, p. 14](#) for unit dimensions and minimum required service and free air clearances. Observe the following points to ensure proper unit operation.

1. Do not install the unit under a low overhang. Outdoor discharge must not be restricted. See Notes in [Figure 3, p. 12](#) through [Figure 5, p. 14](#).

**Important:** Do not obstruct outdoor discharge air. This can result in warm air recirculation through the coil.

2. Do not locate the unit in a position where runoff water can fall into the fan discharge openings.
3. Outdoor intake air is supplied from three or four sides of the unit. Adhere to the minimum required clearances given in [Figure 3, p. 12](#) through [Figure 5, p. 14](#).

## Unit Mounting

### **WARNING** **Mounting Integrity!**

Ensure that the roof structure supports are strong enough to support the weight of the unit and any accessories. Failure to do so could result in death or serious injury or possible equipment or property-only damage.

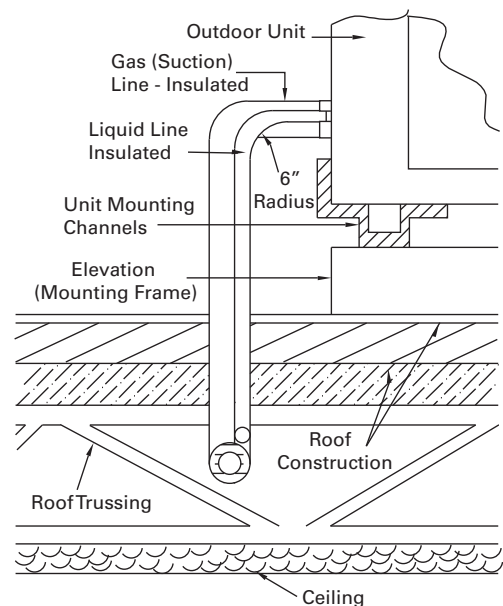
### Rooftop Mounting

If the unit will be roof mounted, determine for certain that the structure is strong enough to support the unit and any required accessories. Unit weights are given in [Table 1](#) and [Table 2, p. 8](#). The unit should be elevated on a level, field fabricated four-inch steel or wood 4" x 4" mounting frame. Complete the frame and secure it into position before lifting the unit to the roof. The mounting frame must support a minimum of three of the unit's four sides and should span roof supports to distribute the load on the roof.

### Ground Level Mounting

For ground level installation, the unit base should be adequately supported and hold the unit near level. The installation must meet the guidelines set forth in local codes. The support should extend two inches beyond the unit base channels at all points. The unit and support must be isolated from any adjacent structure to prevent possible noise or vibration problems. Any ground level location must comply with required clearances given in [Figure 3, p. 12](#) through [Figure 5, p. 14](#).

**Figure 1. Roof Mounted Unit**



### Snow Belt Recommendations

In regions where deep snow is encountered, raise the unit a minimum distance of 8 to 12 inches above the mounting surface. This will reduce the risk of snow blocking the coil and improves runoff of water produced during the defrost cycle. Avoid locating the unit where snow tends to drift. Snow accumulations must be removed from around the unit immediately to prevent drastic efficiency reduction. A snow drift barrier may be constructed around the unit to prevent snow blockage. Clearance between the snow barrier and the unit must comply with the clearances given in [Figure 3, p. 12](#) through [Figure 5, p. 14](#).

### Refrigerant Piping

#### **WARNING**

##### **R-410A Refrigerant under Higher Pressure than R-22!**

The unit described in this manual uses R-410A refrigerant which operates at higher pressures than R-22 refrigerant. Use **ONLY** R-410A rated service equipment or components with this unit. For specific handling concerns with R-410A, please contact your local Trane representative. Failure to use R-410A rated service equipment or components could result in equipment or components exploding under R-410A high pressures which could result in death, serious injury, or equipment damage.

#### **NOTICE**

##### **Roof Damage!**

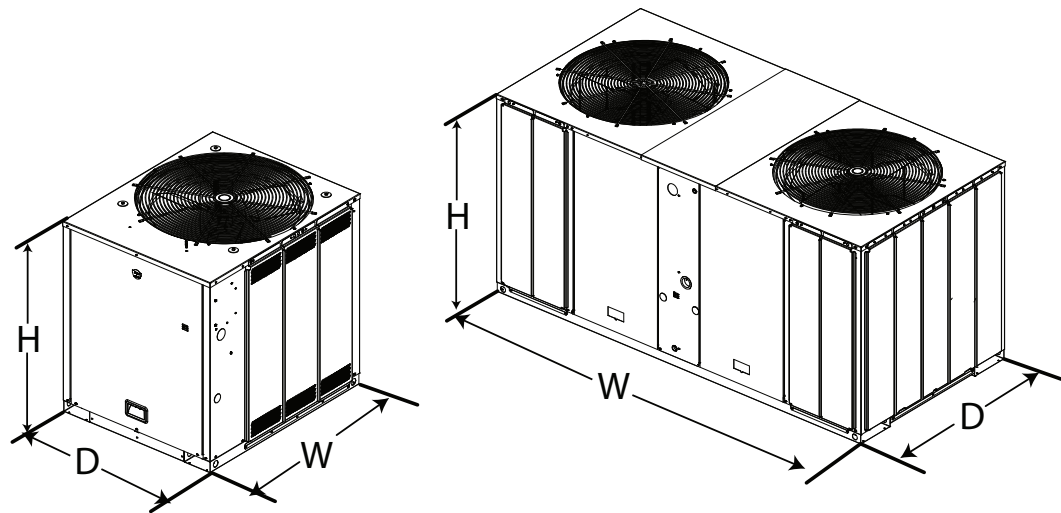
System contains oil and refrigerant under high pressure. Roofs should be protected from exposure to oils and refrigerant in the system. If rooftop is not protected damage to the roof may occur.

#### **Structural Preparation**

**Important:** Refer to local building codes for proper installation. All installation must comply with local building codes.

# Dimensional Data

Figure 2. TWA Quick Reference

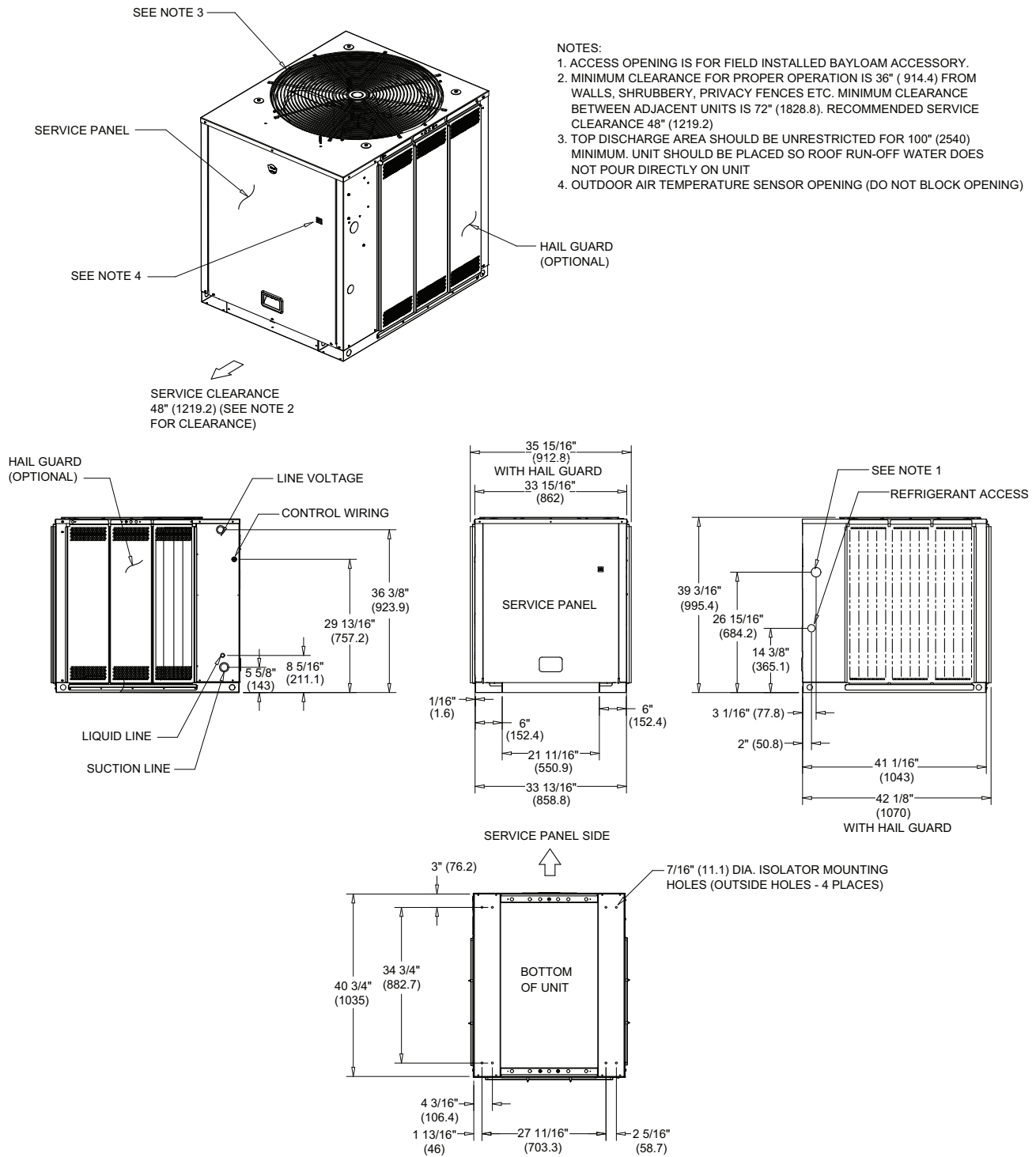


	H	W	D
TWA 061, 073, 076, 090	39.125 (993.8)	42.125 (1070)	36 (914.4)
TWA101, 120	39.125 (993.8)	52.125 (1324)	40 (1016)
TWA 156, 180, 201, 240	45.125 (1146.1)	95.5 (2425.7)	45.875 (1165.2)

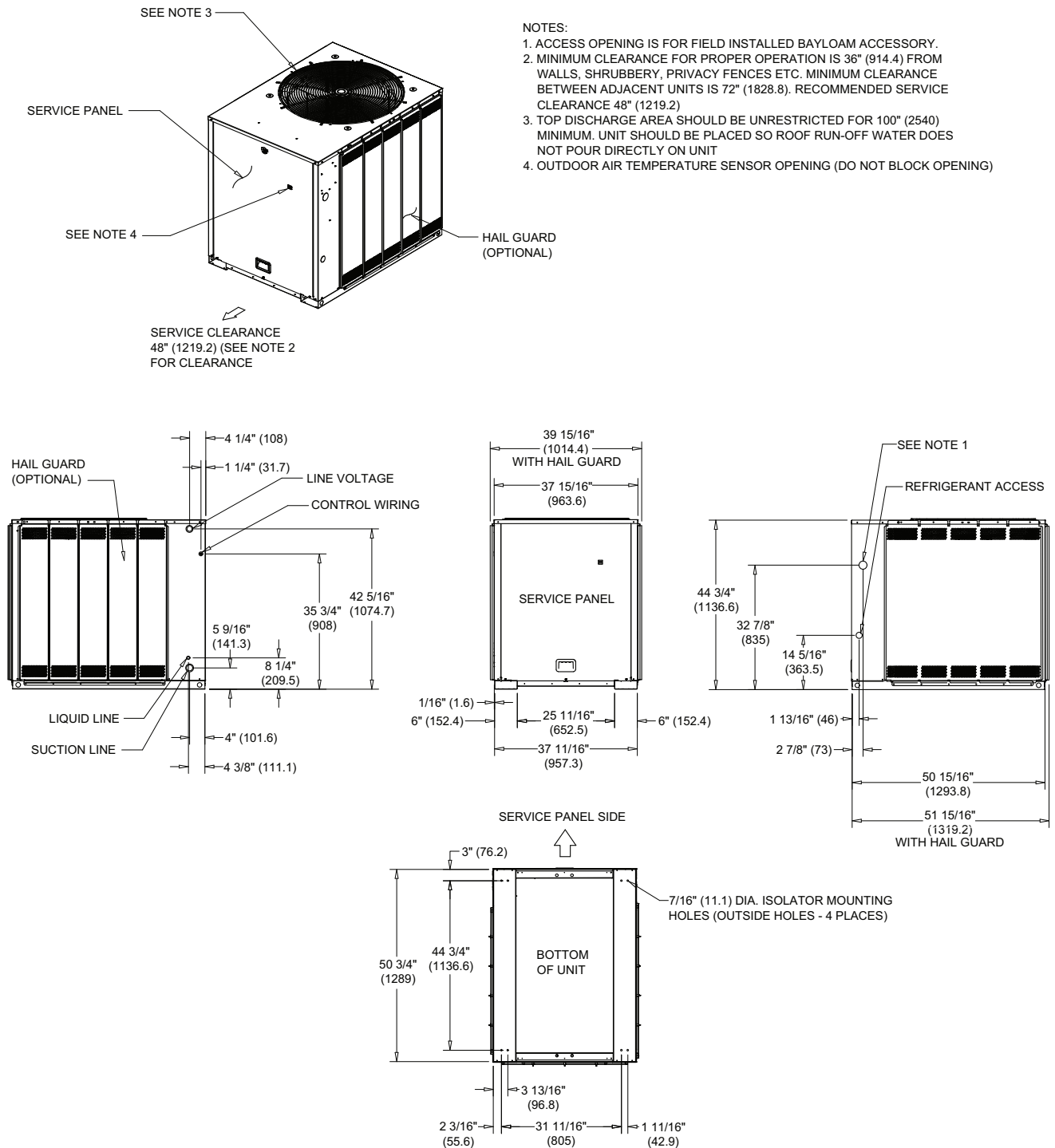
**Note:** Full dimensional data available on next pages.

## Dimensional Data

**Figure 3. TWA061, 073, 076, 090 Heat Pump, Single Compressor**

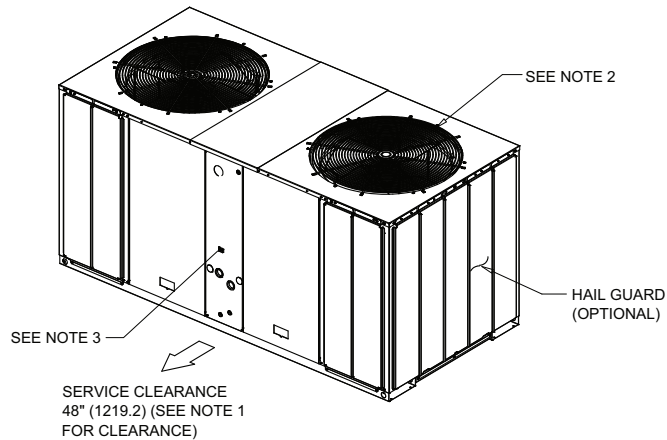


**Figure 4. TWA101, 120 Heat Pump, Single Compressor**



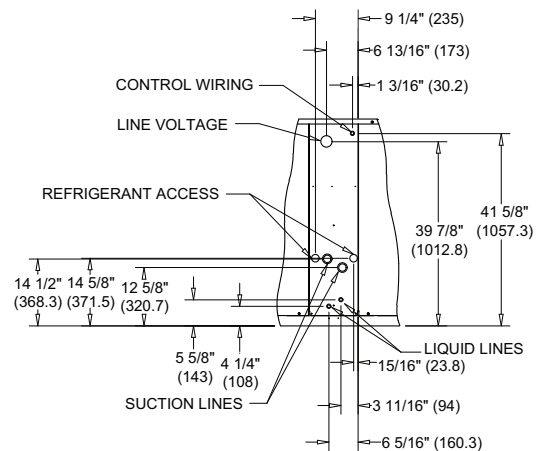
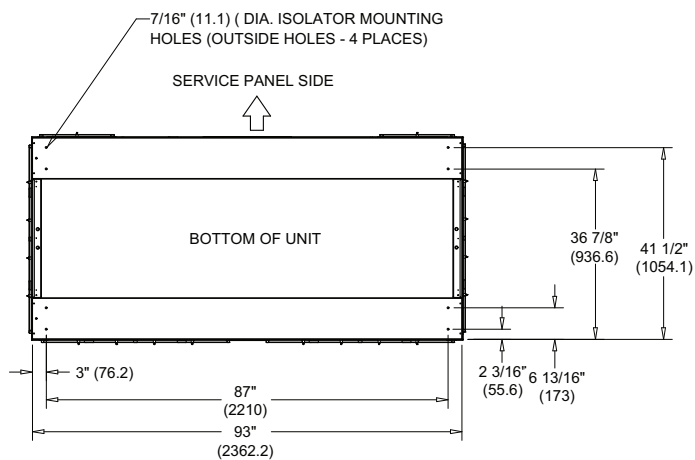
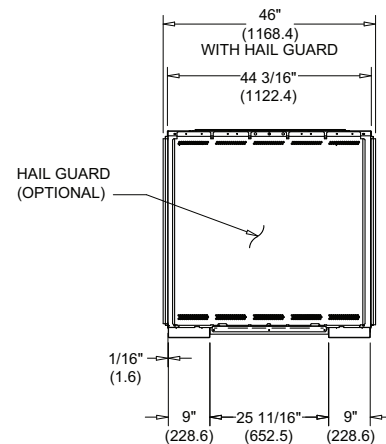
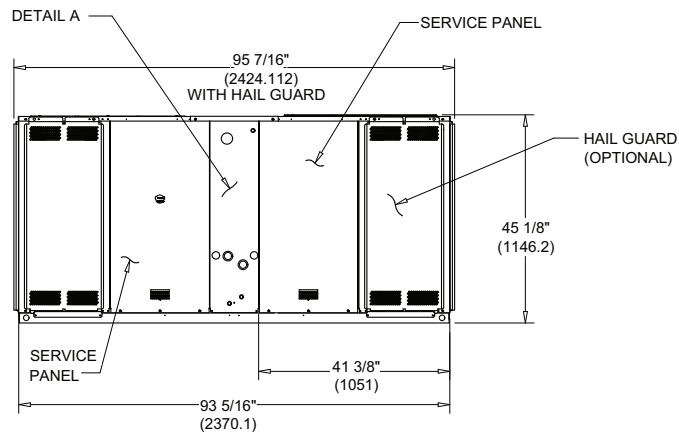
## Dimensional Data

Figure 5. TWA156, 180, 201, 240 Heat Pump, Dual Compressor



### NOTES:

1. MINIMUM CLEARANCE FOR PROPER OPERATION IS 36" (914.4) FROM WALLS, SHRUBBERY, PRIVACY FENCES ETC. MINIMUM CLEARANCE BETWEEN ADJACENT UNITS IS 72" (1829). RECOMMENDED SERVICE CLEARANCE 48" (1219.2)
2. TOP DISCHARGE AREA SHOULD BE UNRESTRICTED FOR 100" (2540) MINIMUM. UNIT SHOULD BE PLACED SO ROOF RUN-OFF WATER DOES NOT POUR DIRECTLY ON UNIT
3. OUTDOOR AIR TEMPERATURE SENSOR OPENING (DO NOT BLOCK OPENING).



FRONT DETAIL A

DIMENSIONAL DETAIL

# Electrical Data

**Table 3. Electrical Characteristics — Motors — Heat Pumps — 50Hz**

Unit Model No.	Compressor Motor					Condenser Fan Motor				
	No.	Volts	Phase	Amps		No.	Volts	Phase	Amps	
				RLA (Ea.)	LRA (Ea.)				RLA (Ea.)	LRA (Ea.)
TWA061DD	1	380/415	3	10.9	74	1	380/415	1	1.6	3.8
TWA076DD	1	380/415	3	12.5	101	1	380/415	1	1.6	3.8
TWA101DD	1	380/415	3	17.2	111	1	380/415	1	1.9	5.8
TWA156ED	2	380/415	3	12.5	100	2	380/415	1	1.9	5.8
TWA201ED	2	380/415	3	18.5	118	2	380/415	1	1.9	5.8

**Table 4. Unit Wiring — Heat Pumps — 50 Hz**

Tons	Unit Model No.	Unit Operating Voltage Range	Maximum Circuit Ampacity	Maximum Fuse Size or Maximum Circuit Breaker <sup>(a)</sup>
5	TWA061DD	380/415	15.2	20
6.25	TWA076DD	380/415	17.3	25
8.33	TWA101DD	380/415	23.4	30
13	TWA156ED	380/415	32.0	40
16.7	TWA201ED	380/415	45.4	60

(a) HACR type circuit breaker per NEC.

## Electrical Data

**Table 5. Electrical Characteristics — Compressor and Condenser Fan Motors — Heat Pumps — 60Hz**

Tons	Unit Model No.	Compressor Motor					Condenser Fan Motor				
		No.	Volts	Phase	Amps		No.	Volts	Phase	Amps	
					RLA (ea.)	LRA (ea.)				FLA (ea.)	LRA (ea.)
6	TWA073D3	1	208-230	3	22.4	149	1	208-230	1	3.1	8.1
	TWA073D4	1	460	3	10.6	75	1	460	1	1.6	3.8
	TWA073DK	1	380	3	11.3	88	1	380	1	2.7	7.0
	TWA073DW	1	575	3	8.3	54	1	575	1	1.2	3.0
7½	TWA090D3	1	208-230	3	25.0	164	1	208-230	1	3.1	8.1
	TWA090D4	1	460	3	13.0	100	1	460	1	1.6	3.8
	TWA090DK	1	380	3	14.3	94.3	1	380	1	2.7	7.0
	TWA090DW	1	575	3	10.8	78	1	575	1	1.2	3.0
10	TWA120D3	1	208-230	3	30.1	225	1	208-230	1	5.0	14.4
	TWA120D4	1	460	3	16.7	114	1	460	1	2.5	5.8
	TWA120DK	1	380	3	24.4	145	1	380	1	3.4	7.8
	TWA120DW	1	575	3	12.3	80	1	575	1	2.0	5.1
15	TWA180E3	2	208-230	3	25.0	164	2	208-230	1	5.0	14.4
	TWA180E4	2	460	3	12.6	100	2	460	1	2.5	5.8
	TWA180EK	2	380	3	14.3	94.3	2	380	1	3.4	7.8
	TWA180EW	2	575	3	10.4	78	2	575	1	2.0	5.1
20	TWA240E3	2	208-230	3	33.8	239	2	208-230	1	5.0	14.4
	TWA240E4	2	460	3	18.0	125	2	460	1	2.5	5.8
	TWA240EK	2	380	3	24.4	145	2	380	1	3.4	7.8
	TWA240EW	2	575	3	13.7	80	2	575	1	2.0	5.1



**Table 6. Unit Wiring — Heat Pumps — 60 Hz**

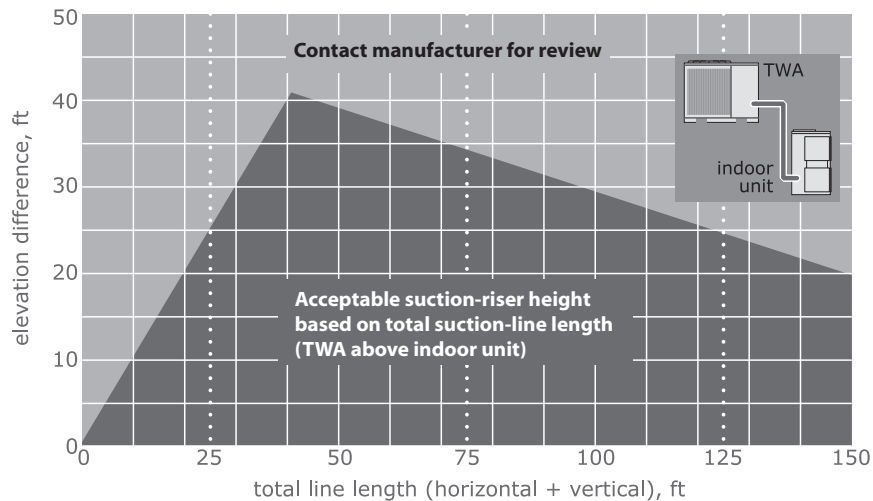
<b>Tons</b>	<b>Unit Model No.</b>	<b>Unit Operating Voltage Range</b>	<b>Minimum Circuit Ampacity</b>	<b>Maximum Fuse Size or Maximum Circuit Breaker<sup>(a)</sup></b>
6	TWA073D3	187-253	31.1	40
	TWA073D4	414-506	14.9	20
	TWA073DK	342-418	16.8	20
	TWA073DW	518-632	11.6	15
7½	TWA090D3	187-253	34.4	45
	TWA090D4	414-506	17.9	25
	TWA090DK	342-418	20.6	25
	TWA090DW	518-632	14.7	20
10	TWA120D3	187-253	42.6	60
	TWA120D4	414-506	23.4	30
	TWA120DK	342-418	33.9	45
	TWA120DW	518-632	17.4	25
15	TWA180E3	187-253	66.3	80
	TWA180E4	414-506	33.4	40
	TWA180EK	342-418	39.0	45
	TWA180EW	518-632	27.4	30
20	TWA240E3	187-253	86.1	100
	TWA240E4	414-506	45.5	50
	TWA240EK	342-418	61.8	70
	TWA240EW	518-632	34.8	40

(a) HACR type circuit breaker per NEC.

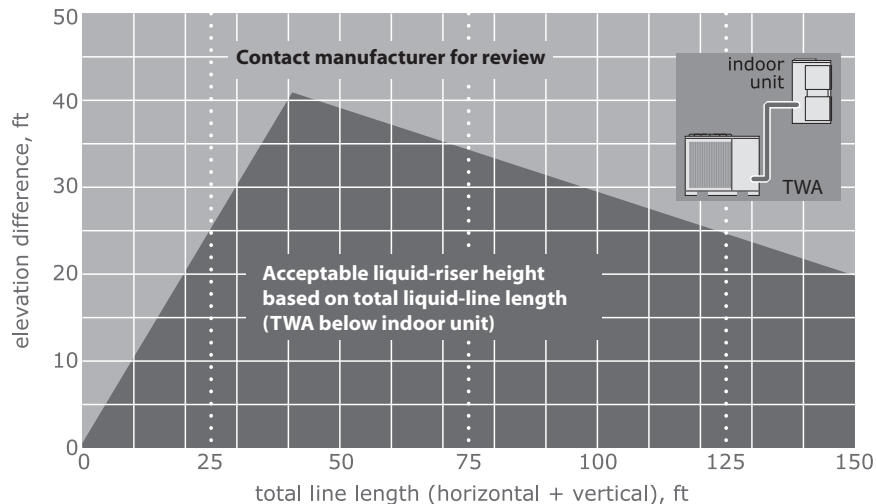
# Installation

## Refrigerant Piping Guidelines

**Figure 6. Allowable elevation difference: Cooling only TWA *above* indoor unit**



**Figure 7. Allowable elevation difference: TWA *below* indoor unit**



**Note:** Route refrigerant piping for minimum linear length, minimum number of bends and fittings (no reducers) and minimum amount of line exposed to outdoor ambients.

## Refrigerant Piping Procedures (Outdoor Units)

### **⚠ WARNING**

#### **R-410A Refrigerant under Higher Pressure than R-22!**

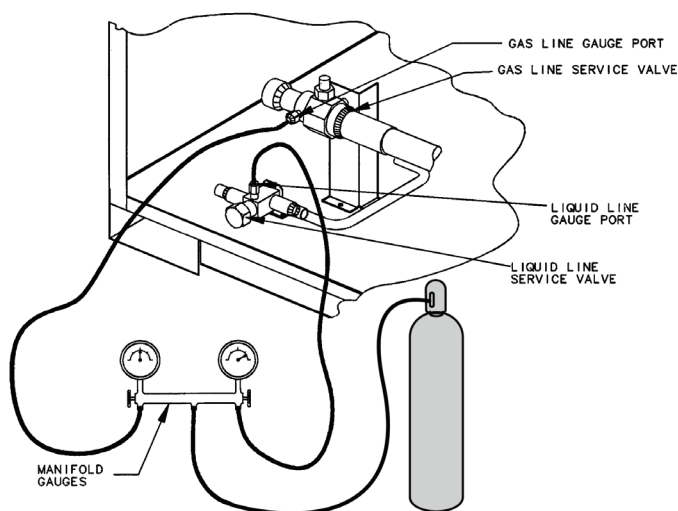
The unit described in this manual uses R-410A refrigerant which operates at higher pressures than R-22 refrigerant. Use **ONLY** R-410A rated service equipment or components with this unit. For specific handling concerns with R-410A, please contact your local Trane representative.

**Failure to use R-410A rated service equipment or components could result in equipment or components exploding under R-410A high pressures which could result in death, serious injury, or equipment damage.**

Each TWA unit ships with a holding charge of dry nitrogen. The nitrogen should be removed and the entire system evacuated (at the proper time) to avoid possible contamination.

1. Remove the compressor service access panel.
2. Locate the liquid and suction line service valves. Check that the piping connection stubs on the valves ([Figure 8](#)) line up properly with the holes in the unit cabinet.

**Figure 8. Outdoor Units - Refrigerant Piping (with dry nitrogen)**



3. Remove the refrigerant connection seal caps and open the service valve slowly to release the nitrogen from the unit.

## **NOTICE**

### **System Component Damage!**

Do not remove the seal caps from refrigerant connections, or open the service valves until prepared to braze refrigerant lines to the connections. Excessive exposure to atmosphere (> 5 min.) may allow moisture or dirt to contaminate the system, damaging valve seals and causing ice formation in system components.

## **⚠ WARNING**

### **Hazard of Explosion and Deadly Gases!**

Never solder, braze or weld on refrigerant lines or any unit components that are above atmospheric pressure or where refrigerant may be present. Always remove refrigerant by following the guidelines established by the EPA Federal Clean Air Act or other state or local codes as appropriate. After refrigerant removal, use dry nitrogen to bring system back to atmospheric pressure before opening system for repairs. Mixtures of refrigerants and air under pressure may become combustible in the presence of an ignition source leading to an explosion. Excessive heat from soldering, brazing or welding with refrigerant vapors present can form highly toxic gases and extremely corrosive acids. Failure to follow all proper safe refrigerant handling practices could result in death or serious injury.

4. Cut, fit and braze tubing, starting at the outdoor unit and work toward the indoor unit.

**Note:** Use long radius ells for all 90° bends.

All brazing should be done using a 2 to 3 psig dry nitrogen purge flowing through the pipe being brazed, [Figure 8, p. 19](#).

### **NOTICE**

#### **System Component Damage!**

Install a regulating valve between the nitrogen source and the gauge manifold ([Figure 8](#)). Unregulated pressure can damage system components.

### **NOTICE**

#### **System Component Damage!**

Wet-wrap all valves and protect painted surfaces from excessive heat. Heat can damage system components and the unit finish.

5. Shut off nitrogen supply. Shut off the manifold valve for the line that is connected to the suction line service valve. Disconnect the line from the gauge port on the valve.

## **Refrigerant Piping Procedure (Indoor Unit)**

Once liquid and suction lines are complete to the refrigerant connections on the indoor unit, remove the gauge port core(s) on the indoor unit connection stubs to release the dry nitrogen charge.

### **NOTICE**

#### **Unit Damage!**

Do not apply heat to remove seal caps until the gauge port cores have been removed. If seal caps are intact, application of heat may generate excessive pressure in the unit and result in damage to the coil or expansion valve.

1. Remove both seal caps from the indoor unit connection stubs.

### **NOTICE**

#### **Equipment Damage!**

Do not remove the seal caps from refrigerant connections, or open the service valves until prepared to braze refrigerant lines to the connections. Due to the high hygroscopic properties of the R-410A oil, excessive exposure to the atmosphere will allow moisture to contaminate the system, damaging the compressor.

2. Turn nitrogen supply on. Nitrogen enters thorough liquid line gauge port.
3. Braze the liquid line connections.
4. Open the gauge port on the suction line and then braze the suction line to the connection stub. Nitrogen will bleed out the open gauge port on the suction line.
5. Shut off nitrogen supply.

## Leak Check

### **WARNING**

#### **Hazard of Explosion!**

Use only dry nitrogen with a pressure regulator for pressurizing unit. Do not use acetylene, oxygen or compressed air or mixtures containing them for pressure testing. Do not use mixtures of a hydrogen containing refrigerant and air above atmospheric pressure for pressure testing as they may become flammable and could result in an explosion. Refrigerant, when used as a trace gas should only be mixed with dry nitrogen for pressurizing units. Failure to follow these recommendations could result in death or serious injury or equipment or property-only damage.

### **WARNING**

#### **Hazard of Explosion!**

Never use an open flame to detect gas leaks. Explosive conditions may occur. Use a leak test solution or other approved methods for leak testing. Failure to follow recommended safe leak test procedures could result in death or serious injury or equipment or property-only-damage.

After the brazing operation of refrigerant lines to both the outdoor and indoor unit is completed, the field brazed connections must be checked for leaks. Pressurize the system through the service valve with dry nitrogen to 200 psi. Use soap bubbles or other leak-checking methods to ensure that all field joints are leak free. If not, release pressure, repair and repeat leak test.

### **System Evacuation**

1. After completion of leak check, evacuate the system.
2. Attach appropriate hoses from manifold gauge to gas and liquid line pressure taps.

**Note:** *Unnecessary switching of hoses can be avoided and complete evacuation of all lines leading to sealed system can be accomplished with manifold center hose and connecting branch hose to a cylinder of R-410A and vacuum pump.*

3. Attach center hose of manifold gauges to vacuum pump.

### **NOTICE**

#### **Operating Under Vacuum**

**Do not operate or apply power to the compressor while under a vacuum. Failure to follow these instructions will result in compressor failure.**

4. Evacuate the system to hold a 500 micron vacuum.
5. Close off valve to vacuum pump and observe the micron gauge. If gauge pressure rises above 500 microns in one (1) minute, then evacuation is incomplete or the system has a leak.
6. If vacuum gauge does not rise above 500 microns in one (1) minute, the evacuation should be complete.

### **NOTICE**

#### **Equipment Damage**

**Charge with access port on the liquid line service valve only.**

7. With vacuum pump and micron gauge blanked off, open valve on R-410A cylinder and allow refrigerant pressure to build up to about 80 psig.
8. Close valve on the R-410A supply cylinder. Close valves on manifold gauge set and remove refrigerant charging hoses from liquid and gas gauge ports.

9. Leak test the entire system. Using proper procedures and caution, repair any leaks found and repeat the leak test.

### Insulating and Isolating Refrigerant Lines

Insulate the entire suction line with refrigerant piping insulation. Also insulate any portion of the liquid line exposed to temperature extremes. Insulate and isolate liquid and suction lines from each other. Isolate refrigerant lines from the structure and any duct work.

**Note:** *To prevent possible noise or vibration problems, be certain to isolate refrigerant lines from the building.*

**Important:** *All suction and hot gas bypass piping (if installed) should be insulated from the termination in the air handler to the condensing unit cabinet entry. Failure to do so can cause condensate drip off and performance degradation.*

**Important:** *Prior to starting a unit, it is advisable to have approved oils on hand in the event oil is required to be added to the system.*

### NOTICE

#### Equipment Damage!

This is POE oil which readily absorbs moisture, always use new oil and never leave the containers open to atmosphere while not in use.

Table 7. TWA Approved Oils

Unit Model Number	Approved Oils
TWA061, TWA073, TWA076, TWA090, TWA101, TWA120, TWA156, TWA180, TWA201, TWA240	Trane Oil Part Number OIL00094 (1 quart container)

### Refrigerant Charging Procedure

If charging by weight, refer to [Table 8, p. 23](#) for starting charge. If refrigerant adjustments are needed because of length of line, refer to charging curves "[Charging Charts](#)," [p. 29](#).

Charge by weight through the gauge port on the liquid line. Once the charge enters the system, backseat (open) the liquid line service valve and disconnect the charging line and replace the cap on the gauge port.

#### Notes:

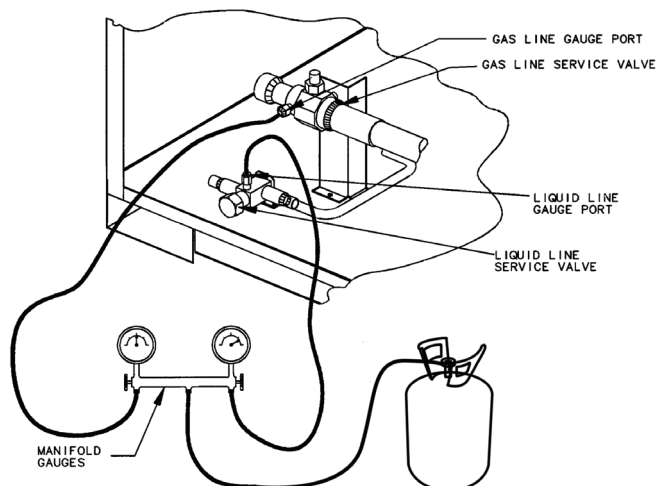
- *R-410A should only be charged in the liquid state.*
- *When possible, always charge the refrigerant into the liquid line of the unit.*
- *If the entire charge can't be charged into the liquid line, the balance of the unit charge can be metered through a charging manifold set as liquid preferably through a schrader valve into the suction line to the compressor — only while the compressor is running.*

### NOTICE

#### Equipment Damage!

Never charge liquid refrigerant into the suction line of the unit with the compressor off.

**Figure 9. Outdoor Units - Refrigerant Piping**



**Table 8. Estimated charge levels at ARI rated line lengths (25 feet)**

Matched Set	Refrigerant Charge		Per Circuit	
	Circuit 1	Circuit 2	Liquid Line Diameter	Vapor Line Diameter
TWA061D w/TWE076D	20.4	NA	0.5	1.125
TWA073D w/TWE090D	20.4	NA	0.5	1.125
TWA076D w/TWE076D	20.6	NA	0.625	1.375
TWA090D w/TWE090D	20.6	NA	0.625	1.375
TWA101D w/TWE101D	27.9	NA	0.5	1.375
TWA120D w/TWE120D	27.9	NA	0.5	1.375
TWA156E w/TWE156E	22.9	24.2	0.5	1.375
TWA180E w/TWE180E	22.9	24.2	0.5	1.375
TWA201E w/TWE201E	23.5	23.5	0.625	1.375
TWA240E w/TWE240E	23.5	23.5	0.625	1.375

## Installation

**Table 9. TWA Superheat with Matched TWE Air Handler**

Condenser	Air Handler	Cooling Superheat		Heating Superheat	
		Circuit 1	Circuit 2	Circuit 1	Circuit 2
TWA073D	TWE090D	14.9	—	12.7	—
TWA090D	TWE090D	16.0	—	15.7	—
TWA120D	TWE120D	16.3	—	13.1	—
TWA180E	TWE180E	15.5	15.5	12.2	12.2
TWA240E	TWE240E	14.7	14.7	11.4	11.4

**Notes:**

1. A preset, adjustable TXV is provided for each circuit in the TWE and TWA models. If the application causes the superheat to deviate from the values shown above by more than 1 degree - after the system has achieved steady state - the TXV should be adjusted to provide the values shown as measured at the compressor.
2. The values given above have been tested and are approved for the matched sets shown. If an alternate combination is used, an expansion device should be used that provides 16-20°F degrees of superheat measured at the compressor.

## Liquid Charging

This procedure is accomplished with the unit operating. Electrical connections must be complete. Do not proceed until the system is ready to operate.

**Note:** The compressor access panel must be installed when the unit is running and being charged. Manifold hoses must be routed through refrigerant gauge access hole(s). See dimensional diagrams for specific locations ([Figure 3, p. 12](#) - [Figure 5, p. 14](#)).

### WARNING

#### Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

1. Turn on power to the unit. Allow the system to run for 5 to 10 minutes to stabilize operating conditions.
2. Measure airflow across the indoor coil. Compare the measurements with the fan performance data in the Data/Submittal or Service Facts. Once proper airflow is established, compare discharge pressure and liquid temperature to the [“Charging Charts,” p. 29](#). Add or remove refrigerant (liquid only) as required to obtain correct discharge pressure and liquid temperature. Check suction line superheat and condenser sub-cooling to ensure the unit is operating properly.
3. Disconnect all power to the unit.

**Important:** If the unit is charged and left without power until a later date, the crankcase heater should be energized for a minimum of 8 hours prior to powering the compressor(s).

### WARNING

#### Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.



4. Remove the charging system from the unit.
5. Replace all panels.

## Electrical Wiring

TWA field wiring consists of providing power supply to the unit, installing the system indoor thermostat and providing low voltage system interconnecting wiring. Access to electrical connection locations is shown in [Figure 3, p. 12](#) - [Figure 5, p. 14](#).

### **WARNING**

#### **Electrocution and Fire Hazards with Improperly Installed and Grounded Field Wiring!**

Improperly installed and grounded field wiring poses FIRE & ELECTROCUTION hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. All field wiring **MUST** be performed by qualified personnel. Failure to follow these requirements could result in death or serious injury.

## Unit Power Supply

The installer must provide line voltage circuit(s) to the unit main power terminals as shown by the unit wiring diagrams in Service Facts or field wiring. The power supply must include a disconnect switch in a location convenient to the unit. Ground the unit according to local codes and provide flexible conduit if codes require and/or if vibration transmission may cause noise problems.

**Important:** All wiring must comply with applicable local and national (NEC) codes. Type and location of disconnect switches must comply with all applicable codes.

### **WARNING**

#### **Ground Wire!**

All field-installed wiring must be completed by qualified personnel. All field-installed wiring must comply with NEC and applicable local codes. Failure to follow this instruction could result in death or serious injuries.

### **NOTICE**

#### **Equipment Damage!**

Use copper conductors only! Unit terminals are not designed to accept other types of conductors. Failure to do so could result in possible equipment damage.

## Field Wiring- ReliaTel™ Control

Wiring shown with dashed lines is to be furnished and installed by the customer. All customer-supplied wiring must be copper only and must conform to NEC and local electrical codes. Codes may require line of sight between disconnect switch and unit.

### **WARNING**

#### **Hazardous Voltage w/Capacitors!**

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

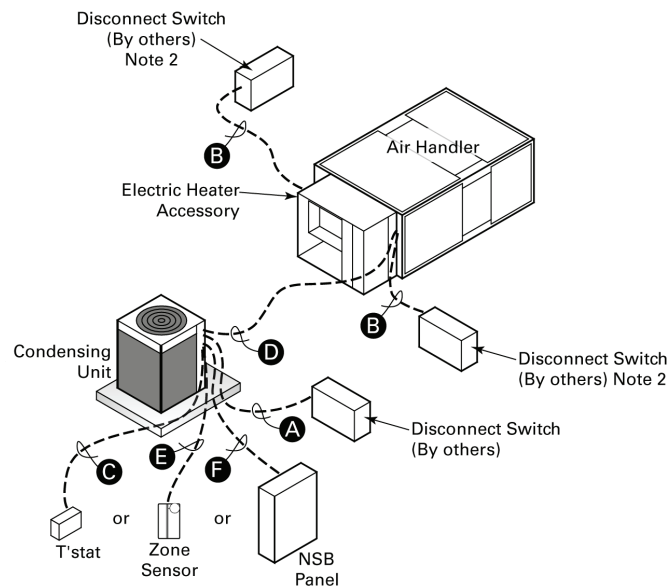
### Low Voltage Wiring

Mount the indoor thermostat, zone sensor or Night Setback Panel (NSB) in accordance with the corresponding installation instructions. Install color-coded, weather-proof, multi-wire cable according to the interconnecting wiring diagrams in the Air Handler IOM.

#### Notes:

1. When electric heater accessory is used, single point power entry or dual point power entry is field optional. Single point power entry option is through electric heater only.
2. \*\*\*Choose only one of the following; Thermostat, Zone Sensor, or NSB Panel.

**Figure 10. Thermostat and Control Connections — ReliaTel™ Controls**



#### 60 Hz - TWA/TWE

TWA073D/TWE090D  
TWA090D/TWE090D  
TWA120D/TWE120D

TWA180E/TWE180E  
TWA240E/TWE240E  
(2) TWA073D/TWE150E

(2) TWA090D/TWE180E  
(2) TWA120D/TWE240E

#### 50 Hz - TWA/TWE

TWA061DD/TWE076DD  
TWA076DD/TWE076DD

TWA101DD/TWE101DD  
TWA156ED/TWE156ED

TWA201ED/TWE201ED

#### Field Wiring:

- 3 power wires, line voltage for 3 phase, (2 power wires for single phase)
- 3 power wires, line voltage for 3 phase, (2 power wires for single phase)
- Cooling only thermostat:** 3 to 7 wires depending on stages of electric heat  
**Zone Sensor:** 4 to 10 wires depending on zone sensor model <sup>1</sup>
- 3 to 7 wires depending on type of outdoor unit(s).

<sup>1</sup> See Zone Sensor wiring instructions for wiring information (ReliaTel Controls only).

Field Wiring - Sensors

Figure 11. Night Setback Panel Field Wiring

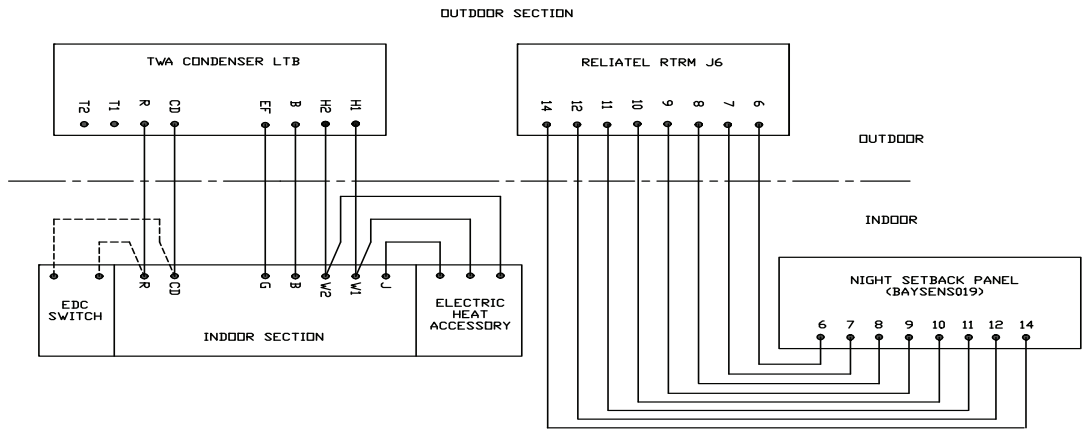


Figure 12. Zone Sensor Field Wiring

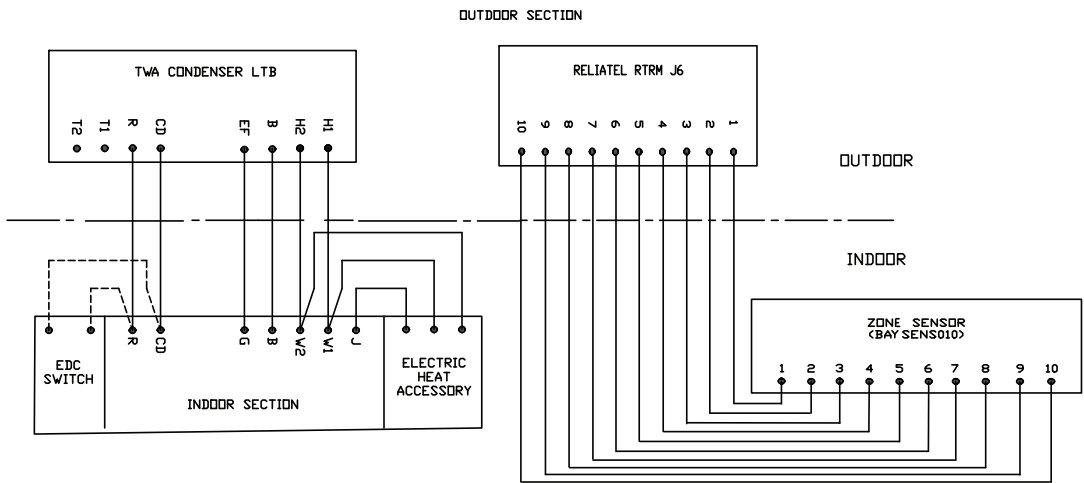
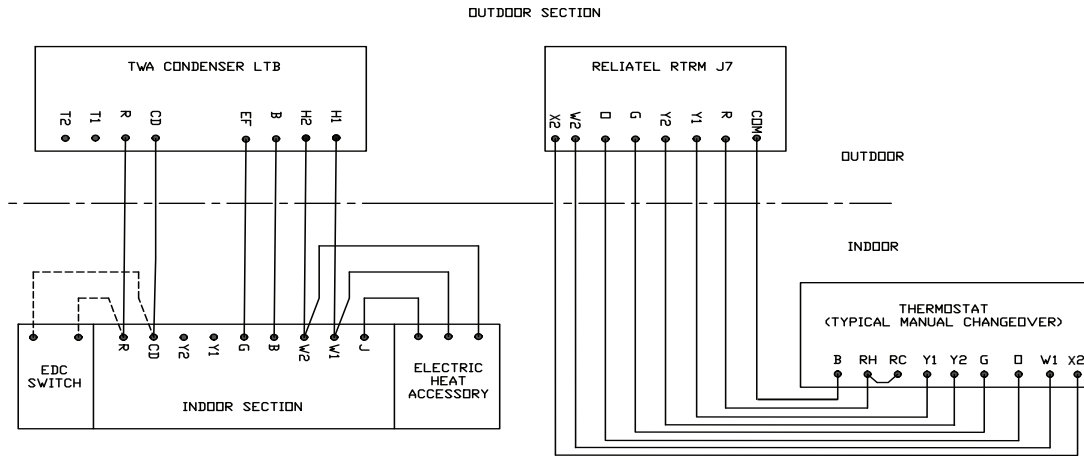


Figure 13. Zone Sensor Field Wiring



Refrigerant Circuit

Figure 14. Typical Split System Heat Pump - Cooling - Refrigerant Circuit

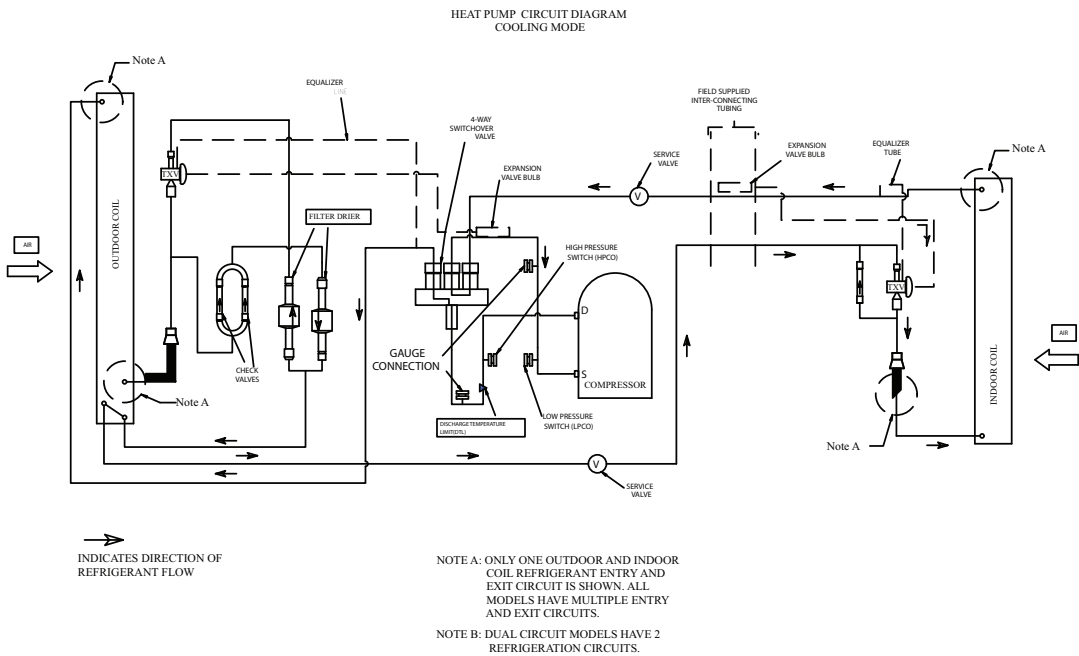
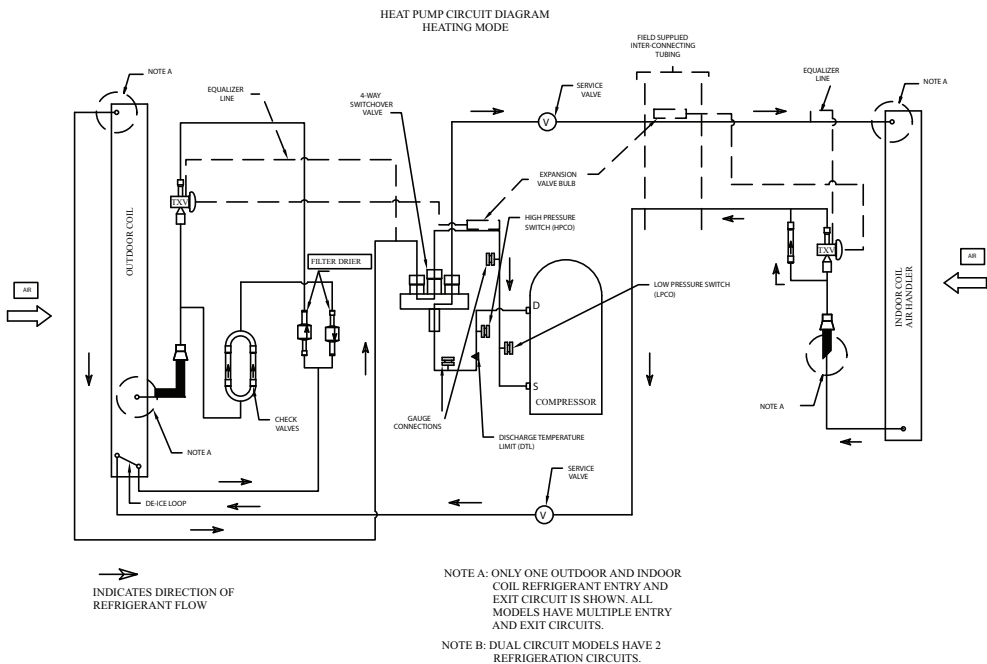
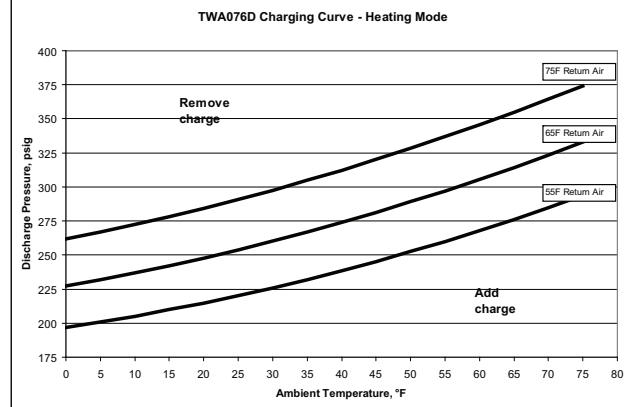
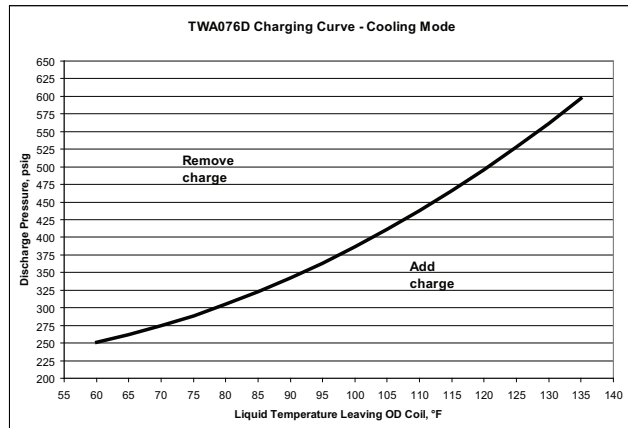
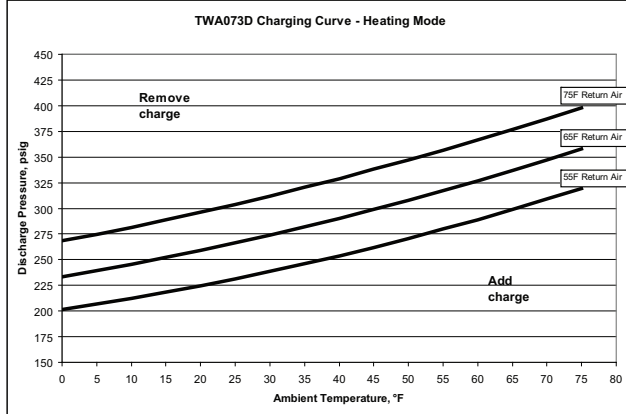
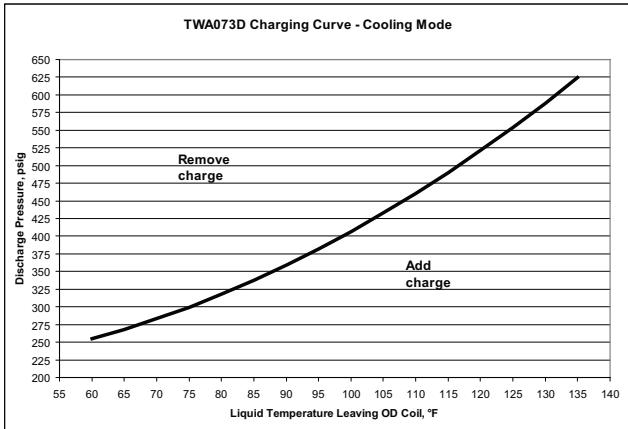
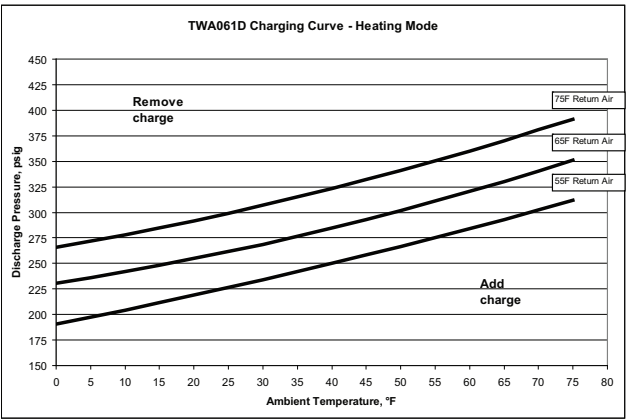
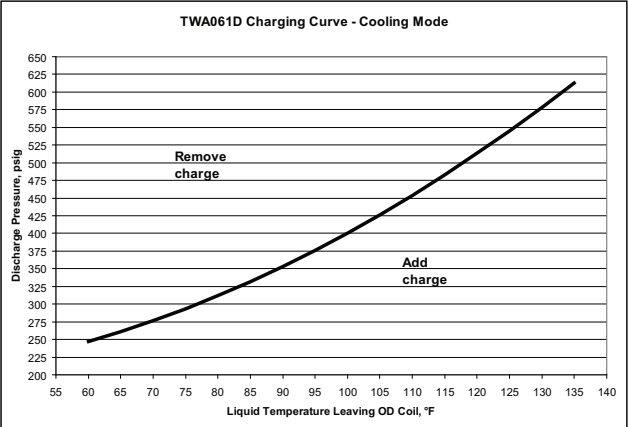


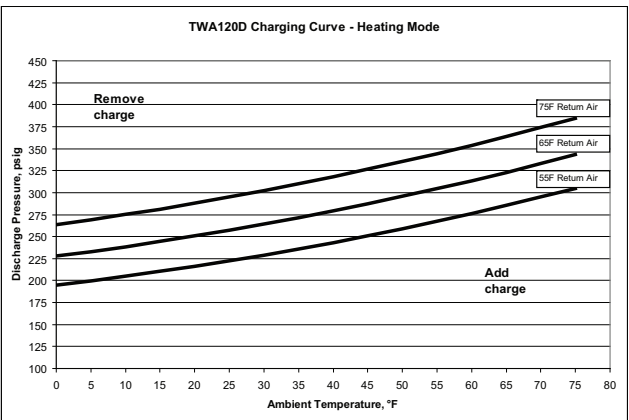
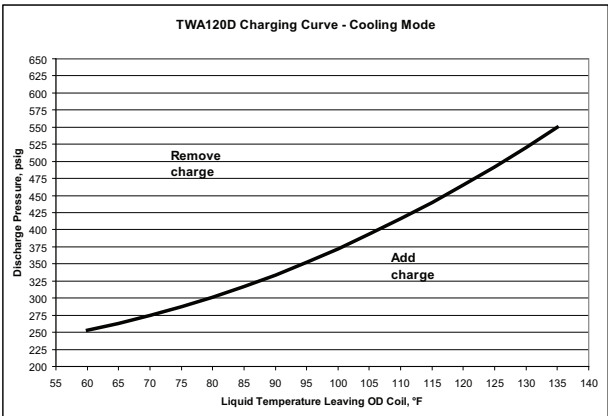
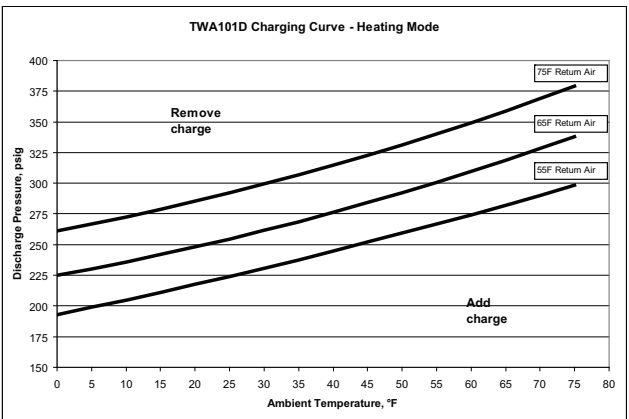
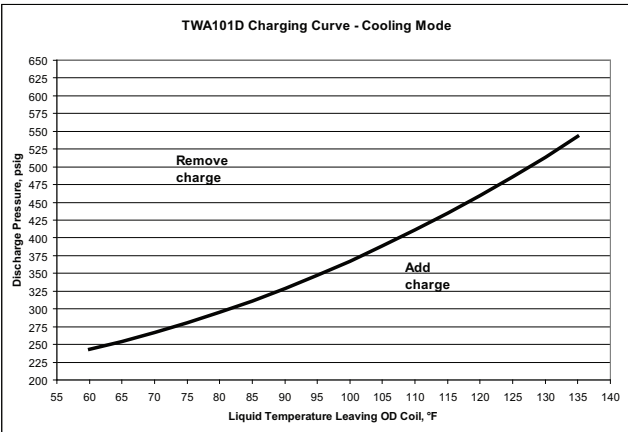
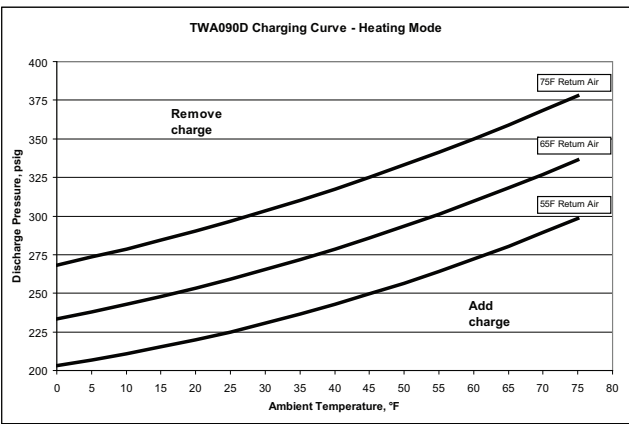
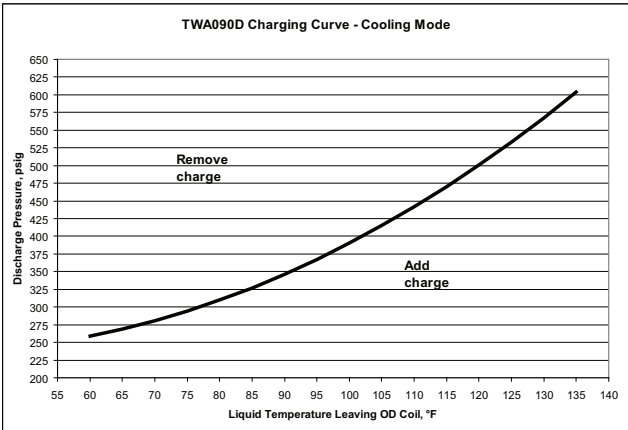
Figure 15. Typical Split System Heat Pump - Heating - Refrigerant Circuit



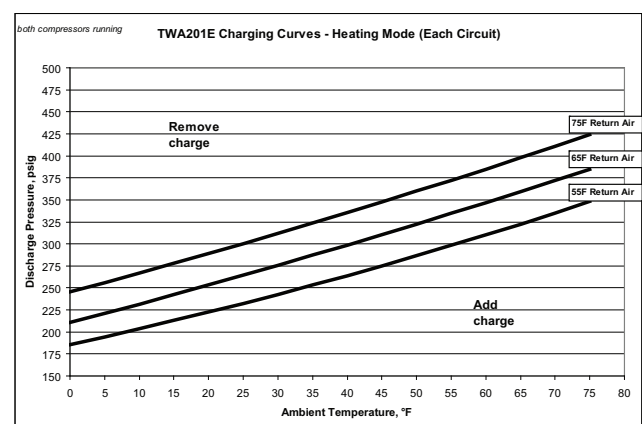
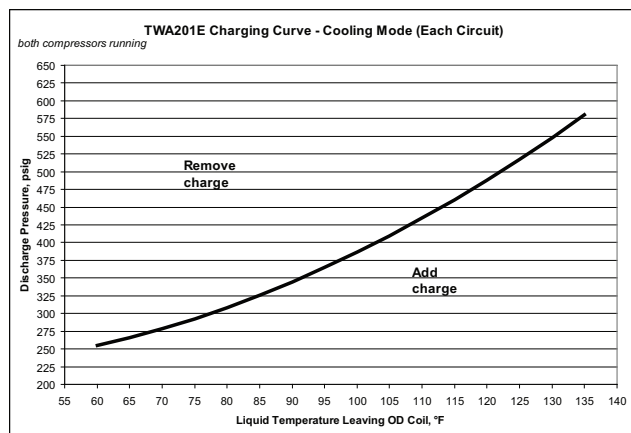
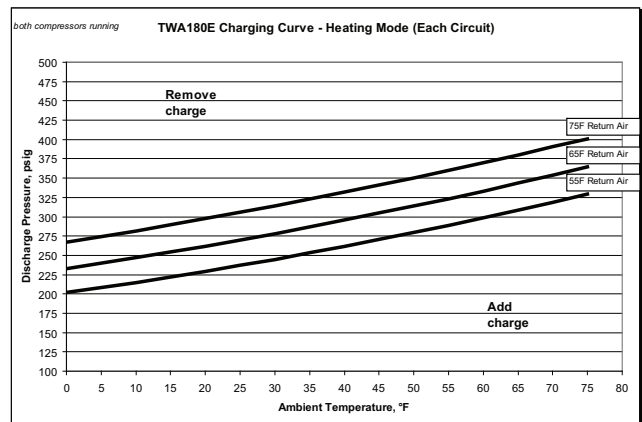
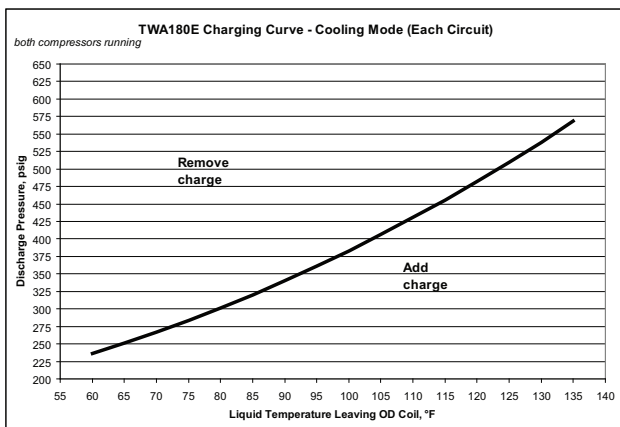
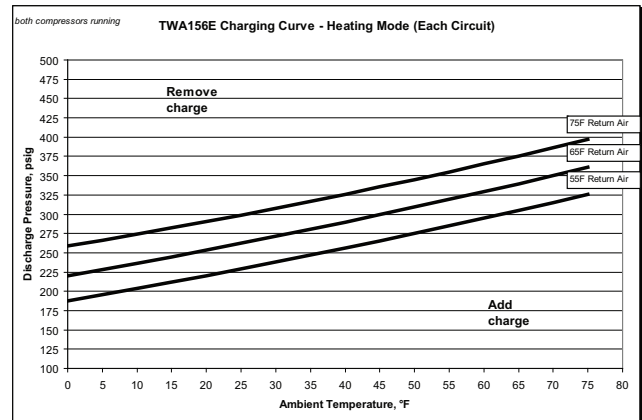
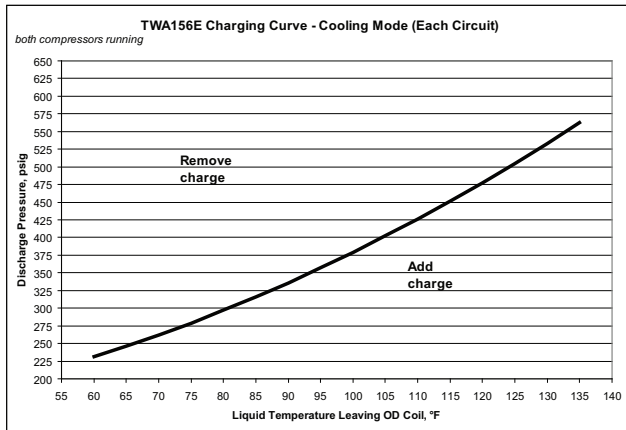
# Charging Charts



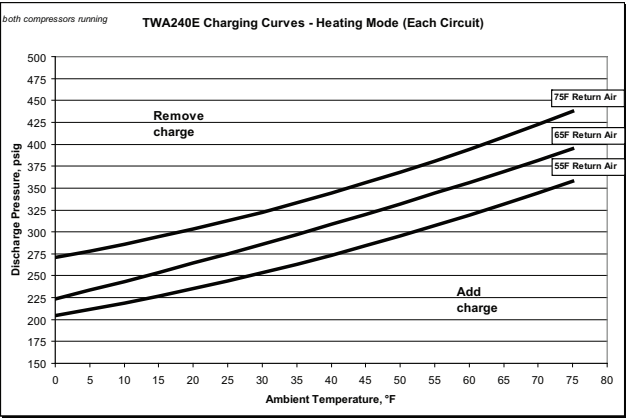
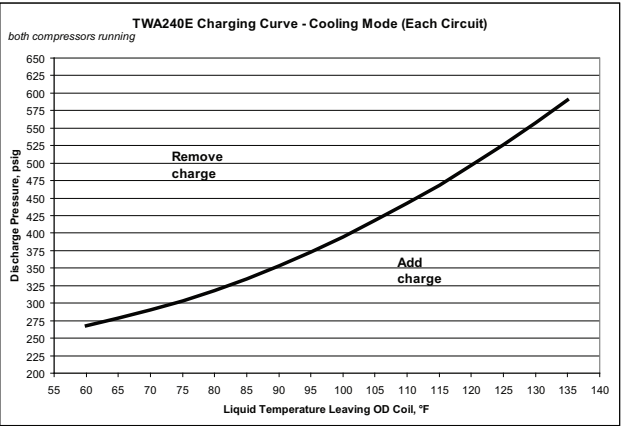
# Charging Charts



## Charging Charts



# Charging Charts





# Pre-Start

## Control Circuit Features

**Note:** Not all of these features may be required for your unit, check electrical schematic.

### Discharge Temperature Limit (DTL)

The control's sensor is located on the discharge line. This device will shut off the compressor and the outdoor fan(s) if the discharge temperature exceeds the DTL setting. Once the discharge temperature has returned to normal, the compressor will cycle back on.

### Evaporator Defrost Control (EDC)

This control is located in the Air Handler of Split Units. The control's sensing tube is embedded vertically in the evaporator coil, near the center. This device will stop the compressor if the indoor coil temperature drops below its setting. The indoor air will still circulate across the coil, bringing the temperature of the coil back up to the cut-in temperature of the evaporator defrost control.

### Low Pressure Cut-Out (LPCO)

This control's sensor is located in the suction (gas) line, near the compressor. The control will stop the compressor and outdoor fans if suction pressure drops below the Low Pressure Cut-Out setting. Once the suction pressure has returned to normal, the compressor and outdoor fans will cycle back on.

### High Pressure Cut-Out (HPCO)

This control's sensor is located in the discharge line. This device will shut off the compressor and the outdoor fan(s) if the discharge pressure exceeds the High Pressure Cut-Out setting. Once the discharge pressure has returned to normal, the compressor will cycle back on.

## WARNING

### Prevent Injury!

**Due to agency safety requirements, no schrader core is installed beneath the HPCO. Removal of the HPCO without evacuating the system charge could cause injury and release of refrigerant.**

### Internal Overload Protector (IOL)

This device is embedded in the compressor motor windings. It will shut off the compressor if the discharge temperature or current of the compressor windings exceeds its design trip temperature.

**Note:** The IOL will place the compressor back in operation once the compressor motor heat has dropped below the trip setting; however, a check of the refrigerant and electrical systems should be made to determine the cause and be corrected.

## Installation Checklist

Complete this checklist once the unit is installed to verify that all recommended procedures have been accomplished before starting the system. Do not operate the system until all items covered by this checklist are complete.

1. Inspect unit location for proper required service clearances.
2. Inspect unit location for proper free air clearances.
3. Inspect unit location for secure, level mounting position.

### **Refrigerant Piping**

1. Properly sized/constructed liquid and suction lines connected to stubs at both the indoor and outdoor units?
2. Insulated the entire suction line?
3. Insulated portions of liquid line exposed to extremes in temperature?
4. Performed initial leak test?
5. Evacuated each refrigerant circuit to 500 microns?
6. Charged each circuit with proper amount of R-410A?

### **Electrical Wiring**

1. Provided unit power wiring (with disconnect) to proper terminals in the unit control section?
2. Installed system indoor thermostat?
3. Installed system low voltage interconnecting wiring to proper terminals of outdoor unit, indoor unit and system thermostat?

# Start-Up

## TWA - Heat Pump with ReliaTel™

The ReliaTel™ Control is a microelectronic control feature, which provides operating functions that are significantly different than conventional Electro-mechanical units. The ReliaTel™ Refrigeration Module (RTRM) uses proportional/integral control algorithms to perform specific unit functions that govern the unit operation in response to application conditions.

The RTRM provides compressor anti-short cycle (ASC) timing functions through minimum "Off" and "On" timing to increase reliability, performance and to maximize unit efficiency. Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are functioning. It also checks the configuration parameters against the components connected to the system. The system LED located on the RTRM module is turned "On" within one second after power-up if all internal operations are correct.

The heating and cooling cycles of the heat pump are automatic for Heat and Cool functions when using an optional automatic changeover thermostat (TS).

The fan switch on the optional automatic changeover thermostat can be placed in either the ON position, causing continuous evaporator (indoor) fan operation, or the AUTO position causing fan operation to coincide with heating or cooling run cycles. (In AUTO position, the fan switch automatically changes to Heat or Cool in response to sufficient room temperature change.)

## Terminology

The following terms and acronyms may be used in this section.

ASC	Anti-Short Cycle Timer
CC	Compressor Contactor
CCH	Crankcase Heater
CF	Outdoor Fan Capacitor
CHR	Crankcase Heater Relay
COMM	Communication Interface Module
CPR	Compressor
CTS	Coil Temperature Sensor
DTL	Discharge Temperature Limit Switch
EDC	Evaporator Defrost Control Switch
FTB	Outdoor Fan Terminal Block
HPC	High Pressure Cutout Switch
HTB	High Voltage Terminal Block
LPC	Low Pressure Cutout Switch
LTB	Low Voltage Terminal Board
OAS	Outdoor Air Temperature Sensor
ODF	Outdoor Fan Relay
ODM	Outdoor Fan Motor
PM	Phase Monitor
RTRM	ReliaTel™ Refrigeration Module
SOV	Switchover Valve
TNS	Transformer

## Heat Pump Functions and Features

These subsections describe the following key heat pump functions and features:

- Processing Activated When the Disconnect Switch is in ON Position
- Mechanical Heat
- Auxiliary Heat
- Emergency Heat
- Cooling
- Demand Defrost

### Processing Activated When the Disconnect Switch is in the ON Position

The following table lists the processing that occurs given the stated condition.

Condition	Resulting Operations
If the disconnect switch is in the ON position...	1. Current is supplied to the compressor crankcase heater(s) (CCH) through the normally closed contacts of the crankcase heater relay (CHR) when the compressor is not running.
	2. The phase monitor (PM) is powered.
	3. The phase monitor (PM) looks at the incoming power to verify that there is no reversed phase, no phase imbalance, and no loss of phase. If the phase monitor detects any of these three conditions, it will shut off control voltage.
	4. The control transformer (TNS) is powered.
	5. The ReliaTel™ control board (RTRM) is powered and performs self-diagnostic checks to insure that all internal controls are functioning.
	6. The ReliaTel™ control board (RTRM) checks the configuration parameters against the components connected to the system.
	7. The system LED located on the RTRM module is turned "ON" within one second after power-up if all internal operations are correct.
	8. The communications board (COMM) is powered if installed.
	9. The indoor thermostat (TS) is powered.

### Mechanical Heat

In Heat mode the switchover valve (SOV) is turned OFF. When a request for heating occurs, the control system turns ON the mechanical heat (compressors) to perform heating. Dual circuit heat pumps are factory configured to have 2-step mechanical heating enabled (RTRM J4-3 tied to ground).

The staging sequence depends on the type of mechanical heating that is enabled.

- If 1-Step mechanical heating is enabled (RTRM J4-3 not tied to ground), the unit will stage according to [Table 12, p. 38](#), as a result of the proportional/integral control algorithms.
- Units with 2-step mechanical heating will stage according to [Table 13, p. 39](#), as a result of the proportional/integral control algorithms.

With mechanical heating, when a heat request is turned ON, the Indoor Fan request is turned ON. When the heat request is turned OFF, the Indoor Fan request is turned OFF after a specified delay (60 seconds on all dual-compressor units and 80 seconds on all single compressor units). See [Table 10, p. 38](#), [Table 11](#), [Table 12](#), and [Table 13, p. 39](#) in this document for the staging, sequence, and control.

### Auxiliary Heat

Auxiliary Heat is factory disabled on all Odyssey units (Jumper placed between J2-1 and J2-2 RTRM inputs). If configured (Jumper wire cut or removed between J2-1 and J2-2 on RTRM) and installed, Auxiliary Heat is enabled or disabled by "Smart Recovery".

#### Smart Recovery

Smart Recovery dictates that if the Active Zone Temperature is making a recovery using only mechanical heating toward the setpoint at a rate of at least 6°F/hour (0.1°F/minute), the electric heat is disabled. If Smart Recovery is not disabling electric heat, an approximate 9 minute stage-up delay (plus or minus a few minutes) is provided for each stage to allow time for recovery to begin. Stages of electric heat are enabled and energized as necessary to meet heating demand. When the request for Auxiliary Heat is removed, the Indoor Fan request is turned OFF at the same time as the Electric Heat Stages. See [Table 10, p. 38](#), [Table 11](#), [Table 12](#), and [Table 13, p. 39](#) for the staging, sequence, and control.

All split system units are also configured from the factory for only 1-Stage of Electric Heat (Jumper placed between J1-3 and J1-6 RTRM inputs). To enable two stages of Electric Heat, cut or remove the jumper between J1-3 and J1-6 RTRM inputs.

## Emergency Heat

When Emergency Heat mode is requested and Auxiliary Electric Heat is configured and installed, only the Auxiliary Electric Heat will be turned ON to satisfy the Heat request. Mechanical heat will be held OFF. When the request for Emergency Heat is initiated, the Indoor Fan request is turned ON 1 second before the electric heat stages are activated. See [Table 10, p. 38](#), [Table 11](#), [Table 12](#), and [Table 13, p. 39](#) for the staging, sequence, and control.

## Cooling

With a request for Cooling, the RTRM stages the circuits and control normally for single and dual stage cooling applications. If the unit is configured with a zone sensor, switchover valve 1 (SOV1) and switchover valve 2 (SOV2) are energized for the duration of the Cooling mode and do not change states until the unit either enters OFF mode or transitions to Heat mode. If the unit is controlled with a thermostat, SOV1 and SOV2 are energized while the thermostat W1/O signal output to the RTRM is active.

The outdoor fans (ODF) will turn ON and OFF with the compressors. Circuit 1 fan cycles with compressor 1 and circuit 2 fan will cycle with compressor. If a compressor is turned OFF, the anti-short cycle timer (ASC) will hold the compressor OFF for 3 minutes. See [Table 10, p. 38](#), [Table 11](#), [Table 12](#), and [Table 13, p. 39](#) for the staging, sequence, and control.

## Demand Defrost

When power is first applied to the unit, the first demand-defrost cycle will be initiated based on a cumulative run time of exactly 30 minutes only at the required conditions. The cumulative run time at the required conditions is tracked separately for each compressor.

Shortly after completion of the first defrost cycle, the system control calculates the temperature difference between the outdoor coil and outdoor air, using the result as an indicator of unit performance at dry coil conditions.

### *Conditions Triggering the Defrost Cycle*

Over time, as moisture and frost accumulate on the coil, the coil temperature will drop, increasing the temperature difference. When the temperature difference is large enough, a defrost cycle is initiated. Demand Defrost is initiated when the outdoor air temperature (OAS) is below 52°F and the outdoor coil temperature (CTS) is below 33°F.

### *Single and Dual Circuits*

When a circuit enters Defrost mode, the compressor will remain energized, the associated outdoor fan (ODF) will de-energize, the associated switchover valve (SOV) output will energize, and the first stage of Auxiliary Heat energizes.

On dual circuit units, the opposite circuit's state will remain unchanged if a defrost cycle has not been initiated on that circuit. Each circuit will enter defrost independently based on its associated Outdoor Coil Temperature Sensor (CTS), the Outdoor Air Temperature Sensor (OAS), and its total accumulated run time.

### *Termination of the Defrost Cycle*

A circuit will leave defrost, during normal conditions, once the outdoor coil temperature reaches the outdoor air temperature + 47°F which must be above 57°F and not greater than 72°F.

Termination of the defrost cycle includes a "Soft Start" delay of 5 seconds for the switchover valve (SOV) where the outdoor fans (ODF) are turned on 5 seconds before the switchover valve (SOV) is returned to the heating position to help smooth the transition.

### *Behavior of Switchover Valves*

The switchover valves (SOV) will both be energized during cooling mode and will be de-energized during Heat or OFF mode. However, during a defrost cycle, only the circuit that requires a defrost cycle will energize its switchover valve (SOV). For thermostat control, if a thermostat is requesting

## Start-Up

for the switchover (SOV) to be energized or de-energized, both switchover valve (SOV) outputs will follow the thermostat request (unless a circuit is in a defrost cycle).

### Defrost Configuration Facts

Units are configured from the factory to have Independent Circuit defrost (RTRM input J9-3 tied to ground with RTRM input J1-5 OPEN).

**Table 10. Heat Pump Operation with Thermostat**

Inputs							Outputs		
Y1	Y2	G	W1	W2	O	X	Cool	Heat1	Indoor Fan
ON	OFF	Don't Care	Don't Care	OFF	HEAT	OFF	OFF	Stage 1	ON
OFF	ON	Don't Care	Don't Care	OFF	HEAT	OFF	OFF	Stage 2	ON
ON	ON	Don't Care	Don't Care	OFF	HEAT	OFF	OFF	Stage 1 + Stage 2	ON
ON	OFF	Don't Care	Don't Care	ON	HEAT	OFF	OFF	Stage 1 + Auxiliary	ON
OFF	ON	Don't Care	Don't Care	ON	HEAT	OFF	OFF	Stage 2 + Auxiliary	ON
ON	ON	Don't Care	Don't Care	ON	HEAT	OFF	OFF	Stage 1 + Stage 2 + Auxiliary	ON
Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	Don't Care	ON	OFF	Em Heat	ON

**Note:** Stage 1 = Circuit 1 and Stage 2 = Circuit 2

**Table 11. Heat Pump Operation with a Zone Sensor with Lead/Lag Enabled**

Heating Request	Circuit Output
0 (None)	All Off
1	Circuit 1
2	Circuit 2 + Circuit 1
3	Auxiliary Heat 1
4	Auxiliary Heat 2
0 (None)	All Off
1	Circuit 2 + Circuit 1
2	Circuit 1 + Circuit 2
3	Auxiliary Heat 1
4	Auxiliary Heat 2

**Table 12. Heat Pump Control (1-Step Mechanical Heating)**

Active Unit Mode	Stage	Indoor Fan	Compressor	Auxiliary Heat 1	Auxiliary Heat 2	Switchover Valve 1	Switchover Valve 2 <sup>(a)</sup>
Heat/Off	Off	Off	Off	Off	Off	Off	Off
Heat	Stage 1	On	Both Compressors	Off	Off	Off	Off
Heat	Auxiliary 1	On	Both Compressors	On	Off	Off	Off
Heat	Auxiliary 2	On	Both Compressors	On	On	Off	Off
Emergency Heat	Stage 1	On	Off	On	Off	Off	Off
Emergency Heat	Stage 2	On	Off	On	On	Off	Off
Heat	Defrost	On	Both Compressors	On	Off	On <sup>(b)</sup>	On <sup>(b)</sup>
Cool	Don't Care	Off	Off	Off	Off	On	On

(a) Only units configured as an independent circuit heat pump will control the switchover valve 2 output.

(b) On units with independent circuits, only the circuit whose conditions are correct for defrost will enter defrost mode and energize the switchover valve. The other circuit's switchover valve will remain in its previous state until it has a defrost request or until the unit mode changes.

**Table 13. Heat Pump Control (2-Step Mechanical Heating)**

Active Unit Mode	Stage	Indoor Fan	Compressor	Auxiliary Heat 1	Auxiliary Heat 2	Switchover Valve 1	Switchover Valve 2 <sup>(a)</sup>
Heat/Off	Off	Off	Off	Off	Off	Off	Off
Heat	Stage 1	On	Compressor 1	Off	Off	Off	Off
Heat	Stage 2	On	Both Compressors	Off	Off	Off	Off
Heat	Auxiliary 1	On	Both Compressors	On	Off	Off	Off
Heat	Auxiliary 2	On	Both Compressors	On	On	Off	Off
Emergency Heat	Stage 1	On	Off	On	Off	Off	Off
Emergency Heat	Stage 2	On	Off	On	On	Off	Off
Heat	Defrost	On	Both Compressors	On	Off	On <sup>(b)</sup>	On <sup>(b)</sup>
Cool	Don't Care	Off	Off	Off	Off	On	On

(a) Only units configured as an independent circuit heat pump will control the switchover valve 2 output.

(b) On units with independent circuits, only the circuit whose conditions are correct for defrost will enter defrost mode and energize the switchover valve. The other circuit's switchover valve will remain in its previous state until it has a defrost request or until the unit mode changes.

# Service Test Modes ReliaTel™ Controls

## Test Modes

Upon power initialization, the RTRM performs self-diagnostic checks to ensure that all internal controls are functional. It also checks the configuration parameters against the components connected to the system. The system LED located on the RTRM module is turned “On” within one second of power-up if internal operation is okay.

Use one of the following "Test" procedures to bypass some time delays and to start the unit at the control panel. Each step of unit operation can be activated individually by temporarily shorting across the "Test" terminals for 2 to 3 seconds. The system LED located on the RTRM module will blink when the test mode has been initiated. The unit can be left in any "Test" step for up to one hour before it will automatically terminate, or it can be terminated by opening the main power disconnect switch. Once the test mode has been terminated, the system LED will glow continuously and the unit will revert to the “System” control.

There are three methods in which the “Service Test” can be cycled at LTB-Test 1(T1) and LTB-Test 2 (T2).

### 1. Step Test Mode

This method initiates the different components of the unit, one at a time, by temporarily shorting across the two test terminals for 2 to 3 seconds.

For the initial start-up of the unit, this method allows the technician to cycle a component “On” and have up to one hour to complete the check. Service Test Mode will be ignored if a short is present across Test 1 and Test 2 at start-up.

### 2. Resistance Test Mode

This method can be used for start-up when a decade box for variable resistance outputs is available. This method initiates the different components of the unit, one at a time, when a specific resistance value is placed across the two test terminals. The unit will remain in the specific test mode for approximately one hour even though the resistance is left on the test terminals.

**Table 14. Service Test Guide for Component Operation**

Test Step	Mode	Fan	Comp 1	Comp 2	Heat 1	Heat 2	Ohms
1	Fan	On	Off	Off	Off	Off	2.2K
2	Cool 1	On	On <sup>(a)</sup>	Off	Off	Off	4.7K
3 <sup>(b)</sup>	Cool 2	On	On <sup>(a)</sup>	On <sup>(a)</sup>	Off	Off	6.8K
4 <sup>(b)</sup>	Heat 1	On	Off	Off	On	Off	10K
5 <sup>(b)</sup>	Heat 2	On	Off	Off	On	On	15K
6 <sup>(b)</sup>	Em Heat	On	Off	Off	On	On	47K

(a) The condenser fans will operate any time a compressor is ON providing the outdoor air temperature is within the operating value.

(b) Steps for optional accessories and non-applicable modes in unit will be skipped.

### 3. Auto Test Mode

This method is not recommended for start-up due to the short timing between individual component steps. This method initiates the different components of the unit, one at a time, when a fixed jumper is installed across the test terminals. The unit will start the first test step and change to the next step every 30 seconds. At the end of the test mode, control of the unit will automatically revert to the applied "System" control method. For unit test steps, test modes, and step resistance values to cycle the various components, refer to [Table 14](#).



# Troubleshooting

## Trouble Shooting ReliaTel™ Controls

The RTRM has the ability to provide the service personnel with some unit diagnostics and system status information.

Before turning the main power disconnect switch "Off," follow the steps below to check the ReliaTel™ Refrigeration Module (RTRM). All diagnostics & system status information stored in the RTRM will be lost when the main power is turned "**Off**".

### WARNING

#### Live Electrical Components!

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

**Note:** *The J6 & J7 screw terminals must be tightened in order to accurately measure voltage in the required steps.*

1. Verify that the system LED on the RTRM is burning continuously. If the LED is lit, go to [Step 3](#).
2. If the LED is not lit, verify that 24 VAC is present between J1-1 and J1-2. If 24 VAC is present, proceed to Step 3. If 24 VAC is not present, check the unit main power supply, check transformer (TNS1). Proceed to [Step 3](#) if necessary.
3. Utilizing "Method 1" or "Method 2" in the "System Status Checkout Procedure" section, check the following:
  - System status
  - Heating status
  - Cooling status

**Note:** *If a System failure is indicated, proceed to Step 4. If no failures are indicated, proceed to [Step 5](#).*

4. If a System failure is indicated, recheck [Step 1](#) and [Step 2](#). If the LED is not lit in [Step 1](#), and 24 VAC is present in [Step 2](#), then the RTRM has failed. Replace the RTRM.
5. If no failures are indicated, use one of the TEST mode procedures described in the "Unit Start-Up" section to start the unit. This procedure will allow you to check all of the RTRM outputs, and all of the external controls (relays, contactors, etc.) that the RTRM outputs energize, for each respective mode. Proceed to [Step 6](#).
6. Step the system through all of the available modes, and verify operation of all outputs, controls, and modes. If a problem in operation is noted in any mode, you may leave the system in that mode for up to one hour while troubleshooting. Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to [Step 7](#) and [Step 8](#).
7. If no abnormal operating conditions appear in the test mode, exit the test mode by turning the power "Off" at the main power disconnect switch.
8. Refer to the individual component test procedures if other microelectronic components are suspect.

### System Status Checkout Procedure

"System Status" is checked by using one of the following two methods:

**Method 1.** If the Zone Sensor Module (ZSM) is equipped with a remote panel with LED status indication, you can check the unit within the space. If the ZSM does not have LED's, use Method 2. BAYSENS010B, BAYSENS011B, BAYSENS019A, BAYSENS020A, BAYSENS021A, BAYSENS023A, BAYSENS109 and BAYSENS110 all have the remote panel indication feature. The LED descriptions are listed below.

#### **LED 1 (System)**

- "On" during normal operation.
- "Off" if a system failure occurs or the LED fails.
- "Flashing" indicates test mode.

#### **LED 2 (Heat)**

- "On" when the heat cycle is operating.
- "Off" when the heat cycle terminates or the LED fails.
- "Flashing" indicates a heating failure.

#### **LED 3 (Cool)**

- "On" when the cooling cycle is operating.
- "Off" when the cooling cycle terminates or the LED fails.
- "Flashing" indicates a cooling failure.

The following information describes the complete listing of failure indication causes.

### **System Failure**

Check the voltage between terminals 6 and 9 on J6, it should read approximately 32 VDC. If no voltage is present, a System failure has occurred. Refer to [Step 4](#) in the previous section for the recommended troubleshooting procedure.

### **Cooling Failure**

1. Cooling and heating set point (slide pot) on the zone sensor has failed. Refer to the "Zone Sensor Test Procedure" section.
2. Zone temperature thermistor ZTEMP on ZTS failed. Refer to the "Zone Sensor Test Procedure" section.
3. CC1 or CC2 24 VAC control circuit has opened, check CC1 & CC2 coils, and any of the controls below that apply to the unit (HPC1, HPC2, DTL1, DTL2).
4. LPC1 has opened during the 3 minute minimum "on time" during 4 consecutive compressor starts, check LPC1 or LPC2 by testing voltage between the J1-8 & J3-2 terminals on the RTRM and ground. If 24 VAC is present, the LPCs have not tripped. If no voltage is present, LPCs have tripped.

### **Simultaneous Heat and Cool Failure**



#### **WARNING**

#### **Live Electrical Components!**

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1. Emergency Stop is activated.

### Method 2

The second method for determining system status is done by checking voltage readings at the RTRM (J6). The system indication descriptions and the approximate voltages are listed below.

### System Failure

Measure the voltage between terminals J6-9 & J6-6.

- Normal Operation = approximately 32 VDC
- System Failure = less than 1 VDC, approximately 0.75 VDC
- Test Mode = voltage alternates between 32 VDC & 0.75 VDC

### Heat Failure

Measure the voltage between terminals J6-7 & J6-6.

- Heat Operating = approximately 32 VDC
- Heat Off = less than 1 VDC, approximately 0.75 VDC
- Heating Failure = voltage alternates between 32 VDC & 0.75 VDC

### Cool Failure

Measure the voltage between terminals J6-8 & J6-6.

- Cool Operating = approximately 32 VDC
- Cool Off = less than 1 VDC, approximately 0.75 VDC
- Cooling Failure = voltage alternates between 32 VDC & 0.75 VDC

To use LED's for quick status information at the unit, purchase a BAYSENS010B ZSM and connect wires with alligator clamps to terminals 6 through 10. Connected each respective terminal wire (6 through 10) from the Zone Sensor to the unit J6 terminals 6 through 10.

**Note:** If the system is equipped with a programmable zone sensor, (BAYSENS019A, or BAYSENS023A), the LED indicators will not function while the BAYSENS010A is connected.

## Resetting Cooling and Heating Lockouts

Cooling Failures and Heating Lockouts are reset in an identical manner. Method 1 explains resetting the system from the space; Method 2 explains resetting the system at the unit.

**Note:** Before resetting Cooling Failures and Heating Lockouts check the Failure Status Diagnostics by the methods previously explained. Diagnostics will be lost when the power to the unit is disconnected.

### Method 1

To reset the system from the space, turn the **MODE** selection switch at the zone sensor to the **OFF** position. After approximately 30 seconds, turn the **MODE** selection switch to the desired mode, i.e. **HEAT, COOL**, or **AUTO**.

### Method 2

To reset the system at the unit, cycle the unit power by turning the disconnect switch "**Off**" and then "**On**".

Lockouts can be cleared through the building management system. Refer to the building management system instructions for more information.

### Zone Temperature Sensor (ZTS) Service Indicator

The ZSM SERVICE LED is a generic indicator that will signal the closing of a Normally Open switch at any time, providing the Indoor Motor (IDM) is operating. This indicator is usually used to indicate an airside fan failure.

The RTRM will ignore the closing of this Normally Open switch for 2 ( $\pm 1$ ) minutes. This helps prevent nuisance SERVICE LED indications.

#### Temperature Tests

**Note:** *These procedures are not for programmable or digital models and are conducted with the Zone Sensor Module electrically removed from the system.*

#### Test 1 - Zone Temperature Thermistor (ZTEMP)

This component can be tested by measuring the resistance between terminals 1 and 2 on the Zone Temperature Sensor. Below are some typical indoor temperatures, and corresponding resistive values.

**Table 15. Typical Indoor Temperatures and Values**

<b>Zone Temperature</b>	<b>Nominal Resistance</b>
50°F or 10.0°C	19.9 Kohms
55°F or 12.8°C	17.47 Kohms
60°F or 15.6°C	15.3 Kohms
65°F or 18.3°C	13.49 Kohms
70°F or 21.1°C	11.9 Kohms
75°F or 23.9°C	10.50 Kohms
80°F or 26.7°C	9.3 Kohms
85°F or 29.4°C	8.25 Kohms
90°F or 32.2°C	7.3 Kohms

#### Test 2 - Cooling Set Point (CSP) and Heating Set Point (HSP)

##### **Cool SP = Terminals 2 and 3**

Range = 100 to 900 Ohms approximate

##### **Heat SP = Terminals 2 and 5**

Range = 100 to 900 Ohms approximate

**Table 16. Test 3 - System Mode and Fan Selection**

Resistance Valves (Ohms)	Zone Sensor Unit/Fan Mode	Local Unit Mode	Local Fan Mode
2.32K	Off/Auto	Off	Auto
4.87K	Cool/Auto	Cool	Auto
7.68K	Auto/Auto	Auto	Auto
10.77K	Off/On	Off	On
13.32K	Cool/On	Cool	On
16.13K	Auto/On	Auto	On
19.48K	Heat/Auto	Heat	Auto
27.93K	Heat/On	Heat	On
35.0K	Emergency Heat/Auto	Emergency Heat	Auto
43.45K	Emergency Heat/On	Emergency Heat	On
Out of Range (Short)	INVALID/Short	Invalid (CV), Auto (VAV)	Invalid
Out of Range (Open)	INVALID/Open	Invalid (CV), Off (VAV)	Invalid

## Test 3 - System Mode and Fan Selection

The combined resistance of the Mode selection switch and the Fan selection switch can be measured between terminals 2 and 4 on the Zone Sensor. The possible switch combinations are listed in [Table 16, p. 45](#) with their corresponding resistance values.

## Test 4 - LED Indicator Test, (SYS ON, HEAT, & COOL)

### WARNING

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### Method 1

Testing the LED using a meter with diode test function. Test both forward and reverse bias. Forward bias should measure a voltage drop of 1.5 to 2.5 volts, depending on your meter. Reverse bias will show an Over Load, or open circuit indication if LED is functional.

### Method 2

Testing the LED with an analog Ohmmeter. Connect Ohmmeter across LED in one direction, then reverse the leads for the opposite direction. The LED should have at least 100 times more resistance in reverse direction, as compared with the forward direction. If high resistance in both directions, LED is open. If low in both directions, LED is shorted.

### Method 3

To test LED's with ZSM connected to unit, test voltages at LED terminals on ZSM. A measurement of 32 VDC, across an unlit LED, means the LED has failed.

**Important:** Measurements should be made from LED common (ZSM terminal 6 to respective LED terminal). Refer to the Zone Sensor Module (ZSM) Terminal Identification table at the beginning of this section.

### Programmable & Digital Zone Sensor Test

#### Testing serial communication voltage

1. Verify 24 VAC is present between terminals J6-14 & J6-11.



#### **WARNING**

#### **Live Electrical Components!**

**During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.**

2. Disconnect wires from J6-11 and J6-12. Measure the voltage between J6-11 and J6-12, should be about 32 VDC.
3. Reconnect wires to terminals J6-11 and J6-12. Measure voltage again between J6-11 and J6-12, voltage should flash high and low every 0.5 seconds. The voltage on the low end will measure about 19 VDC, while the voltage on the high end will measure from approximately 24 to 38 VDC.
4. Verify all modes of operation, by running the unit through all of the steps in the "Test Modes" section discussed in "Unit Start-Up."
5. After verifying proper unit operation, exit the test mode. Turn the fan on continuously at the ZSM, by pressing the button with the fan symbol. If the fan comes on and runs continuously, the ZSM is good. If you are not able to turn the fan on, the ZSM is defective.

#### **RLCI Loss of Communications**

If the RLCI loses input from the building management system, the RTRM will control in the default mode after approximately 15 minutes. If the RTRM loses the Heating and Cooling setpoint input, the RTRM will control in the default mode instantaneously. The temperature sensing thermistor in the Zone Sensor Module is the only component required for the "Default Mode" to operate.

# Maintenance

## WARNING

### Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

## NOTICE

### Operating Under Vacuum

**Do not operate or apply power to the compressor while under a vacuum. Failure to follow these instructions will result in compressor failure.**

Perform all of the indicated maintenance procedures at the intervals scheduled. This will prolong the life of the unit and reduce the possibility of costly equipment failure.

## Monthly

Conduct the following maintenance inspections once per month.

1. Check unit wiring to ensure all connections are tight and that the wiring insulation is intact.
2. Inspect the condenser coils for dirt and debris. If the coils appear dirty, clean them.
3. With the unit operating in the cooling mode, check the suction and discharge pressures and compare them with Pressure Curve values in unit Service Facts. Record these readings on the "Maintenance Log."

## Annually (Cooling Season)

The following maintenance procedures must be performed at the beginning of each cooling season to ensure efficient unit operation.

1. Perform all of the monthly maintenance inspections.
2. With the unit operating, check unit superheat and record the reading in the "Maintenance Log."
3. Remove any accumulation of dust and/or dirt from the unit casing.
4. Remove corrosion from any surface and repaint. Check the gasket around the control panel door to ensure it fits correctly and is in good condition to prevent water leakage.
5. Inspect the control panel wiring to ensure that all connections are tight and that the insulation is intact.

**Note:** *Condenser fan motors are permanently lubricated.*

6. Check refrigerant piping and fittings for leaks.
7. Inspect the condenser coils for dirt and debris. If the coils appear dirty, clean them.

## Coil Cleaning

Regular coil maintenance, including annual cleaning-enhances the unit's operating efficiency by minimizing:

- compressor head pressure and amperage draw;
- water carryover;
- fan brake horsepower and
- static pressure losses.

At least once each year-or more often if the unit is located in a "dirty" environment-clean the evaporator and condenser coils using the instructions outlined below. Be sure to follow these instructions as closely as possible to avoid damaging the coils. To clean refrigerant coils, use a soft brush and a sprayer. Contact your local Parts Center for appropriate detergents.

1. Remove enough panels from the unit to gain safe access to coils.

### **WARNING**

#### **No Step Surface!**

**Do not walk on the sheet metal base. Walking on the base could cause the supporting metal to collapse. Failure of the base could result in death or serious injury.**

2. Straighten any bent coil fins with a fin comb.
3. Remove loose dirt and debris from both sides of the coil with a soft brush.
4. Mix the detergent with water according to the manufacturer's instructions. If desired, heat the solution to 150° F maximum to improve its cleansing capability.
5. Pour the cleaning solution into the sprayer.
6. Spray the leaving-airflow side of the coil first; then spray the opposite side of the coil. Allow the cleaning solution to stand on the coil for five minutes.
7. Rinse both sides of the coil with cool, clean water.
8. Inspect both sides of the coil; if it still appears to be dirty, repeat Steps 7 and 8.
9. Reinstall all of the components and panels removed in Step 1; then restore power to the unit.
10. Using a fin comb, straighten any coil fins that were inadvertently bent during the cleaning process.



[illegible]

**Note:** Perform each inspection once per month (during cooling season) while unit is operating

# Warranty

## For Commercial Unitary Equipment Rated Under 20 Tons and Related Accessories

**Products Covered** — This warranty is extended by Trane, and applies to the following products:

- All packaged and split system air conditioners and heat pumps have a rated capacity of less than 20 tons.
- All packaged combinations gas/electric air conditioners having a rated capacity of less than 20 tons.
- All packaged combination gas/electric air conditioners having a rated capacity of 1 ½ through 5 tons single phase electric power and used for commercial applications. (As used in this warranty, a commercial application is any application where the end purchaser uses the product for other than personal, family or household purposes.)
- All accessories for the above products which are sold by Trane and applied in accordance with Trane specifications.

### Basic Warranty

The warrantor warrants for a period of twelve (12) months from the initial start-up or eighteen (18) months from date of shipment, whichever is sooner, that the products covered by this warranty (1) are free from defects in material and manufacture, and (2) have the capacities and ratings set forth in the warrantor's catalogs and bulletins.

### Extended Four-Year Warranty On Compressors

The warrantor warrants for a period of four (4) years commencing twelve (12) months from date of installations or eighteen (18) months from date of shipment, whichever is sooner, that the compressor in any product covered by this warranty (1) is free from defects in material and manufacture, and (2) has the capacities and ratings set forth in the warrantor's catalogs and bulletins.

### Exclusions And Limitations

The warrantor's obligations and liabilities under this warranty are limited to furnishing F.O.B. factory or warehouse at the warrantor-designated shipping point, freight allowed to Buyer's city (or port of export for shipments outside the conterminous United States) a replacement product or, at the option of the warrantor, parts for the repair of the product not conforming to this warranty and which have been returned to the warrantor.

The warrantor's warranty is conditional on the Customer providing written notice to the warrantor within thirty (30) days of the discovery of the defect. No product shall be returned to the warrantor without the warrantor's written permission. No liability whatever shall attach to warrantor until said products have been fully paid for and then said liability shall be limited to the purchase price of the equipment shown to be defective.

The warranty does not apply to any compressor or gas-fired heat exchanger which has been repaired or altered in such manner as, in the judgement of the warrantor, affects its stability or reliability. This warranty does not cover (1) any heat exchanger which has been fired with an improper type of fuel (2) a heat exchanger which is installed in a beauty parlor, dry cleaning establishment, de-greasing plant or in any corrosive atmosphere; or (3) any heat exchanger which is not shown to be defective by the warrantor's inspection.

This warranty does not cover damage due to accident, abuse, improper use, external causes, freezing, corrosion, erosion or deterioration.

Local transportation, related service labor, air filters, diagnosis calls, refrigerant and related items are not covered.

THE WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM THE

COURSE OF DEALING OR TRADE. IN NO EVENT SHALL THE WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

The warrantor makes certain further warranty protection available on an optional, extra-cost basis. Any further warranty must be in writing. If you wish further help or information concerning this warranty, contact:

Trane — Warrantor, 2701 Wilma Rudolph Blvd., Clarksville, TN 37040

### **Commercial Equipment Rated 20 Tons and Larger and Related Accessories (Parts Only)**

**Products Covered** — This warranty is extended by Trane, and applies only to commercial equipment rated 20 tons and larger and related accessories purchased and retained for use within the U.S.A. and Canada.

Warrantor warrants for a period of 12 months from initial start-up or 18 months from date of shipment, whichever is less, that the products covered by this warranty (1) are free from defects in material and manufacture, and (2) have the capacities and ratings set forth in catalogs and bulletins; provided, that no warranty is made against corrosion, erosion or deterioration.

Warrantor's obligations and liabilities under this warranty are limited to furnishing, F.O.B. factory replacement parts (or equipment at the option of Warrantor) for all Warrantor's products not conforming to this warranty. Warrantor shall not be obligated to pay for the cost of lost refrigerant. No liability whatever shall attach to Warrantor until said products have been paid for and then said liability shall be limited to the purchase price of the equipment shown to be defective.

The Warranty and Liability set forth herein are in lieu of all other warranties and liabilities, whether in contract or in negligence, express or implied, in law or in fact, including implied warranties of merchantability and fitness for particular use, and in no event shall warrantor be liable for any incidental or consequential damages

Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Trane — Warrantor, 2701 Wilma Rudolph Blvd., Clarksville, TN 37040

GW-598-4799

# Wiring Diagram Matrix

**Note:** Wiring diagrams are available through e-Library or by contacting your local sales office.

DIAGRAM NO.	DIAGRAM TYPE	UNIT MODEL NO'S
2313-0405	Power/Control Diagram	TWA120D30RAA, TWA120D30TAA, TWA120D3HRAA, TWA120D3HTAA, TWA120D30UAA, TWA120D30WAA, TWA120D3HUAA, TWA120D3HWAA, TWA240E30RAA, TWA240E30TAA, TWA240E3HRAA, TWA240E3HTAA, TWA240E30UAA, TWA240E30WAA, TWA240E3HUAA, TWA240E3HWAA
2313-0406	Power/Control Diagram	TWA061DD0RAA, TWA061DD0TAA, TWA061DDHRAA, TWA061DDHTAA, TWA061DD0UAA, TWA061DD0WAA, TWA061DDHUAA, TWA061DDHWAA, TWA073D30RAA, TWA073D30TAA, TWA073D3HRAA, TWA073D3HTAA, TWA073D30UAA, TWA073D30WAA, TWA073D3HUAA, TWA073D3HWAA, TWA073D40RAA, TWA073D40TAA, TWA073D4HRAA, TWA073D4HTAA, TWA073D40UAA, TWA073D40WAA, TWA073D4HUAA, TWA073D4HWAA, TWA073DW0RAA, TWA073DW0TAA, TWA073DWHRAA, TWA073DWHHTAA, TWA073DW0UAA, TWA073DW0WAA, TWA073DWHUAA, TWA073DWHWAA, TWA073DK0RAA, TWA073DK0TAA, TWA073DKHRAA, TWA073DKHTAA, TWA073DK0UAA, TWA073DK0WAA, TWA073DKHUAA, TWA073DKHWAA, TWA076DD0RAA, TWA076DD0TAA, TWA076DDHRAA, TWA076DDHTAA, TWA076DD0UAA, TWA076DD0WAA, TWA076DDHUAA, TWA076DDHWAA, TWA090D30RAA, TWA090D30TAA, TWA090D3HRAA, TWA090D3HTAA, TWA090D30UAA, TWA090D30WAA, TWA090D3HUAA, TWA090D3HWAA, TWA090D40RAA, TWA090D40TAA, TWA090D4HRAA, TWA090D4HTAA, TWA090D40UAA, TWA090D40WAA, TWA090D4HUAA, TWA090D4HWAA, TWA090DW0RAA, TWA090DW0TAA, TWA090DWHRAA, TWA090DWHHTAA, TWA090DW0UAA, TWA090DW0WAA, TWA090DWHUAA, TWA090DWHWAA, TWA090DK0RAA, TWA090DK0TAA, TWA090DKHRAA, TWA090DKHTAA, TWA090DK0UAA, TWA090DK0WAA, TWA090DKHUAA, TWA090DKHWAA, TWA101DD0RAA, TWA101DD0TAA, TWA101DDHRAA, TWA101DDHTAA, TWA101DD0UAA, TWA101DD0WAA, TWA101DDHUAA, TWA101DDHWAA, TWA120D40RAA, TWA120D40TAA, TWA120D4HRAA, TWA120D4HTAA, TWA120D40UAA, TWA120D40WAA, TWA120D4HUAA, TWA120D4HWAA, TWA120DW0RAA, TWA120DW0TAA, TWA120DWHRAA, TWA120DWHHTAA, TWA120DWHUAA, TWA120DWHWAA, TWA120DK0RAA, TWA120DK0TAA, TWA120DKHRAA, TWA120DKHTAA, TWA120DK0UAA, TWA120DK0WAA, TWA120DKHUAA, TWA120DKHWAA, TWA156ED0RAA, TWA156ED0TAA, TWA156EDHRAA, TWA156EDHTAA, TWA156ED0UAA, TWA156ED0WAA, TWA156EDHUAA, TWA156EDHWAA, TWA180E30RAA, TWA180E30TAA, TWA180E3HRAA, TWA180E3HTAA, TWA180E30UAA, TWA180E30WAA, TWA180E3HUAA, TWA180E3HWAA, TWA180E40RAA, TWA180E40TAA, TWA180E4HRAA, TWA180E4HTAA, TWA180E40UAA, TWA180E40WAA, TWA180E4HUAA, TWA180E4HWAA, TWA180EW0RAA, TWA180EW0TAA, TWA180EWHRAA, TWA180EWHHTAA, TWA180EW0UAA, TWA180EW0WAA, TWA180EWHUAA, TWA180EWHWAA, TWA180EK0RAA, TWA180EK0TAA, TWA180EKHRAA, TWA180EKHTAA, TWA180EK0UAA, TWA180EK0WAA, TWA180EKHUAA, TWA180EKHWAA, TWA201ED0RAA, TWA201ED0TAA, TWA201EDHRAA, TWA201EDHTAA, TWA201ED0UAA, TWA201ED0WAA, TWA201EDHUAA, TWA201EDHWAA, TWA240E40RAA, TWA240E40TAA, TWA240E4HRAA, TWA240E4HTAA, TWA240E40UAA, TWA240E40WAA, TWA240E4HUAA, TWA240E4HWAA, TWA240EW0RAA, TWA240EW0TAA, TWA240EWHRAA, TWA240EWHHTAA, TWA240EW0UAA, TWA240EW0WAA, TWA240EWHUAA, TWA240EWHWAA, TWA240EK0RAA, TWA240EK0TAA, TWA240EKHRAA, TWA240EKHTAA, TWA240EK0UAA, TWA240EK0WAA, TWA240EKHUAA, TWA240EKHWAA
2313-0419	Connection Diagram	TWA061DD0RAA, TWA061DD0TAA, TWA061DDHRAA, TWA061DDHTAA, TWA061DD0UAA, TWA061DD0WAA, TWA061DDHUAA, TWA061DDHWAA, TWA073D30RAA, TWA073D30TAA, TWA073D3HRAA, TWA073D3HTAA, TWA073D30UAA, TWA073D30WAA, TWA073D3HUAA, TWA073D3HWAA, TWA073D40RAA, TWA073D40TAA, TWA073D4HRAA, TWA073D4HTAA, TWA073D40UAA, TWA073D40WAA, TWA073D4HUAA, TWA073D4HWAA, TWA073DW0RAA, TWA073DW0TAA, TWA073DWHRAA, TWA073DWHHTAA, TWA073DW0UAA, TWA073DW0WAA, TWA073DWHUAA, TWA073DWHWAA, TWA073DK0RAA, TWA073DK0TAA, TWA073DKHRAA, TWA073DKHTAA, TWA073DK0UAA, TWA073DK0WAA, TWA073DKHUAA, TWA073DKHWAA, TWA076DD0RAA, TWA076DD0TAA, TWA076DDHRAA, TWA076DDHTAA, TWA076DD0UAA, TWA076DD0WAA, TWA076DDHUAA, TWA076DDHWAA, TWA090D30RAA, TWA090D30TAA, TWA090D3HRAA, TWA090D3HTAA, TWA090D30UAA, TWA090D30WAA, TWA090D3HUAA, TWA090D3HWAA, TWA090D40RAA, TWA090D40TAA, TWA090D4HRAA, TWA090D4HTAA, TWA090D40UAA, TWA090D40WAA, TWA090D4HUAA, TWA090D4HWAA, TWA090DW0RAA, TWA090DW0TAA, TWA090DWHRAA, TWA090DWHHTAA, TWA090DW0UAA, TWA090DW0WAA, TWA090DWHUAA, TWA090DWHWAA, TWA090DK0RAA, TWA090DK0TAA, TWA090DKHRAA, TWA090DKHTAA, TWA090DK0UAA, TWA090DK0WAA, TWA090DKHUAA, TWA090DKHWAA, TWA101DD0RAA, TWA101DD0TAA, TWA101DDHRAA, TWA101DDHTAA, TWA101DD0UAA, TWA101DD0WAA, TWA101DDHUAA, TWA101DDHWAA, TWA120D40RAA, TWA120D40TAA, TWA120D4HRAA, TWA120D4HTAA, TWA120D40UAA, TWA120D40WAA, TWA120D4HUAA, TWA120D4HWAA, TWA120DW0RAA, TWA120DW0TAA, TWA120DWHRAA, TWA120DWHHTAA, TWA120DW0UAA, TWA120DW0WAA, TWA120DWHUAA, TWA120DWHWAA, TWA120DK0RAA, TWA120DK0TAA, TWA120DKHRAA, TWA120DKHTAA, TWA120DK0UAA, TWA120DK0WAA, TWA120DKHUAA, TWA120DKHWAA
2313-0420	Connection Diagram	TWA120D30RAA, TWA120D30TAA, TWA120D3HRAA, TWA120D3HTAA, TWA120D30UAA, TWA120D30WAA, TWA120D3HUAA, TWA120D3HWAA

## Wiring Diagram Matrix

DIAGRAM NO.	DIAGRAM TYPE	UNIT MODEL NO'S
2313-0429	Connection Diagram	TWA156ED0RAA, TWA156ED0TAA, TWA156EDHRAA, TWA156EDHTAA, TWA156ED0UAA, TWA156ED0WAA, TWA156EDHUAA, TWA156EDHWAA, TWA180E30RAA, TWA180E30TAA, TWA180E3HRAA, TWA180E3HTAA, TWA180E30UAA, TWA180E30WAA, TWA180E3HUAA, TWA180E3HWAA, TWA180E40RAA, TWA180E40TAA, TWA180E4HRAA, TWA180E4HTAA, TWA180E40UAA, TWA180E40WAA, TWA180E4HUAA, TWA180E4HWAA, TWA180EW0RAA, TWA180EW0TAA, TWA180EWHRAA, TWA180EWHHTAA, TWA180EW0UAA, TWA180EW0WAA, TWA180EWHUAA, TWA180EWHWAA, TWA180EK0RAA, TWA180EK0TAA, TWA180EKHRAA, TWA180EKHTAA, TWA180EK0UAA, TWA180EK0WAA, TWA180EKHUAA, TWA180EKHWAA, TWA201ED0RAA, TWA201ED0TAA, TWA201EDHRAA, TWA201EDHTAA, TWA201ED0UAA, TWA201ED0WAA, TWA201EDHUAA, TWA201EDHWAA, TWA240E40RAA, TWA240E40TAA, TWA240E4HRAA, TWA240E4HTAA, TWA240E40UAA, TWA240E40WAA, TWA240E4HUAA, TWA240E4HWAA, TWA240EW0RAA, TWA240EW0TAA, TWA240EWHRAA, TWA240EWHHTAA, TWA240EW0UAA, TWA240EW0WAA, TWA240EWHUAA, TWA240EWHWAA, TWA240EK0RAA, TWA240EK0TAA, TWA240EKHRAA, TWA240EKHTAA, TWA240EK0UAA, TWA240EK0WAA, TWA240EKHUAA, TWA240EKHWAA
2313-0430	Connection Diagram	TWA240E30RAA, TWA240E30TAA, TWA240E3HRAA, TWA240E3HTAA, TWA240E30UAA, TWA240E30WAA, TWA240E3HUAA, TWA240E3HWAA

**Note:** Wiring diagrams are available via e-Library.

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Literature Order Number	SSP-SVX14A-EN
Date	November 2009
Supersedes	SSP-SVX14A-EN (August 2009)

The manufacturer has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.