

Installation, Operation, and Maintenance **Packaged Rooftop Air Conditioners** **Precedent™ Cooling and Gas/ Electric**

Standard Efficiency
6 to 25 Tons – 60 Hz



Model Numbers: YSJ072A - YSJ300A

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

May 2023

RT-SVX071C-EN

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:



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.

Important 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 according to local rules. For the USA, 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

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, **MUST** follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- Before installing/servicing this unit, technicians **MUST** put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). **ALWAYS** refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.
- If there is a risk of energized electrical contact, arc, or flash, technicians **MUST** put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, **PRIOR** to servicing the unit. **NEVER** PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.

⚠ WARNING**Follow EHS Policies!**

Failure to follow instructions below could result in death or serious injury.

- All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.
- Non-Trane personnel should always follow local regulations.

⚠ WARNING**Hazard of Explosion or Fire!**

Failure to follow instructions could result in death or serious injury and equipment or property damage.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

IF YOU SMELL GAS, follow instructions below:

- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone in your building.
- Open windows and doors.
- Alert others and evacuate building immediately.
- From a phone outside of the building, immediately call your gas supplier. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

⚠ WARNING**Safety Hazards!**

Failure to follow instructions below could result in death or serious injury and equipment or property damage.

- Do not use this furnace if any portion has been under water as it may have rendered the unit hazardous to operate. Immediately call a qualified service technician to inspect the furnace and to replace any part or the control system and any gas control which has been under water.
- Should overheating occur, or the unit gas valve fail to shut off, close the gas valve to the furnace before shutting off the electrical supply.

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Revision History

Updated Wiring Diagrams chapter.

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Model Number Description

Digit 1 — Unit Function

Y = DX Cooling, Gas Heat

Digit 2 — Cooling Efficiency

S = Standard Efficiency

Digit 3 — Refrigerant

J = R-410A

Digit 4,5,6 — Nominal Gross Cooling Capacity (MBh)

072 = 6 Ton

090 = 7.5 Ton

102 = 8.5 Ton

120 = 10 Ton

150 = 12.5 Ton

180 = 15 Ton

210 = 17.5 Ton

240 = 20 Ton

300 = 25 Ton

Digit 7 — Major Design Sequence

Digit 8 — Voltage Selection

3 = 208–230/60/3

4 = 460/60/3

W = 575/60/3

Digit 9 — Unit Controls

S = Symbio™ 700

Digit 10 — Heat Type

0 = Base Model

A = Stainless Steel Gas Heat

Digit 11 — Heating Capacity¹

L = Low Gas Heat

M = Medium Gas Heat

H = High Gas Heat

Digit 12, 13 — Service Sequence

** = Factory Assigned

Digit 14 — Fresh Air Selection

0 = No Fresh Air

A = Manual Outside Air Damper 0–50%

B = Motorized Outside Air Damper 0–50%

C = Economizer, Dry Bulb 0–100% without Barometric Relief²

D = Economizer, Dry Bulb 0–100% with Barometric Relief²

E = Economizer, Reference Enthalpy 0–100% without Barometric Relief²

F = Economizer, Reference Enthalpy 0–100% with Barometric Relief²

G = Economizer, Comparative Enthalpy 0–100% without Barometric Relief²

H = Economizer, Comparative Enthalpy 0–100% with Barometric Relief²

K = Downflow Low Leak Economizer, Dry Bulb with Barometric Relief²

M = Downflow Low Leak Economizer, Reference Enthalpy with Barometric Relief²

P = Downflow Low Leak Economizer, Comparative Enthalpy with Barometric Relief²

R = Downflow Low Leak Economizer, Differential Dry Bulb with Barometric Relief²

Digit 15 — Supply Fan/Drive Type/Motor

0 = Multi-Speed Motor

1 = Optional Oversized/High Static Motor

2 = Single Zone Variable Air Volume with Standard Motor

3 = Single Zone Variable Air Volume with Oversized/High Static Motor

4 = Multiple Zone Variable Air Volume with Standard Motor

5 = Multiple Zone Variable Air Volume with Oversized/High Static Motor

Digit 16 — Hinged Service Access/Filters

0 = Standard Panels/Standard Filters

A = Hinged Access Panels/Standard Filters

B = Standard Panels/2 inch MERV 8 Filters

C = Hinged Access Panels/2 inch MERV 8 Filters

D = Standard Panels/2 inch MERV 13 Filters

E = Hinged Access Panels/2 inch MERV 13 Filters

Digit 17 — Condenser Coil Protection

0 = Standard Coil

1 = Condenser with CompleteCoat™

Digit 18 — Through-the-Base Provisions

0 = No Through-the-Base Provisions

A = Through-the-Base Electric

B = Through-the-Base Gas Piping⁵

C = Through-the-Base Electric and Gas Piping⁵

Digit 19 — Disconnect/Circuit Breaker (three-phase only)

0 = No Disconnect/No Circuit Breaker

1 = Unit Mounted/Non-Fused Disconnect

2 = Unit Mounted Circuit Breaker

Digit 20— Convenience Outlet

0 = No Convenience Outlet

A = Unpowered 20A Convenience Outlet

B = Powered 15A Convenience Outlet

(three-phase only)

Digit 21— Communications Options

0 = No Communications Interface

1 = Advanced Controller with BACnet® Communications Interface

2 = Advanced Controller with LonTalk® Communications Interface

3 = Advanced Controller with Air-Fi® Communications Interface

Digit 22— Refrigeration System Option

0 = Standard Refrigeration System

A = Dehumidification Option^{1, 3}

Digit 23— Controls Expansion Module

0 = None

1 = XM-30 Expansion Module

2 = XM-32 Expansion Module

3 = XM-30 and XM-32 Expansion Module

4 = XM-30 Expansion Module (Qty 2)

5 = XM-32 Expansion Module (Qty 2)

Digit 24— Smoke Detector

0 = No Smoke Detector

A = Return Air Smoke Detector²

B = Supply Air Smoke Detector¹

C = Supply and Return Air Smoke Detectors^{1, 2}

Digit 25— System Monitoring Controls

0 = No Monitoring Control
1 = Clogged Filter Switch²
2 = Condensate Overflow Switch¹
3 = Discharge Air Sensing Tube
4 = Clogged Filter Switch and Condensate Overflow Switch^{1, 2}
5 = Clogged Filter Switch and Discharge Air Sensing Tube²
6 = Condensate Overflow Switch and Discharge Air Sensing Tube¹
7 = Clogged Filter Switch, Condensate Overflow Switch and Discharge Air Sensing Tube^{1, 2}

Digit 26— Not Used**Digit 27— Unit Hardware Enhancements**

0 = No Enhancements
1 = Stainless Steel Drain Pan

Digit 28— Short Circuit Current Rating

0 = Standard (5k) SCCR Marking
A = Tier 2 (=65K) SCCR Marking

Digit 29— Low Ambient⁴

0 = None
A = Low Ambient Cooling to 0°F

Model Number Notes**Notes:**

1. Includes Symbio™ Indoor Module.
2. Includes Symbio™ Fresh Air Module.
3. Includes Symbio™ Customer Connection Module.
4. Standard Low Ambient Cooling Limit is 40°F.
5. Includes gas piping and shutoff valve (field assembly required).

General Information

Unit Inspection

To protect against loss due to damage incurred in transit, perform inspection immediately upon receipt of the unit. Check carefully for shipping damage. If any damage is found, report it immediately, and file a claim against the transportation company.

Exterior Inspection

If the job site inspection reveals damage or material shortages, file a claim with the carrier immediately. Specify the type and extent of the damage on the bill of lading before signing. Notify the appropriate sales representative.

Important: Do not proceed with installation of a damaged unit without sales representative approval.

- Inspect the complete exterior for signs of shipping damages to unit or packing material.
- Verify that the nameplate data matches the sales order and bill of lading.
- Verify that the unit is properly equipped and there are no material shortages.
- Verify the power supply complies with the unit nameplate specifications.

Inspection for Concealed Damage

Inspect the components for concealed damage as soon as possible after delivery and before it is stored.

If concealed damage is discovered:

- Notify the carrier's terminal of the damage immediately by phone and by mail.
- Concealed damage must be reported within 15 days.
- Request an immediate, joint inspection of the damage with the carrier and consignee.
- Stop unpacking the unit.
- Do not remove damaged material from receiving location.
- Take photos of the damage, if possible.
- The owner must provide reasonable evidence that the damage did not occur after delivery.

Unit Storage

Take precautions to prevent condensate from forming inside the unit's electrical compartments and motors if:

- The unit is stored before it is installed; or,
- The unit is set on the roof curb, and temporary heat is provided in the building. Isolate all side panel service entrances and base pan openings (e.g., conduit holes, S/A and R/A openings, and flue openings) from the ambient air until the unit is ready for start-up.

Note: Do not use the unit's heater for temporary heat without first completing the start-up.

The manufacturer will not assume any responsibility for equipment damage resulting from condensate accumulation on the unit's electrical and/or mechanical components.

Unit Description

Before shipment, each unit is leak tested, dehydrated, charged with refrigerant and compressor oil, and run tested for proper control operation.

The condenser coils are all aluminum microchannel.

Direct-drive, vertical discharge condenser fans are provided with built-in thermal overload protection.

All units come with standard Symbio™ 700 control system with advanced diagnostics.

Door Handles

Door handles rotate 180 degrees for use on either left- or right-handed doors. Handles will be in the vertical position when latched, as shown in the following figure.

Figure 1. Door handles



To lock:

1. Verify handle is in the vertical (latched) position.
2. Using a Phillips head screwdriver, push and rotate the handle screw clockwise 1/4 turn.

To unlock:

Use a Phillips head screwdriver to push and rotate handle screw counterclockwise 1/4 turn.

Unit Nameplate

A Mylar unit nameplate is located on the unit's corner support next to the filter access panel. It includes the unit model number, serial number, electrical characteristics, refrigerant charge, as well as other pertinent unit data.

Compressor Nameplate

The nameplate for the compressors are located on the side of the compressor.

Microchannel Coil Barcode ID

Barcode decal used for coil part identification can be located on the header and top of coil's inlet/outlet side.

LonTalk Communication Interface (Optional)

The Symbio™ controllers supports communication with LonTalk® open protocol applications. An advanced license is required to enable this feature. The LonTalk module is available factory supplied or as a field-installed kit. For more details, refer to *LonTalk® Integration to Precedent™ Packaged Rooftop Air-Conditioners with Symbio™ 700 Controls Integration Guide* (BAS-SVP063*-EN).

BACnet Communications Interface (Optional)

The Symbio™ controller provides integrated communication with BACnet® open protocol applications. An advanced license is required to enable this feature. When enabled, the following selections are available: BACnet MS/TP, BACnet IP, or BACnet Zigbee® (Air-Fi®). For more details, refer to *BACnet® and Modbus™ Integration to Precedent™ Packaged Rooftop Air-Conditioners with Symbio™ 700 Controls Integration Guide* (BAS-SVP062*-EN).

System Input Devices and Functions

The Symbio™ 700 controller requires a zone sensor or thermostat input to operate the unit in a CVZT or VVZT configuration.

Note: Use of a conventional thermostat will reduce unit functionality.

The number of available modes depends on the type of zone sensor or thermostat selected. Descriptions of the basic input devices used with the Symbio 700 network are provided to acquaint the operator with the various modules. Refer to the unit schematic for specific module connections. The following controls are available from the factory for field installation.

Supply Fan Failure

Supply Fan Proving is active when the Supply Fan is commanded ON. The supply fan speed must be greater than 30 rpm for 40 continuous seconds. If the supply fan speed falls below 30 rpm, supply fan failure diagnostic is generated, and operation is stopped.

Clogged Filter Switch (Optional)

The unit mounted clogged filter switch monitors the pressure differential across the return air filters. It is mounted in the filter section and is connected to the Fresh Air Options Module. A diagnostic signal is sent to the controller if the pressure differential across the filters is at least 0.5 inch w.c. The contacts will automatically open when the pressure differential across the filters decreases to approximately 0.4 inch w.c. The clogged filter output is energized when the supply fan is operating and the clogged filter switch has been closed for at least 2 minutes. The system will continue to operate regardless of the status of the filter switch. For further details, refer to Installation Instructions ACC-SVN238*-EN.

Note: On units equipped with factory installed MERV 13 filters, a clogged filter switch with different pressure settings will be installed. This switch will close when the differential pressure is approximately 0.8 inch w.c. and open when the differential falls to 0.7 inch w.c.

Condensate Drain Pan Overflow Switch

A condensate overflow condition will be detected by a condensate overflow float switch. When the condensate level reaches the trip point, the diagnostic condition will be detected. When the condensate overflow input CLOSES for six continuous seconds, the following actions will be taken by the Symbio™ 700 controls:

- An auto-reset diagnostic will be generated. All compressor or heating operations will be disabled immediately. Condenser fans and compressors will be de-energized. Supply fan operation will be shutdown.
- Once the overflow condition has been cleared and the input is OPEN for six seconds, all diagnostic conditions will be cleared. The unit will return to normal operation. Auto-reset clearing will occur twice each time the unit is powered up. On the third occurrence, the unit will initiate a lock-out and require manual reset. If an auto-reset overflow occurs once, but does not occur again for 72 hours, the trip counter will reset allowing more auto-resets to occur.

Compressor Disable (CPR1/2)

This input incorporates the low pressure control (LPC) of each refrigeration circuit.

If this circuit is open before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is opened for one continuous second during compressor operation, the compressor for that circuit is immediately turned OFF. The compressor will not be allowed to restart for a minimum of three minutes should the contacts close.

If four consecutive open conditions occur during the first three minutes of operation, the compressor for that circuit will be locked out, a diagnostic communicated to the remote panel (if installed), and a manual reset will be required to restart the compressor.

Low Pressure Control

When the LPC is opened for 1 continuous second, the compressor for that circuit is turned off immediately. The compressor will not be allowed to restart for a minimum of 3 minutes.

If four consecutive open conditions occur during an active call for cooling, the compressor will be locked out, a diagnostic generated, if applicable, and a manual reset required to restart the compressor.

High Pressure Control

The high pressure controls are wired in series between the compressor outputs on the Symbio™ controller and the compressor contactor coils. If the high pressure control switch opens, the controller senses a lack of current while calling for cooling and locks the compressor out.

If four consecutive open conditions occur during an active call for cooling, the compressor will be locked out, a diagnostic generated, if applicable, and a manual reset required to restart the compressor.

Zone Sensors

Manual Changeover (BAYSENS106*)

This sensor features three system switch settings (Heat, Cool, and Off) and two fan settings (On and Auto). It is a manual changeover control with single setpoint.

Manual/Automatic Changeover (BAYSENS108*)

This sensor features four system switch settings (Heat, Cool, Auto, and Off) and two fan settings (On and Auto). It is a manual or auto changeover control with dual setpoint capability. It can be used with a remote zone temperature sensor BAYSENS077*.

Wall Mounted Relative Humidity Sensor (BAYSENS036*)

Field installed, wall mounted humidity sensor that measures temperature and relative humidity. Relative humidity input is used to control activation of dehumidification

Duct Mounted Relative Humidity Sensor (BAYSENS037*)

Field installed, duct mounted humidity sensor that measures temperature and relative humidity. Relative humidity input is used to control activation of dehumidification.

Integrated Comfort System (BAYSENS073*)

This sensor features remote zone sensing and timed override with override cancellation. It is used with a Trane Integrated Comfort™ building management system.

Integrated Comfort System (BAYSENS074*)

This sensor features single setpoint capability and timed override with override cancellation. It is used with a Trane Integrated Comfort™ building management system.

Remote Zone Sensor (BAYSENS016*)

This bullet type temperature sensor can be used for outside air (ambient) sensing, return air temperature sensing, supply air temperature sensing, remote temperature sensing (uncovered). Wiring procedures vary according to the particular application and equipment involved. Refer to the unit's wiring diagrams for proper connections.

Remote Zone Sensor (BAYSENS077*)

This sensor can be used with BAYSENS106*, 108*, 110*, 800* Remote Panels. When this sensor is wired to a BAYSENS800* Remote Panel, wiring must be 18 AWG Shielded Twisted Pair (Belden 8760 or equivalent). Refer to the specific Remote Panel for wiring details.

Thermostat

The unit must have a thermostat to operate.

- BAYSTAT151
One Heat/One Cool Auto changeover digital display thermostat.
- BAYSTAT155
Three Heat/Two Cool Auto changeover display thermostat.
- BAYSENS150
Three Heat/Two Cool Auto changeover digital display thermostat. Seven day programmable thermostat with night setback.

High Temperature Sensor (FIAHTST001*)

This sensor connects to the Symbio™ 700 Emergency Stop Input and provides high limit "shutdown" of the unit. The sensor is used to detect high temperatures due to a high thermal event in the air conditioning or ventilation ducts. The sensor is designed to mount directly to the sheet metal duct. Each kit contains two sensors. The return air duct sensor (X13100040010) is set to open at 135°F. The supply air duct sensor (X13100040020) is set to open at 240°F. The control can be reset after the temperature has been lowered approximately 25°F below the cutout setpoint.

Digital Display Zone Sensor (BAYSENS135*)

LCD display provides heat, cool, auto, on, and off status. Display includes two temperature setpoints, and a lockable setting with °F or °C indicators.

Touch Screen Programmable Zone Sensor (BAYSENS800)

This sensor uses a BACnet® MS/TP link to communicate zone temperature and setpoints. Sensor includes Auto, Heat, Cool, or Off system switch, as well as Fan Auto or On switch. This is a seven day programmable thermostat with night setback.

Notes:

- Not compatible with VAV units. Requires BACnet® communications.
- For additional sensors, refer to the product catalog.

Note: BAYSENS800* with BACnet® enabled on the Symbio™ controller will report fault detection and diagnostics at the zone sensor. This functionality is only applicable if the customer does not have a building management system, and the unit is running standalone with the BAYSENS800.

Evaporator Frost Control

Frostat is standard on all units.

Discharge Line Temp Switch (DLTS)

The DLTS is looped in series with HPC and LPC. It prevents the compressor from overheating (over 300°F dome temp) in case of indoor fan failure (cooling) or outdoor fan failure (heating).

Smoke Detector Sensor (Optional)

This sensor provides high limit “shutdown” of the unit and requires a manual reset. The sensor is used to detect smoke in the air conditioning or ventilation ducts.

Notes:

- The supply air smoke detector samples supply air. The return smoke detectors sample return air. The smoke detectors are designed to shut off the unit if smoke is sensed. This function is performed by sampling the airflow entering the unit at the return air opening. Follow the instructions provided below to assure that the airflow through the unit is sufficient for adequate sampling. Failure to follow these instructions will prevent the smoke detectors from performing its design function.
- Airflow through the unit is affected by the amount of dirt and debris accumulated on the indoor coil and filters. To insure that airflow through the unit is adequate for proper sampling by the return air smoke detector, complete adherence to the maintenance procedures, including recommended intervals between filter changes, and coil cleaning is required.
- Periodic checks and maintenance procedures must be performed on the smoke detector to insure that it will function properly. For detailed instructions concerning these checks and procedures, refer to the appropriate section(s) of the smoke detector Installation and Maintenance Instructions provided with the literature package for this unit.

In order for the supply air smoke detector or return air smoke detector to properly sense smoke in the supply air stream or return air stream, the air velocity entering the smoke detector unit must be between 500 and 4000 feet per minute. Equipment covered in this manual will develop an airflow velocity that falls within these limits over the entire airflow range specified in the evaporator fan performance tables.

Phase Monitor

This sensor monitors voltage between the 3 conductors of the 3 phase power supply. Two LED lights are provided:

- The green light indicates that a balanced 3 phase supply circuit is properly connected.
- The red light indicates that unit operation has been prevented. There are two conditions that will prevent unit operation:
 - The power supply circuit is not balanced with the proper phase sequence of L1, L2, L3 for the 3 conductors of a 3 phase circuit.
 - The line to line voltage is not between 180 volts and 633 volts.

Pre-Installation

⚠ WARNING

Fiberglass Wool!

Exposure to glass wool fibers without all necessary PPE equipment could result in cancer, respiratory, skin or eye irritation, which could result in death or serious injury. Disturbing the insulation in this product during installation, maintenance or repair will expose you to airborne particles of glass wool fibers and ceramic fibers known to the state of California to cause cancer through inhalation.

You **MUST** wear all necessary Personal Protective Equipment (PPE) including gloves, eye protection, a NIOSH approved dust/mist respirator, long sleeves and pants when working with products containing fiberglass wool.

Precautionary Measures:

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing; rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respirator.

First Aid Measures:

- **Eye Contact** - Flush eyes with water to remove dust. If symptoms persist, seek medical attention.
- **Skin Contact** - Wash affected areas gently with soap and warm water after handling.

Precautionary Measures

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing: rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respiration in these situations.

First Aid Measures

Eye Contact - Flush eyes with water to remove dust. If symptoms persist, seek medical attention.

Skin Contact - Wash affected areas gently with soap and warm water after handling.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Dimensions and Weights

Dimensional Data

Figure 2. 6 to 10 tons standard efficiency

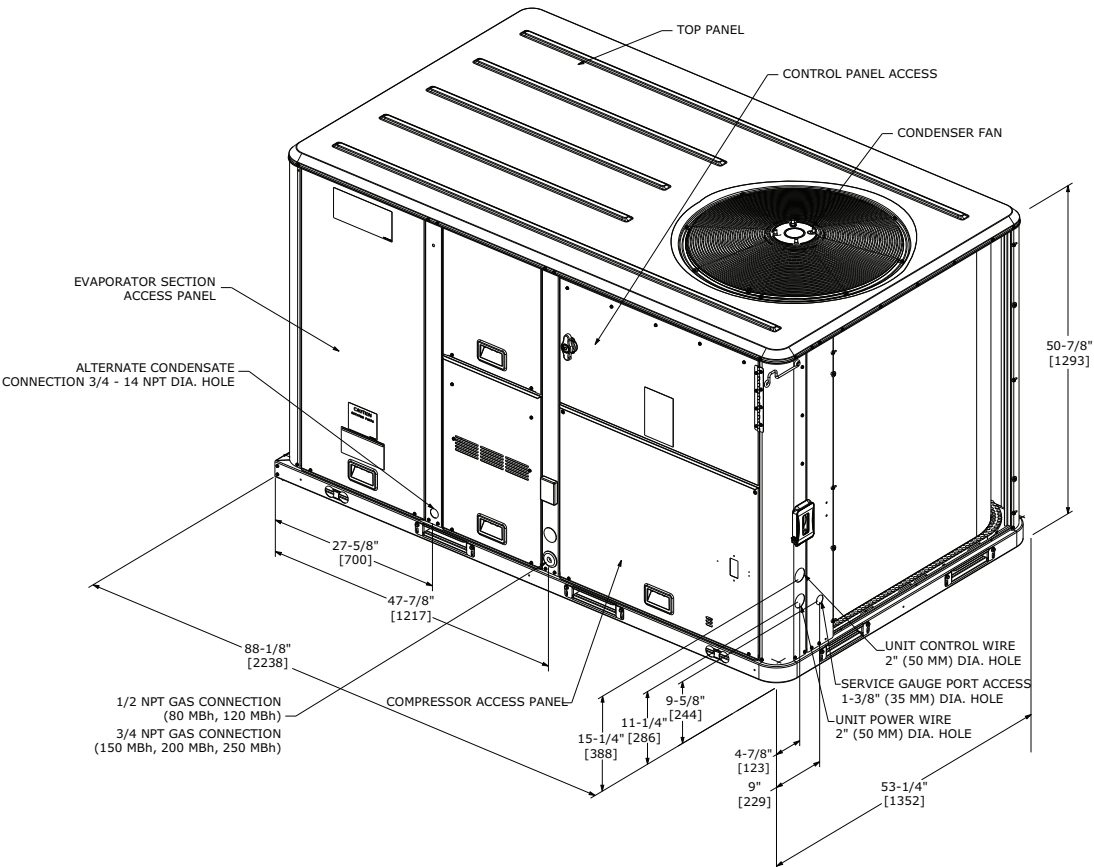


Figure 3. 6 to 10 tons standard efficiency – downflow airflow supply/return, through-the-base utilities

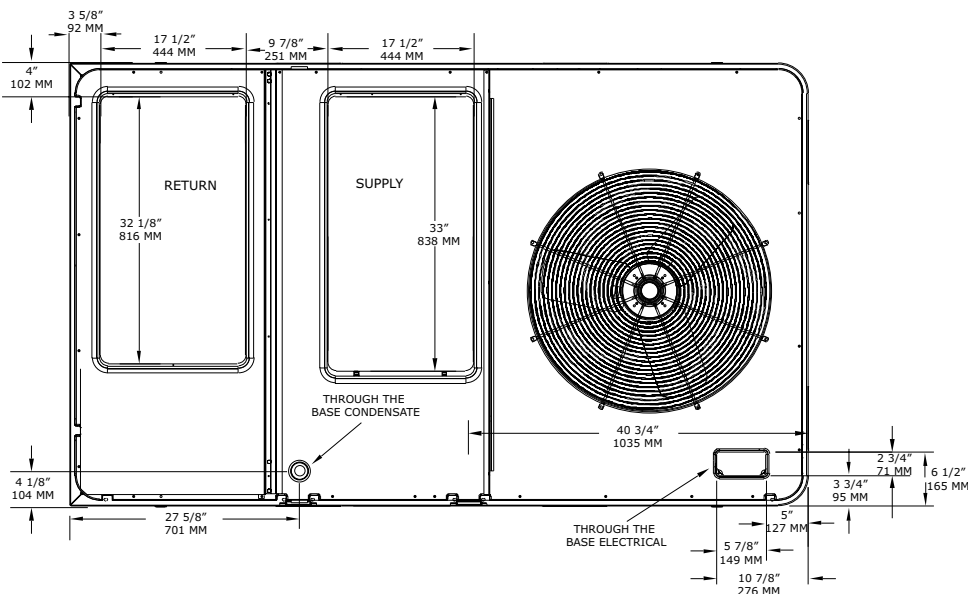


Figure 4. 6 to 10 tons standard efficiency – horizontal airflow supply/return

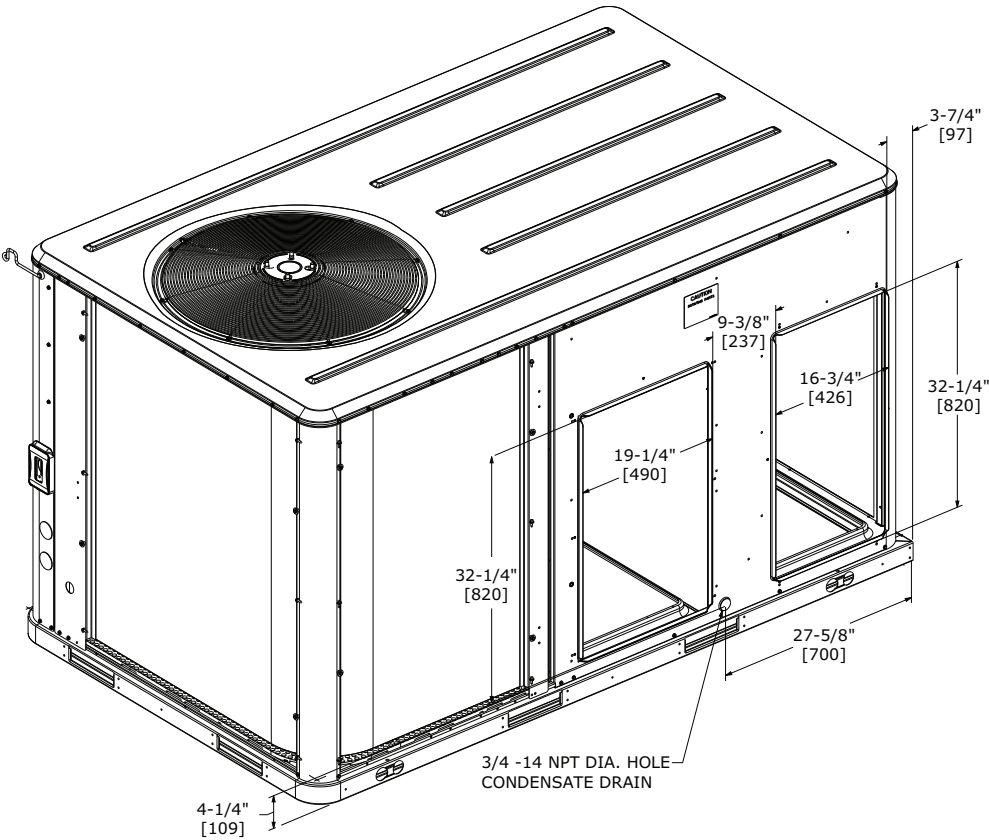


Figure 5. 6 to 10 tons standard efficiency — unit clearance and roof opening

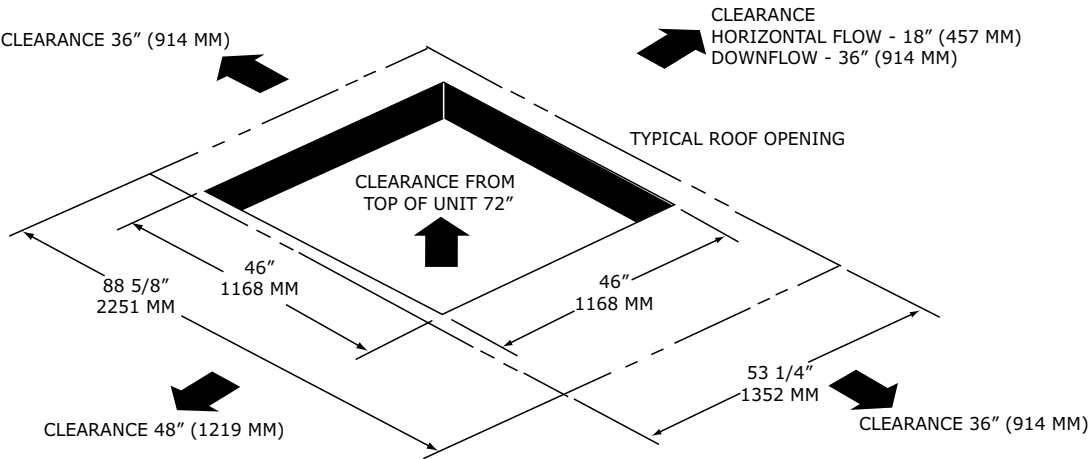


Figure 6. 6 to 10 tons standard efficiency – roof curb

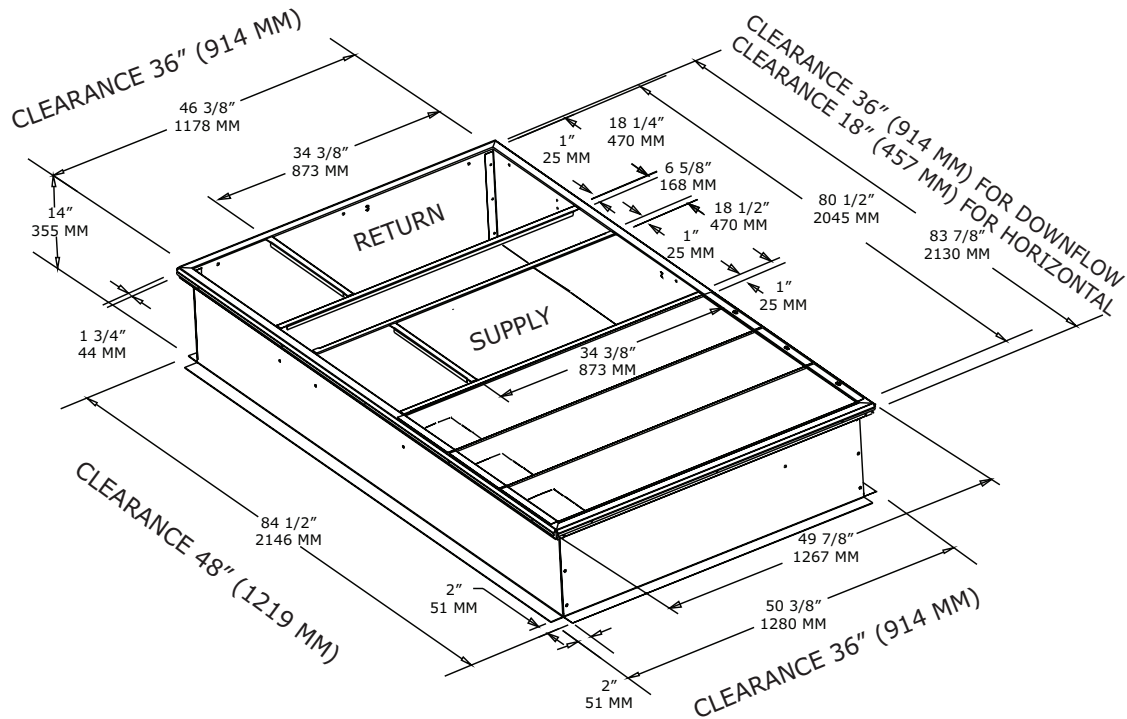


Figure 7. 6 to 10 tons standard efficiency – downflow duct connections, field fabricated

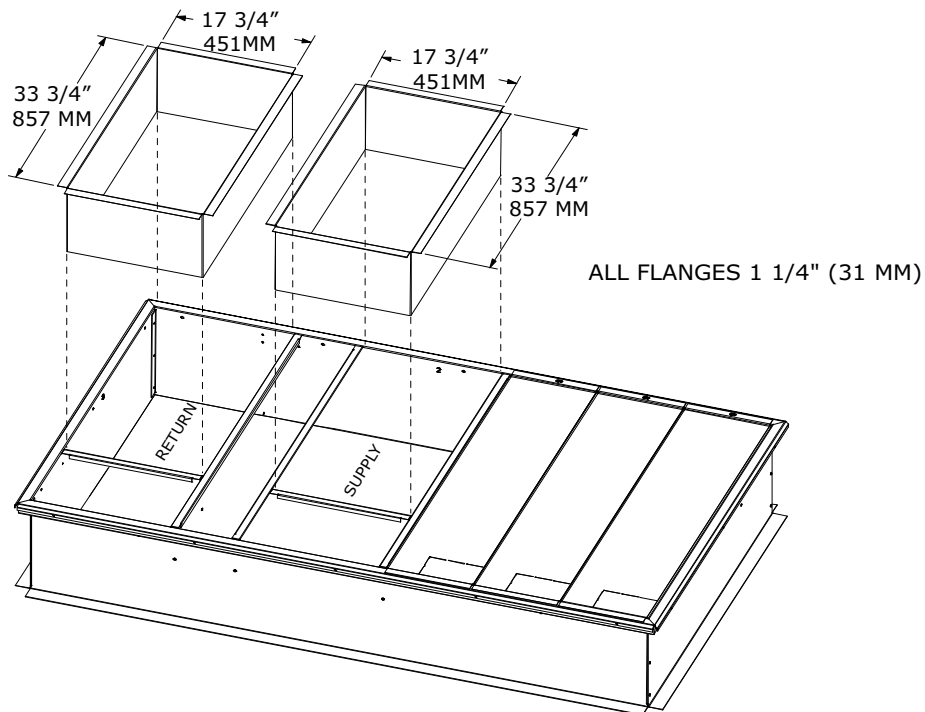


Figure 8. 6 to 10 tons standard efficiency – swing diameter for hinged door(s) option

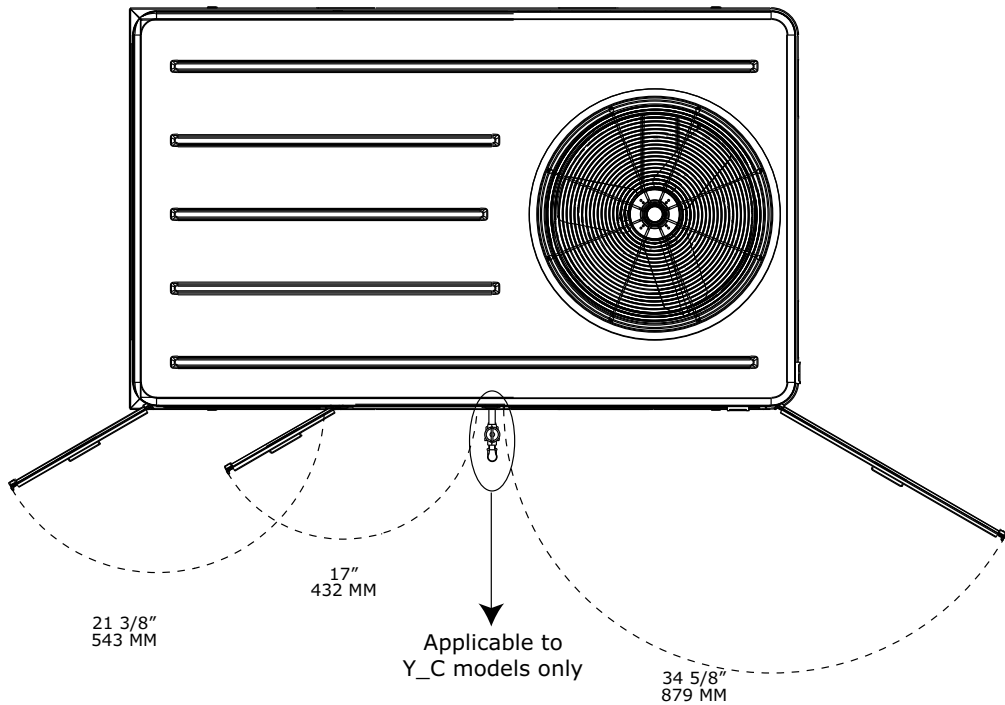
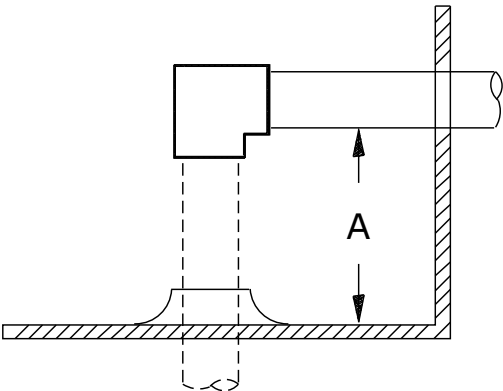


Figure 9. 6 to 25 tons standard efficiency— gas pipe height



Note: Height of gas pipe required from inside unit base to gas shut off assembly (factory provided).

Model	Dimension A	
	inch	mm
YSJ (072 – 150)A	4 5/8	117
YSJ (180 – 300)A	1 3/6	30

Figure 10. 12.5 tons standard efficiency

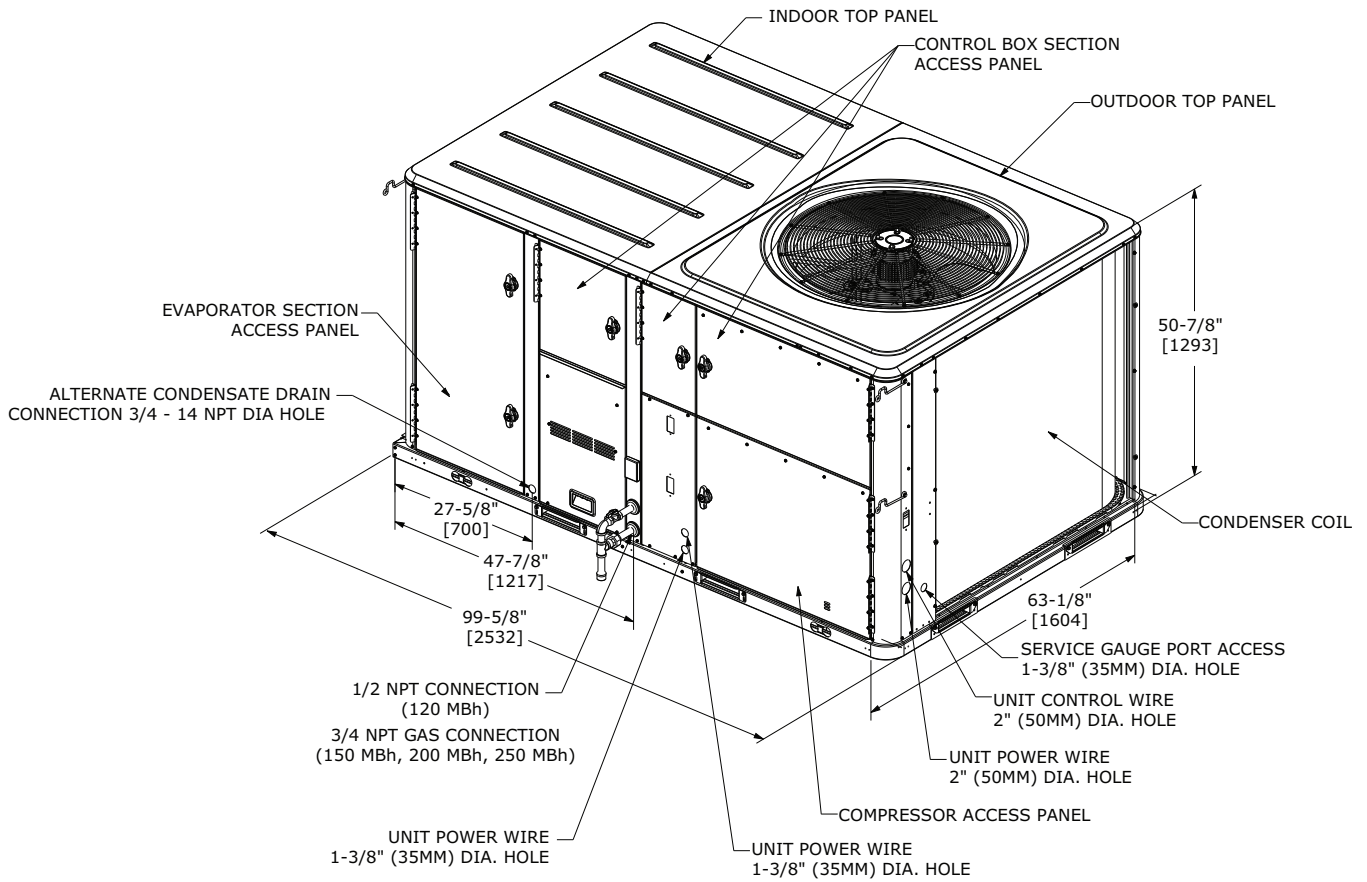


Figure 11. 12.5 tons standard efficiency – downflow airflow supply/return, through-the-base utilities

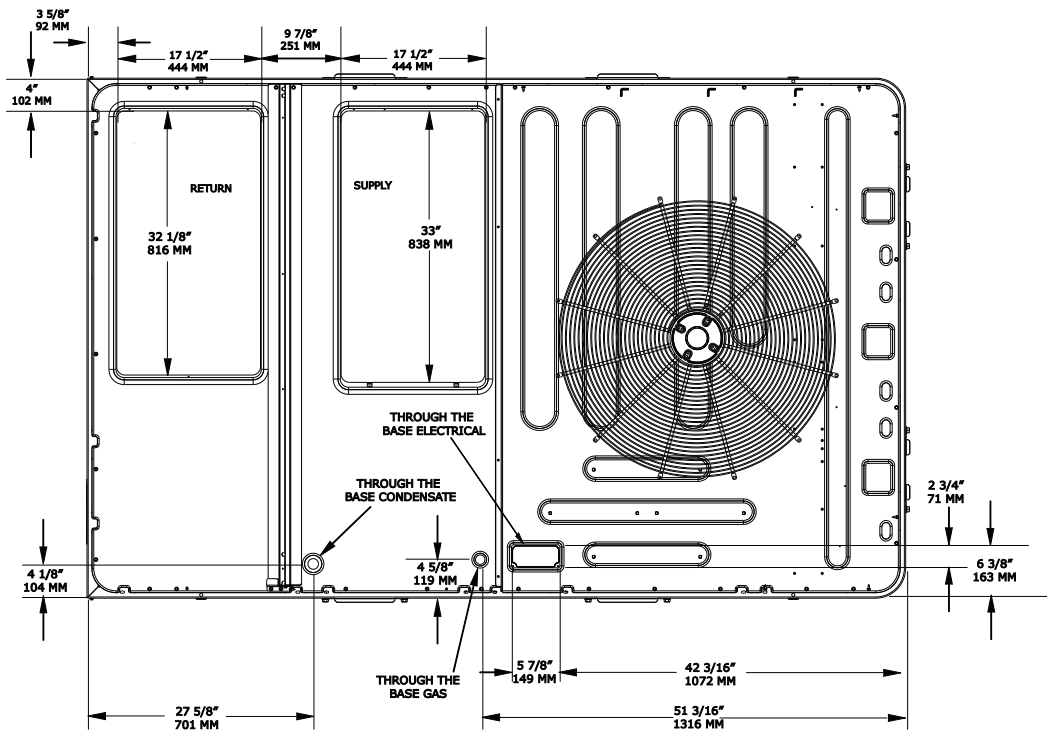


Figure 12. 12.5 tons standard efficiency – horizontal airflow, supply and return

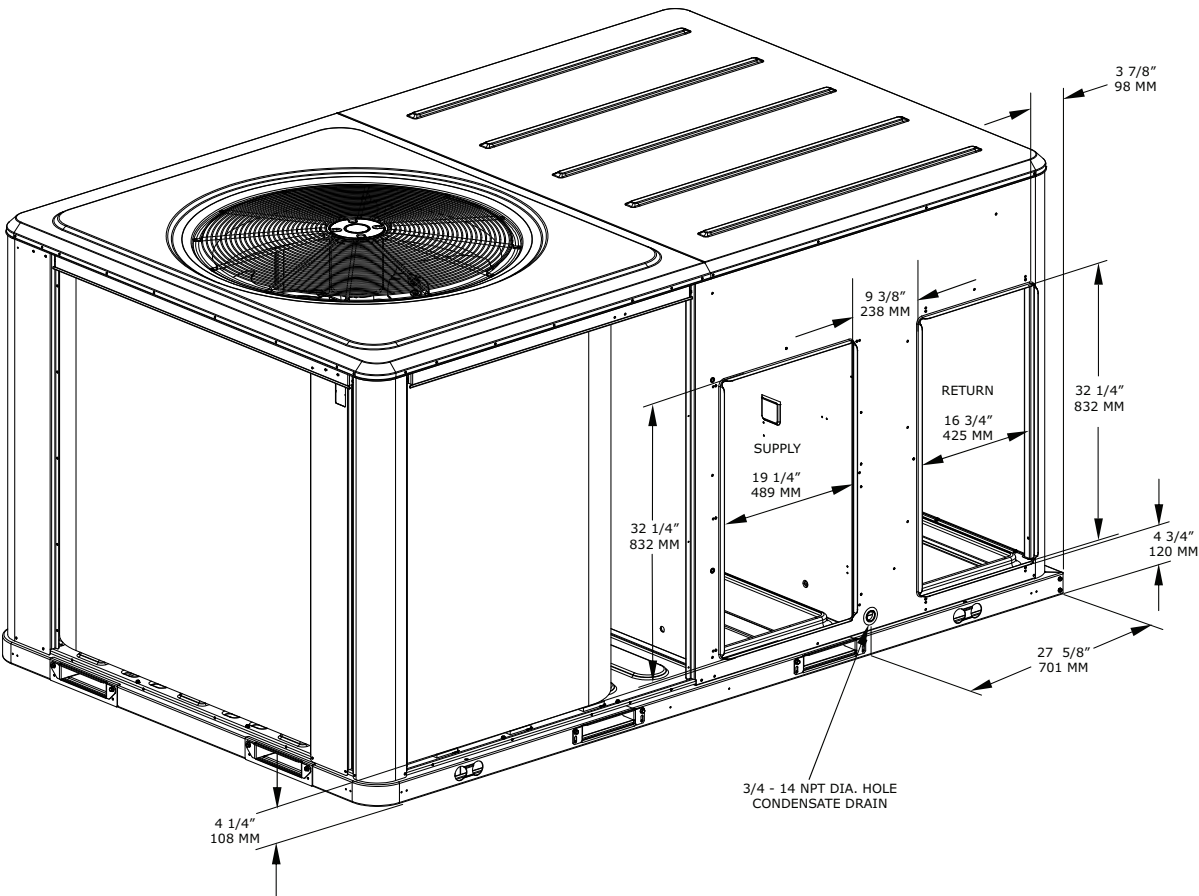


Figure 13. 12.5 tons standard efficiency – unit clearance and roof opening

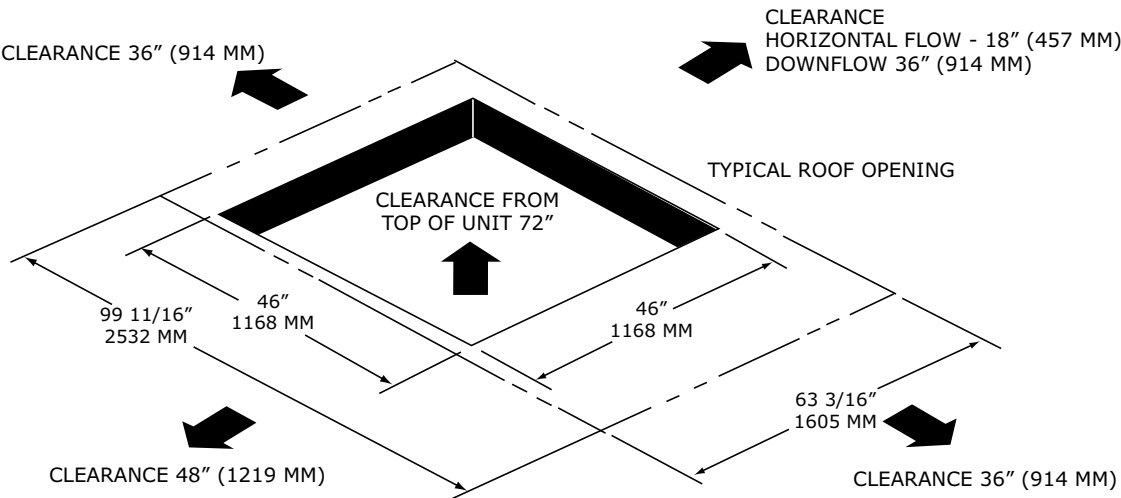


Figure 16. 6 to 12.5 tons standard efficiency – economizer, manual or motorized fresh air damper

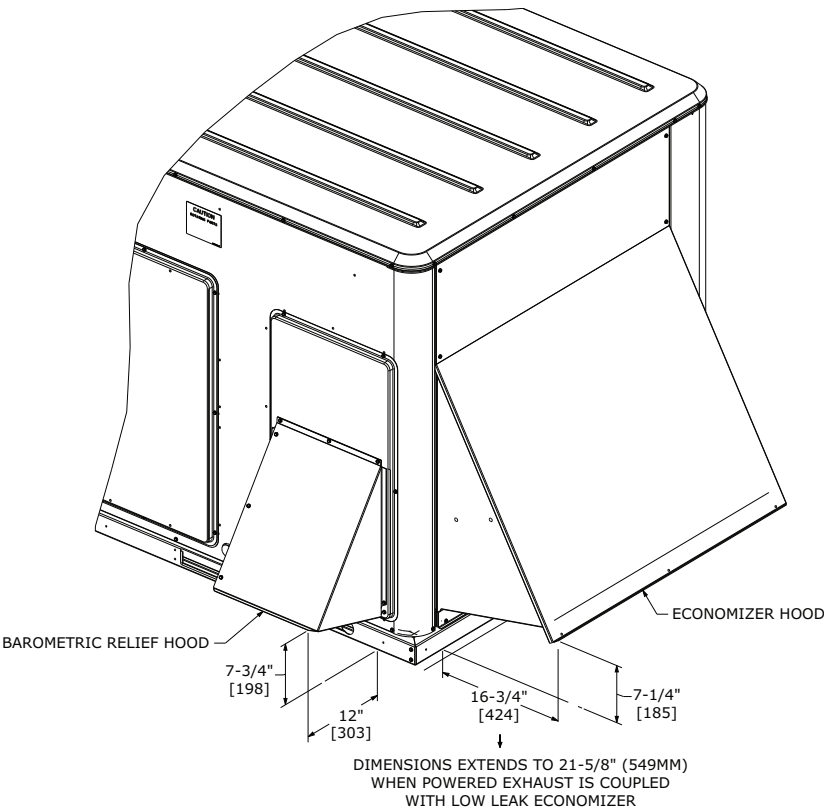


Figure 17. 6 to 12.5 tons standard efficiency – power exhaust

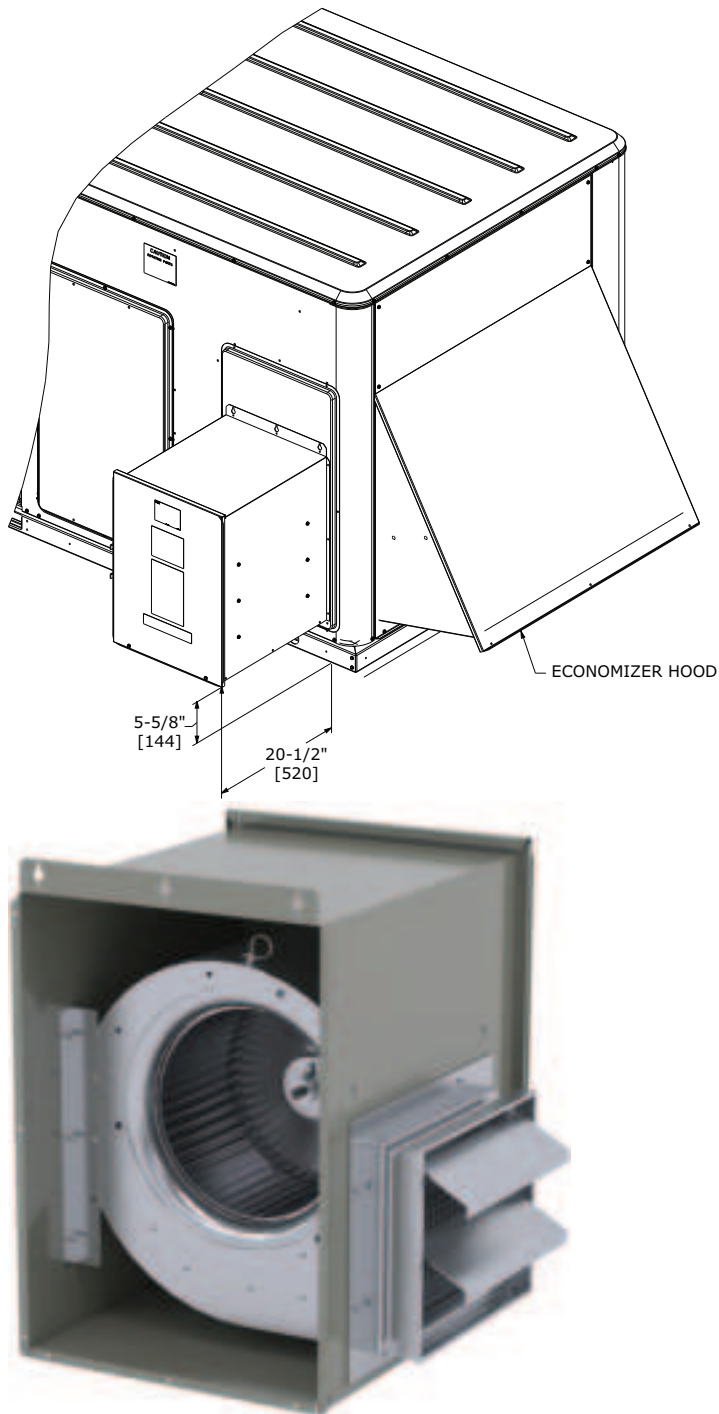


Figure 18. 15 to 25 tons standard efficiency – power exhaust

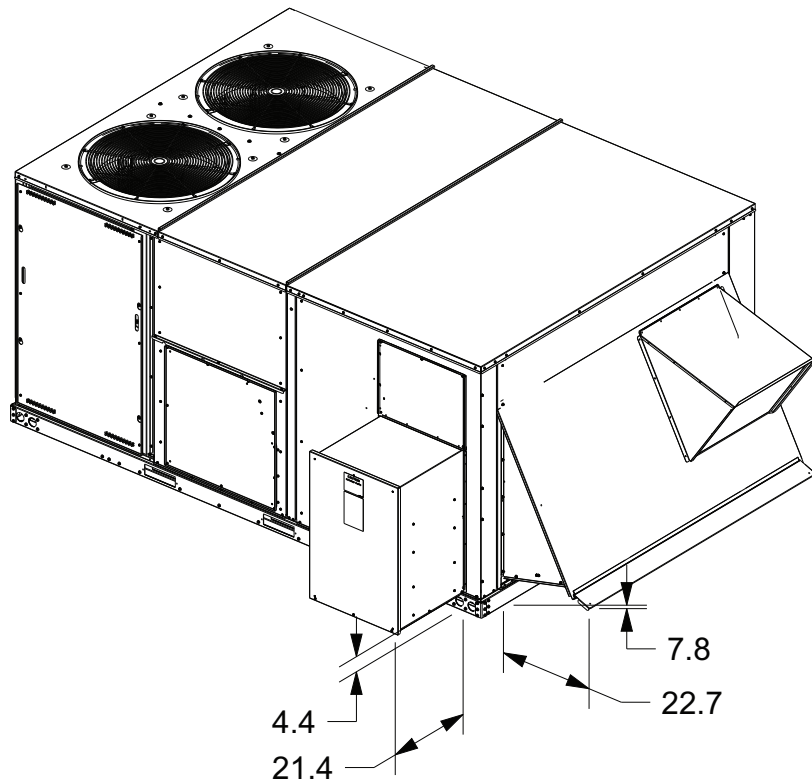
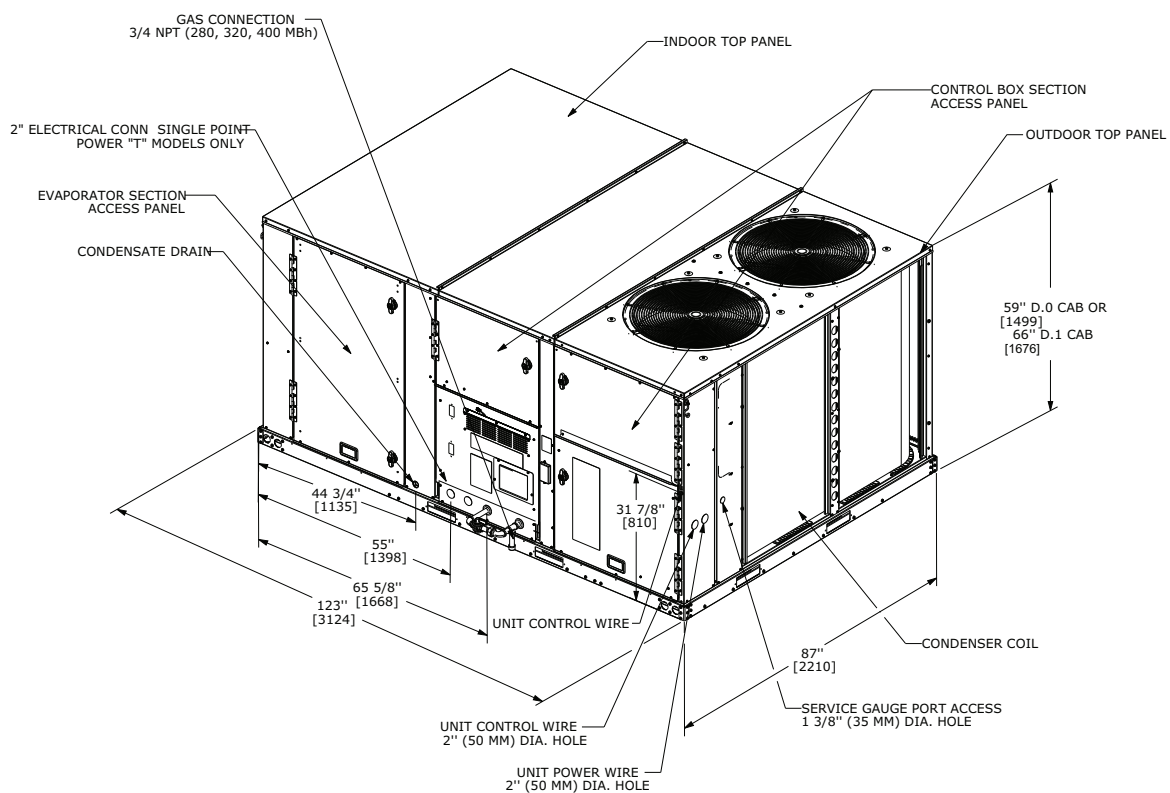


Figure 19. 15 to 25 tons standard efficiency



Note: Cabinet size for 15 to 15 ton units: D0.

Figure 22. 15 to 25 tons standard efficiency – unit clearance and roof opening

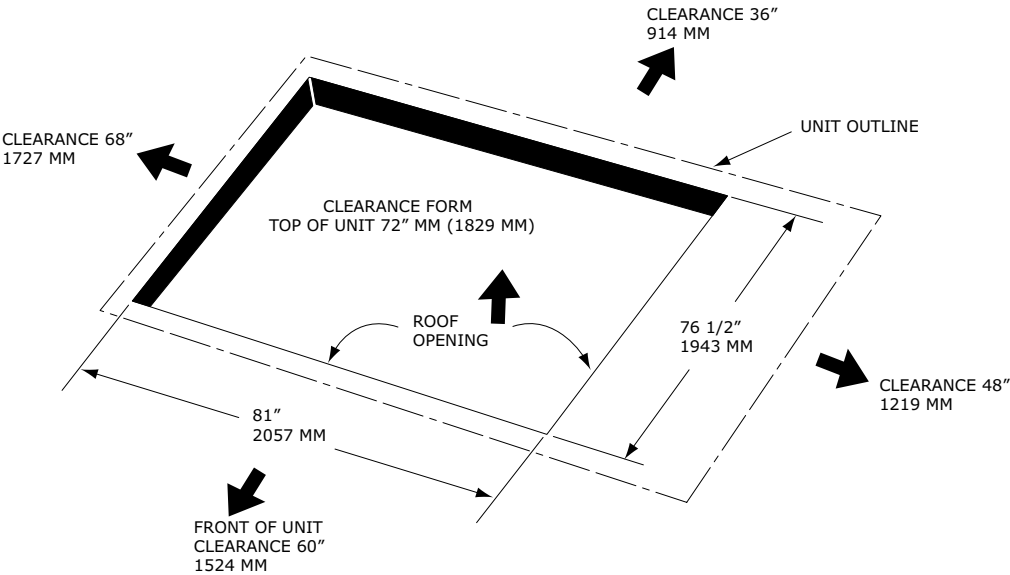


Figure 23. 15 to 25 tons standard efficiency – roof curb

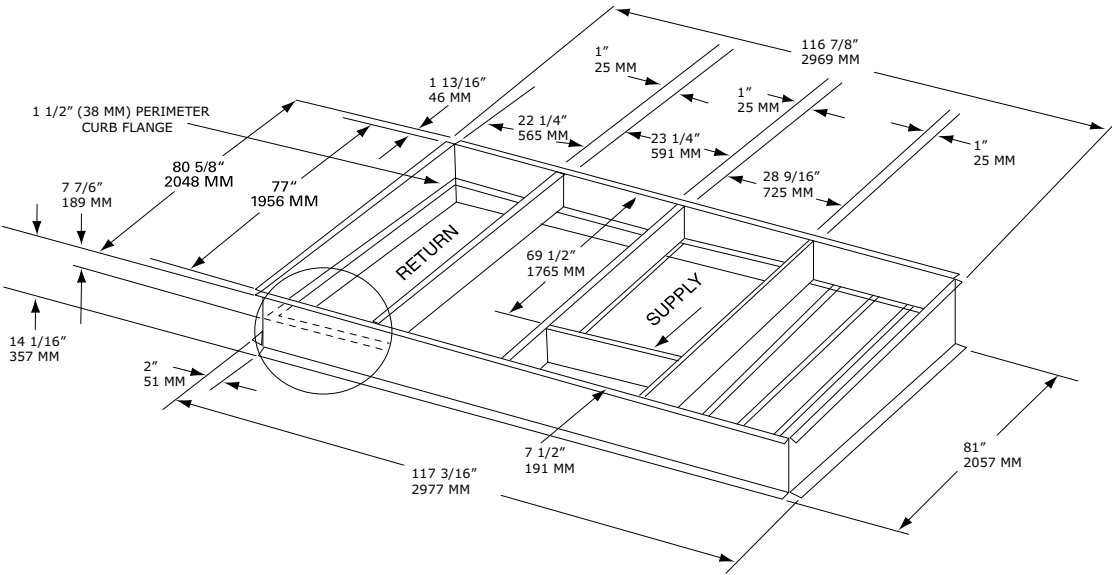
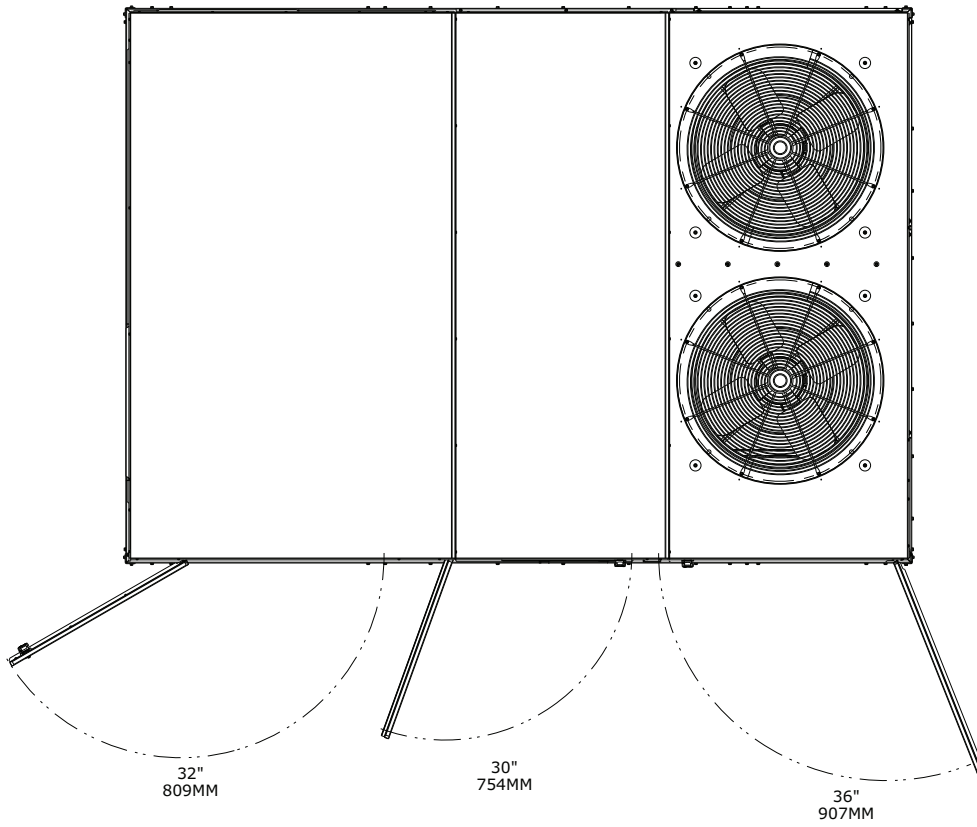


Figure 24. 15 to 25 ton standard efficiency – swing diameter for hinged door(s) option

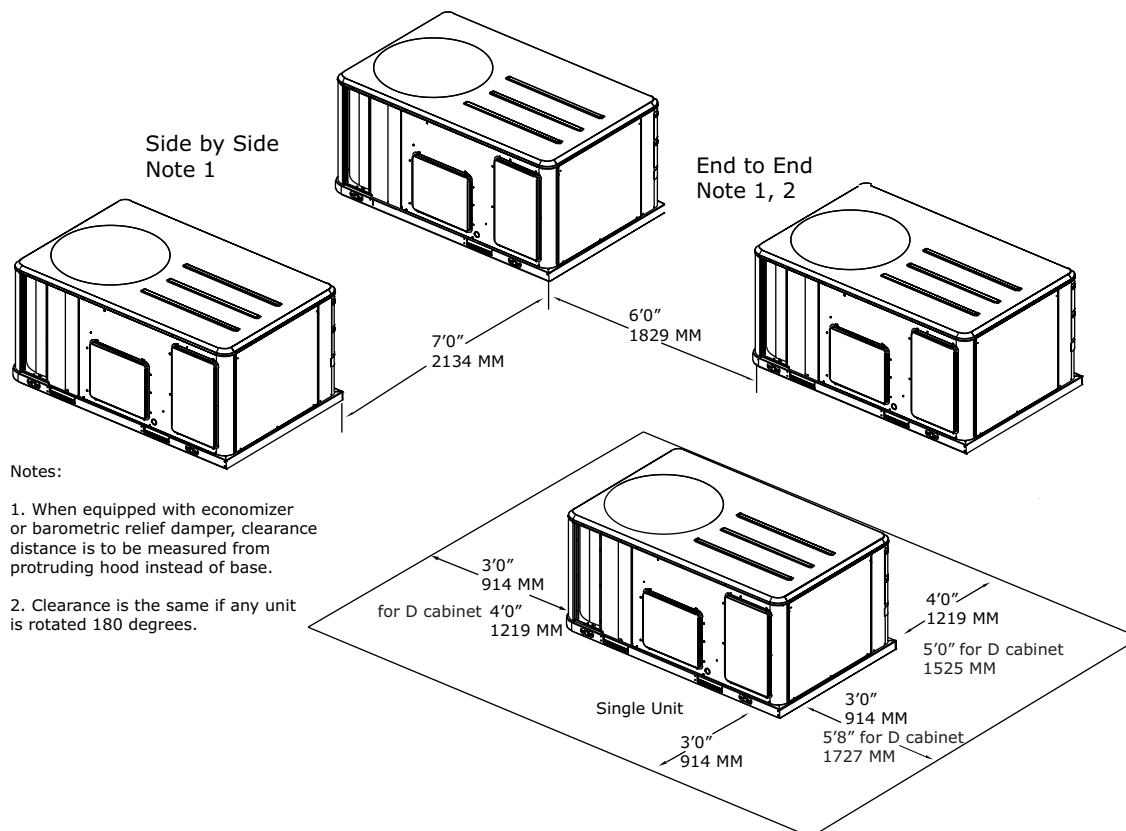


Clearances

Figure 25, p. 26 illustrates the minimum operating and service clearances for either a single or multiple unit installation. These clearances are the minimum distances necessary to assure adequate serviceability, cataloged unit

capacity, and peak operating efficiency. Providing less than the recommended clearances may result in condenser coil starvation, "short-circuiting" of exhaust and economizer airflows, or recirculation of hot condenser air.

Figure 25. Typical installation clearances for single and multiple unit applications



Weights

Table 1. Model weights, corner weights (lbs) and center of gravity dimensions (in.)

Tons	Unit Model No.	Model Weights ^(a)		Corner Weights ^(b)				Center of Gravity (in.)	
		Shipping	Net	A	B	C	D	Length	Width
6	YSJ072	1107	1009	331	309	178	191	43	19
7.5	YSJ090	1111	1013	333	310	178	191	43	19
8	YSJ102	1127	1029	338	315	181	194	43	19
10	YSJ120	1137	1039	341	318	183	196	43	19
12.5	YSJ150	1512	1318	385	389	273	270	50	26
15	YSJ180	2220	2000	671	492	354	483	52	36
17.5	YSJ210	2250	2030	672	509	366	484	53	36
20	YSJ240	2320	2100	754	516	337	493	50	34
25	YSJ300	2370	2150	746	529	363	512	51	35

^(a) Weights are approximate. Weights do not include additional factory or field installed options/accessories. For option/accessory additional weights to be added to unit weight, reference the following table.

^(b) Corner weights are given for information only.

Figure 26. Corner weights

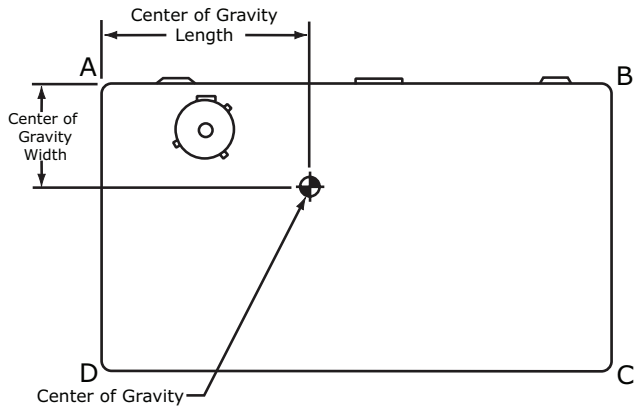


Table 2. Factory installed options (FIOPS)/accessory net weights (lb)

Accessory	YSJ072-120	YSJ150	YSJ180-300
	6, 7.5, 8.5, 10 Tons	12.5 Tons	15, 17.5, 20, 25 Tons
Barometric Relief	10	10	40
Economizer	36	36	91
Hinged Doors	12	12	20
Low Leak Economizer - Downflow	91	91	150
Low Leak Economizer - Horizontal	—	—	180
Manual Outside Air Damper	26	26	15
Motorized Outside Air Damper	30	30	82
Oversized Motor	14	—	30
Powered Convenience Outlet	38	50	50
Powered Exhaust	80	80	110
Reheat Coil	16	20	33
Roof Curb	105	111	235
Smoke Detector, Supply	5	5	5
Smoke Detector, Return	7	7	5
Stainless Steel Heat Exchanger	6	6	5
Through-the-Base Electrical	13	13	10
Through-the-Base Gas	5	5	10
Unit Mounted Circuit Breaker	5	5	10
Unit Mounted Disconnect	5	5	10

Notes:

1. Weights for options not listed are <5 lbs.
2. Net weight should be added to unit weight when ordering factory-installed accessories.
3. Weights are approximate.

Lifting and Rigging

⚠ WARNING

Heavy Object!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles 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.

⚠ WARNING

Improper Unit Lift!

Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage.

Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

Figure 27. Rigging and center of gravity — 6 to 12.5 tons

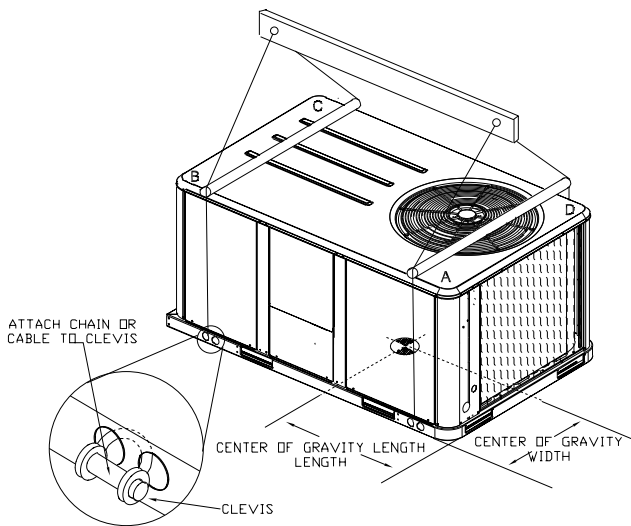
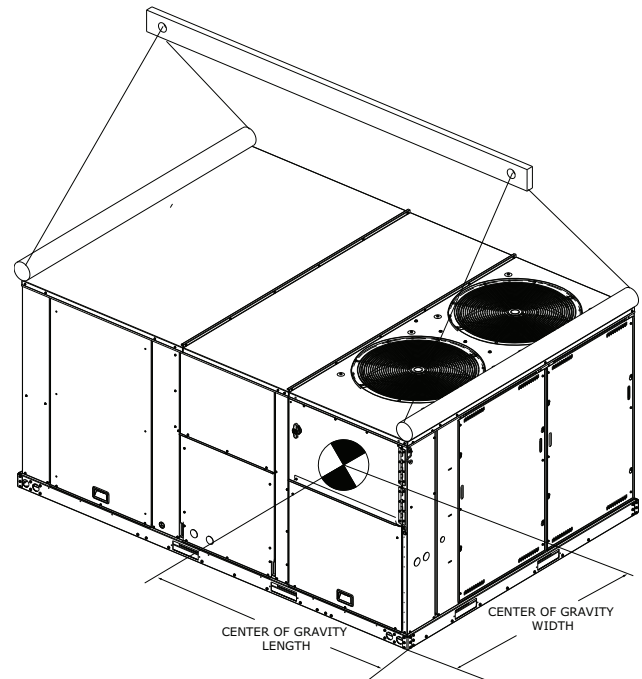


Figure 28. Rigging and center of gravity — 15 to 25 tons



Installation

Horizontal Units

If the unit is installed at ground level, elevate it above the snow line. Provide concrete footings at each support location with a "full perimeter" support structure or a slab foundation for support. Refer to the weights information in the Dimensions and Weights chapter for the unit's operating and point loading weights when constructing a footing foundation.

If anchoring is required, anchor the unit to the slab using hold down bolts or isolators. Isolators should be installed to minimize the transmission of vibrations into the building.

⚠ WARNING

Risk of Roof Collapsing!

Failure to ensure proper structural roof support could cause the roof to collapse, which could result in death or serious injury and property damage.

Confirm with a structural engineer that the roof structure is strong enough to support the combined weight of the roofcurb, the unit, and any accessories.

For rooftop applications, ensure the roof is strong enough to support the combined unit and support structural weight. Refer to maximum unit and corner weights (center of gravity) dimensions in the Dimensions and Weights section for the unit operating weights. If anchoring is required, anchor the unit to the roof with hold-down bolts or isolators.

Check with a roofing contractor for proper waterproofing procedures.

Ductwork

Supply and return air openings as viewed from the rear of the unit are shown in the following drawings.

Figure 29. 6 to 10 tons standard efficiency – horizontal airflow supply/return

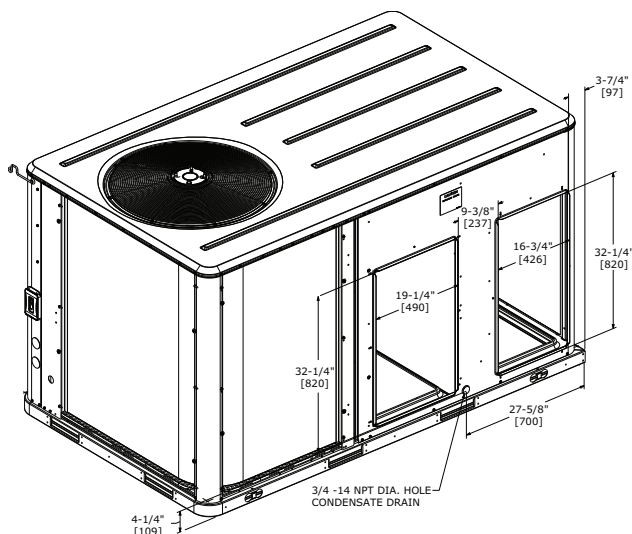


Figure 30. 12.5 tons standard efficiency – horizontal airflow, supply and return

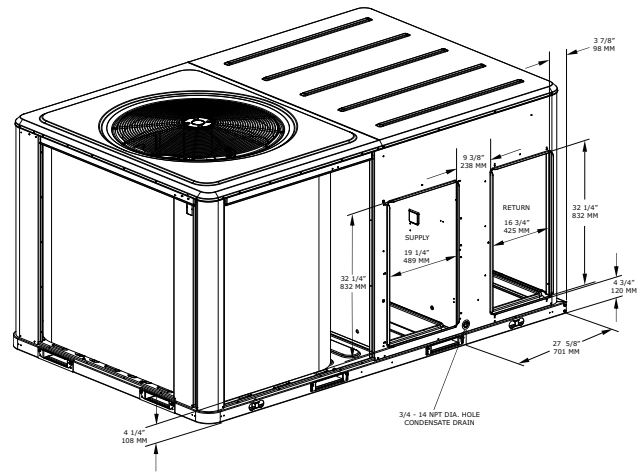
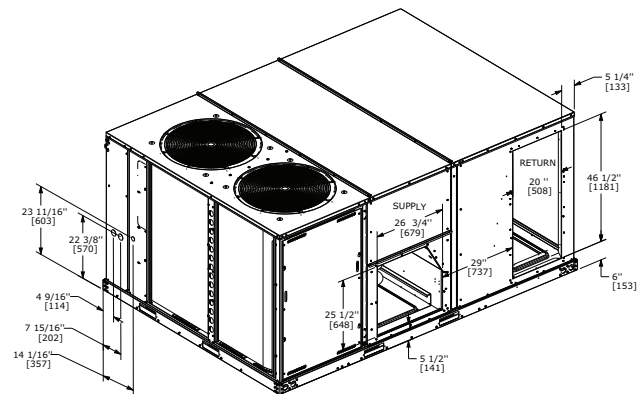


Figure 31. 15 to 25 ton standard efficiency – horizontal airflow supply/return



Supply and return air openings as viewed from a downflow configuration are shown in the following drawings.

Elbows with turning vanes or splitters are recommended to minimize air noise due to turbulence and to reduce static pressure.

When attaching the ductwork to the unit, provide a water tight flexible connector at the unit to prevent operating sounds from transmitting through the ductwork.

All outdoor ductwork between the unit and the structure should be weather proofed after installation is completed.

Figure 32. 6 to 10 tons standard efficiency – downflow airflow supply/return, through-the-base utilities

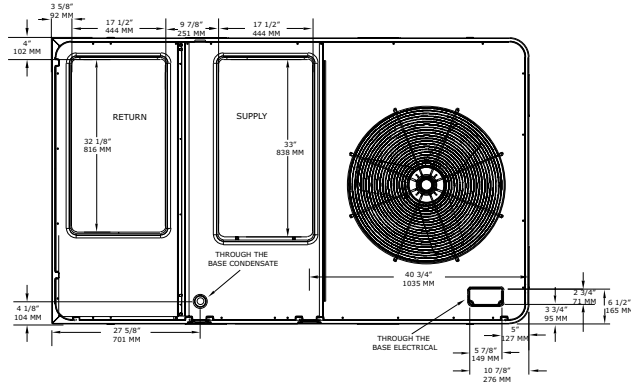


Figure 33. 12.5 tons standard efficiency – downflow airflow supply/return, through-the-base utilities

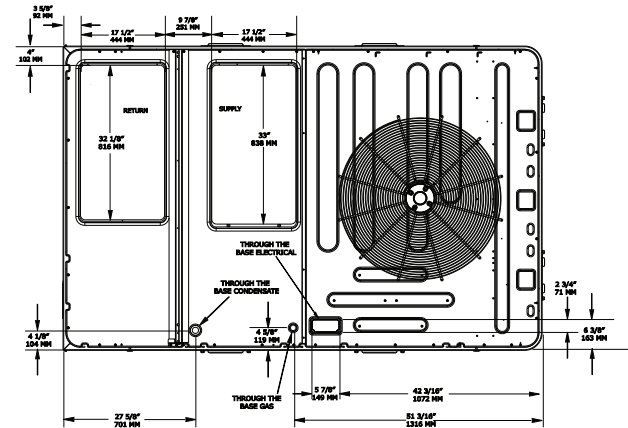
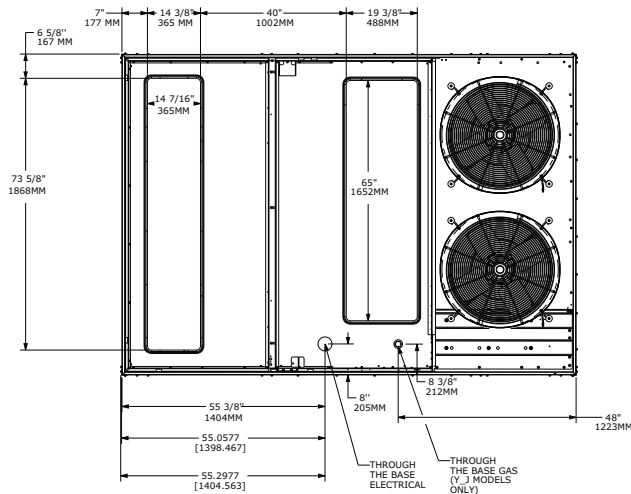


Figure 34. 15 to 25 tons standard efficiency – downflow airflow supply/return, through-the-base utilities



Roof Curb

Downflow

The roof curbs for these units consists of a “full perimeter” enclosure to support the unit just inside of the unit base rail. The 12.5 ton units contain a support base alignment rail and will extend past the end of the roof curb as shown in figures below

Before installing any roof curb, verify:

- It is the correct curb for the unit.
- The includes the necessary gaskets and hardware.
- The purposed installation location provides the required clearance for proper operation.
- Insure that the curb is level and square. The top surface of the curb must be true to assure an adequate curb-to unit seal.

⚠ WARNING

Combustible Materials!

Failure to maintain proper clearance between the unit and combustible materials could cause a fire which could result in death, serious injury, or property damage.

Refer to unit nameplate and installation instructions for proper clearances.

Verify that appropriate materials were used in the construction of roof and ductwork. Combustible materials should not be used in the construction of ductwork or roof curb that is in close proximity to heater elements or any hot surface. Any combustible material on the inside of the unit base should be removed and replaced with appropriate material.

Step-by-step curb assembly and installation instructions ship with each accessory roof curb kit. Follow the instructions carefully to assure proper fit-up when the unit is set into place.

Note: To assure proper condensate flow during operation, the unit (and curb) must be level.

If the unit is elevated, a field constructed catwalk around the unit is strongly recommended to provide easy access for unit maintenance and service.

Recommendations for installing the Supply Air and Return Air ductwork joining the roof curb are included in the curb instruction booklet. Curb ductwork must be fabricated and installed by the installing contractor before the unit is set into place.

Note: For sound consideration, cut only the holes in the roof deck for the ductwork penetrations. Do not cut out the entire roof deck within the curb perimeter.

Figure 35. View for base to roof curb alignment on C.0 cabinet on a 50" x 84" roof curb

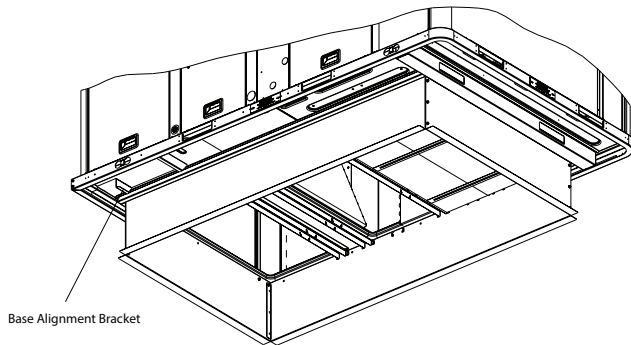
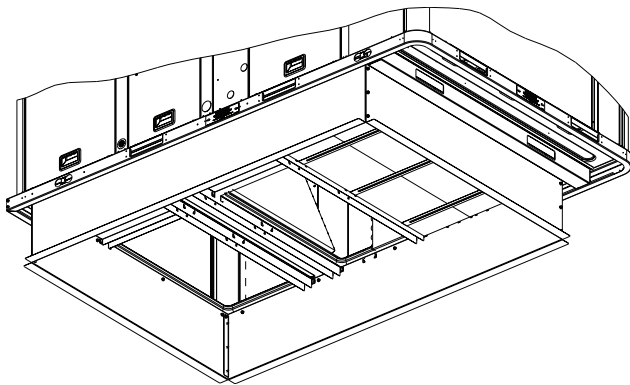


Figure 36. View for base to roof curb alignment on C.0 cabinet on a 60" x 84" roof curb



If a Curb Accessory Kit is not used:

- The ductwork can be attached directly to the factory-provided flanges around the unit's supply and return air openings. Be sure to use flexible duct connections at the unit.
- For "built-up" curbs supplied by others, gaskets must be installed around the curb perimeter flange and the supply and return air opening flanges.

Rigging

⚠ WARNING

Heavy Object!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage.

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles 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.

See Dimensions and Weights section for rigging illustration, and center-of-gravity dimensional data. Refer to the typical unit operating weights table before proceeding.

1. Confirm unit does not need additional moves by fork lift.
2. Prepare unit for rigging as follows:
 - 6 to 12.5 ton units: Remove all drill screws fastening wood protection to metal base rail. Remove all screws securing wooden protection to wooden top crate.
 - 15 to 25 ton units: Remove the front base rail bumper protection.

Note: For unit protection, the top crate should remain in place during lifting. If it must be removed prior to lifting, protect unit from damage. Top crate must be removed prior to operation.

⚠ WARNING

Improper Unit Lift!

Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage.

Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

3. Rig the unit as shown in the weights section. Attach adequate strength lifting slings to all four lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
4. Install a lifting bar, as shown in the Dimensions and Weights chapter, to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
5. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.

Figure 37. Fork pockets — 6 to 10 ton standard efficiency units

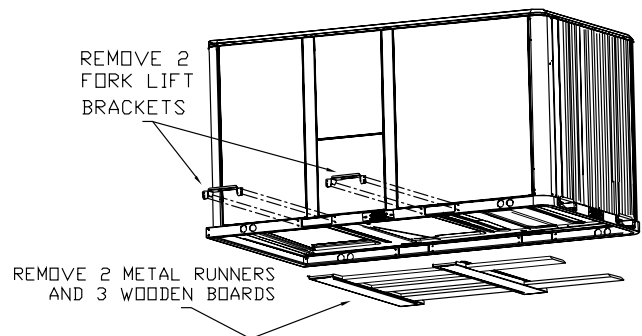


Figure 38. Fork pockets — 12.5 ton standard efficiency units

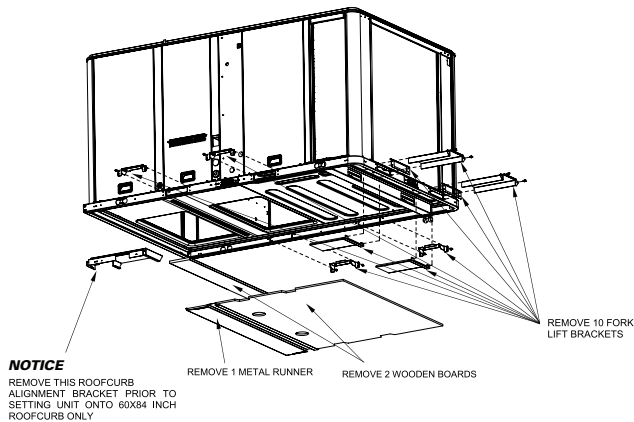
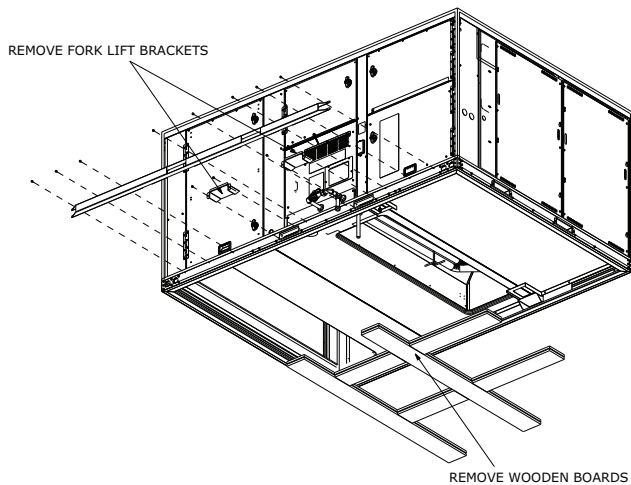


Figure 39. Fork pockets — 15 to 25 ton standard efficiency units



6. Lift the unit enough to allow the removal of base fork pocket protection components as shown in the following figures.
7. When C cabinet (digit 39 = C) units are installed on smaller existing roof curb (50"x 84") for replacement applications, do not remove alignment bracket. This bracket helps assure proper alignment of duct openings.
8. Downflow units; align the base rail of the unit with the curb rail while lowering the unit onto the curb. Make sure that the gasket on the curb is not damaged while positioning the unit.

General Unit Requirements

The checklist listed below is a summary of the steps required to successfully install a commercial unit. This checklist is intended to acquaint the installing personnel with what is required in the installation process. It does not replace the detailed instructions called out in the applicable sections of this manual.

- Check the unit for shipping damage and material shortage; file a freight claim and notify appropriate sales representative.
- Verify correct model, options and voltage from unit nameplate.
- Verify that the installation location of the unit will provide the required clearance for proper operation.
- Assemble and install the roof curb (if applicable). Refer to the latest edition of the curb installers guide that ships with each curb kit.
- Fabricate and install ductwork; secure ductwork to curb.
- Install pitch pocket for power supply through building roof. (If applicable)
- Rigging the unit.
- Set the unit onto the curb; check for levelness.
- Ensure unit-to-curb seal is tight and without buckles or cracks.
- Install and connect a condensate drain line to the evaporator drain connection.

Factory Installed Economizer

- Ensure the economizer has been pulled out into the operating position. Refer to the economizer installers guide for proper position and setup.
- Install all access panels.

External Vent Hood Installation

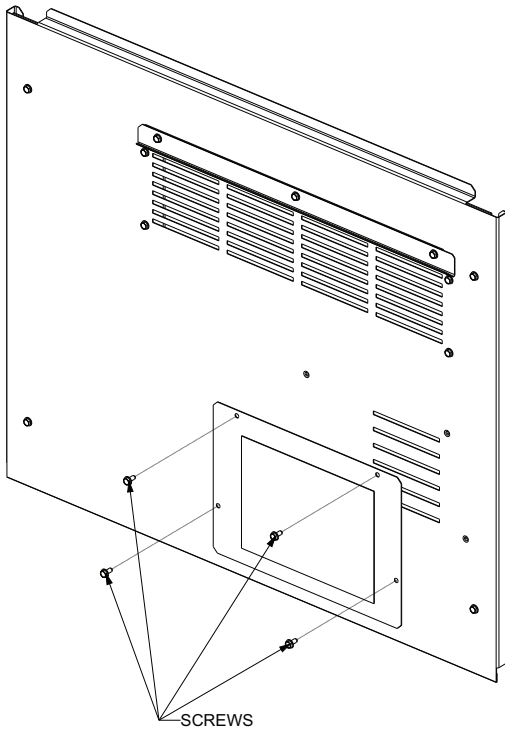
Note: This procedure applies only to 15 to 25 tons gas heat models.

1. Remove and discard the cover plate located on the gas heat panel.

Important:

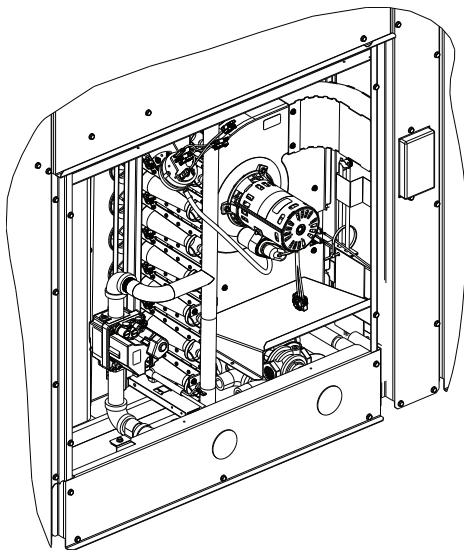
- Make sure you read the label located on the cover plate before you discard it.
- Do not discard the fastening screws! They will be needed to install the vent hood.

Figure 40. Discard cover plate



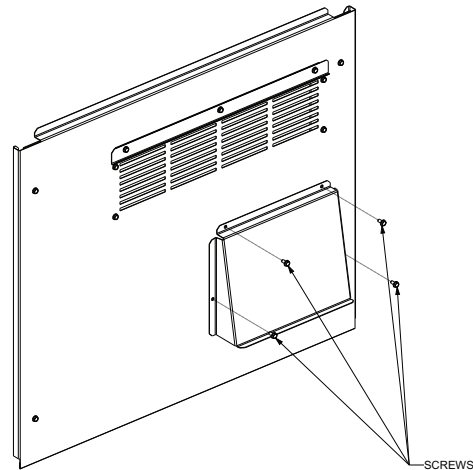
2. Locate the vent hood behind the panel, on the right side of the burner assembly.

Figure 41. Vent hood shipping location



3. Install the vent hood on the gas heat panel using the screws removed in Step 1. Make sure it is properly secured to the panel.

Figure 42. Vent hood installation



Temperature Limit Switch Usage

Units are factory shipped in the downflow discharge configuration but can be field converted to a horizontal discharge configuration. Some, but not all units require a different TCO1 limit switch, which is either attached to the combustion blower motor (6 to 12.5 tons) or to the installed TCO1 limit switch (15 to 25 tons) if horizontal discharge configuration is used.

If any of the units are installed in the downflow discharge configuration and have the alternate TCO1 limit switch provided, remove the additional TCO1 limit switch which is either attached to the combustion blower motor (6 to 12.5 tons) or to the installed TCO1 limit switch (15 to 25 tons) and discard.

For detailed instructions, refer to [“TCO1 Instructions,” p. 35.](#)

Table 3. TCO1 tripping values

Tons	Unit Model Number	TCO1 Tripping Values - Downflow/Horizontal
6	YSJ072A**(0,A)L	105F
	YSJ072A**(0,A)M	120F
	YSJ072A**(0,A)H	140F
7.5	YSJ090A**(0,A)L	120F/110F
	YSJ090A**(0,A)M	130F/135F
	YSJ090A**(0,A)H	125F/150F
8.5	YSJ102A**(0,A)L	120F/110F
	YSJ102A**(0,A)M	130F/135F
	YSJ102A**(0,A)H	125F/150F
10	YSJ120A**(0,A)L	135F
	YSJ120A**(0,A)M	125F/140F
	YSJ120A**(0,A)H	130F/150F
12.5	YSJ150A**(0,A)L	125F/130F
	YSJ150A**(0,A)M	130F
	YSJ150A**(0,A)H	110F
15	YSJ180A**(0,A)L	140F-3"/150-7"
	YSJ180A**(0,A)M	150F-3"/195F-3"
	YSJ180A**(0,A)H	150F-3"/200F-3"

Table 3. TC01 tripping values (continued)

Tons	Unit Model Number	TC01 Tripping Values - Downflow/Horizontal
17.5	YSJ210A**(0,A)L	140F-3"/150-7"
	YSJ210A**(0,A)M	150F-3"/195F-3"
	YSJ210A**(0,A)H	150F-3"/200F-3"
20	YSJ240A**(0,A)L	140F-3"/150-7"
	YSJ240A**(0,A)M	150F-3"/195F-3"
	YSJ240A**(0,A)H	150F-3"/200F-3"
25	YSJ300A**(0,A)L	140F-3"/150-7"
	YSJ300A**(0,A)M	150F-3"/195F-3"
	YSJ300A**(0,A)H	150F-3"/200F-3"

Table 4. TC01 tripping values

Tons	Unit Model Number	TC01 Tripping Values - Downflow/Horizontal
6	YHJ072A**(0,A)L	105°F
	YHJ072A**(0,A)M	120°F
	YHJ072A**(0,A)H	140°F
7.5	YHJ090A**(0,A)L	120°F/110°F
	YHJ090A**(0,A)M	130°F/135°F
	YHJ090A**(0,A)H	125°F/150°F
8.5	YHJ102A**(0,A)L	120°F/110°F
	YHJ102A**(0,A)M	130°F/135°F
	YHJ102A**(0,A)H	125°F/150°F
10	YHJ120A**(0,A)L	135°F
	YHJ120A**(0,A)M	125°F/140°F
	YHJ120A**(0,A)H	130°F/150°F
12.5	YHJ150A**(0,A)L	125°F/130°F
	YHJ150A**(0,A)M	130°F
	YHJ150A**(0,A)H	110°F
15	YHJ180A**(0,A)L	140°F-3 inch/150-7 inch
	YHJ180A**(0,A)M	150°F-3 inch/195°F-3 inch
	YHJ180A**(0,A)H	150°F-3 inch/200°F-3 inch
17.5	YHJ210A**(0,A)L	140°F-3 inch/150-7 inch
	YHJ210A**(0,A)M	150°F-3 inch/195°F-3 inch
	YHJ210A**(0,A)H	150°F-3 inch/200°F-3 inch
20	YHJ240A**(0,A)L	140°F-3 inch/150-7 inch
	YHJ240A**(0,A)M	150°F-3 inch/195°F-3 inch
	YHJ240A**(0,A)H	150°F-3 inch/200°F-3 inch
25	YHJ300A**(0,A)L	140°F-3 inch/150-7 inch
	YHJ300A**(0,A)M	150°F-3 inch/195°F-3 inch
	YHJ300A**(0,A)H	150°F-3 inch/200°F-3 inch

Horizontal Discharge Conversion (6 to 12.5 Ton Units)

Notes:

- 15 to 25 ton units require purchase of an accessory kit for conversion.
- 6 to 12.5 ton units move the supply cover to return opening and return cover to supply opening.

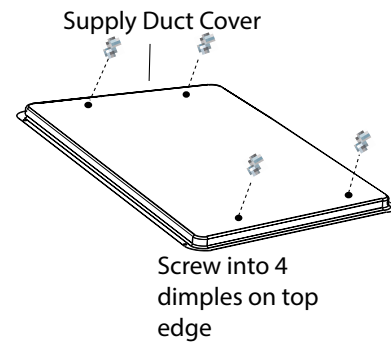
Supplies Needed by Installer for Conversion: 3 ounce tube of high temperature RTV sealant (500°F / 260°C, similar to Dow Corning 736).

Note: Failure to use recommended sealant could result in unit performance loss.

If a unit is to be converted to a horizontal discharge, the following conversion must be performed:

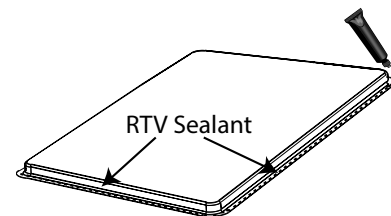
1. Remove RETURN and SUPPLY duct covers.
2. Place SUPPLY DUCT COVER over down-flow return opening. (insulation side down)
3. Using self-drilling screws, (or screws removed from duct cover), screw through dimples to attach DUCT COVER to base.

Figure 43. Supply duct cover



4. On original RETURN DUCT COVER, apply ¼" (6 mm.) continuous bead of 500°F RTV sealant around flange (opposite insulation side), as shown.

Figure 44. Return duct cover

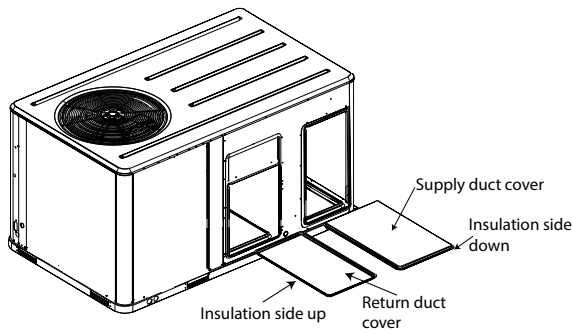


5. Slide RETURN DUCT COVER (insulation side up) into supply opening until inward edge of duct cover engages with the 2 retaining clips on the duct flange. Secure outward edge of the duct cover with two screws.

Notes:

- If unit is equipped with Return Air Smoke Detector, refer to field conversion instructions for horizontal discharge before installing return air duct.
- If unit is equipped with Discharge Air Sensing option refer to the following figure for proper tube positioning based on unit supply duct orientation / tonnage or refer to literature ACC-SVN240*-EN for more details.

Figure 45. Supply and return opening

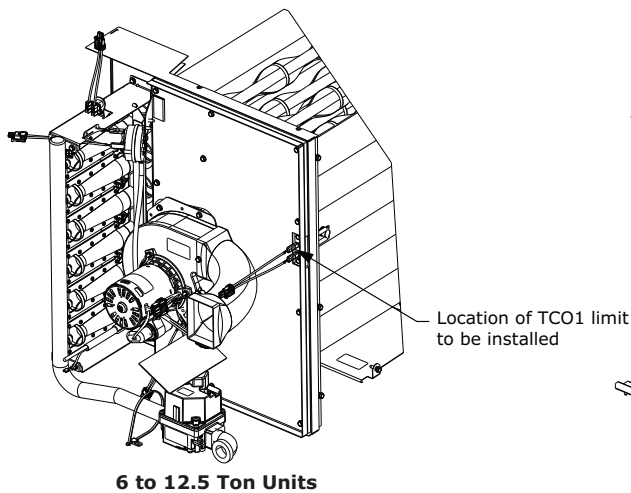


6. After completing installation of the duct covers for horizontal discharge, proceed to TCO-1 instructions.

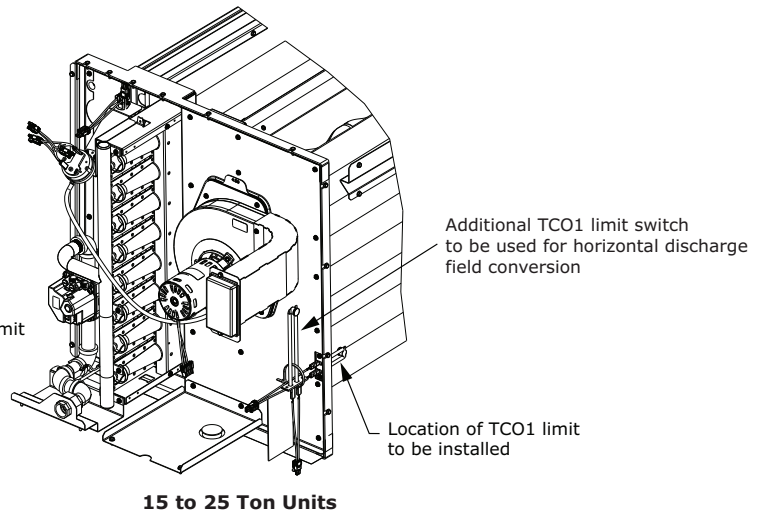
TCO1 Instructions

Note: For complete Gas Heat User information, Operation, Start-up, Shutdown and Maintenance refer to “Gas Heat Operation and Maintenance,” p. 62.

Figure 46. TCO1 instructions



Note: The TCO1 switch is attached by 2 screws in the location shown. The switch has short legs on it so use caution when sliding out of vestibule face during removal.



Note: Refer to downflow view for screw locations of 15 to 25 ton units.

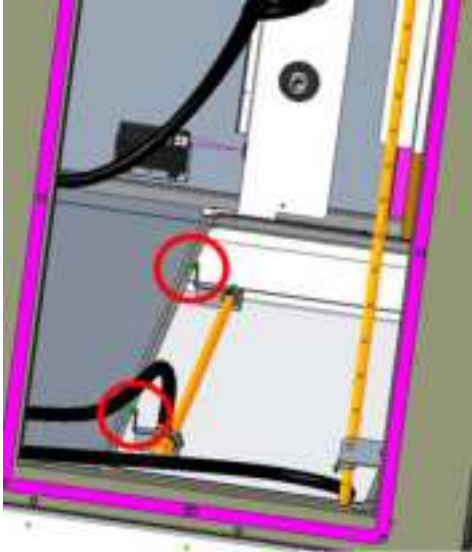
Return Air Smoke Detector

The factory installed Return Air Smoke Detector is installed in the downflow discharge position for 15 to 25 ton units. No additional field setup is required.

If a unit is to be converted to horizontal discharge, for 15 to 25 ton units, the following conversion must be performed:

1. If the unit has an economizer, it must be pulled out in the operating position.
2. Remove the 2 screws from the mounting brackets.

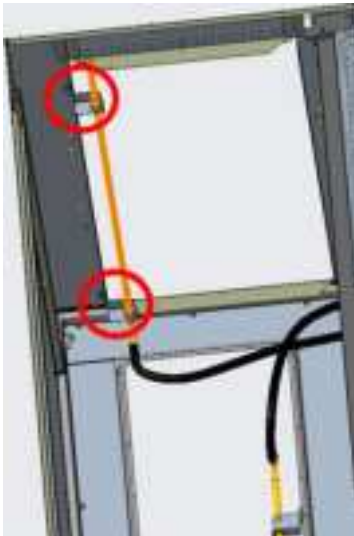
Figure 47. Downflow bracket installation (view from horizontal return duct)



3. Lift the tube and bracket from the downflow duct opening. Rotate the tube and bracket assembly 90 degrees ensuring that the holes on the aluminium sensing tube face away from the unit and face the return air ductwork.

Note: Refer to horizontal views below of the 15 to 25 ton units.

Figure 48. Horizontal bracket installation (top view of unit)

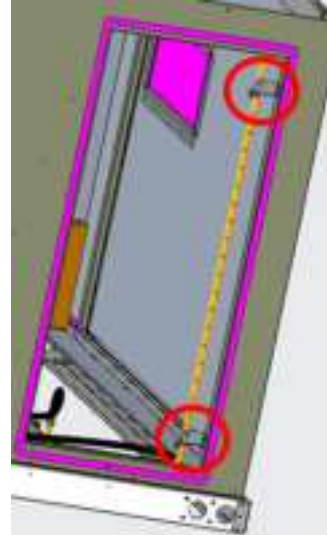


Note: Check to insure that the flexible tubing lies flat on the base pan surface.

4. Slide the top bracket down the aluminium sensing tube.
 - For 15 to 25 ton units with standard or low leak economizers, also secure the tube to the top right side of the horizontal opening flange (right side

when viewed from outside unit facing horizontal supply). See Figure 49, p. 36.

Figure 49. Horizontal bracket installation (view from horizontal return duct)



5. Using the remaining 2 screws and bracket removed in step 2, secure the bottom bracket.

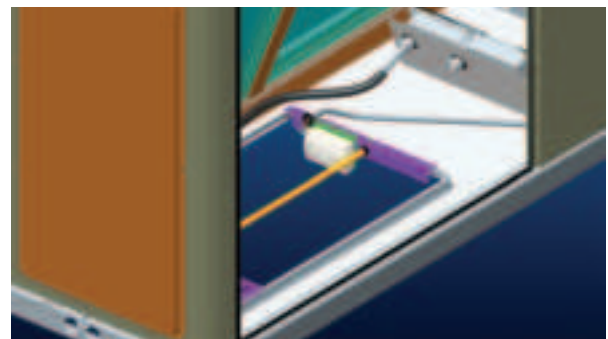
Air-Fi® Wireless Communication Interface

The factory installed wireless communications interface is installed in the downflow discharge position.

If a unit is to be converted to horizontal discharge, the following conversion must be performed:

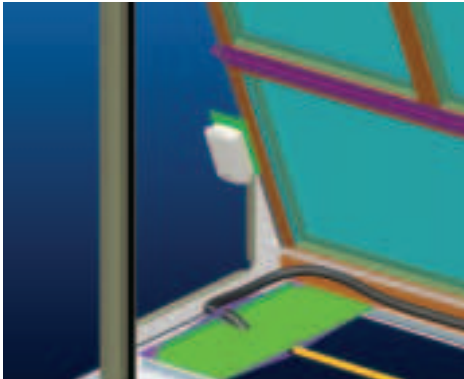
1. If the unit has an economizer, it must be pulled out in the operating position.
2. Remove the screw from the mounting bracket. Refer to downflow view for screw and bracket location.

Figure 50. Wireless communication interface - downflow



3. Mount the bracket in the horizontal discharge location. Refer to horizontal view for screw and bracket location.

Figure 51. Wireless communication interface - horizontal



Note: Cable ties must be removed to allow the cable to extend to the horizontal mounting location.

Main Electrical Power Requirements

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

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 a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

- Verify that the power supply complies with the unit nameplate specifications.

- Inspect all control panel components; tighten any loose connections.
- Connect properly sized and protected power supply wiring to a field-supplied/installed disconnect switch and to the main power terminal block (HTB1) in the unit control panel.
- Install proper grounding wires to an earth ground.

Through-the-Base Gas Installation

Important: All phases of this installation must comply with **NATIONAL, STATE, and LOCAL CODES**. In absence of local codes, the installation must conform with American National Standard-Z223.1a- National Fuel Gas Code Latest Revision.

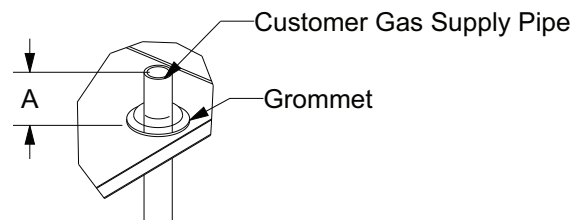
Note: For complete Gas Heat User information, Operation, Start-up, Shutdown and Maintenance refer to “[Gas Heat Operation and Maintenance](#),” p. 62.

1. Field connections are made by first removing the access panel for the heat section on the front of the unit.
2. The gas piping assembly ships inside this section and includes the shut-off valve, a pressure tap for testing, and the necessary unions for field connection. For through the base access, remove the factory-provided cap from the base pan opening. See [Figure 52](#), p. 37 and [Figure 53](#), p. 38.
3. Route field piping through this hole to the dimension shown in [Table 5](#), p. 37.
4. Place the assembly through the cabinet opening as shown in [Figure 53](#), p. 38 and [Figure 54](#), p. 38, and make the union connection to the field piping and to the gas train.

Table 5. Through-the-base gas piping dimension

Model	Dimension A (inch)
YSJ(072-150)A**(0,A) (L, M, H)	4 5/8
YSJ(180-300)A**(0,A)(L, M, H)	1 3/16

Figure 52. Through-the-base gas pipe height



DETAIL A

Figure 53. Through-the-base gas pipe assembly for YSJ(180-300)A

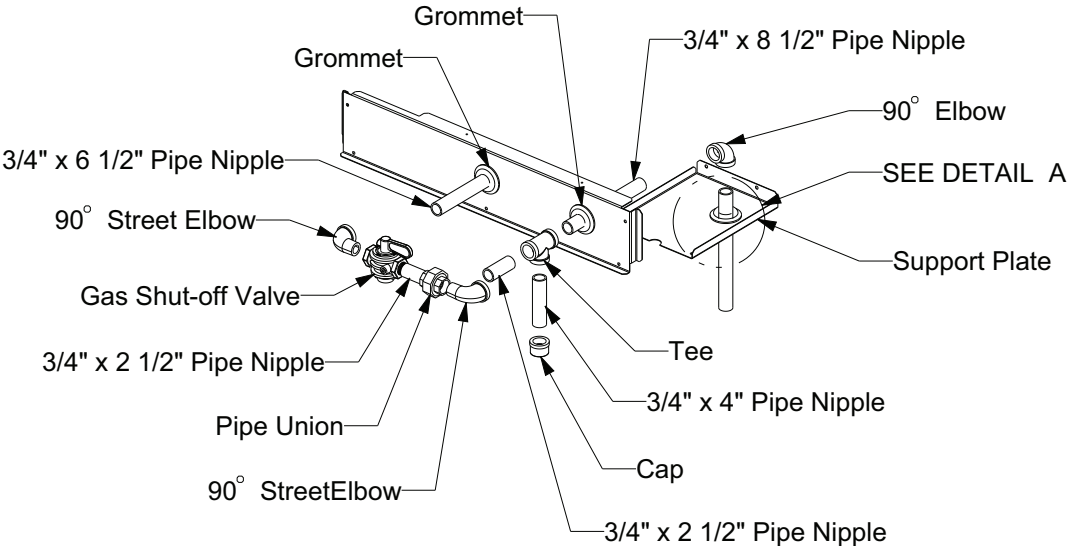
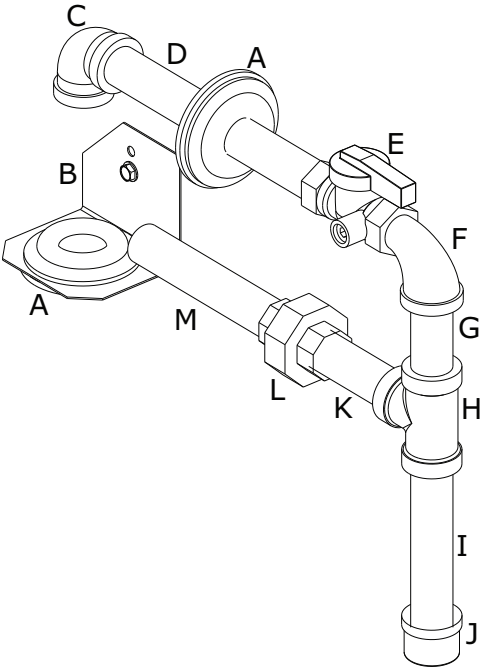


Figure 54. Through-the-base gas pipe assemblies for YSJ(072-150)A



1/2" and 3/4" Gas Pipe Connection

Table 6. Through-the-base gas pipe assembly components for YSJ(072-150)A (inch)

Component	Description	Connection Size	
		1/2 inch	3/4 inch
A	Grommets	1/2	3/4
B	TBUG bracket	-	-
C	90° Elbow	1/2	3/4

Table 6. Through-the-base gas pipe assembly components for YSJ(072-150)A (inch) (continued)

Component	Description	Connection Size	
		1/2 inch	3/4 inch
D	Pipe fitting	1/2 x 7 1/4	3/4 x 6 1/2
E	Gas ball valve	1/2	3/4
F	Street elbow	1/2	3/4
G	Pipe fitting	1/2 x 2 1/2	3/4 x 2 1/4
H	Tee pipe	1/2	3/4
I	Pipe fitting	1/2 x 4	3/4 x 4
J	Pipe cap	1/2	3/4
K	Pipe fitting	1/2 x 2 3/4	3/4 x 2
L	Pipe union	1/2	3/4
M	Pipe fitting	1/2 x 4 1/2	3/4 x 5 1/4

For detailed Through-the-Base Gas Installation instructions, refer to the *Through-the-Base Gas Piping 3 to 25 Tons Gas/Electric Packaged Units Installation Instructions* (ACC-SVN17*-EN) provided with Through-the-Base Gas Installation kit.

Requirements of Gas Heat

The unit gas train and optional through-the-base gas shut-off valve are rated at 0.50 PSIG maximum. A pressure reducing regulator is recommended to prevent this maximum from being exceeded. These components must be isolated during field gas piping test that exceed 0.50 PSIG. It is recommended that the field piping be capped prior to the unit gas train or optional through-the-base gas shut-off valve if present.

- Gas supply line properly sized and connected to the unit gas train.
- All gas piping joints properly sealed.
- Gas piping leak checked with a soap solution. If piping connections to the unit are complete, do not pressurize piping in excess of 0.50 PSIG or 14-inch W.C. to prevent component failure.
- Drip leg installed in the gas piping near the unit.
- Flue Exhaust clear of any obstruction.

Table 7. Gas heat data

	YSJ(072-150)A	YSJ(180-300)A		
Heating Input Rate — Btu/h	80,000 – 250,000	250,000	320,000	400,000
Minimum Supply Gas Pressure NG/LP (in. w.c.)	4.5/11.5	4.5/11.5		6/11.5
Maximum Supply Gas Pressure (in. w.c.)	14			
Manifold Gas Pressure – 1st Stage -NG (in. w.c.)	1.8	1.7	1.8	1.7
Manifold Gas Pressure – 2nd Stage -NG (in. w.c.)	3.5	3.3	3.5	3.3

Condensate Drain Configuration

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

An evaporator condensate drain connection is provided on each unit. Refer to the ductwork section in the Installation chapter for the appropriate drain location.

The 6 to 12.5 tons condensate drain pan is convertible. Refer to the ductwork section in the Installation chapter for the drawings. It can be converted to drain condensate out the front side of the unit or through the base.

To convert drain condensate out the front of unit:

1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit and rotate 180°.
4. Slide the condensate drain pan back into the unit, align the drain with the grommeted opening in the rear support panel and push until the coupling is seated in the grommet.
5. Replace the front support panel by aligning the panel with tabs in the raceway. Align the condensate drain

pan support in the grommeted hole as the panel is put in place.

6. Replace evaporator access panel and supply air access panels.

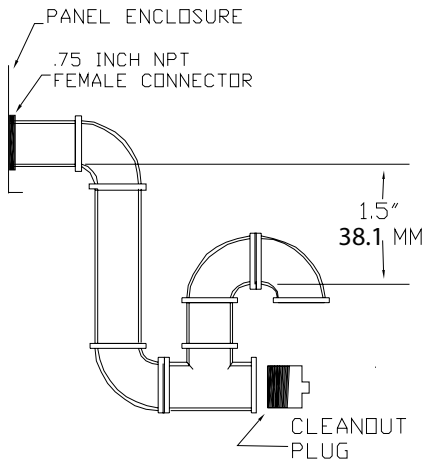
To convert drain condensate through the base of unit:

1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit.
4. Place on a level surface in the position it was removed from the unit.
5. Remove the plug knockout in the bottom of the drainpan to convert it to through the base drainage.
6. Plug the original condensate drain opening with a field supplied 3/4" NPT plug.
7. Slide the condensate drain pan back into the unit, align the drain support with the grommeted opening in the rear support panel and push until the support is seated in the grommet.
8. Replace the front support panel by aligning the panel with tabs in the raceway. Align the plugged condensate drain pan coupling in the grommeted hole as the panel is put in place.
9. Replace evaporator access panel and supply air access panels.

A condensate trap must be installed at the unit due to the drain connection being on the "negative pressure" side of the fan. Install the P-Trap using the guidelines in [Figure 55, p. 40](#).

A condensate drain line must be connected to the P-Trap. Pitch the drain lines at least 1/2 inch for every 10 feet of horizontal run to assure proper condensate flow. Do not allow the horizontal run to sag causing a possible double trap condition which could result in condensate backup due to "air lock".

Figure 55. Condensate trap installation



Note: Minimum if unit static is higher trap must be taller to drain appropriately.

Drain Pan Removal (Units with Condensate Overflow Switch Option)

Before drain pan removal, the switch wire must be disconnected from wire tie on panel and/or any tape before drain pan can be removed.

Care must be taken so the wire does not catch on the bottom of indoor coil or any protrusion.

Note: When reversing the drain pan, on some units, the condensate overflow switch will need to be moved to the second hole in its bracket to avoid contact with headers or indoor coil.

Filter Installation

The quantity of filters is determined by unit size. Refer to General Data section in . Access to the filters is obtained by removing the filter access panel.

Note: Do not operate the unit without filters.

Field Installed Power Wiring

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in **NEC** and your local/state/national electrical codes.

An overall dimensional layout for the field installed wiring entrance into the unit is illustrated in the Dimensions and

Weights chapter. To insure that the unit's supply power wiring is properly sized and installed, follow the following guidelines.

Verify that the power supply available is compatible with the unit's nameplate ratings. The available supply power must be within 10% of the rated voltage stamped on the nameplate. Use only copper conductors to connect the power supply to the unit.

NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as the equipment was not designed or qualified to accept other types of conductors.

Important: If the unit is not equipped with an optional factory installed non-fused disconnect switch or circuit breaker, a field supplied disconnect switch must be installed at or near the unit in accordance with the *National Electrical Code (NEC latest edition)*.

Main Unit Power

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in **NEC** and your local/state/national electrical codes.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Standard Wiring

1. Location of the applicable electrical service entrance is illustrated in the Dimensions and Weights chapter. Complete the unit's power wiring connections at HTB1 main power terminal block in unit control panel. Refer to the customer connection diagram that is shipped with the unit for specific termination points.

2. Provide proper grounding for the unit in accordance with local and national codes.

Optional TBUE Wiring (Through-the-Base Electrical Option)

Location of the applicable electrical service is illustrated below. Refer to the customer connection diagram that is shipped with the unit for specific termination points. The termination points, depending on the customer option selected would be a factory mounted non-fused disconnect switch (UDC) or circuit breaker (UCB). If neither a factory mounted non-fused disconnect switch (UDC) or circuit breaker (UCB) was factory mounted, field wiring connections should be terminated in the control box at main panel power terminal block (HTB1).

Provide proper grounding for the unit in accordance with local and national codes.

Notes:

- *Black gasket is shipped from the factory and is located in the literature Ship With bag in the control box. Apply black gasket around conduit plate on all four sides after installation to prevent air leakage from the building entering the electrical enclosures.*
- *Seal any unused unit penetrations and around conduit and wiring at all unit and curb penetrations.*

Field-Installed Control Wiring

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

An overall layout of the various control options available with the required number of conductors for each control device is illustrated in the wiring diagram located on main control box door.

All field wiring must conform to NEC guidelines as well as state and local codes.

Control Power Transformer

The 24 volt control power transformers are to be used only with the accessories called out in this manual.

Transformers rated greater than 50 VA are equipped with internal circuit breakers. If a circuit breaker trips, turn "Off" all power to the unit before attempting to reset it.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

The transformers are located in the control panel. The circuit breaker is located on the right side of the transformer and can be reset by pressing in on the black reset button.

Controls using 24 Vac

Before installing any connecting wiring, refer to the Dimensions and Weights chapter for the electrical access locations provided on the unit and [Table 8, p. 43](#) for AC conductor sizing guidelines, and;

1. Use copper conductors unless otherwise specified.
2. Ensure that the AC control wiring between the controls and the unit's termination point does not exceed 2.5 ohms/conductor for the length of the run

NOTICE

Component Failure!

Resistance in excess of two and a half (2.5) ohms per conductor could result in component failure due to insufficient AC voltage supply.

Do not exceed two and a half (2.5) ohms per conductor for the length of the run.

Note: Be sure to check all loads and conductors for grounds, shorts, and mis-wiring.

3. Do not run the AC low voltage wiring in the same conduit with the high voltage power wiring.
4. Route low voltage wiring per illustrations below.

Figure 56. Low voltage wiring — B cabinet

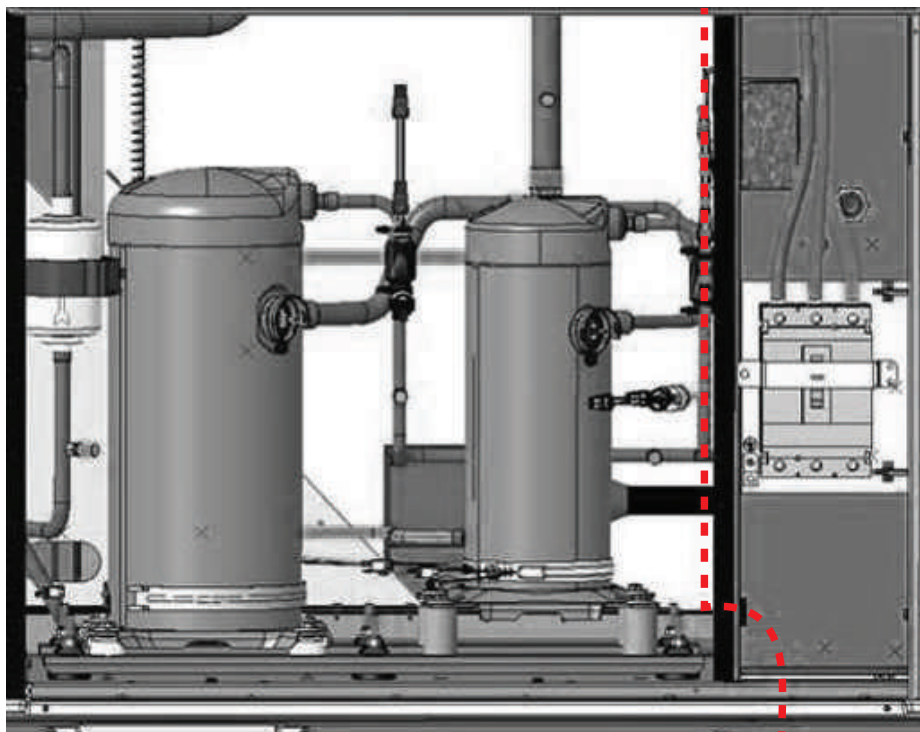


Figure 57. Low voltage wiring — C cabinet

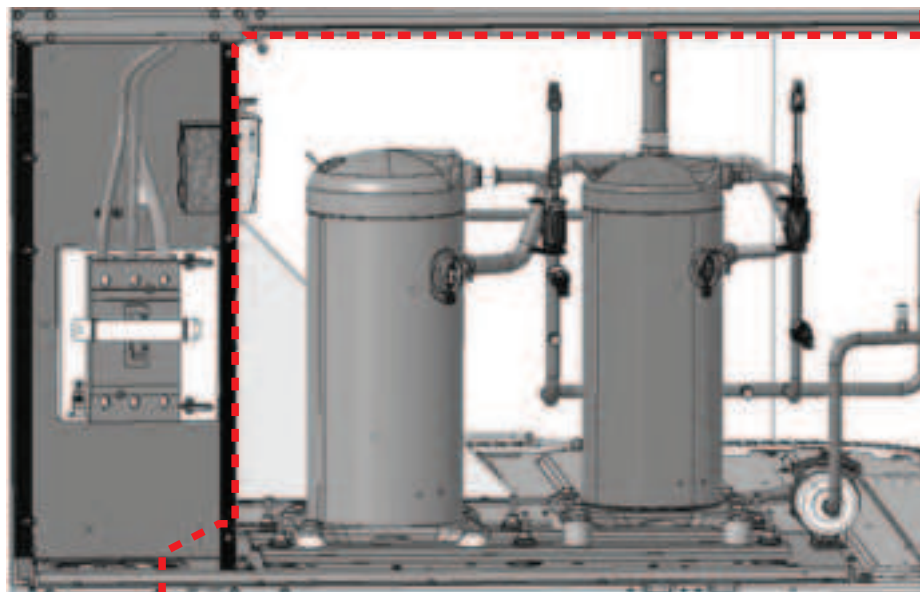


Figure 58. Low voltage wiring — D cabinet

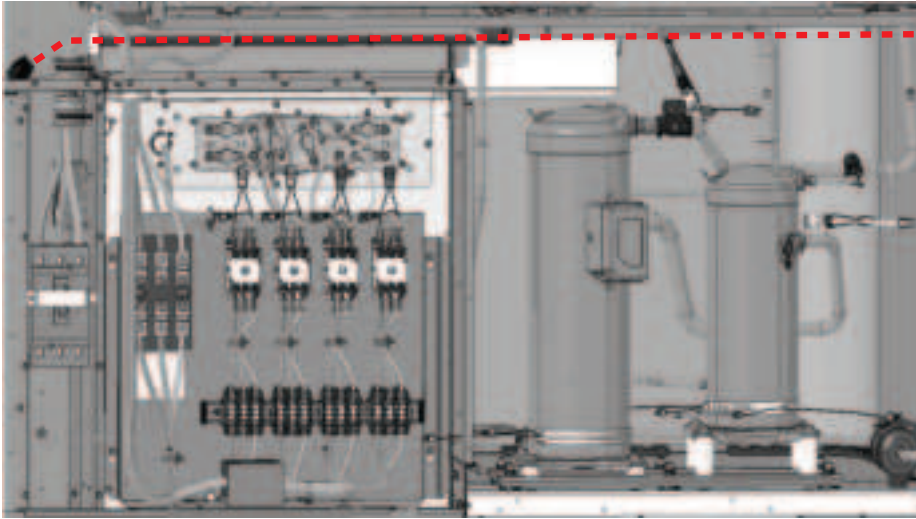


Figure 59. Main control panel low voltage wiring

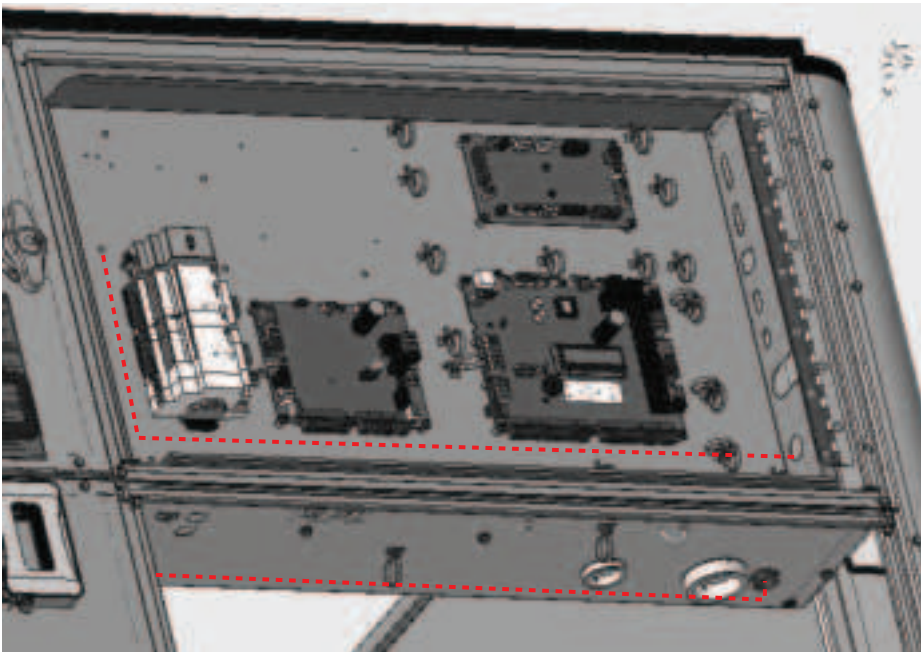


Table 8. Recommended wire lengths

Wire Size		Maximum recommended wire length from unit controller to sensor	
AWG	mm ²	Meters	Feet
22	0.33	0–46	0–150
20	0.50	47–73	151–240
18	0.75	74–117	241–385
16	1.30	118–185	386–610

Table 8. Recommended wire lengths (continued)

Wire Size		Maximum recommended wire length from unit controller to sensor	
AWG	mm ²	Meters	Feet
14	2.00	186–296	611–970

Note: The total resistance of these low voltage wires must not exceed 2.5 Ω /conductor. Any resistance greater than 2.5 Ω may cause the control to malfunction due to an excessive voltage drop.

Controls using DC Analog Input/Outputs (Standard Low Voltage Multi conductor Wire)

Before installing any connecting wiring between the unit and components utilizing a DC analog input/output signal, refer to the Dimensions and Weights chapter for the electrical access locations provided on the unit.

- Table 9, p. 44 lists the conductor sizing guidelines that must be followed when interconnecting the DC binary output devices and the system components utilizing a DC analog input/output signal to the unit.

Notes:

- Resistance in excess of 2.5 ohms per conductor can cause deviations in the accuracy of the controls.
- Ensure that the wiring between controls and the unit's termination point does not exceed two and a half (2.5) ohms/conductor for the length of the run.
- Do not run the electrical wires transporting DC signals in or around conduit housing high voltage wires.

DC Conductors

Table 9. Zone sensor module wiring

Distance from Unit to Control	Recommended Wire Size
0 - 150 feet	22 gauge
0 - 45.7 m	0.33 mm ²
151 - 240 feet	20 gauge
46 - 73.1 m	0.50 mm ²

Table 9. Zone sensor module wiring (continued)

Distance from Unit to Control	Recommended Wire Size
241 - 385 feet	18 gauge
73.5 - 117.3 m	0.75 mm ²
386 - 610 feet	16 gauge
117.7 - 185.9 m	1.3 mm ²
611 - 970 feet	14 gauge
186.2 - 295.7 m	0.2 mm ²

Note: See Symbio™ 700 unit controls schematic, 1213-4349, for controls wiring.

Space Temperature Averaging

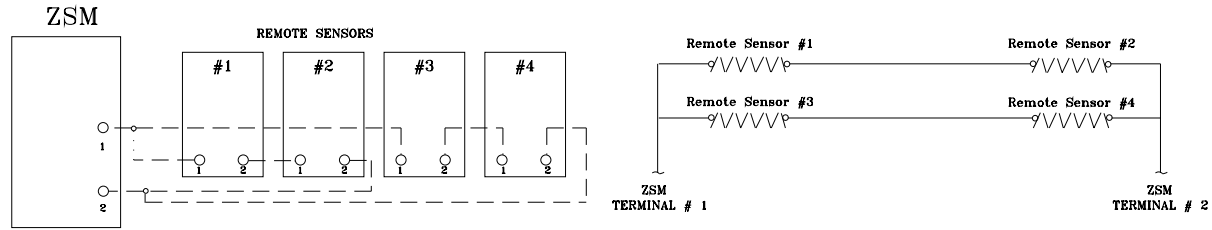
Space temperature averaging is accomplished by wiring a number of remote sensors in a series/parallel circuit.

Using the BAYSENS016* or BAYSENS077*, at least four sensors are required to accomplish space temperature averaging.

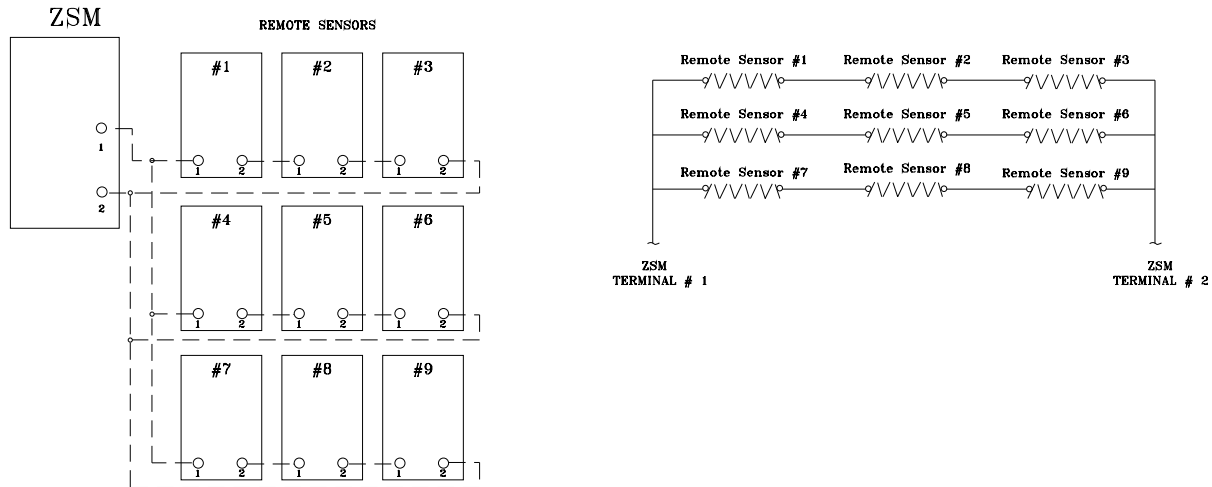
- Example #1 illustrates two series circuits with two sensors in each circuit wired in parallel. The square of any number of remote sensors is required.
- Example #2 illustrates three sensors squared in a series/parallel circuit. Using BAYSENS077*, two sensors are required to accomplish space temperature averaging.
- Example #3 illustrates the circuit required for this sensor. lists the temperature versus resistance coefficient for all sensors.

Figure 60. Examples

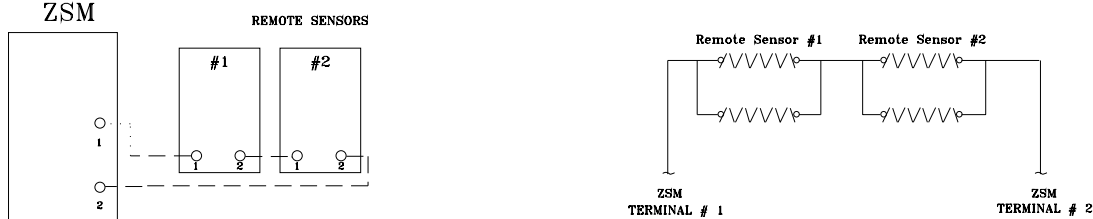
EXAMPLE #1



EXAMPLE #2



EXAMPLE #3



Note: Wiring pin numbers are for reference only. There are multiple smoke detector systems that could have differently numbered pins. For correct wiring details, please refer to the specific smoke detector literature that accompanied this unit.

Table 10. Temperature vs. resistance

Temperature		Nominal Resistance (kOhms)
Degrees °F	Degrees °C	
-20	-28.9	170.1
-15	-26.1	143.5
-10	-23.3	121.4
-5	-20.6	103.0
0	-17.8	87.56

Table 10. Temperature vs. resistance (continued)

Temperature		Nominal Resistance (kOhms)
Degrees °F	Degrees °C	
5	-15.0	74.65
10	-12.2	63.80
15	-9.4	54.66
20	-6.7	46.94
25	-3.8	40.40
30	-1.1	34.85
35	1.7	30.18
40°	4.4	26.22
45°	7.2	22.85

Table 10. Temperature vs. resistance (continued)

Temperature		Nominal Resistance (kOhms)
Degrees °F	Degrees °C	
50°	10.0	19.96
55°	12.8	17.47
60°	15.6	15.33
65°	18.3	13.4
70°	21.1	11.89
75°	23.9	10.50
80°	26.7	9.297
85°	29.4	8.247
90°	32.2	7.330
95°	35.0	6.528

Table 11. Sizing natural gas pipe mains and branches

Length of Pipe (Ft.)	Iron Pipe Size (IPS) Inches				
	½" Pipe	¾" Pipe	1" Pipe	1¼" Pipe	1½" Pipe
15	76	176	345	750	1220
30	52	120	241	535	850
45	43	99	199	435	700
60	38	86	173	380	610
75	-	77	155	345	545

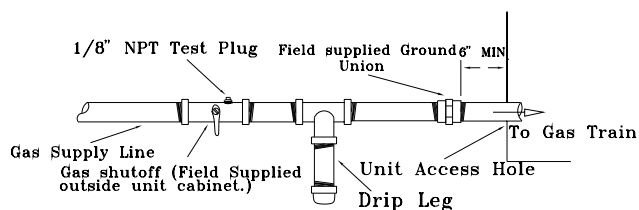
Note: Capacity of Pipe of Different Diameters and Lengths in Cu. Meter Per Hr. with Pressure Drop of 74.6 Pa and Specific Gravity of 0.60.

Table 12. Iron pipe size (SI) millimeters

Length of Pipe (Meters)	Iron Pipe Size (SI) Millimeters				
	15 mm Pipe	20 mm Pipe	25 mm Pipe	32 mm Pipe	40 mm Pipe
4.6	2.15	4.98	9.76	21.23	34.54
9.1	1.47	3.39	6.82	15.14	24.06
13.7	1.21	2.80	5.63	12.31	19.82
18.3	1.07	2.43	4.89	10.76	17.27
22.9	—	2.18	4.38	9.76	15.40

Note: Capacity of Pipe of Different Diameters and Lengths in Cu. Meter Per Hr. with Pressure Drop of 74.6 Pa and Specific Gravity of 0.60.

Figure 61. Schematic diagram for field gas piping to Units



Pre-Start

Use the checklist provided below in conjunction with the “General Unit Requirements” checklist to ensure that the unit is properly installed and ready for operation.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

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. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

- Check all electrical connections for tightness and “point of termination” accuracy.
- Verify that the condenser airflow will be unobstructed.

⚠ WARNING

Rotating Components!

Failure to disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury.

During installation, testing, servicing and troubleshooting of this product it may be necessary to work with live and exposed rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks.

- Verify that the condenser fan and indoor blower turn freely without rubbing and are properly tightened on the shafts.
- Verify that a condensate trap is installed and the piping is properly sized and pitched.
- Verify that the correct size and number of filters are in place.
- Inspect the interior of the unit for tools and debris and install all panels in preparation for starting the unit.

Voltage Imbalance

Three phase electrical power to the unit must meet stringent requirements for the unit to operate properly.

Measure each leg (phase-to-phase) of the power supply. Each reading must fall within the utilization range stamped on the unit nameplate. If any of the readings do not fall within the proper tolerances, notify the power company to correct this situation before operating the unit.

Excessive three phase voltage imbalance between phases will cause motors to overheat and eventually fail. The maximum allowable voltage imbalance is 2 percent. Measure and record the voltage between phases 1, 2, and 3 and calculate the amount of imbalance as follows:

$$\% \text{ Voltage Imbalance} = \frac{100 \times AV - VD}{AV} \text{ where;}$$

$$AV \text{ (Average Voltage)} = \frac{\text{Volt1} + \text{Volt2} + \text{Volt3}}{3}$$

- V1, V2, V3 = Line Voltage Readings
- VD = Line Voltage reading that deviates the farthest from the average voltage.

Example: If the voltage readings of the supply power measured 221, 230, and 227, the average volts would be:

$$\frac{221 + 230 + 221}{3} = 226 \text{ Avg.}$$

VD (reading farthest from average) = 221

The percentage of Imbalance equals:

$$\frac{100 + 226 + 221}{226} = 2.2\%$$

The 2.2 percent imbalance in this example exceeds the maximum allowable imbalance of 2.0 percent. This much imbalance between phases can equal as much as a 20 percent current imbalance with a resulting increase in motor winding temperatures that will decrease motor life. If the voltage imbalance is over 2 percent, notify the proper agencies to correct the voltage problem before operating this equipment.

Electrical Phasing (Three Phase Motors)

The compressor motor(s) and the supply fan motor are internally connected for the proper rotation when the incoming power supply is phased as A, B, C.

Proper electrical supply phasing can be quickly determined and corrected before starting the unit by using an instrument such as an Associated Research Model 45 Phase Sequence Indicator and following the steps below:

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

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. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

1. Turn the field supplied disconnect switch that provides power to the main power terminal block or to the "Line" side of the optional factory mounted disconnect switch to the "Off" position.
2. Connect the phase sequence indicator leads to the terminal block or to the "Line" side of the optional factory mounted disconnect switch as follows;
 - Brown (phase A) to L1
 - Orange (phase B) to L2
 - Yellow (phase C) to L3
3. Close the field supplied main power disconnect switch or circuit protector switch that provides the supply power to the unit.

Note: Upon closing main power disconnect and the unit mounted disconnect switch or circuit breaker, the phase monitor will verify proper phasing. If LED on face of the monitor is red, correct supply power fault.

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is 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.

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.

4. Observe the ABC and CBA phase indicator lights on the face of the sequencer. The ABC indicator light will glow if the phase is ABC. If the CBA indicator light glows, open the disconnect switch or circuit protection switch and reverse any two power wires.
5. Restore the main electrical power and recheck the phasing. If the phasing is correct, open the disconnect switch or circuit protection switch and remove the phase sequence indicator.

Compressor Crankcase Heaters

Each compressor can be equipped with a crankcase heater (On some units the crankcase heater comes standard).

The proper operation of the crankcase heater is important to maintain an elevated compressor oil temperature during the "Off" cycle to reduce oil foaming during compressor starts.

Oil foaming occurs when refrigerant condenses in the compressor and mixes with the oil. In lower ambient conditions, refrigerant migration to the compressor could increase.

When the compressor starts, the sudden reduction in crankcase pressure causes the liquid refrigerant to boil rapidly causing the oil to foam. This condition could damage compressor bearings due to reduced lubrication and could cause compressor mechanical failures.

Before starting the unit in the "Cooling" mode, set the system switch to the "Off" position and turn the main power disconnect to the "On" position and allow the crankcase heater to operate a minimum of 8 hours.

Before closing the main power disconnect switch, insure that the "System" selection switch is in the "Off" position and the "Fan" selection switch is in the "Auto" position.

Close the main power disconnect switch and the unit mounted disconnect switch, if applicable.

Note: Upon closing main power disconnect and the unit mounted disconnect switch or circuit breaker, the phase monitor will verify proper phasing. If LED on face of the monitor is red, correct supply power fault.

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is 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.

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.

Symbio Controls

The Symbio™ 700 supports a Service Test Mode that can be used to energize the various components of the system, either to support general system startup tasks or to support troubleshooting. The user can initiate Service Test Mode through the controller user interfaces, including the Symbio Service and Installation mobile application.

The modes shown below can be initiated. Depending on the equipment configuration, the controller will energize the

appropriate outputs. A user-selected timeout value will determine how long the controller will remain in any given state once initiated. For detailed information on how each Service Test State is interpreted based on the equipment's

configuration, see ACC-APG002*-EN, Symbio™ 700 for Precedent Packaged Rooftop Air-Conditioners Application Guide.

Figure 62. Symbio 700 service test mode



Unit Start-Up

Sequence of Operation

See ACC-APG002*-EN, Application Guide, Symbio™ 700 Controller with Precedent™ Packaged Rooftop Air-Conditioners.

Ignition Module

Two-stage (IGN) runs self-check (including verification that the gas valve is de-energized). (IGN) checks the high limit switches (TC01 and TC02) for normally closed contacts, the pressure switch (PS) for normally open contacts, and the flame rollout (FR) switch for continuity.

(IGN) energizes inducer blower on high speed to check pressure switch closure. If the pressure switch is closed, the inducer blower starts a 20 second pre-purge (15 seconds on high speed followed by 5 seconds on low speed). If the pressure switch (PS) is still open, the inducer blower will continue to be energized on high speed until pressure switch closure.

After pre-purge completes, the IGN energizes the first stage gas output for first stage heat demand and energizes second stage gas output for second stage heat and detects flame and de-energizes spark.

At this point indoor fan would start with its minimum speed for the corresponding heat (first stage or second stage) demand.

The (IGN) enters a normal operating loop where all inputs are continuously monitored.

If a call for second stage heat is initiated after a call for first stage heat is established, the (IGN) energizes the second stage of the gas valve and the second stage of inducer blower.

When the zone thermostat is satisfied, the (IGN) de-energizes the gas valve. The (IGN) senses loss of flame.

The (IGN) initiates a 5 second inducer blower post purge. The Symbio 700 initiates a 90 second indoor blower delay off at current speed. The (IGN) de-energizes the inducer blower at the end of the post purge. The Symbio 700 de-energizes the indoor blower at the end of the selected indoor blower delay off

Note: For complete Gas Heat User information, Operation, Start-up, Shutdown and Maintenance refer to “Gas Heat Operation and Maintenance,” p. 62.

Table 13. Ignition module diagnostics

Steady OFF	No Power/Failure/ Internal Failure
Steady ON	Normal – No Call for heat
Slow Flash Rate	Normal, call for heat (¾ second on, ¼ second off)
1 Flash	Loss of Communication

Table 13. Ignition module diagnostics (continued)

2 Flashes	System Lockout: Failed to detect or sustain flame. (failure to ignite, no spark, low/no gas pressure, etc.)
3 Flashes	Pressure switch problem detected. (no vent air flow, bad CBM, closed at initial call for heat). Auto reset.
4 Flashes	High Limit switch protection device open (excessive heat in combustion chamber, low airflow). Auto reset.
5 Flashes	Flame sensed and gas valve not energized, or flame sensed and no call for heat.
6 Flashes	Flame Rollout Switch open. (CBM failure, incorrect gas pressure, incorrect primary air). Requires manual reset of the switch.
7 Flashes	Weak Flame
8 Flashes	Internal Error
9 Flashes	Hardware Mismatch

Return Air Smoke Detector

The return air smoke detector is designed to shut off the unit if smoke is sensed in the return air stream. Sampling the airflow entering the unit at the return air opening performs this function.

In order for the smoke detector to properly sense smoke in the return air stream, the air velocity entering the unit must be between 500 and 4000 feet per minute. Equipment covered in this manual will develop an airflow velocity that falls within these limits over the entire airflow range specified in the evaporator fan performance tables.

Compressor Start-Up

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is 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.

1. Attach a set of service gauges onto the suction and discharge gauge ports for each circuit.

Proceed to the next Service Test step if continuing from previous component start-up or until the desired start-up component test is started.

2. After the compressor and condenser fan have started

and operated for approximately 30 minutes, observe the operating pressures. Compare the operating pressures to the label on the access panel.

3. Check system superheat. Follow the instruction listed on the superheat charging curve in the Service Facts. Superheat should be within $\pm 5^{\circ}\text{F}$ of the superheat chart value.
4. Repeat steps 1 through 4 for each refrigerant circuit.
5. To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure. Remove electromechanical test mode connections (if applicable).

Hot Gas Reheat

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is 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.

Set the unit to Service Test step Reheat. Once the unit is in the reheat test mode, verify that the 3 way valve has shifted to the reheat position and that the supply temperature rises 10°F more than when in cooling mode stage 2.

Monitor the suction pressure for 15 minutes. The suction pressure should remain within 5 psi of normal cooling operation. If the unit has a 2 speed outdoor fan and if the outdoor air temperature is below 70°F , verify that the OD fan is in low speed.

1. Clamp an amp meter around one of 1st stage heater power wires at the heater contactor.
2. Using the Service Test Guide in [Figure 62, p. 49](#), continue the SERVICE TEST start-up procedure for each compressor circuit.

Select the next desired Service Test Mode if continuing from previous component start up or exit Service Test if complete.

Gas Heat Units

Open the main disconnect switch to shut the unit off and to reset the RTRM.

Follow the Test Guide in [Figure 62, p. 49](#) to start the unit in the heating mode. Momentarily jump across the Test 1 and Test 2 terminals on LTB1 one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

When starting the unit for the first time or servicing the heaters, it is a good practice to start the heater with the main gas supply turned "Off".

Once the ignition system and components have been checked, open the main power disconnect switch to reset the unit.

Final System Setup

After completing all of the pre-start and startup procedures outlined in the previous sections (i.e., operating the unit in each of its modes through all available stages of cooling and heating), perform these final checks before leaving the unit:

- Program the Night Setback (NSB) panel (if applicable) for proper unoccupied operation. Refer to the programming instructions for the specific panel.
- Verify that the Remote panel "System" selection switch, "Fan" selection switch, and "Zone Temperature" settings for automatic operation are correct.
- Inspect the unit for misplaced tools, hardware, and debris.
- Verify that all exterior panels including the control panel doors and condenser grilles are secured in place.
- Close the main disconnect switch or circuit protector switch that provides the supply power to the unit's terminal block or the unit mounted disconnect switch.

⚠ WARNING

Safety Alert!

Failure to follow instructions below could result in death or serious injury.

In addition to the following tasks, you MUST:

- **Follow all instructions in the unit's *Installation, Operation, and Maintenance* manual, including warnings, cautions, and notices.**
- **Perform all required tasks in any applicable Service Alerts and Service Bulletins.**
- **Review and understand all information provided in Submittals and Design Specifications.**

Maintenance

⚠ WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, **MUST** follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

Monthly Maintenance

Before completing the following checks, turn the unit OFF and lock the main power disconnect switch open.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Filters

Inspect the return air filters. Clean or replace them if necessary.

Return Air Smoke Detector Maintenance

Airflow through the unit is affected by the amount of dirt and debris accumulated on the indoor coil and filters. To insure that airflow through the unit is adequate for proper sampling by the return air smoke detector, complete adherence to the maintenance procedures, including recommended intervals between filter changes, and coil cleaning is required.

Periodic checks and maintenance procedures must be performed on the smoke detector to insure that it will function properly. For detailed instructions concerning these checks and procedures, refer to the appropriate section(s) of the smoke detector Installation and Maintenance Instructions provided with the literature package for this unit.

Condensate Overflow Switch

During maintenance, the switch float (black ring) must be checked to ensure free movement up and down.

Cooling Season

- Check the unit's drain pans and condensate piping to ensure that there are no blockages.
- Inspect the evaporator and condenser coils for dirt, bent fins, etc. If the coils appear dirty, clean them according to the instructions described in "Coil Cleaning" later in this section.
- Manually rotate the condenser fans to ensure free movement and check motor bearings for wear. Verify that all of the fan mounting hardware is tight.
- Inspect the F/A-R/A damper hinges and pins to ensure that all moving parts are securely mounted. Keep the blades clean as necessary.
- Verify that all damper linkages move freely; lubricate with white grease, if necessary.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Verify that all wire terminal connections are tight.
- Remove any corrosion present on the exterior surfaces of the unit and repaint these areas.
- Generally inspect the unit for unusual conditions (e.g., loose access panels, leaking piping connections, etc.)
- Make sure that all retaining screws are reinstalled in the unit access panels once these checks are complete.
- With the unit running, check and record the following:
 - ambient temperature
 - compressor suction and discharge pressures (each circuit)
 - superheat (each circuit)

Record this data on an "operator's maintenance log" like the one shown in [Table 15, p. 54](#). If the operating pressures indicate a refrigerant shortage, measure the system superheat. For guidelines, see "[Compressor Start-Up](#)," [p. 50](#).

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.*

Heating Season

- Inspect the unit's air filters. If necessary, clean or replace them.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Inspect both the main unit control panel and heat section control box for loose electrical components and

terminal connections, as well as damaged wire insulation. Make any necessary repairs.

- Verify that the electric heat system operates properly.

Coil Cleaning

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

- Compressor head pressure and amperage draw
- Evaporator water carryover
- Fan brake horsepower
- Due to increase static pressure losses
- Airflow reduction

⚠ WARNING

Hazardous Chemicals!

Failure to follow this safety precaution could result in death or serious injury. Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin or eyes occurs.

Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.

At least once each year, or more often if the unit is located in a "dirty" environment, clean the condenser coils using the instructions outlined below. Be sure to follow these instructions as closely as possible to avoid damaging the coils.

Note: For units equipped with hail guards follow removal procedure listed below.

Hail Guard Removal

- Remove shipping screws (ones without washers).
- Lift hail guards up so screws with washers go to top of keyhole.
- Remove hailguard by sliding washer head screw through keyhole.

To clean refrigerant coils, use a soft brush and a sprayer (either a garden pump-up type or a high-pressure sprayer). A high-quality detergent is also required; suggested brands include "SPREX A.C.", "OAKITE 161", "OAKITE 166" and "COILOX". If the detergent selected is strongly alkaline (ph value exceeds 8.5), add an inhibitor.

Microchannel (MCHE) Coils

NOTICE

Coil Damage!

Failure to follow instructions below could result in coil damage.

DO NOT use any detergents with microchannel condenser coils.

Use pressurized water or air ONLY, with pressure no greater than 600psi.

For additional information regarding the proper microchannel coil cleaning procedure, refer to RT-SVB83*-EN

Due to the soft material and thin walls of the MCHE coils, the traditional field maintenance method recommended for Round Tube Plate Fin (RTPF) coils does not apply to microchannel coils. Moreover, chemical cleaners are a risk factor to MCHE due to the material of the coil. The manufacturer does not recommend the use of chemical cleaners to clean microchannel coils. Using chemical cleaners could lead to warranty claims being further evaluated for validity and failure analysis.

The recommended cleaning method for microchannel condenser coils is pressurized water or air with a non-pinpoint nozzle and an ECU of at least 180 with pressure no greater than 600 psi. To minimize the risk of coil damage, approach the cleaning of the coil with the pressure washer aimed perpendicular to the face of the coil during cleaning.

Note: For more details on microchannel coil cleaning, please refer to bulletin RT-SVB83*-EN.

Hail Guard Reinstallation

Reinstall hail guards by aligning the keyholes over the washer screw heads, and slide into place. If your installation requires seismic or special wind load compliance, reinstall shipping screws.

Hot Gas Reheat Additional Oil

NOTICE

Compressor Damage!

Use of incorrect refrigerant and oil could result in compressor damage and improper unit operation.

Use only refrigerant and oil specified on the unit nameplate.

Additional refrigerant oil has been added in the factory for all Hot Gas Reheat units. If major components (MCHE coil, valve assembly, etc.) are replaced or serviced, the following steps must be taken:

1. Measure the amount of oil removed during servicing.
2. When recharging the unit after servicing, replace the amount of oil removed, as measured in step 1. Verify oil added is the correct type.

3. For compressor replacements and/or additional questions, contact Technical Support.

Annual Maintenance

Clean and repaint any corroded surface.

Table 14. Unit data log

Complete Unit Model Number	
Unit Serial Number	
Wiring Diagram Numbers (from unit control panel)	
Connections	
Schematics	

Final Process

For future reference, record the unit data below in the blanks provided.

Table 15. Sample maintenance log

Date	Current Ambient Temp F/C	Refrigerant Circuit #1						Refrigerant Circuit #2					
		Compr. Oil Level	Suct. Press. Psig/ kPa	Disch. Press Psig/ kPa	Liquid Press Psig/ kPa	Super-heat F/ C	Sub-cool F/C	Compr. Oil Level	Suct. Press. Psig/ kPa	Disch. Press Psig/ kPa	Liquid Press Psig/ kPa	Super-heat F/ C	Sub-cool F/C
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					

Note: Check and record the data requested above each month during the cooling season with the unit running.

Troubleshooting

Refer to the *Symbio™ 700 Controller with Precedent™ Packaged Rooftop Air-Conditioners Application Guide* (ACC-APG002*-EN).

Wiring Diagrams

Note: Wiring diagrams can be accessed using e-Library by entering the diagram number in the literature order

number search field or by contacting technical support.

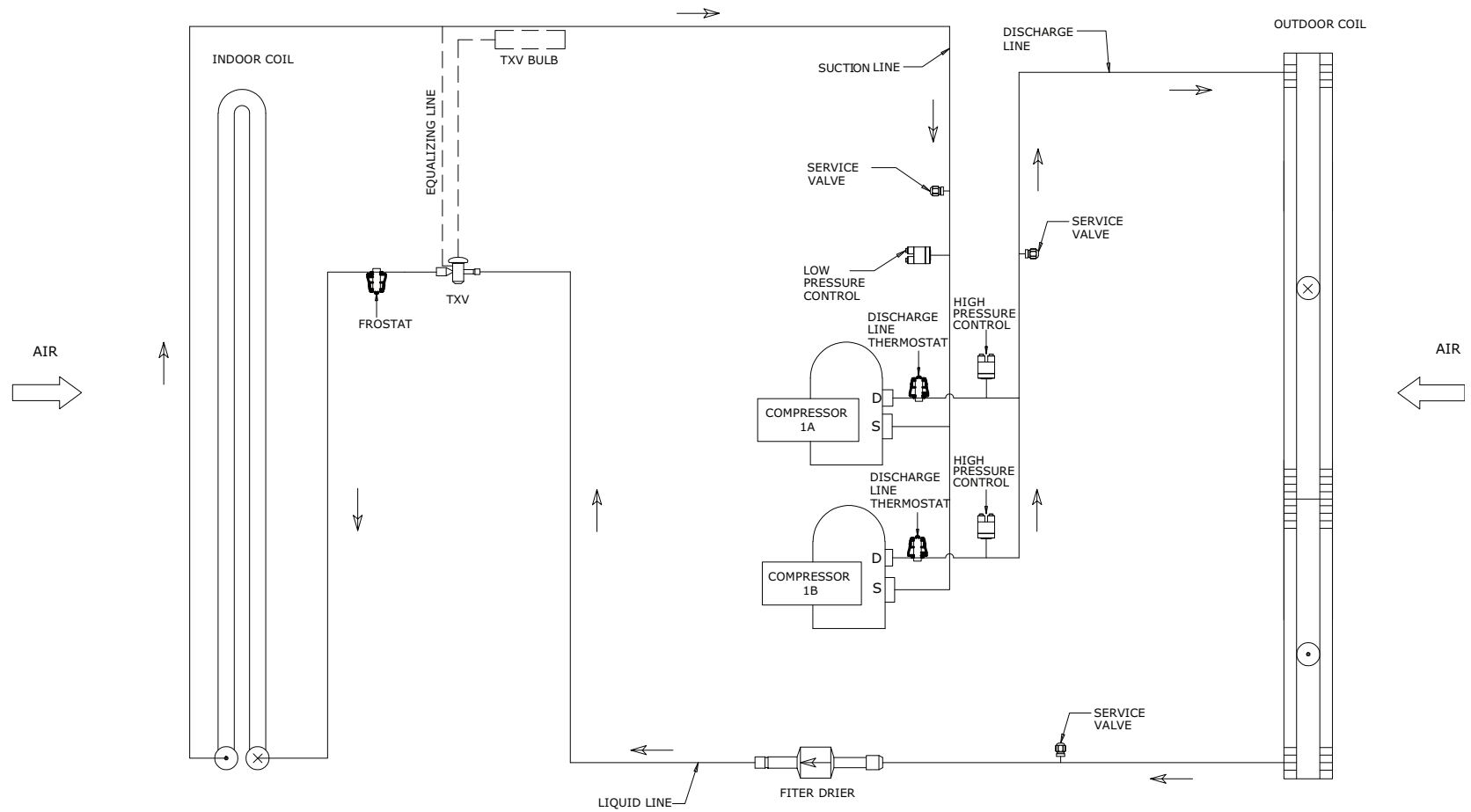
Table 16. Wiring diagrams

Schematic Type	Controls	Voltage	Drawing Number	Description
Main Unit	Symbio 700	All	12134333	SCHEMATIC; SHEET 1, POWER, DUAL COMPRESSOR, SINGLE CONDENSER FAN, STD SCCR
Main Unit	Symbio 700	All	12134334	SCHEMATIC; SHEET 1, POWER, DUAL COMPRESSOR, DUAL CONDENSER FAN, STD SCCR
Main Unit	Symbio 700	All	12134335	SCHEMATIC; SHEET 1, POWER, DUAL COMPRESSOR, SINGLE CONDENSER FAN, HIGH SCCR
Main Unit	Symbio 700	All	12134336	SCHEMATIC; SHEET 1, POWER, DUAL COMPRESSOR, DUAL CONDENSER FAN, HIGH SCCR
Main Unit	Symbio 700	All	12134337	SCHEMATIC; SHEET 2, POWER, SINGLE INDOOR FAN, COOLING ONLY/ ELECTRIC HEAT, STD SCCR
Main Unit	Symbio 700	230V	12134338	SCHEMATIC; SHEET 2, POWER, SINGLE INDOOR FAN, 2-STAGE GAS HEAT, 230V, STD SCCR
Main Unit	Symbio 700	460V/575V	12134339	SCHEMATIC; SHEET 2, POWER, SINGLE INDOOR FAN, 2-STAGE GAS HEAT, 460V/575V, STD SCCR
Main Unit	Symbio 700	All	12134340	SCHEMATIC; SHEET 2, POWER, DUAL INDOOR FAN, COOLING ONLY/ ELECTRIC HEAT, STD SCCR
Main Unit	Symbio 700	230V	12134341	SCHEMATIC; SHEET 2, POWER, DUAL INDOOR FAN, 2-STAGE GAS HEAT, 230V, STD SCCR
Main Unit	Symbio 700	460V/575V	12134342	SCHEMATIC; SHEET 2, POWER, DUAL INDOOR FAN, 2-STAGE GAS HEAT, 460V/575V, STD SCCR
Main Unit	Symbio 700	All	12134343	SCHEMATIC; SHEET 2, POWER, SINGLE INDOOR FAN, COOLING ONLY/ ELECTRIC HEAT, HIGH SCCR
Main Unit	Symbio 700	230V	12134344	SCHEMATIC; SHEET 2, POWER, SINGLE INDOOR FAN, 2-STAGE GAS HEAT, 230V, HIGH SCCR
Main Unit	Symbio 700	460V/575V	12134345	SCHEMATIC; SHEET 2, POWER, SINGLE INDOOR FAN, 2-STAGE GAS HEAT, 460V/575V, HIGH SCCR
Main Unit	Symbio 700	All	12134346	SCHEMATIC; SHEET 2, POWER, DUAL INDOOR FAN, COOLING ONLY/ ELECTRIC HEAT, HIGH SCCR
Main Unit	Symbio 700	230V	12134347	SCHEMATIC; SHEET 2, POWER, DUAL INDOOR FAN, 2-STAGE GAS HEAT, 230V, HIGH SCCR
Main Unit	Symbio 700	460V/575V	12134348	SCHEMATIC; SHEET 2, POWER, DUAL INDOOR FAN, 2-STAGE GAS HEAT, 460V/575V, HIGH SCCR
Main Unit	Symbio 700	All	12134349	SCHEMATIC; SHEET 3, CONTROLS, SYMBIO 700 UNIT CONTROLS
Main Unit	Symbio 700	All	12134538	SCHEMATIC; SHEET 3, CONTROLS, SYMBIO 700 UNIT CONTROLS, HEAT PUMP
Main Unit	Symbio 700	All	12134443	SCHEMATIC; SHEET 4, CONTROLS, ADAPTER BOARD UNIT CONTROLS, DUAL COMPRESSOR, SINGLE FAN
Main Unit	Symbio 700	All	12134444	SCHEMATIC; SHEET 4, CONTROLS, ADAPTER BOARD UNIT CONTROLS, DUAL COMPRESSOR, DUAL FAN
Main Unit	Symbio 700	All	12134445	SCHEMATIC; SHEET 5, CONTROLS, INDOOR OPTIONS
Main Unit	Symbio 700	All	12134438	SCHEMATIC; SHEET 6, CONTROLS, FRESH AIR OPTIONS
Main Unit	Symbio 700	All	12134446	SCHEMATIC; SHEET 7, CONTROLS, CUSTOMER CONNECTION OPTIONS

Table 16. Wiring diagrams (continued)

Schematic Type	Controls	Voltage	Drawing Number	Description
Main Unit	Symbio 700	All	12134447	SCHEMATIC; SHEET 8, CONTROLS, STEPPER MOTOR CONTROLLER
Main Unit	Symbio 700	All	12134448	SCHEMATIC; SHEET 9, CONTROLS, XM30/XM32 EXPANSION MODULES
Main Unit	Symbio 700	All	X39004322	LABEL; FUSE TABLE
Component Location	Symbio 700	All	12134449	DIAGRAM; COMPONENT LOCATION, COOLING/ELECTRIC, B CABINET
Component Location	Symbio 700	All	12134450	DIAGRAM; COMPONENT LOCATION, GAS, B CABINET
Component Location	Symbio 700	All	12134451	DIAGRAM; COMPONENT LOCATION, COOLING/ELECTRIC, C CABINET
Component Location	Symbio 700	All	12134452	DIAGRAM; COMPONENT LOCATION, GAS, C CABINET
Component Location	Symbio 700	All	12134453	DIAGRAM; COMPONENT LOCATION, COOLING/ELECTRIC, D CABINET
Component Location	Symbio 700	All	12134454	DIAGRAM; COMPONENT LOCATION, GAS, D CABINET
Component Location	Symbio 700	All	12134539	DIAGRAM; COMPONENT LOCATION, COOLING/ELECTRIC, D CABINET, HEAT PUMP
Component Location	Symbio 700	All	12134540	DIAGRAM; COMPONENT LOCATION, GAS, D CABINET, DUAL FUEL
Electric Heat	Symbio 700	230V	12134301	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 9 & 18 KW 240V
Electric Heat	Symbio 700	230V	12134302	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 27 & 36 KW 240V
Electric Heat	Symbio 700	230V	12134303	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 54 KW 240V
Electric Heat	Symbio 700	460V/575V	12134304	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 9 & 18 KW 460V/575V
Electric Heat	Symbio 700	460V/575V	12134305	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 27 & 36 KW 460V/575V
Electric Heat	Symbio 700	460V/575V	12134306	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 54 KW 460V/575V
Electric Heat	Symbio 700	230V	12134307	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 18 KW 240V
Electric Heat	Symbio 700	230V	12134308	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 36 KW 240V
Electric Heat	Symbio 700	230V	12134309	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 54 & 72 KW 240V
Electric Heat	Symbio 700	460V/575V	12134310	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 18 KW 460V/575V
Electric Heat	Symbio 700	460V/575V	12134311	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 36 KW 460V/575V
Electric Heat	Symbio 700	460V/575V	12134312	SCHEMATIC; SHEET 1, ELECTRIC HEAT - 54 & 72 KW 460V/575V
Electric Heat	Symbio 700	All	X39004311	LABEL; FUSE REPLACEMENT, ELECTRIC HEAT, 300V/600V
Supplimental	Symbio 700	All	12134327	DIAGRAM; POWER EXHAUST
Supplimental	Symbio 700	All	12134461	DIAGRAM; SCHEMATIC - CONVENIENCE OUTLET OPTION
Supplimental	Symbio 700	All	12134352	LABEL; DIAGRAM, LOW AMBIENT
Main Unit	Symbio 700	All	12134719	SCHEMATIC; SHEET 1, POWER, DUAL COMPRESSOR, SINGLE CONDENSER FAN, STD SCCR, WITH SUPPLY VFD
Main Unit	Symbio 700	230V	12134721	SCHEMATIC; SHEET 2, POWER, SINGLE INDOOR FAN, 2-STAGE GAS HEAT, 230V, WITH SUPPLY VFD
Main Unit	Symbio 700	460V	12134722	SCHEMATIC; SHEET 2, POWER, SINGLE INDOOR FAN, 2-STAGE GAS HEAT, 460V, WITH SUPPLY VFD
Component Location	Symbio 700	All	12134724	DIAGRAM; COMPONENT LOCATION, GAS, B CABINET, WITH SUPPLY VFD

Figure 63. Piping diagram – 6 to 12.5 tons standard efficiency (YSJ072–150)



Piping Diagrams

Figure 64. Piping diagram – 6 to 12.5 tons standard efficiency – hot gas reheat (YSJ072–150)

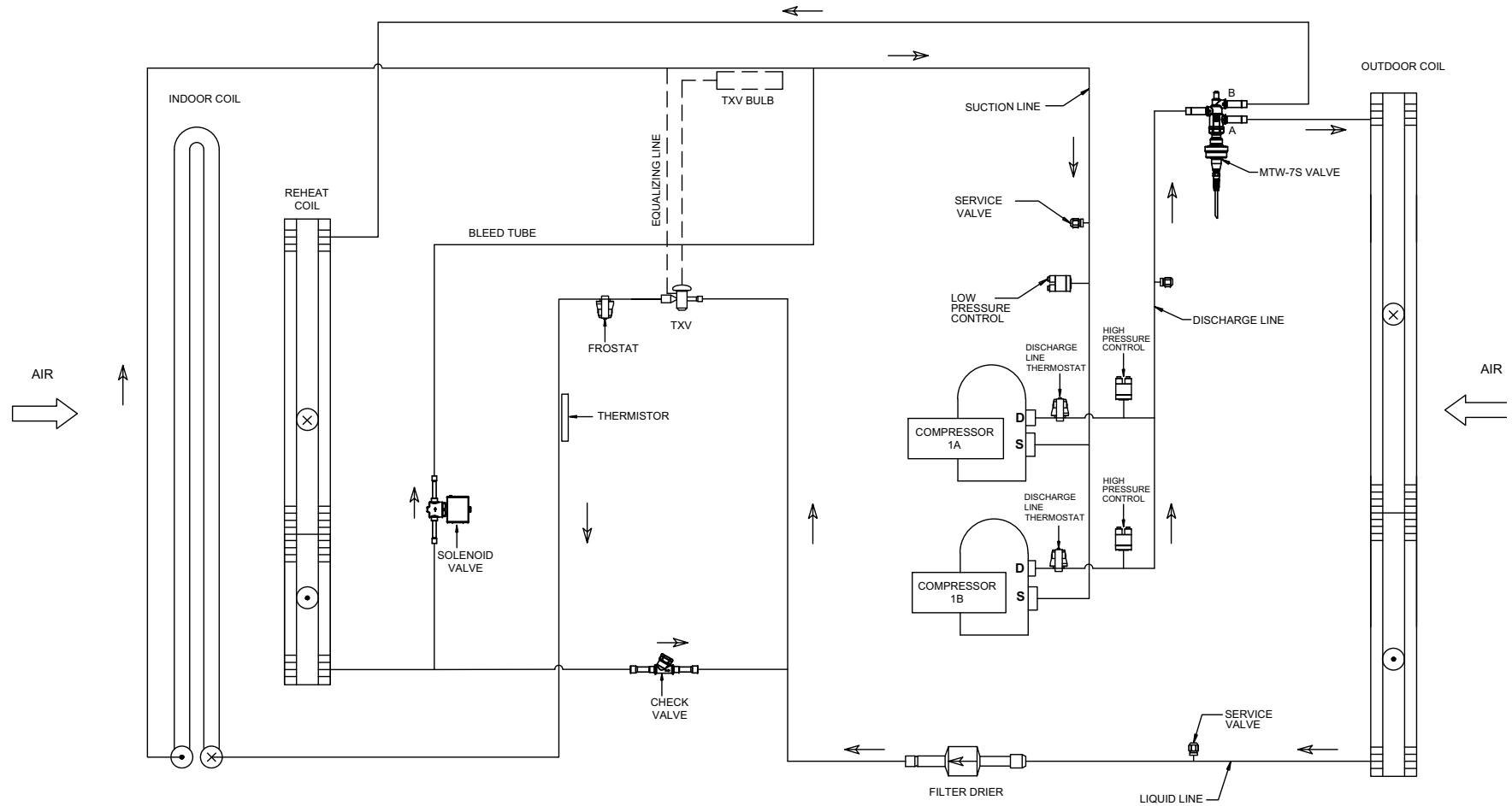


Figure 65. Piping diagram – 15 to 25 tons standard efficiency (YSJ180–300)

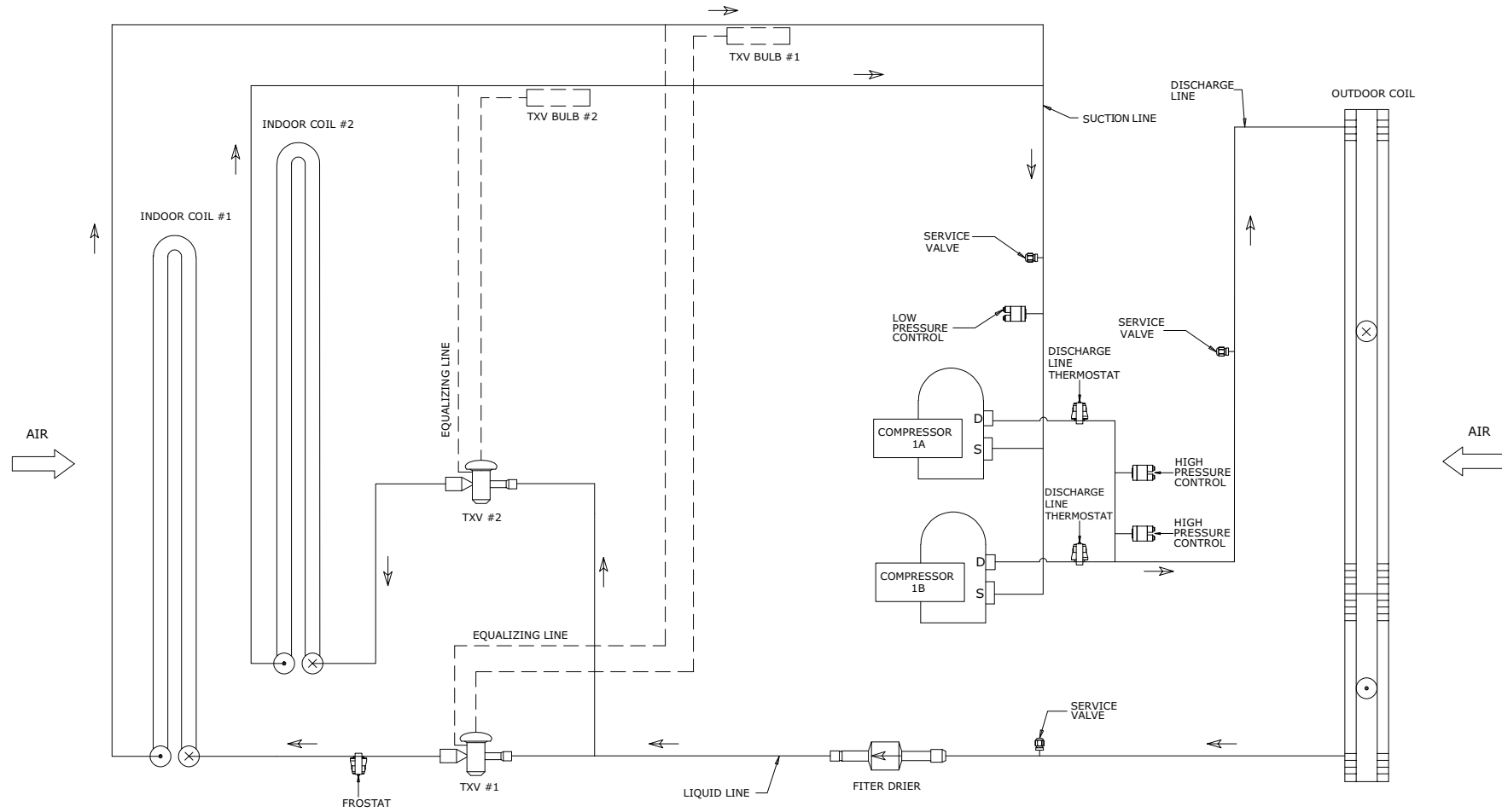
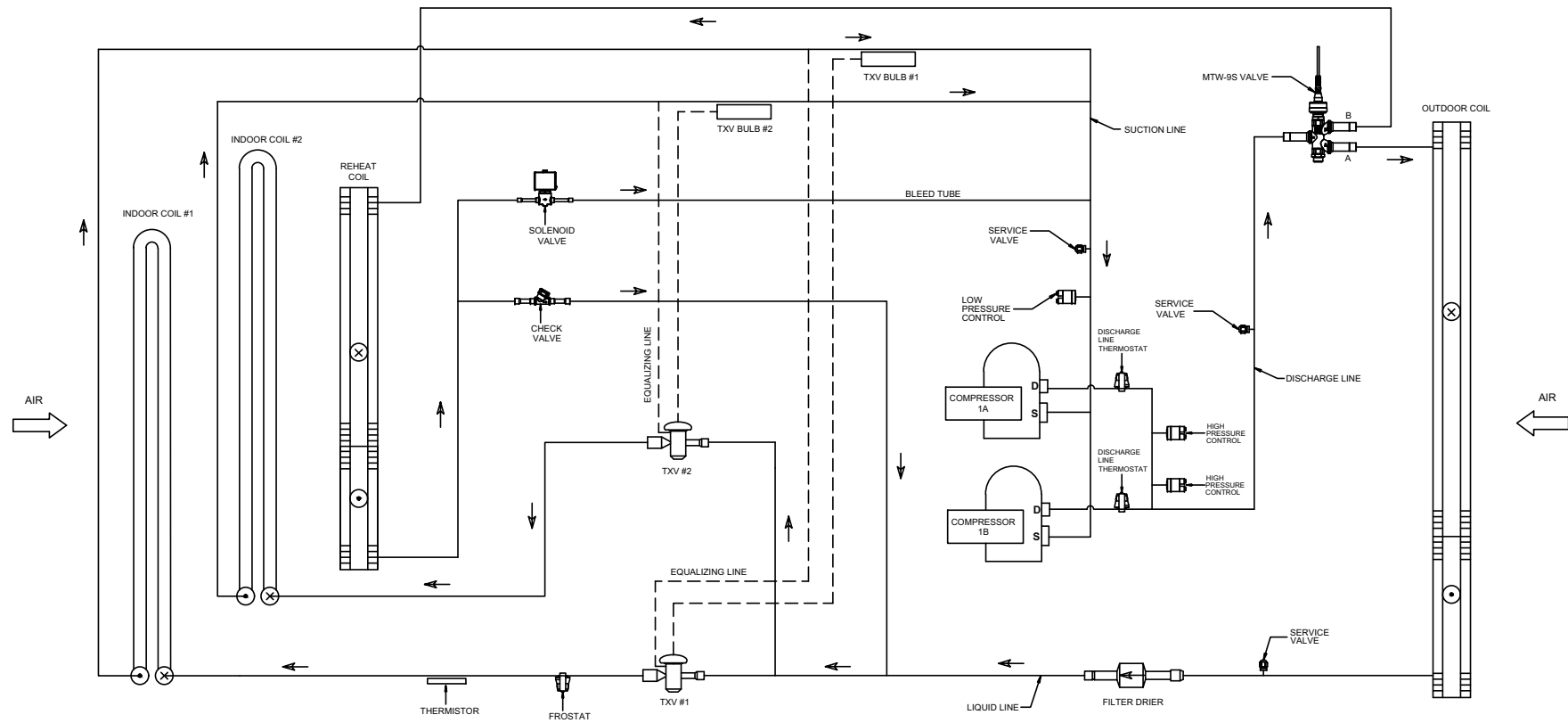


Figure 66. Piping diagram – 15 to 25 tons standard efficiency – hot gas reheat (YSJ180–300)



Gas Heat Operation and Maintenance

Gas Heat Unit General Information

⚠ WARNING

Hazard of Explosion or Fire!

Failure to follow instructions could result in death or serious injury and equipment or property damage.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

IF YOU SMELL GAS, follow instructions below:

- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone in your building.
- Open windows and doors.
- Alert others and evacuate building immediately.
- From a phone outside of the building, immediately call your gas supplier. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

⚠ WARNING

Safety Hazards!

Failure to follow instructions below could result in death or serious injury and equipment or property damage.

- Do not use this furnace if any portion has been under water as it may have rendered the unit hazardous to operate. Immediately call a qualified service technician to inspect the furnace and to replace any part or the control system and any gas control which has been under water.
- Should overheating occur, or the unit gas valve fail to shut off, close the gas valve to the furnace before shutting off the electrical supply.

⚠ WARNING

Safety Hazards!

Failure to follow instructions below could result in death or serious injury.

- Never perform any maintenance procedures until the electrical power to the unit is turned off.
- Never perform any maintenance procedures until the gas valve to the gas supply is turned off.
- Never remove any panels from the unit while it is operating.
- Never remove panels or parts from the unit that are not discussed in this manual.
- Never cover the unit, since it is designed to operate year round.

The unit has a complex design. To ensure that it performs safely and gives long lasting services, some of the maintenance work must be performed by a qualified service person.

When a service person is referred to in this manual it is describing a service technician who has had special training or a number of years experience in servicing this type of equipment. It is your responsibility to select a qualified service company that can provide a service person of this caliber.

Thermostat

Room thermostats are delicate temperature sensing controls. Their main function is to energize and de-energize the heating or cooling circuit to maintain the temperature setting you select.

Many thermostats contain a room thermometer to indicate the approximate room temperature and a temperature scale at the adjustment indicator to select the desired indoor air temperature. In addition, most thermostats have a selector mode switch with Heat, Off and Cool positions and a fan switch with On and Off positions.

When the switch is positioned at Off your unit will not operate in either the heat or cool modes. If the selector switch is set at Heat the unit will automatically cycle on and off to maintain the desired temperature setting. The unit will also operate automatically when the selector switch is positioned at Cool.

The fan selector switch can be used to operate the indoor fan continuously by positioning it at On. When set to Auto the fan will only operate when required during the heating or cooling cycles.

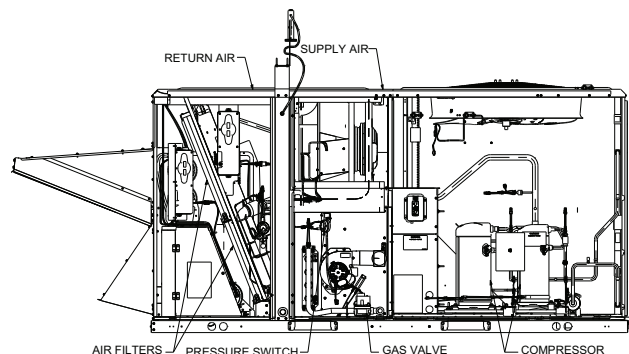
To ensure that the thermostat operates properly, it must be level and positioned to avoid the influence of such external heat sources as lamps, televisions or other heat producing appliances.

Note: Single zone VAV is designed to be used with a zone sensor. If a unit is configured for Single zone VAV operation but is connected to a thermostat, the control will revert to multi-speed (2-speed) indoor fan control and staged compressor control. This drastically reduces the energy savings available with this design.

Air Filters

Filters are to be used with this unit. Units ship from the factory with filters installed.

Figure 67. Gas unit overview



It is very important to keep the central duct system air filters clean. Be sure to inspect them at least once each month when the system is in constant operation. (In new homes, check the filters every week for the first 4 weeks.) See the following table for the required filter size(s).

If you have disposable type filters, replace them with new filters of the same type and size. Do not attempt to clean disposable filters.

Permanent type filters can be cleaned by washing them with a mild detergent and water. Ensure that the filters are thoroughly dry before reinstalling them in the unit (or duct system).

It may be necessary to replace permanent filters annually if washing fails to clean the filter, be sure to use the same type and size as was originally installed.

Table 17. Recommended standard filters

Tons	Unit Model Number	Qty	Filter Size (L x W x D)
6	YSJ072A**(0,A)(L,M,H)	2	18 x 24 x 2
		3	24 x 16 x 2
7.5	YSJ090A**(0,A)(L,M,H)	2	18 x 24 x 2
		3	24 x 16 x 2
8.5	YSJ102A**(0,A)(L,M,H)	2	18 x 24 x 2
		3	24 x 16 x 2
10	YSJ120A**(0,A)(L,M,H)	2	18 x 24 x 2
		3	24 x 16 x 2
12.5	YSJ150A**(0,A)(L,M,H)	3	18 x 18 x 2
		3	24 x 18 x 2
15	YSJ180A**(0,A)(L,M,H)	8	20 x 24 x 2
17.5	YSJ210A**(0,A)(L,M,H)	8	20 x 24 x 2

Table 17. Recommended standard filters (continued)

Tons	Unit Model Number	Qty	Filter Size (L x W x D)
20	YSJ240A**(0,A)(L,M,H)	8	20 x 24 x 2
25	YSJ300A**(0,A)(L,M,H)	8	20 x 24 x 2

Heating System

Heating Cycle Operation

The unit heating system is a solid-state electronic ignition control that lights the furnace burners each time the thermostat calls for heat. At the end of each heating cycle the furnace burners are extinguished. This type of system is called Direct Spark Ignition (DSI).

A normal heating cycle begins when the air temperature drops below the thermostat setting. The thermostat then energizes the heating electrical circuit that starts and controls the furnace burners. Shortly after the burners ignite the indoor fan starts and circulates warm air through the conditioned space.

When the air temperature rises to the thermostat setting the thermostat deenergizes the heating electrical circuit, which in turn extinguishes the burners. The indoor fan continues to circulate warm air until most of the heat is removed from the unit's combustion chamber.

Safety Controls

- The unit is equipped with an automatic reset safety limit control to prevent overheating. When the control opens, it shuts down the heating electrical circuit until the unit cools down sufficiently. Inadequate airflow (i.e., caused by dirty filters or defective fan motor) may cause the unit to cycle on and off as the limit trips and automatically resets. If you suspect the unit is cycling on its limit control, immediately contact a service person for instructions.
- If flames from the burner are not properly drawn into the heat exchanger, a flame rollout protection control will open causing the furnace to shut off. The cause must be investigated by a qualified service person.
- If installed, the condensate overflow switch will shut down the unit before a drain pan overflow occurs.

Heating System Start-Up

Because your unit has an automatic ignition system, it is easy to start the heating cycle at the beginning of the heating season. In order for the unit to operate properly and safely, the furnace needs air for both combustion and ventilation. Check to make sure that all air openings are unobstructed and there is adequate clearance around the unit to provide good airflow.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

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 a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

1. Set the thermostat's heating adjustment lever at its lowest setting.
2. Move the selector switch to the Off position.
3. Turn off all electric power to the unit.

⚠ WARNING

Risk of Burn!

Failure to follow instructions could result in serious injury.

NEVER attempt to manually light the burner.

4. This unit is equipped with an ignition device which automatically lights the burners.
5. Remove the access panel that contains the following label:

Figure 68. Label

REMOVE THIS PANEL
TO GAIN ACCESS TO
THE GAS VALVE

6. Change the ON/OFF switch to the OFF position.

Note: Some valves require the knob to be pushed in slightly before turning.

⚠ WARNING

Hazard of Explosion or Fire!

Failure to follow instructions could result in death or serious injury and equipment or property damage.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

IF YOU SMELL GAS, follow instructions below:

- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone in your building.
- Open windows and doors.
- Alert others and evacuate building immediately.
- From a phone outside of the building, immediately call your gas supplier. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

7. Wait (five) minutes to clear out any gas. If you then smell gas, STOP and proceed with the instructions as per above Warning. If you do not smell gas, go to the next step.
8. Change the ON/OFF switch to the ON position.
9. Replace panel removed in [Step 5](#).
10. Turn on all electric power to unit.
11. Set thermostat to desired temperature and move the selector switch to the ON position. The unit will now operate automatically.
12. If the unit will not operate, follow the instructions in "Turning Off Gas to Unit," [p. 65](#) and call your service technician or gas supplier.

Important: The unit is to be adjusted to obtain an air rise within that specified on the nameplate.

Heating System Shutdown

To shut down the heating system for brief periods of time simply adjust the thermostat selector switch to the "Off" position.

NOTICE

Property Damage!

Furnace failure could cause property damage, such as frozen water pipes.

If the unit is shut down during the cold weather months, provisions must be taken to prevent freeze-up of all water pipes and water receptacles. Whenever your house or building is to be vacant, arrange to have someone inspect your structure for proper temperature. This is very important in below-freezing weather.

NOTICE

Coil Freeze-Up!

Failure to follow instruction below could result in equipment damage.

Drain and vent coils when not in use. Trane recommends glycol protection in all possible freezing applications. Use a glycol approved for use with commercial cooling and heating systems and copper tube coils.

Turning Off Gas to Unit

1. Set the thermostat to lowest setting.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

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 a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

2. Turn off all electric power to the unit if service is to be performed.
3. Remove the access panel that contains the label shown in [Figure 68, p. 64](#).
4. Change ON/OFF switch to the "OFF" position.
5. Replace panel removed in [Step 3](#).

Heating System Maintenance

⚠ WARNING

Hazard of Explosion or Fire!

Failure to follow instructions could result in death or serious injury and equipment or property damage. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

IF YOU SMELL GAS, follow instructions below:

- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone in your building.
- Open windows and doors.
- Alert others and evacuate building immediately.
- From a phone outside of the building, immediately call your gas supplier. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

Complete the following unit inspections and service routines at the beginning of each heating season.

Important: These steps should only be performed by a qualified service technician.

1. Inspect the control panel wiring and heating controls to make sure connections are tight and wiring insulation is intact.
2. Turn the unit on and off at the thermostat to be sure the ignition control and spark electrode are operating properly.
3. Turn off the gas supply with the unit operating to verify that the gas valves closes and that a re-ignition cycle is initiated by the ignition control.
4. Check the operation of the gas ignition system
5. Check the burner manifold pressure. A 1/8 inch pipe plug is provided in the gas valve for this purpose.
6. Visually inspect all of the unit's flue product passage ways for excessive deposit build up and corrosion. If build up or corrosion is apparent, perform the necessary repairs.
7. Arrange for a qualified serviceman to inspect the unit every other heating season to maintain safe and efficient operation.
8. Visually check the main burner flames. They should be bright blue flames extending into the heat exchanger sections.
9. Never store anything flammable or combustible around or near the unit.

Condensate Overflow Sensor (Optional)

If installed, the condensate overflow switch will shut down the unit before a drain pan overflow occurs.

Limited Warranty

Electric Air Conditioner

YSJ Precedent Models

This warranty is extended by Trane to the original purchaser and to any succeeding owner of the real property to which the Electric/ Electric Air Conditioner is originally affixed and applies to products purchased and retained for use within the U.S.A. and Canada. The Company warrants for a period of 36 months from initial start-up or 42 months from date of shipment, whichever is less, that the company products covered by this order (1) are free from defects in material and workmanship and (2) have the capacities and ratings set forth in the Company's catalogs and bulletins.

There is no warranty against corrosion, erosion or deterioration. If any part of your Air Conditioner fails because of a manufacturing defect within three years (36 months) from the date of the original purchase, warrantor will furnish without charge the required replacement part.

If the **heat exchanger** fails because of a manufacturing defect within **ten years** from the date of start-up, warrantor will furnish without charge a replacement heat exchanger.

In addition, if the optional, factory installed, **stainless steel heat exchanger** fails because of a manufacturing defect within **fifteen years** from the date of start-up, warrantor will furnish without charge a replacement heat exchanger. Any local transportation, related service labor and diagnosis calls are not included.

In addition, if the sealed motor-compressor fails because of a manufacturing defect within the fourth through fifth year from the date of original purchase, warrantor will furnish without charge the required replacement compressor.

Warrantor's obligations and liabilities under this warranty are limited to furnishing F.O.B. warrantor factory or warehouse at warrantor designated shipping point, freight allowed to buyer's city, replacement parts for warrantor's products covered under this warranty. Warrantor shall not

be obligated to pay for the cost of lost refrigerant. No liability shall attach to warrantor until products have been paid for and then liability shall be limited solely to the purchase price of the equipment under warranty 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.

The Company makes certain further warranty protection available on an optional extra-cost basis. Any further warranty must be in writing, signed by an officer of the company.

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. In no event shall the company be liable for any incidental or consequential damages.

* This warranty is for commercial usage of said equipment and not applicable when the equipment is used for a residential application. Commercial use is any application where the end purchaser uses the product for other than personal, family or household purposes.

**A five year limited warranty is provided for the optional "Low Leak" economizer.

Trane and American Standard create comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or americanstandardair.com.

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