



Highlands Health & Rehabilitation Center
3549 Norriswood Ave, Memphis, TN, 38111

REQUEST FOR PROPOSAL (RFP)

April 25, 2024

Dear Prospective Bidder,

This is a solicitation for bids for a scope of work as delineated below. Highlands Health & Rehabilitation Center hereby requests your proposal for the below delineated scope of work.

The project involves funding from a state agency and hence, all requirements of the funding agency that has jurisdiction over this project will need to be adhered to by the prospective bidder. Further information regarding the requirements will follow the pre-bid meeting.

ABOUT HIGHLANDS HEALTH & REHABILITATION CENTER

Highlands Health & Rehabilitation Center is a skilled nursing facility that provides short-term rehabilitation, long-term care services including memory care and hospice, and a comprehensive range of therapy and care programs. We firmly believe and strongly encourage our staff to treat every resident with the utmost respect and dignity, as if they were their own parent. www.highlands-healthcenter.com

SCOPE OF WORK

The project scope of work is to remove and replace the current rooftop heating and air conditioning units (HVAC) with new units, per all required safety standards and local laws, including proper disposal of old units without damage to the building or property. Work is to be performed efficiently and in coordination with the facility manager in order to not impede the regular functioning of the business or safety of its residents. The proposed bidder must provide proof of current insurance. Any damages incurred during the project to the roof, building, or property will be the sole responsibility of the proposed bidder.

The scope includes the purchase of the following rooftop HVAC units:

- American Standard YSJ150A3S0M0000 or equivalent (qty 5)
12.5 TON, 14 IEER, 208/230 3P GAS/ELEC RTU R410A

- American Standard YSJ072A3S0M0000 or equivalent (qty 1)
6 TON, 14.6 IEER, 208/230 3P GAS/ELEC RTU R410A
- American Standard YSJ120A3S0M0000 or equivalent (qty 1)
10 TON, 14.6 IEER, 208/230 3P GAS/ELEC RTU R410A
- American Standard YSJ210A3S0M0000 or equivalent (qty 1)
17.5 TON, 14 IEER, 208/230 3P GAS/ELEC RTU R410A
- American Standard YSC036G3EMB0000 or equivalent (qty 1)
3 TON, 14 SEER, 208/230 3P GAS/ELEC RTU R410A

See attached for complete equipment specifications and dimensions.

The scope includes the installation of the above units including:

- electrical and drainage work;
- any curbing, roof mounting, or roof finishing/alterations necessary.

The following onsite equipment is anticipated to be necessary:

- 100-ton Crane with 80-ton weight capacity 140' reach.
- Two flatbed trailers (one to haul in new equipment; one to remove old equipment)

BONDING: THE FOLLOWING MINIMUM REQUIREMENTS MUST BE AS FOLLOWS:

(a) A bid guarantee from each bidder equivalent to five percent of the bid price. The “bid guarantee” must consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of the bid, execute such contractual documents as may be required within the time specified.

(b) A performance bond on the part of the contractor for 100 percent of the contract price. A “performance bond” is one executed in connection with a contract to secure fulfillment of all the contractor's requirements under such contract.

(c) A payment bond on the part of the contractor for 100 percent of the contract price. A “payment bond” is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

INSURANCE

Active general liability insurance, workers’ compensation insurance, and all business-owned vehicles covered by commercial auto insurance. Additional umbrella policy of at least \$1 million preferred.

SAM.GOV REQUIREMENT

All potential bidders should be prepared to be registered on sam.gov. Awarded bidder MUST have an active UEI (unique entity identifier) on sam.gov.

PROJECT FUNDING

The project is funded by ARPA SLFRF through the Tennessee Department of Health's HRP-CI program.

ANTICIPATED PROJECT START: JUNE 10, 2024**PRE-BID WALK THRU DATE: 10:00AM ON THURSDAY, MAY 2, 2024**

Location: 3549 Norriswood Ave, Memphis, TN, 38111

BID PROPOSAL EVALUATION FACTORS:

- 1) Price (55%)
- 2) Quality of Proposed Bidder/Company including Experience, Past Performance, and Safety Protocols (25%)
- 3) Ability to Complete Onsite Work within a reasonable timeframe (20%)

BIDS DUE: BY 12:00PM NOON EDT ON WEDNESDAY, MAY 15, 2024

- 1) Provide cost breakdown of labor & material for the following:
 - a. Purchase & Installation of HVAC Units
 - b. Crane Rental
- 2) Provide Anticipated Project Completion Date
- 3) Provide Number of Anticipated Days on Site
- 4) Provide Company Resume or Bio, including but not limited to:
 - a. Company Qualifications
 - b. Number of Years of Experience
 - c. Safety protocols
 - d. Engineering and Site Experience
- 5) Proof of insurances to be provided upon BID award.
- 6) Proof of an active sam.gov and UEI number to be provided upon BID award.

BIDS SHALL BE ADDRESSED TO:

Administrator
Highlands Health & Rehabilitation Center
3549 Norriswood Ave, Memphis, TN, 38111

CONTACT PERSON FOR ANY QUESTIONS OR TO COORDINATE SITE VISIT:

Wilmer Lopez: maintenance@highlands-healthcenter.com

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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

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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

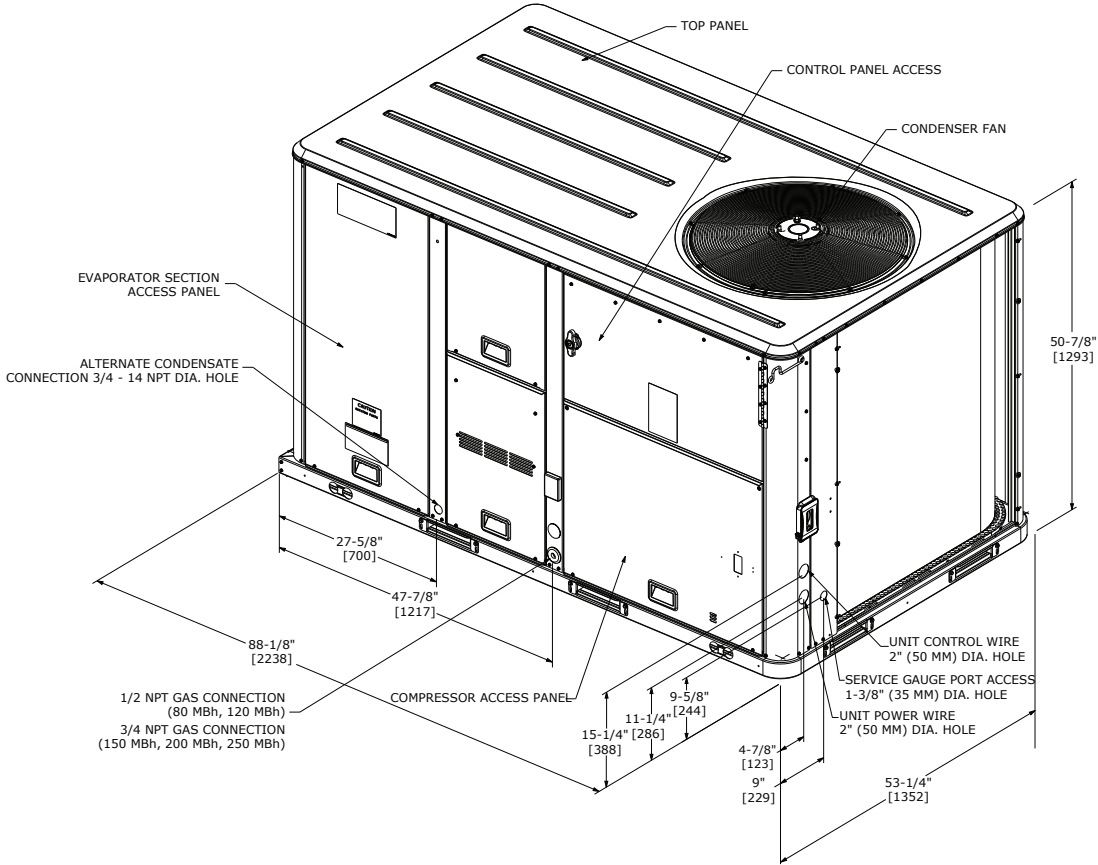
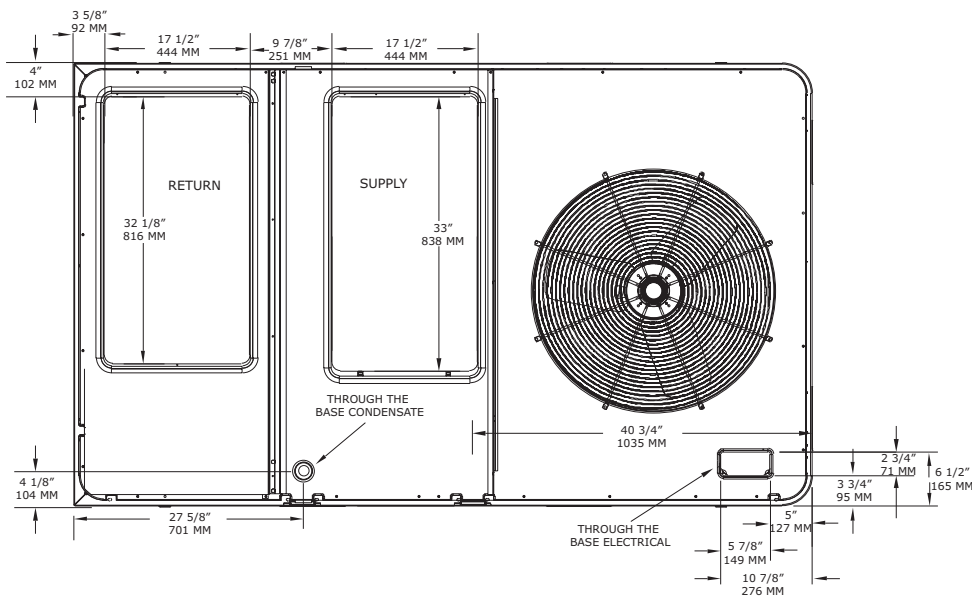


Figure 3. 6 to 10 tons standard efficiency – downflow airflow supply/return, through-the-base utilities



Dimensions and Weights

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

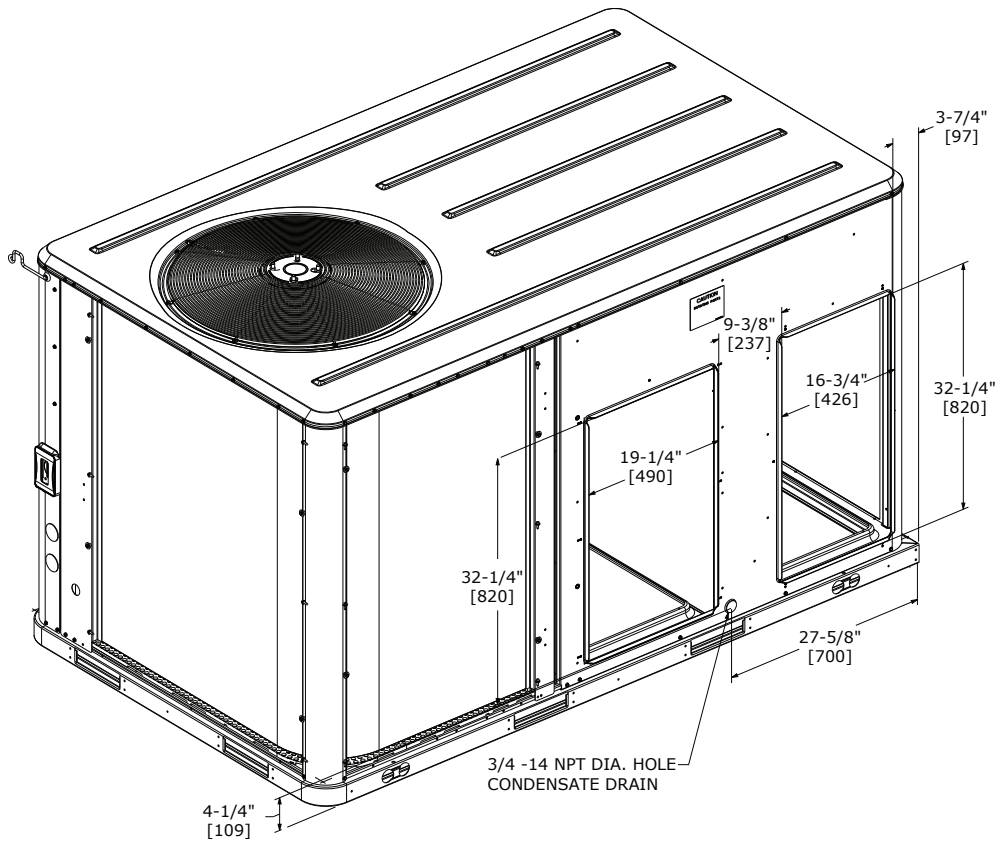


Figure 5. 6 to 10 tons standard efficiency — unit clearance and roof opening

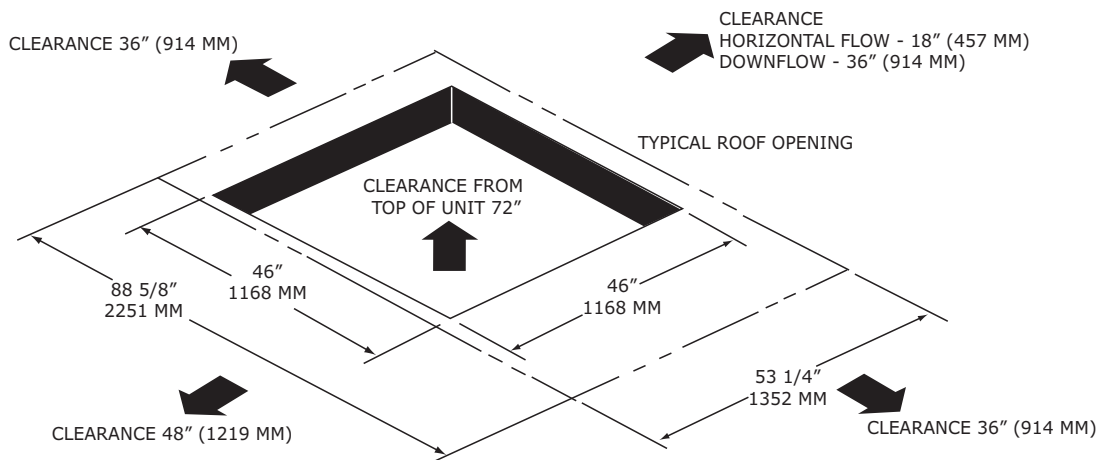


Figure 6. 6 to 10 tons standard efficiency – roof curb

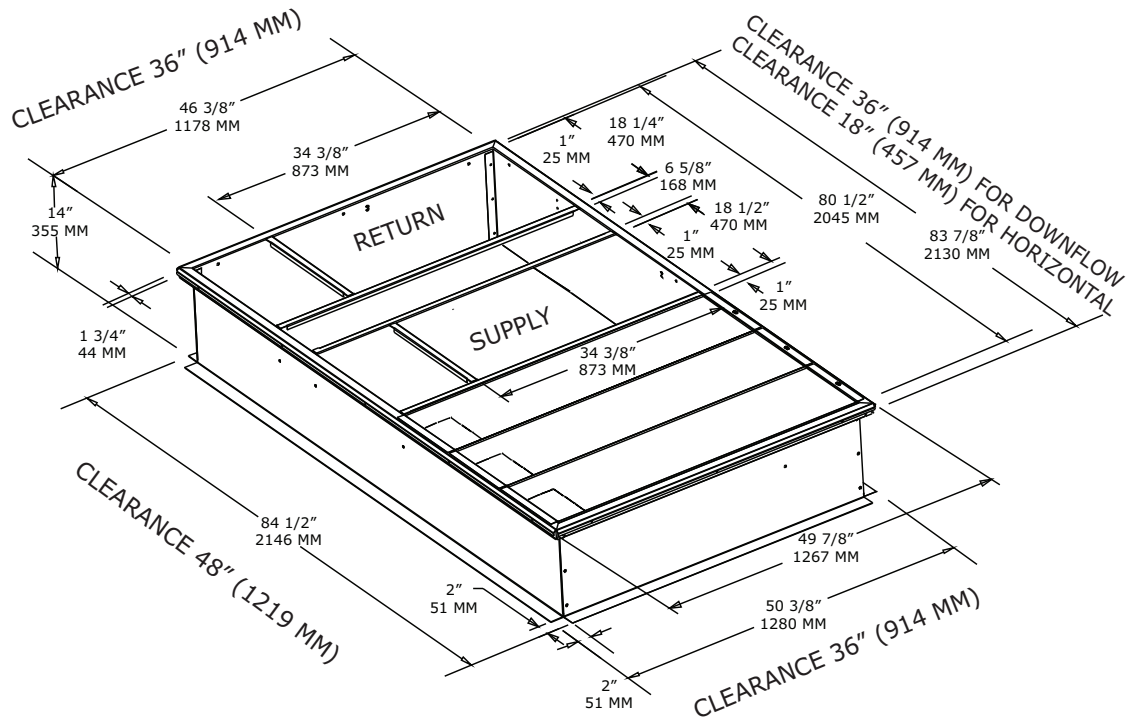
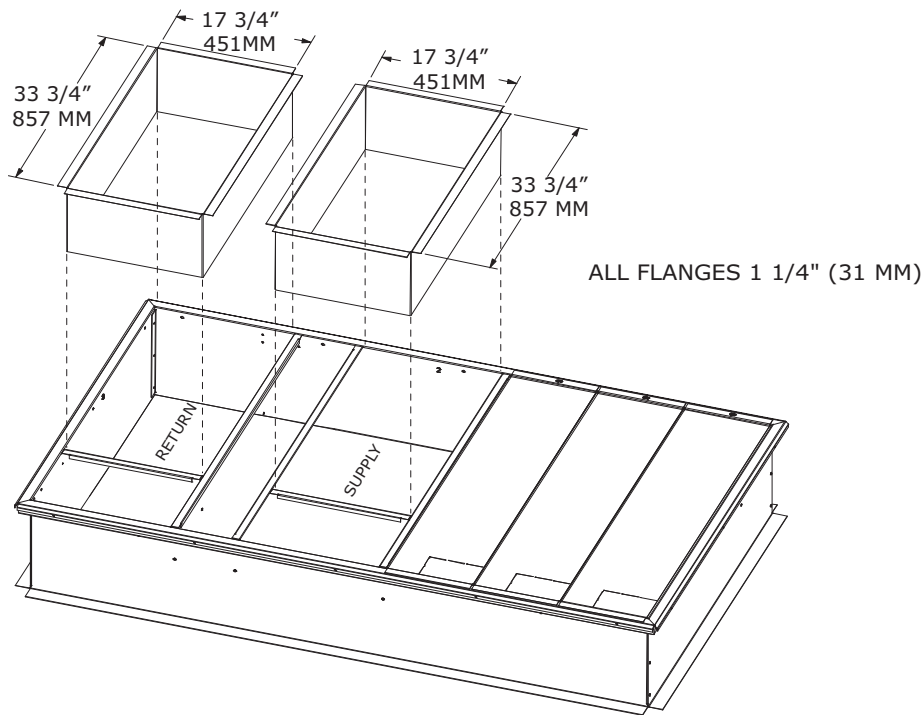


Figure 7. 6 to 10 tons standard efficiency – downflow duct connections, field fabricated



Dimensions and Weights

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

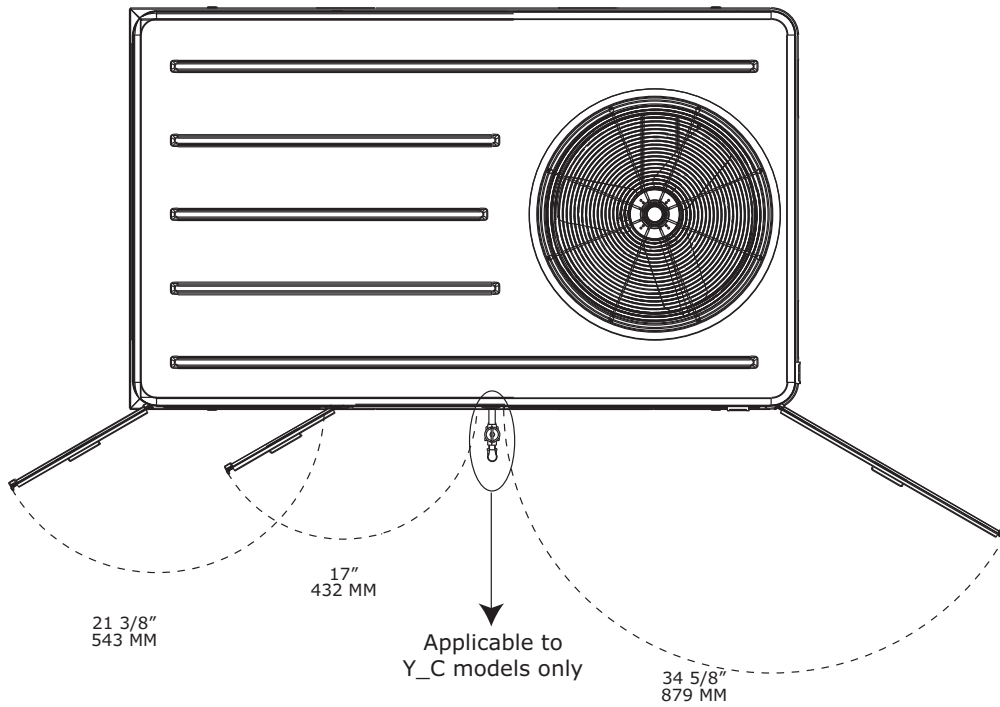
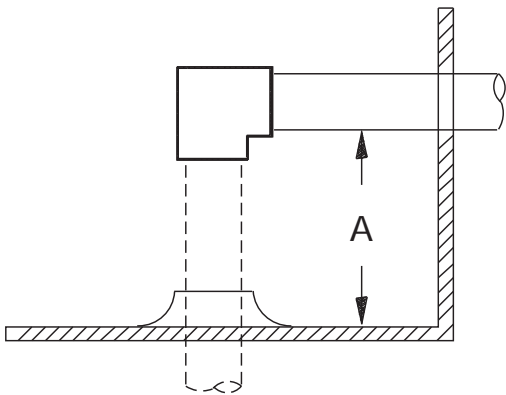


Figure 9. 6 to 25 tons standard efficiency— gas pipe height



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

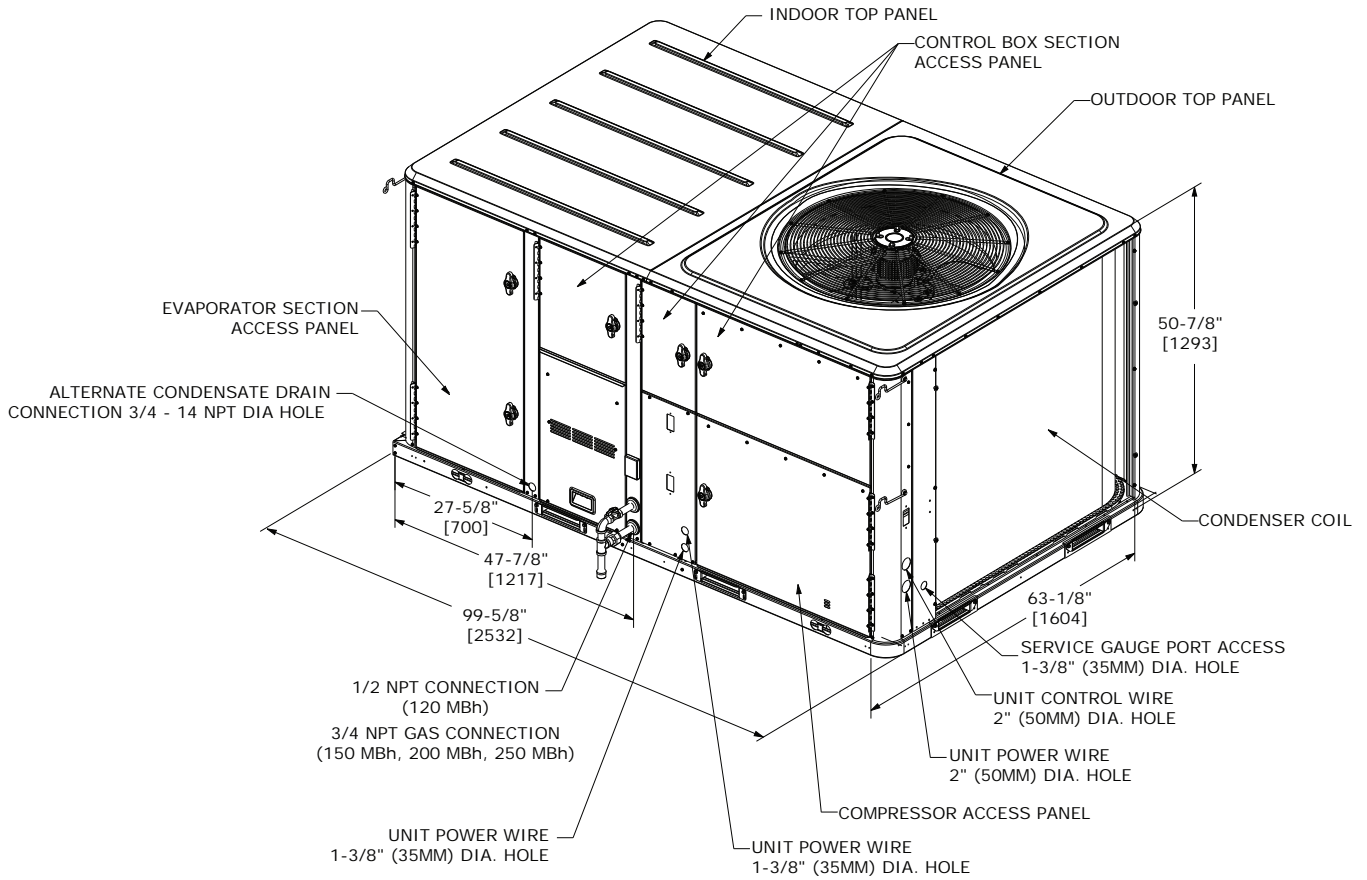
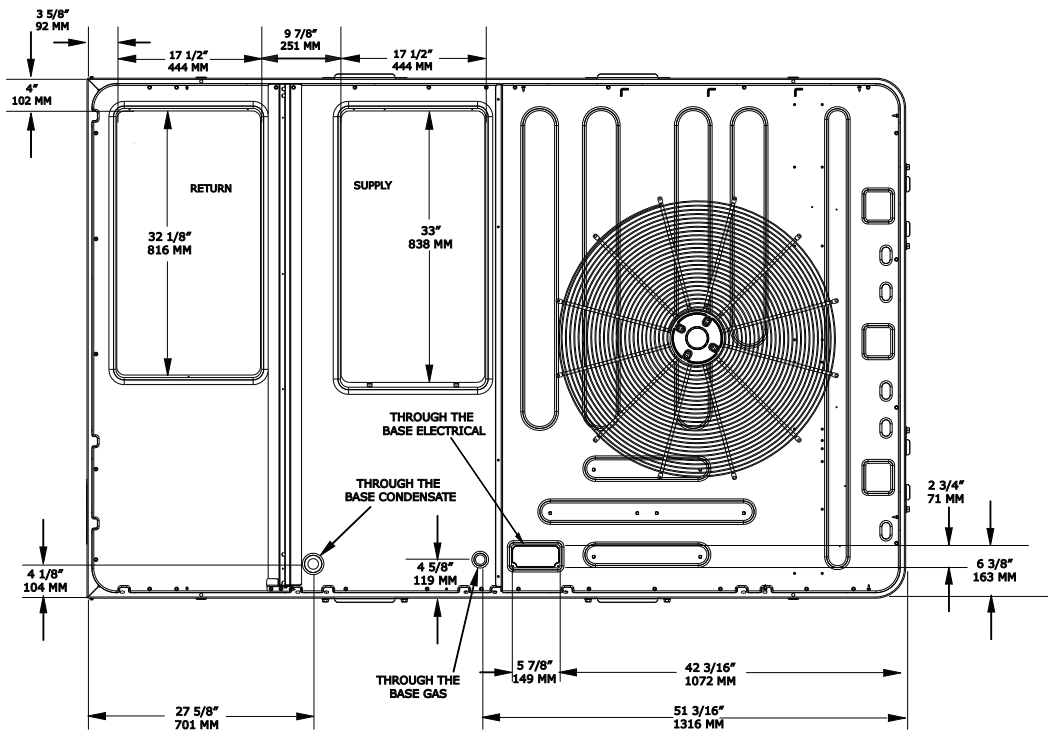


Figure 11. 12.5 tons standard efficiency – downflow airflow supply/return, through-the-base utilities



Dimensions and Weights

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

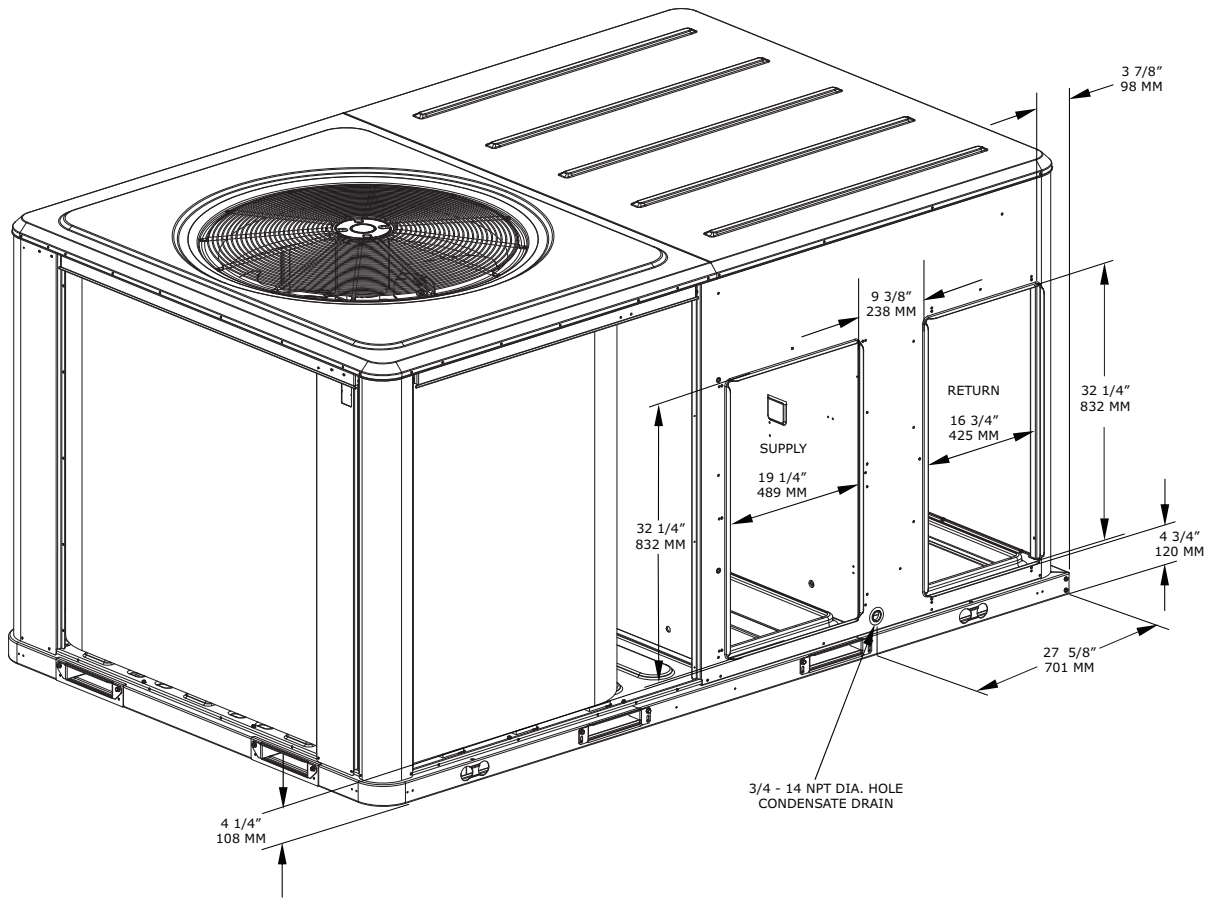


Figure 13. 12.5 tons standard efficiency – unit clearance and roof opening

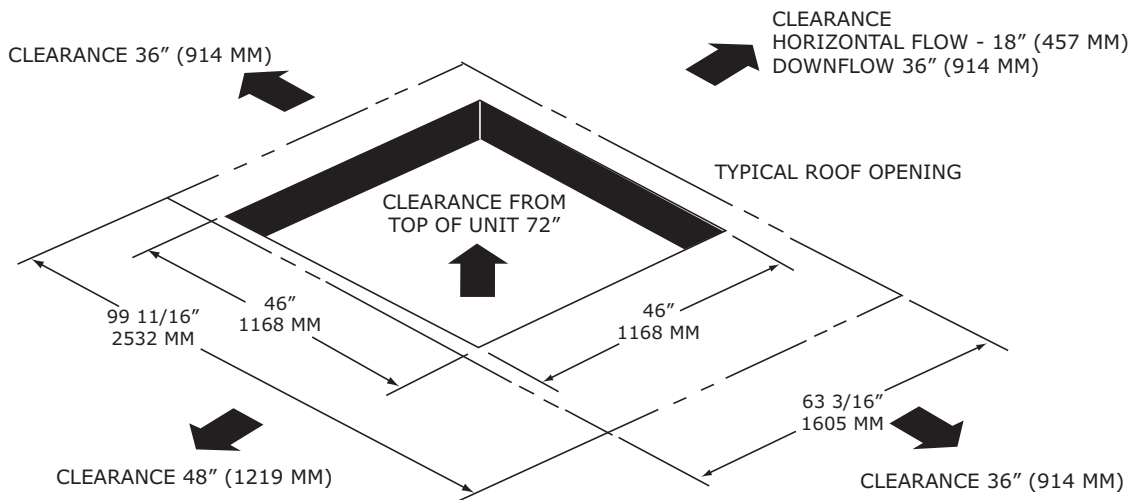


Figure 14. 12.5 tons standard efficiency – roof curb

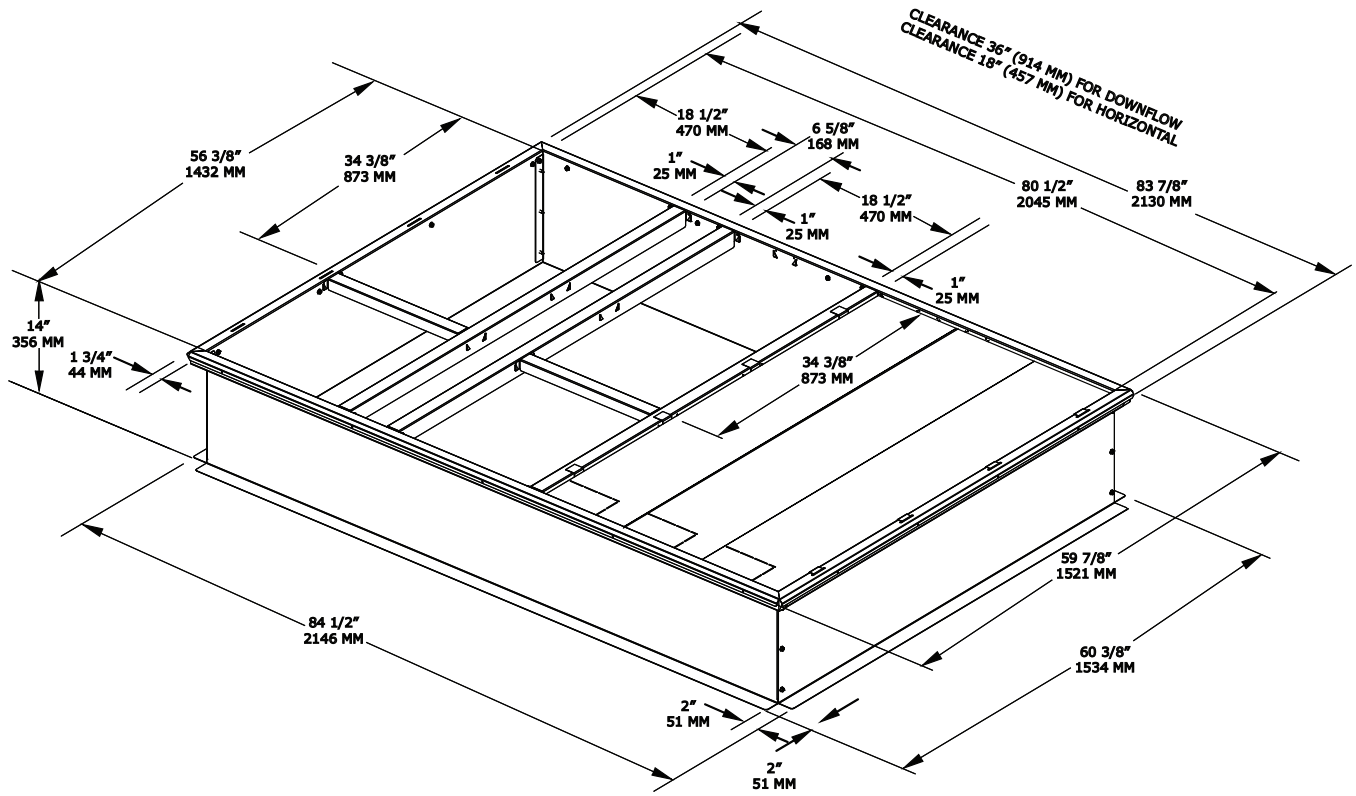
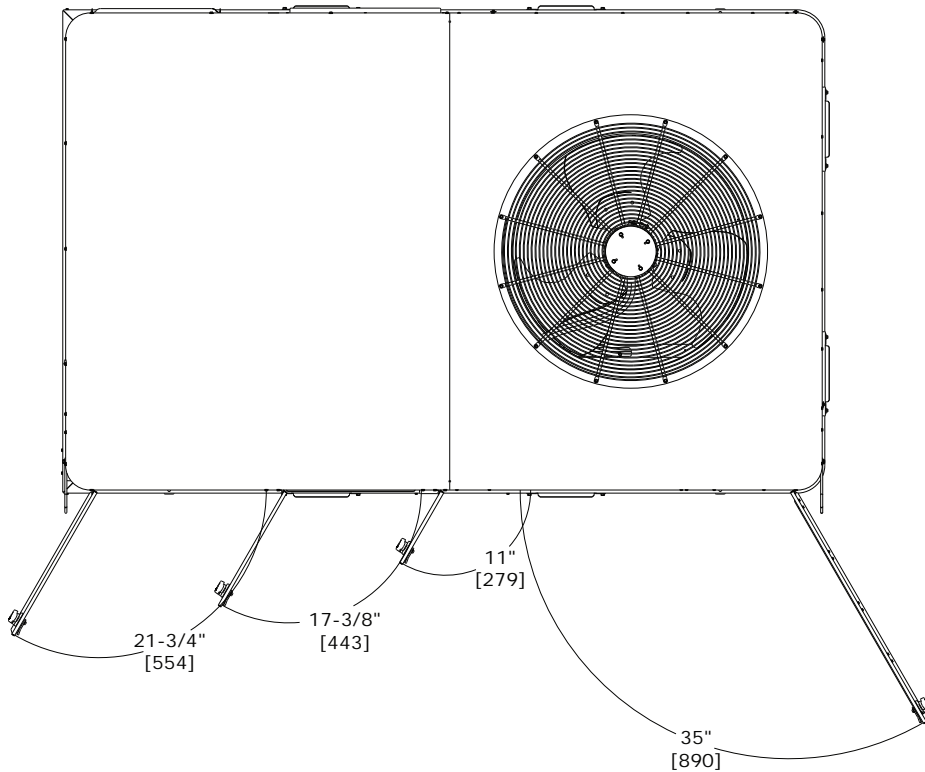


Figure 15. 12.5 tons standard efficiency – swing diameter for hinged door(s) option



Dimensions and Weights

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

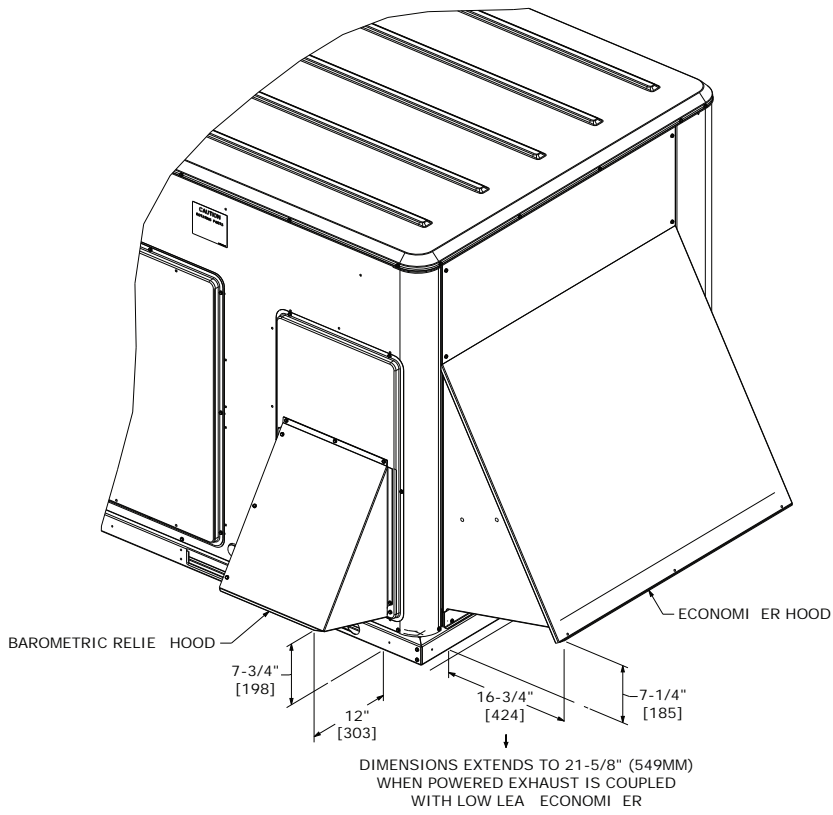
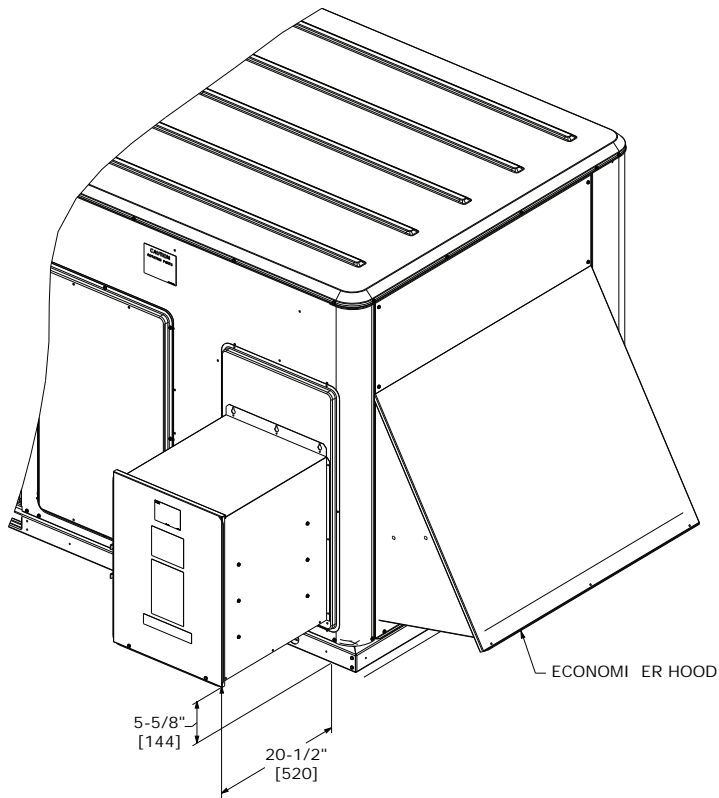


Figure 17. 6 to 12.5 tons standard efficiency – power exhaust



Dimensions and Weights

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

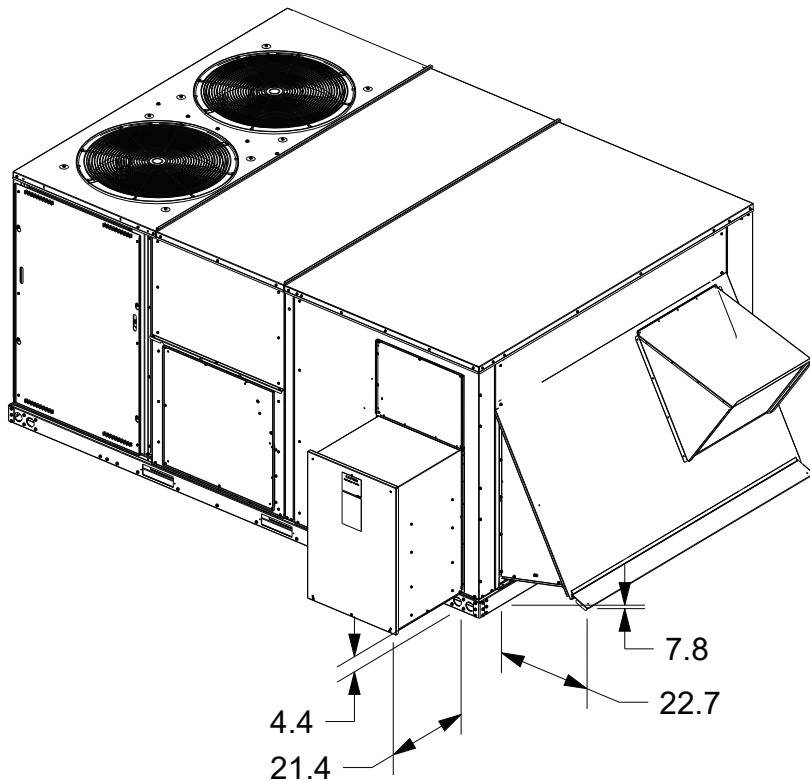
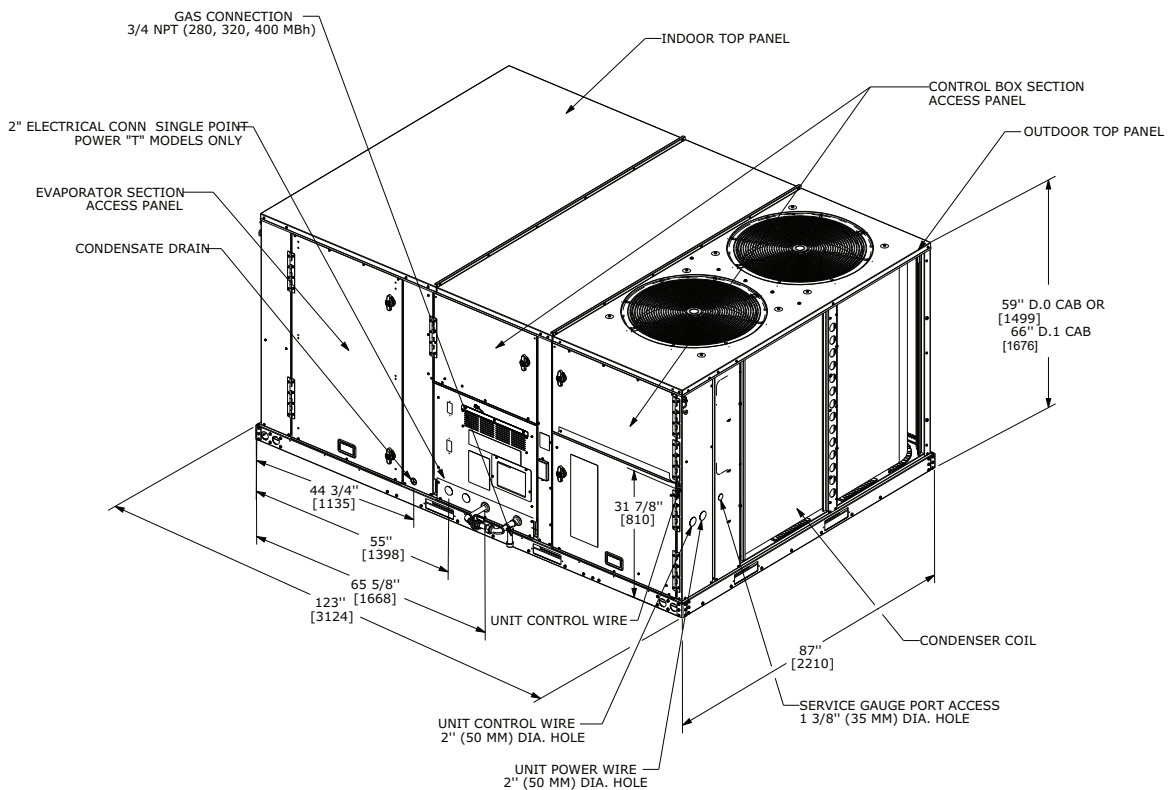


Figure 19. 15 to 25 tons standard efficiency



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

Figure 20. 15 to 25 tons standard efficiency – downflow airflow supply/return, through-the-base utilities

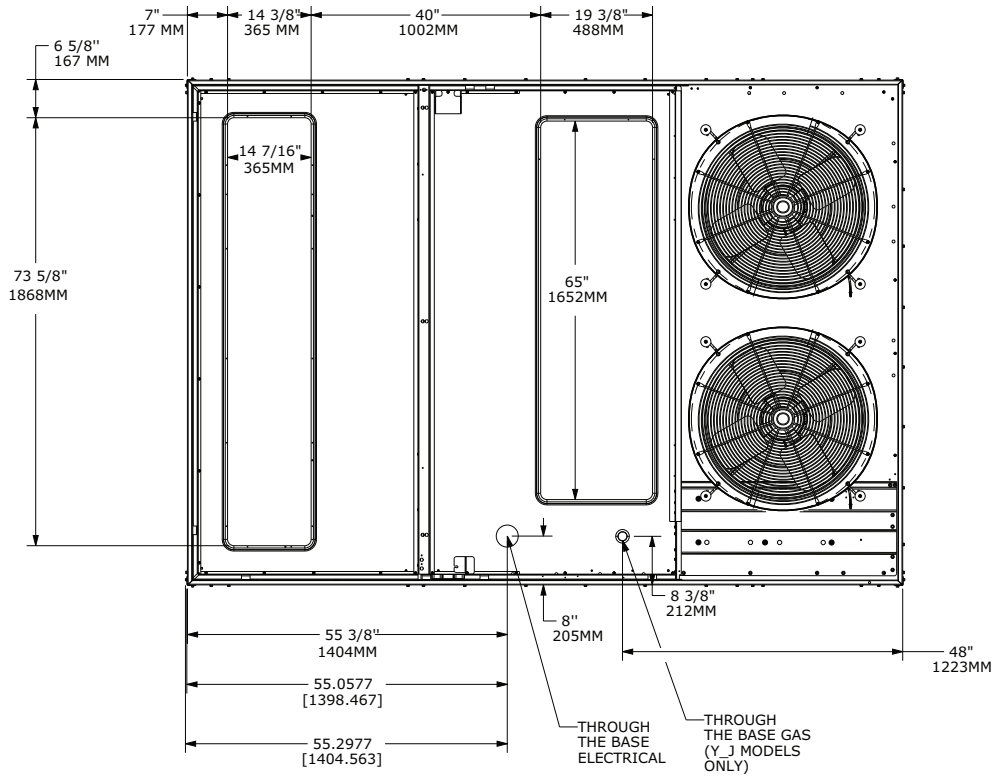
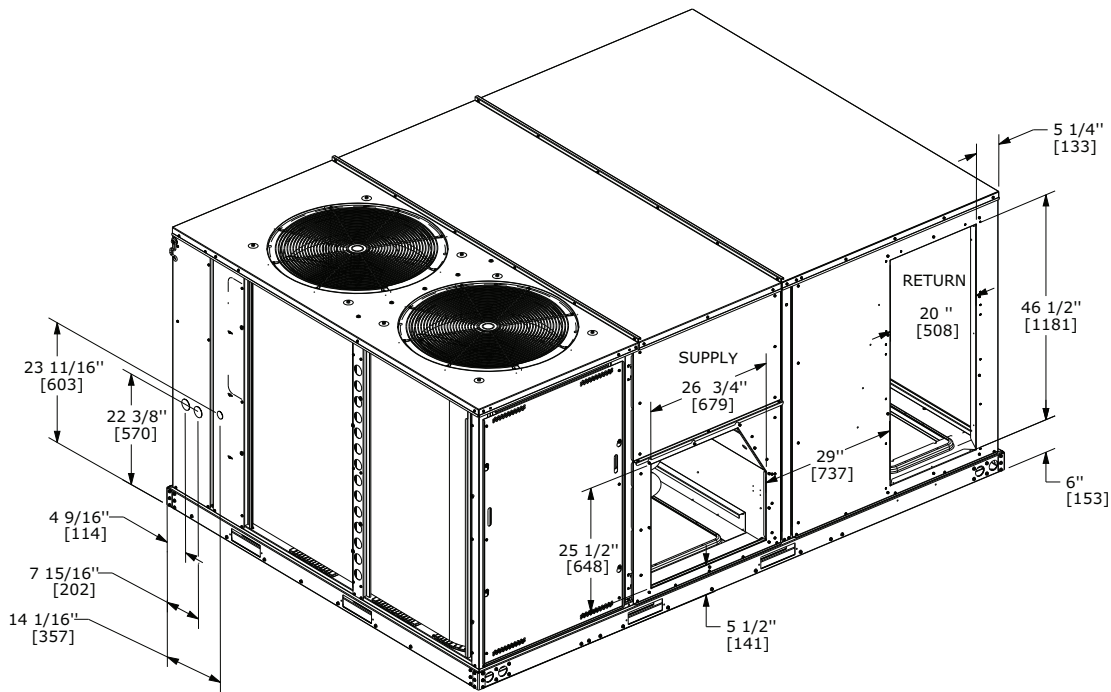


Figure 21. 15 to 25 ton standard efficiency – horizontal airflow supply/return



Dimensions and Weights

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

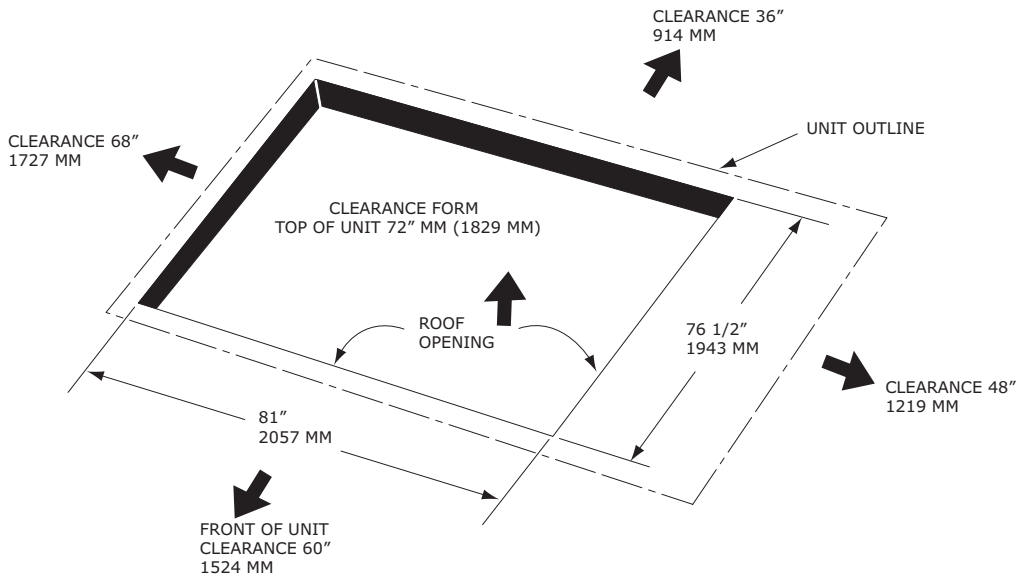


Figure 23. 15 to 25 tons standard efficiency – roof curb

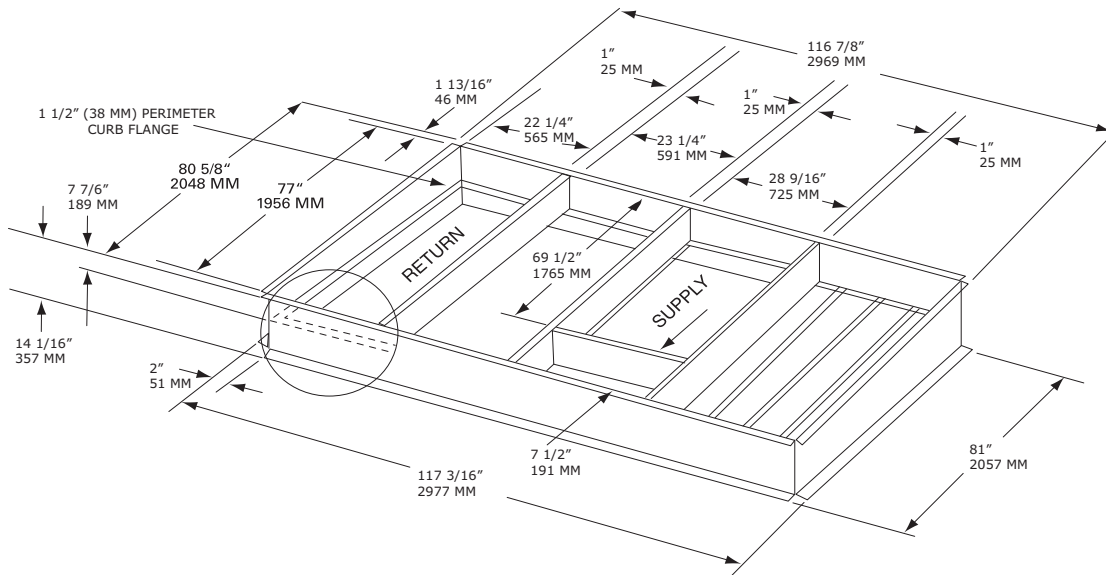
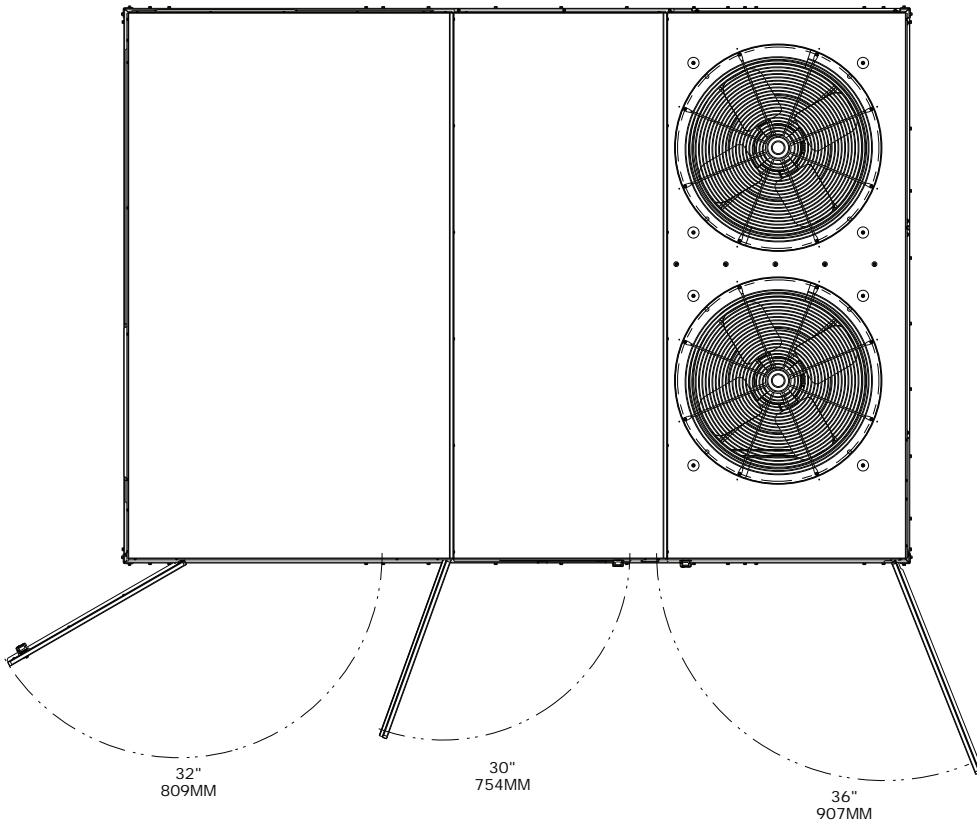


Figure 24. 15 to 25 ton standard efficiency – swing diameter for hinged door(s) option



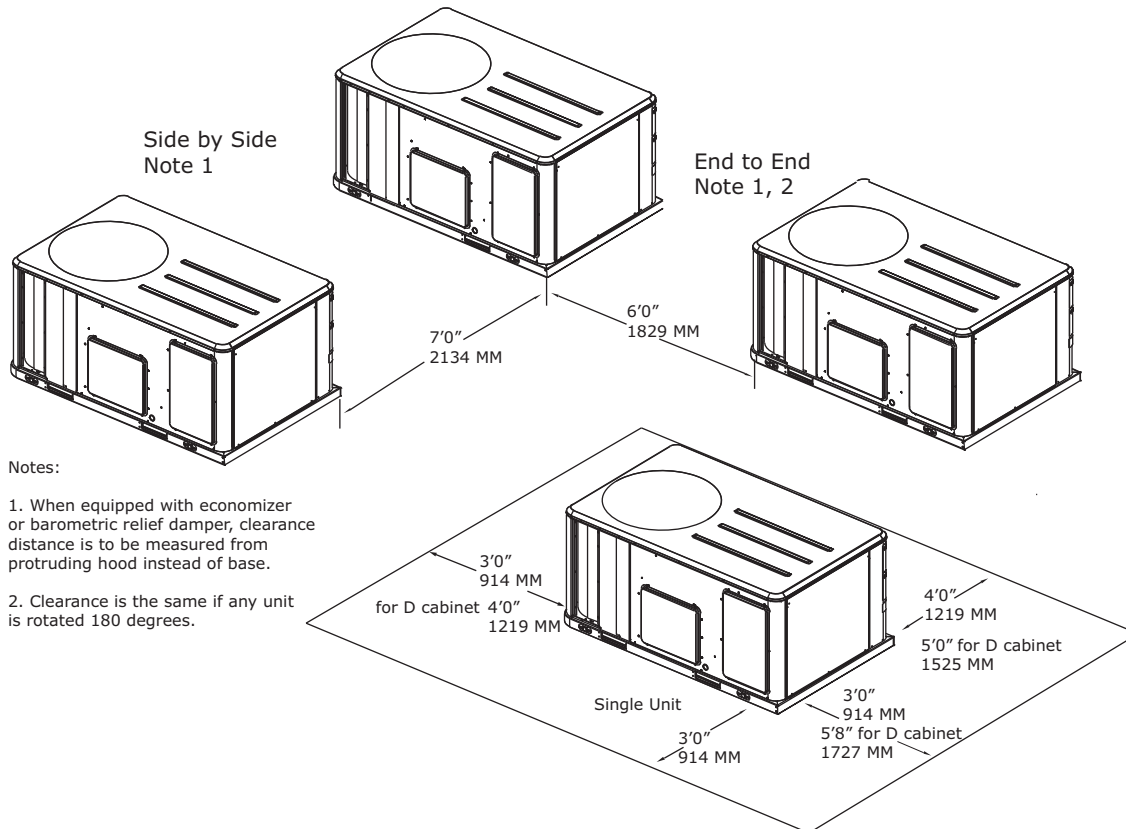
Dimensions and Weights

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



Notes:

1. When equipped with economizer or barometric relief damper, clearance distance is to be measured from protruding hood instead of base.
2. Clearance is the same if any unit is rotated 180 degrees.

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

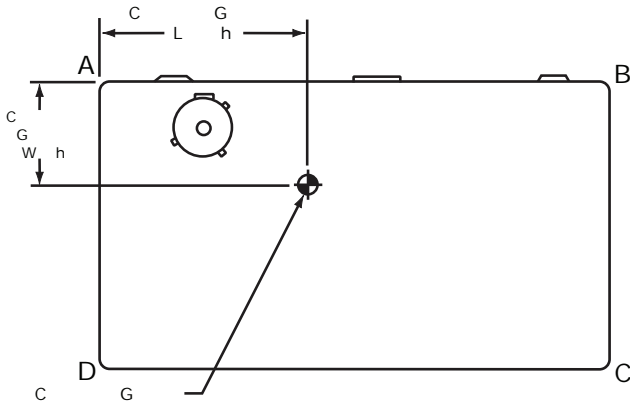


Table 2. Factory installed options (FIOPS)/accessory net weights (lb)

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

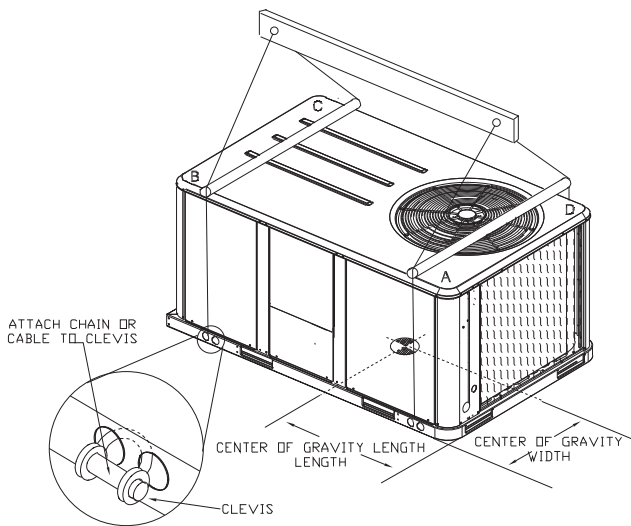
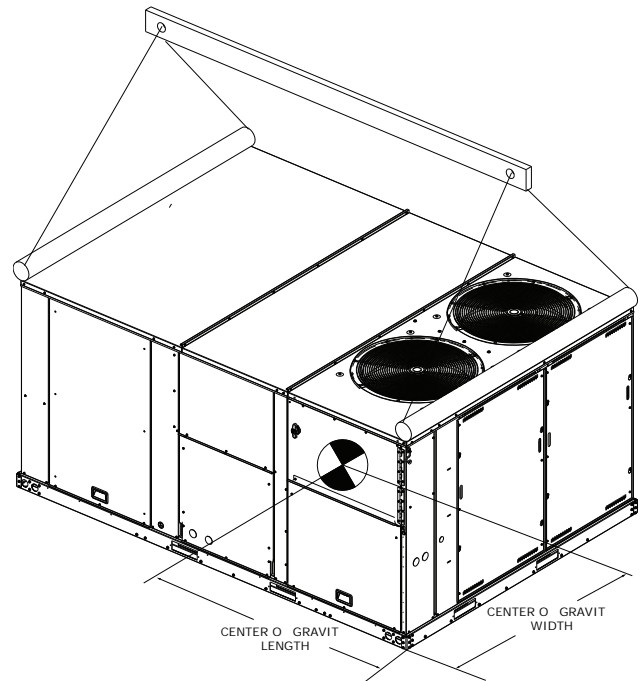


Figure 28. Rigging and center of gravity — 15 to 25 tons



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

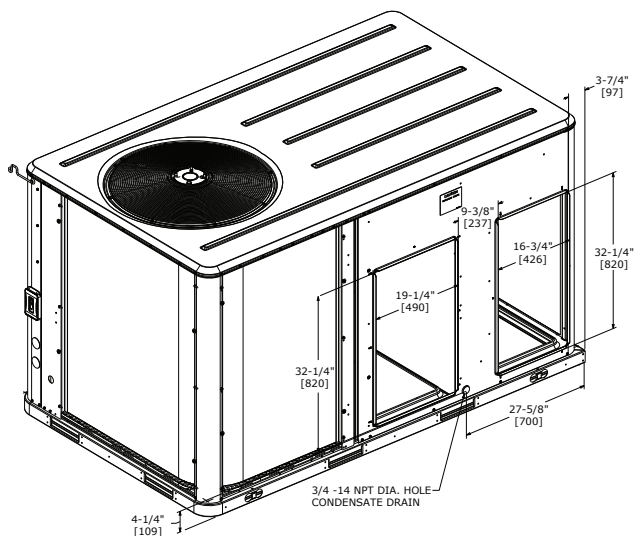


Figure 30. 12.5 tons standard efficiency – horizontal airflow, supply and return

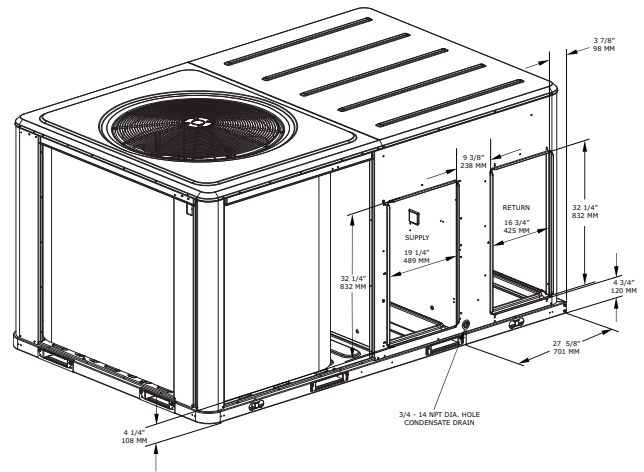
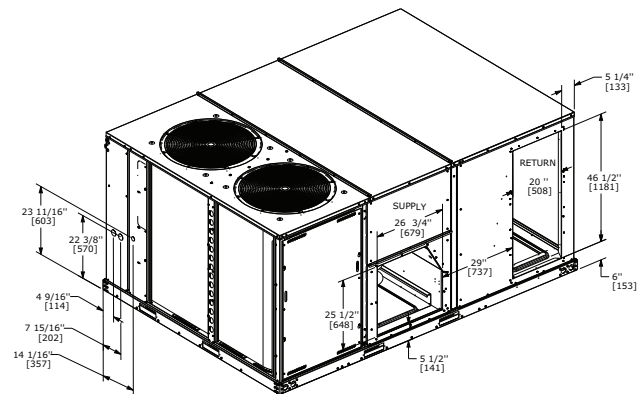


Figure 31. 15 to 25 ton standard efficiency – horizontal airflow supply/return



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

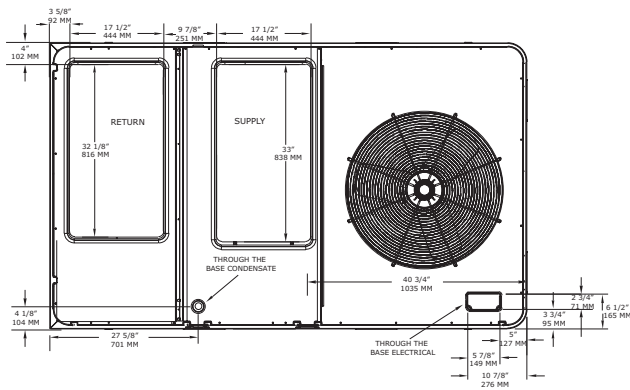


Figure 33. 12.5 tons standard efficiency – downflow airflow supply/return, through-the-base utilities

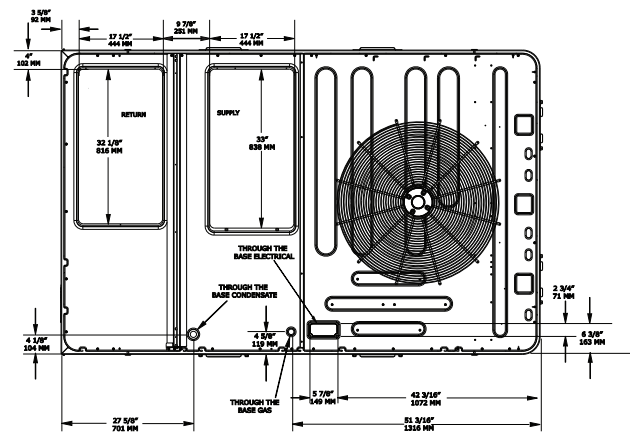
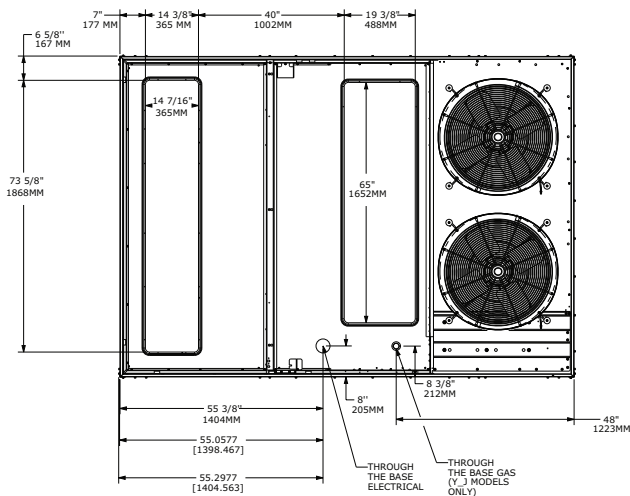


Figure 34. 15 to 25 tons standard efficiency – downflow airflow supply/return, through-the-base utilities



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

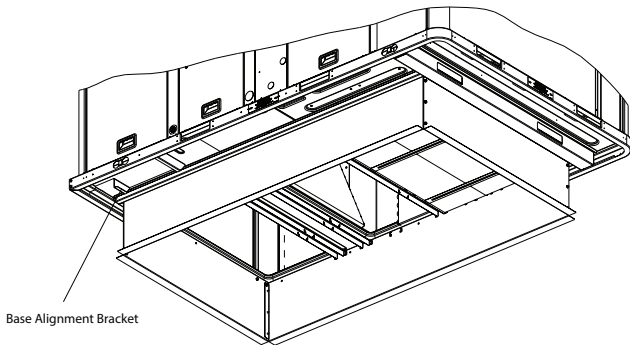
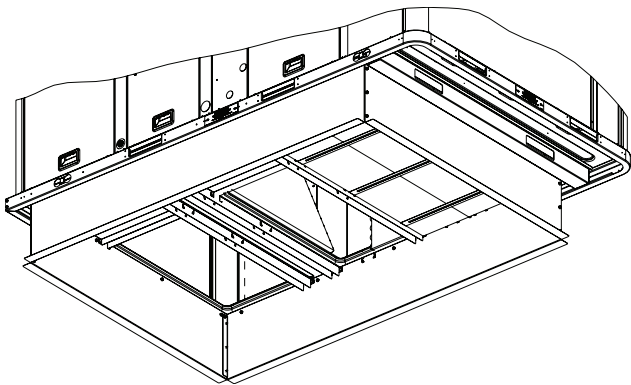


Figure 36. View for base to roof curb alignment on C.0 cabinet on a 60" x 84" roof curb



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

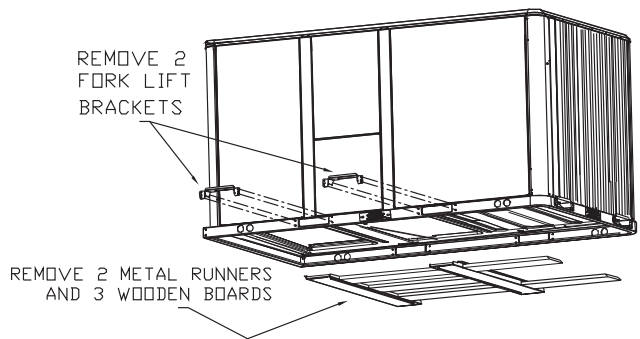


Figure 38. Fork pockets — 12.5 ton standard efficiency units

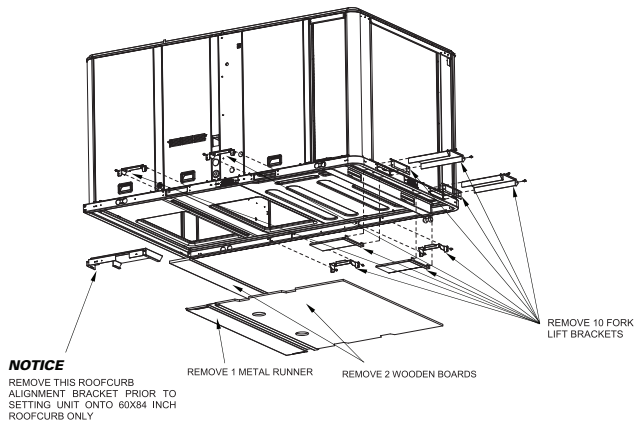
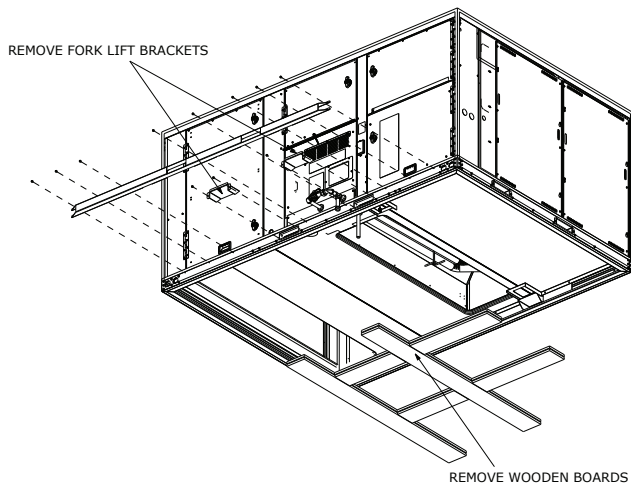


Figure 39. Fork pockets — 15 to 25 ton standard efficiency units



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

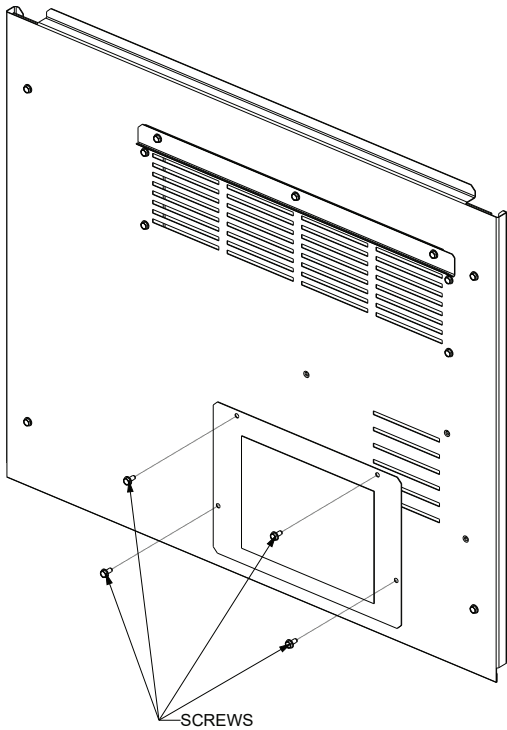
Note: This procedure applies only to 15 to 25 tons gas heat models.

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

Important:

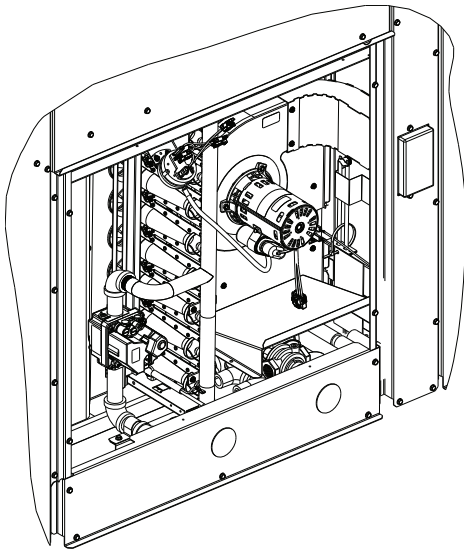
- *Make sure you read the label located on the cover plate before you discard it.*
- *Do not discard the fastening screws! They will be needed to install the vent hood.*

Figure 40. Discard cover plate



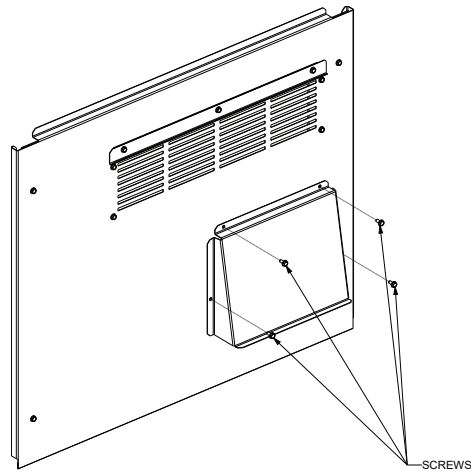
2. Locate the vent hood behind the panel, on the right side of the burner assembly.

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.

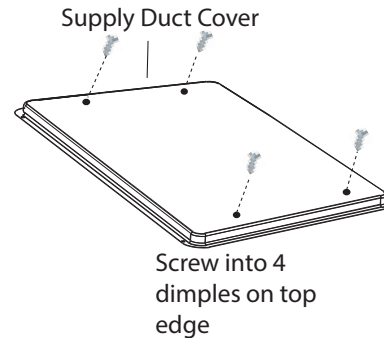
Supplies Needed by Installer for Conversion: 3 ounce tube of high temperature RTV sealant (500°F / 260°C, similar to Dow Corning 736).

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:

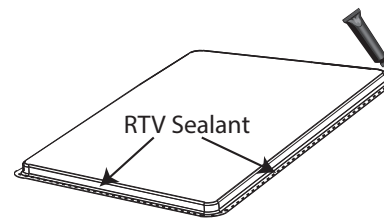
1. Remove RETURN and SUPPLY duct covers.
2. Place SUPPLY DUCT COVER over down-flow return opening. (insulation side down)
3. Using self-drilling screws, (or screws removed from duct cover), screw through dimples to attach DUCT COVER to base.

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

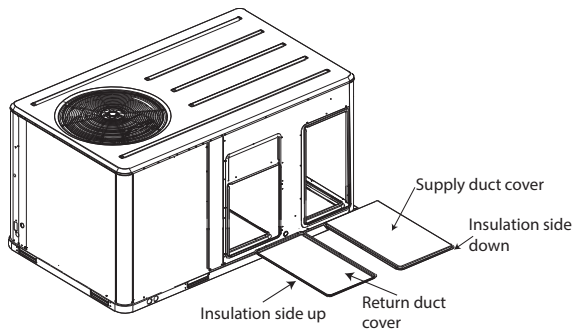


5. Slide RETURN DUCT COVER (insulation side up) into supply opening until inward edge of duct cover engages with the 2 retaining clips on the duct flange. Secure outward edge of the duct cover with two screws.

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

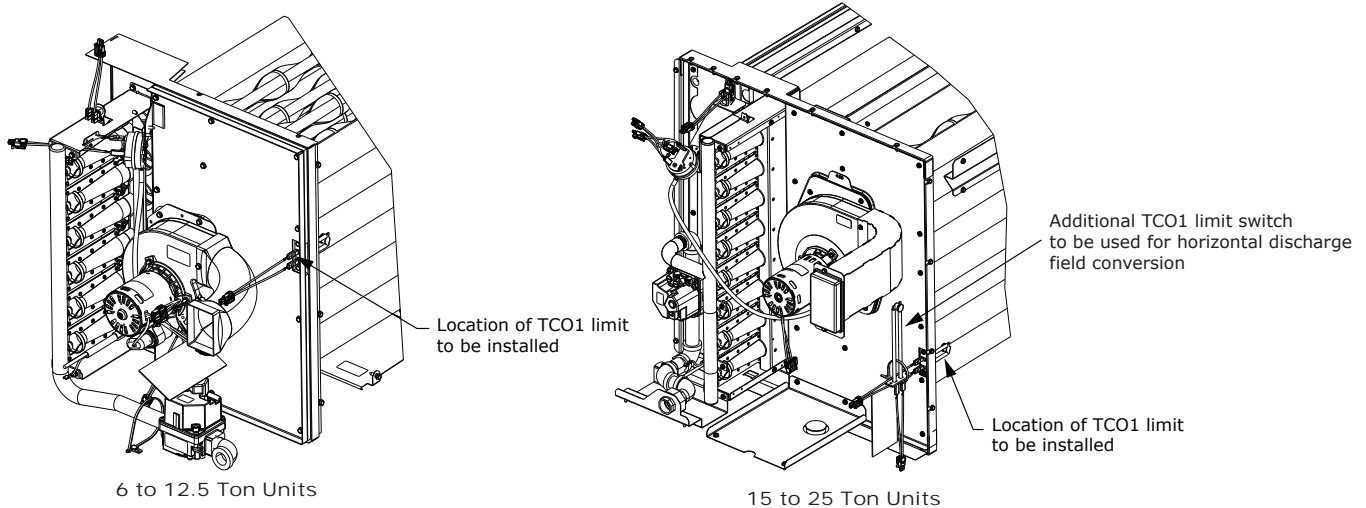


6. After completing installation of the duct covers for horizontal discharge, proceed to TCO-1 instructions.

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



If the unit being installed has a different TCO1 value than listed in , the limit control TCO1 must be replaced with the extra limit control shipped in the heater compartment. Replace TCO1 following the instructions in steps 1 through 3 below. If the unit being installed does not need to replace TCO1 limit switch, skip steps 1 through 3 and go on to next step in the installation process.

1. Remove the heat section access panel.
2. Remove TCO1 from shipping location, 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)
3. Replace and discard the existing TCO1 originally installed at the factory for down flow operation with the TCO1 shipped 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) for horizontal operation.
4. Replace heat section access panel.

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.

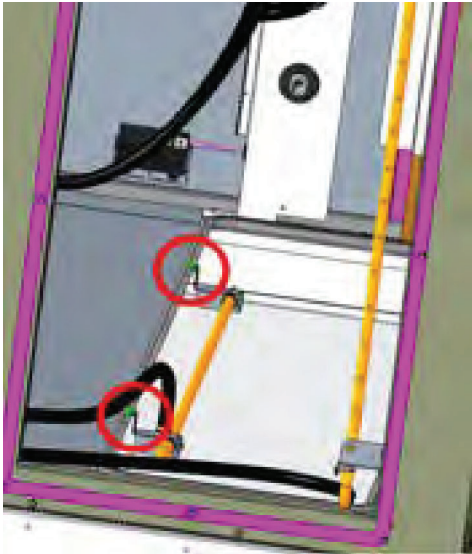
Return Air Smoke Detector

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.

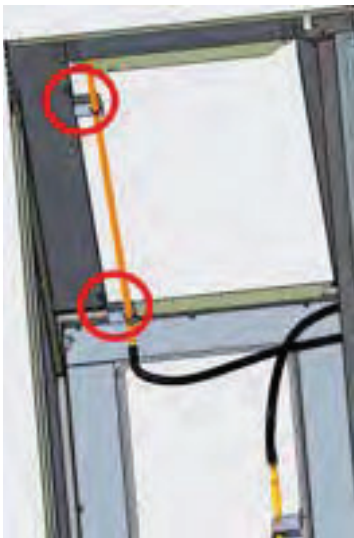
Figure 47. Downflow bracket installation (view from horizontal return duct)



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)

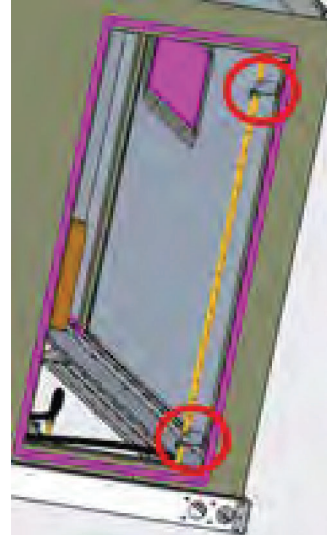


Note: Check to insure that the flexible tubing lies flat on the base pan surface.

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.

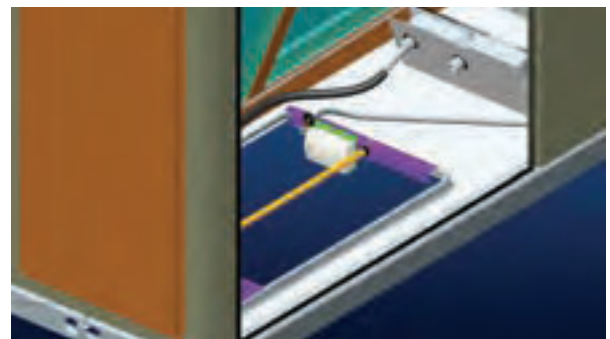
Air-Fi® Wireless Communication Interface

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:

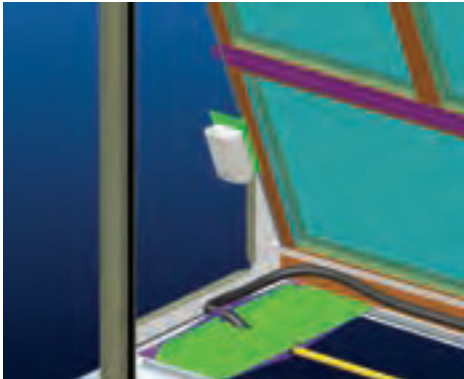
1. If the unit has an economizer, it must be pulled out in the operating position.
2. Remove the screw from the mounting bracket. Refer to downflow view for screw and bracket location.

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.

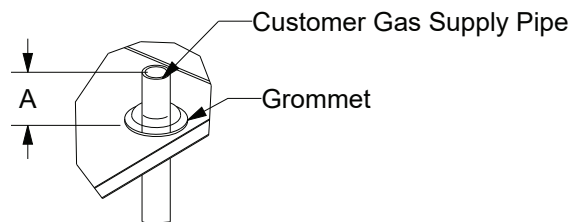
Note: For complete Gas Heat User information, Operation, Start-up, Shutdown and Maintenance refer to "Gas Heat Operation and Maintenance," p. 62.

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

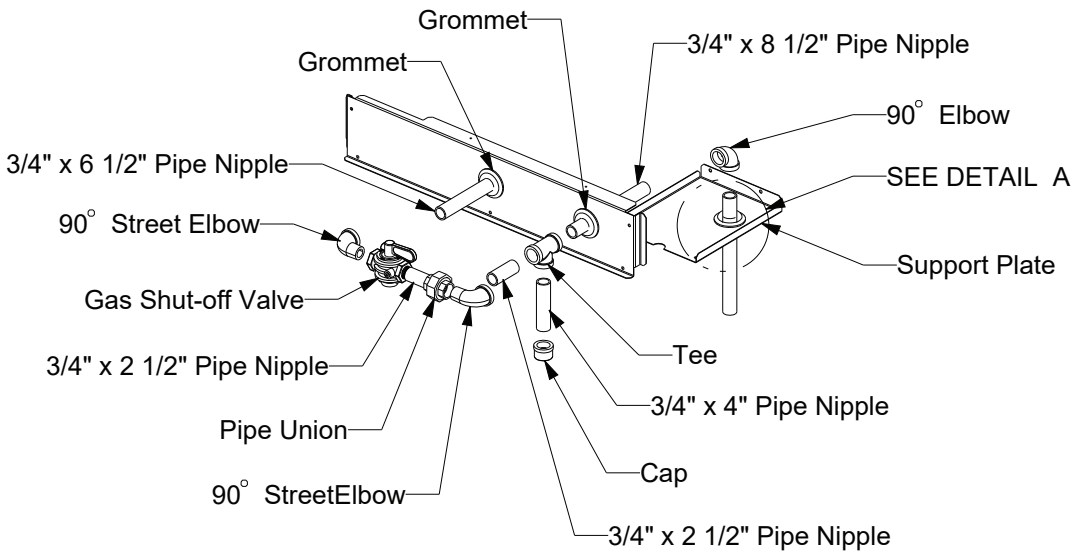
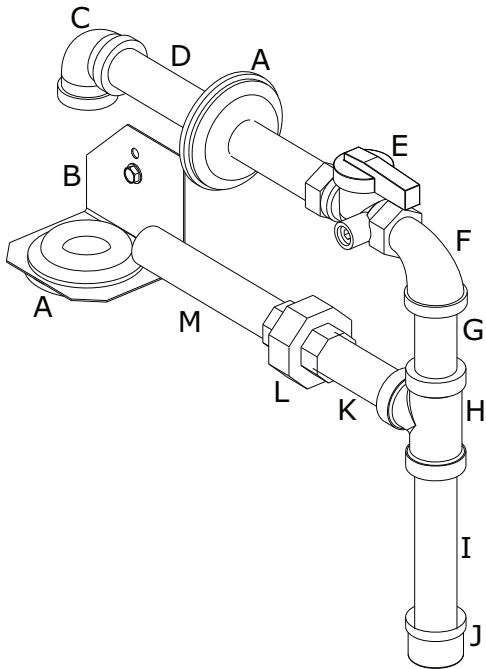


Figure 54. Through-the-base gas pipe assemblies for YSJ(072-150)A



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.

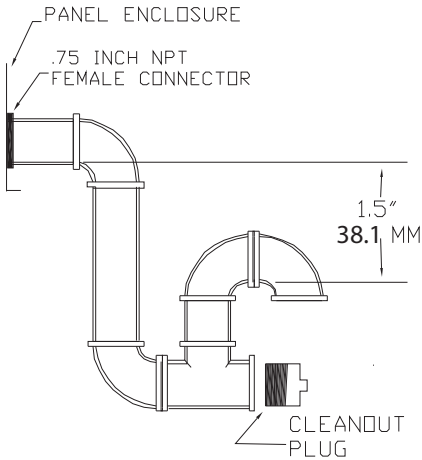
To convert drain condensate through the base of unit:

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

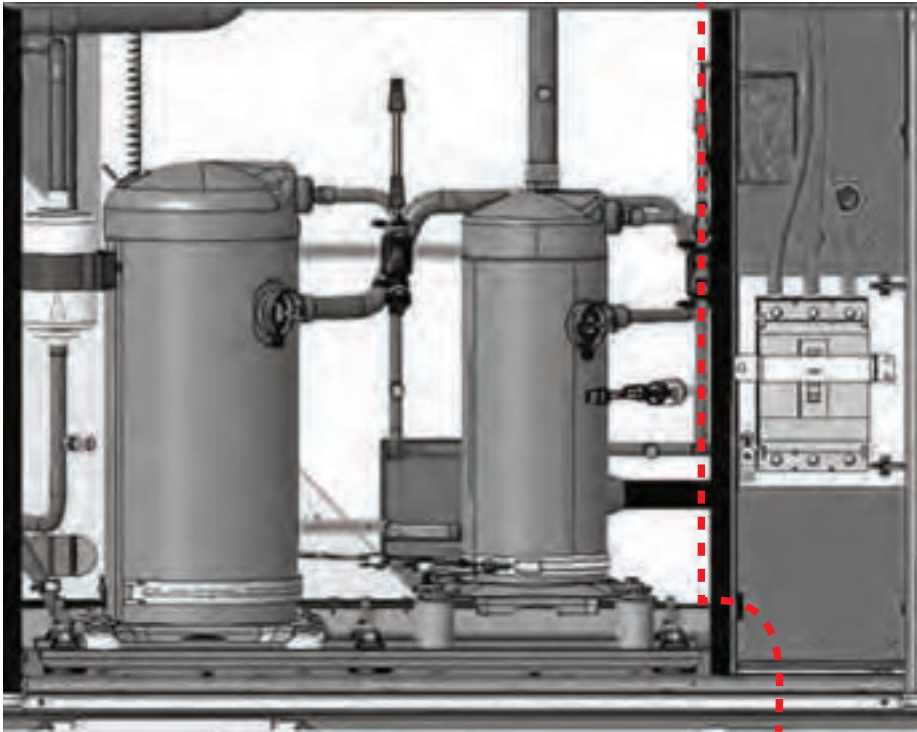


Figure 57. Low voltage wiring — C cabinet

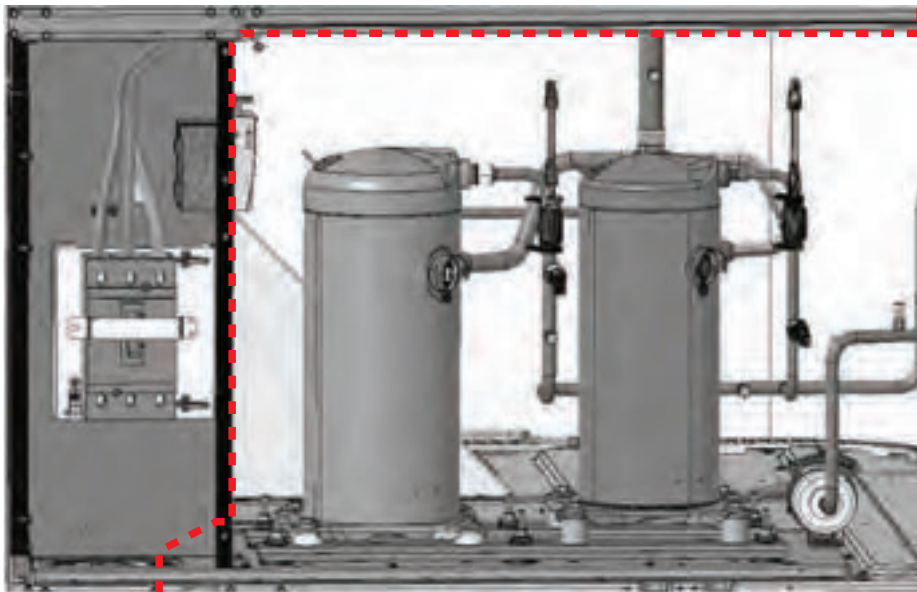


Figure 58. Low voltage wiring — D cabinet

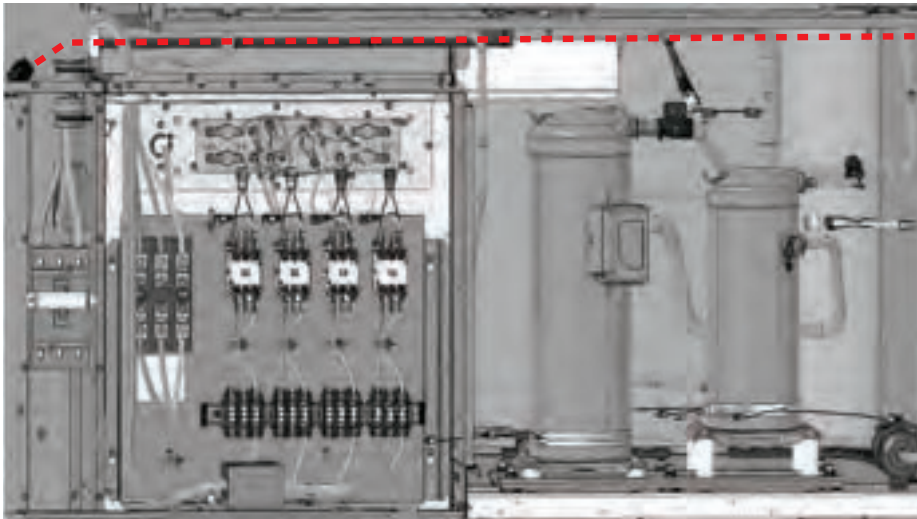


Figure 59. Main control panel low voltage wiring

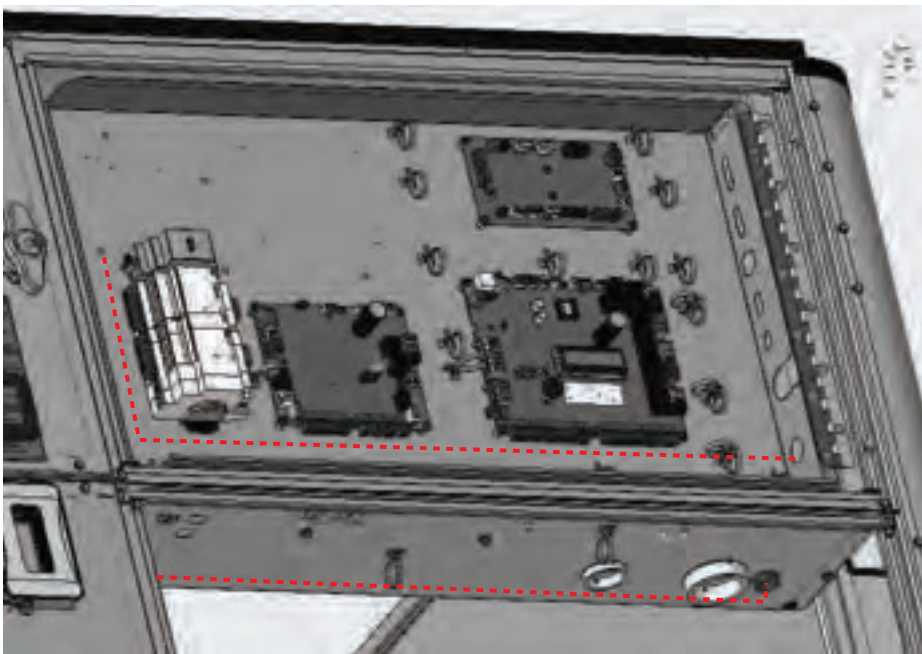


Table 8. Recommended wire lengths

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

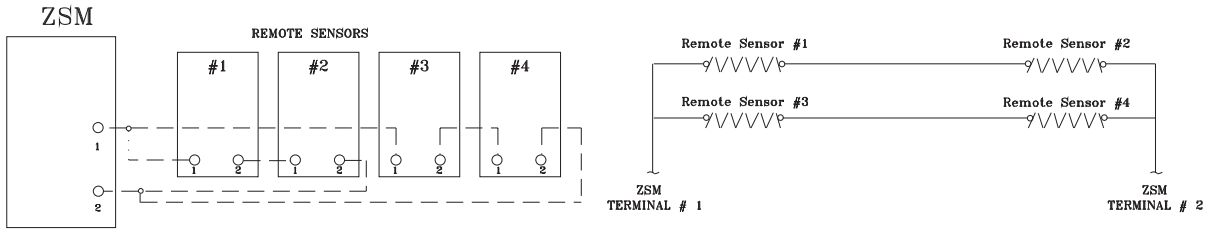
Space temperature averaging is accomplished by wiring a number of remote sensors in a series/parallel circuit.

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

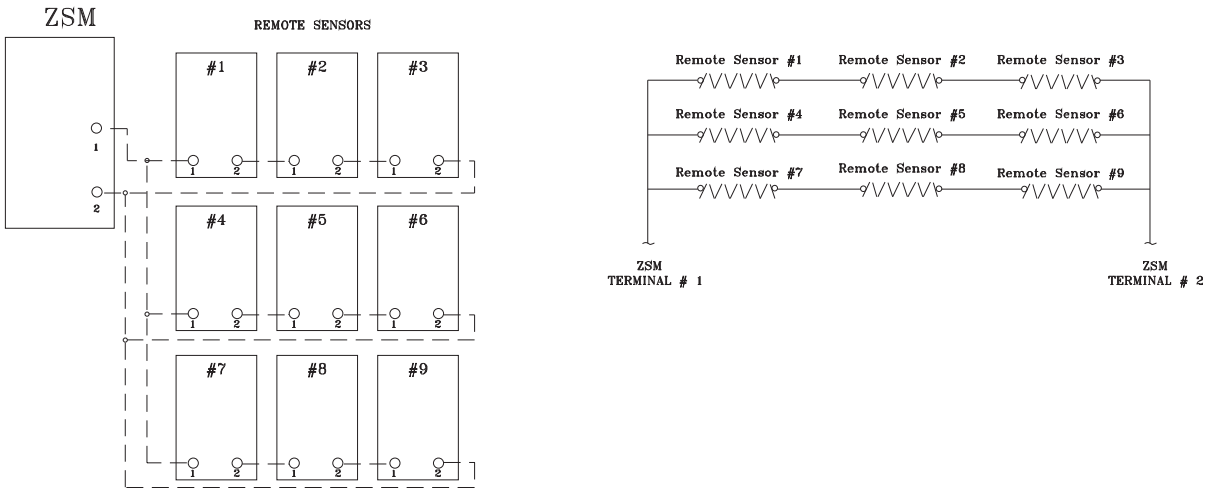
- Example #1 illustrates two series circuits with two sensors in each circuit wired in parallel. The square of any number of remote sensors is required.
- Example #2 illustrates three sensors squared in a series/parallel circuit. Using BAYSENS077*, two sensors are required to accomplish space temperature 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

Installation

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

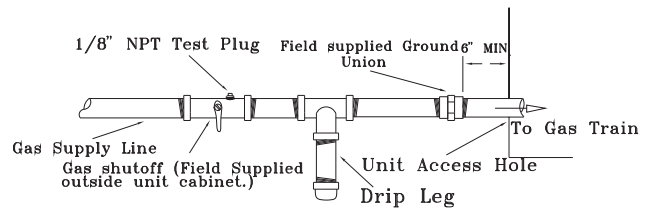
Note: Capacity of Pipe of Different Diameters and Lengths in Cu. Meter Per Hr. with Pressure Drop of 74.6 Pa and Specific Gravity of 0.60.

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

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

Piping Diagrams

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

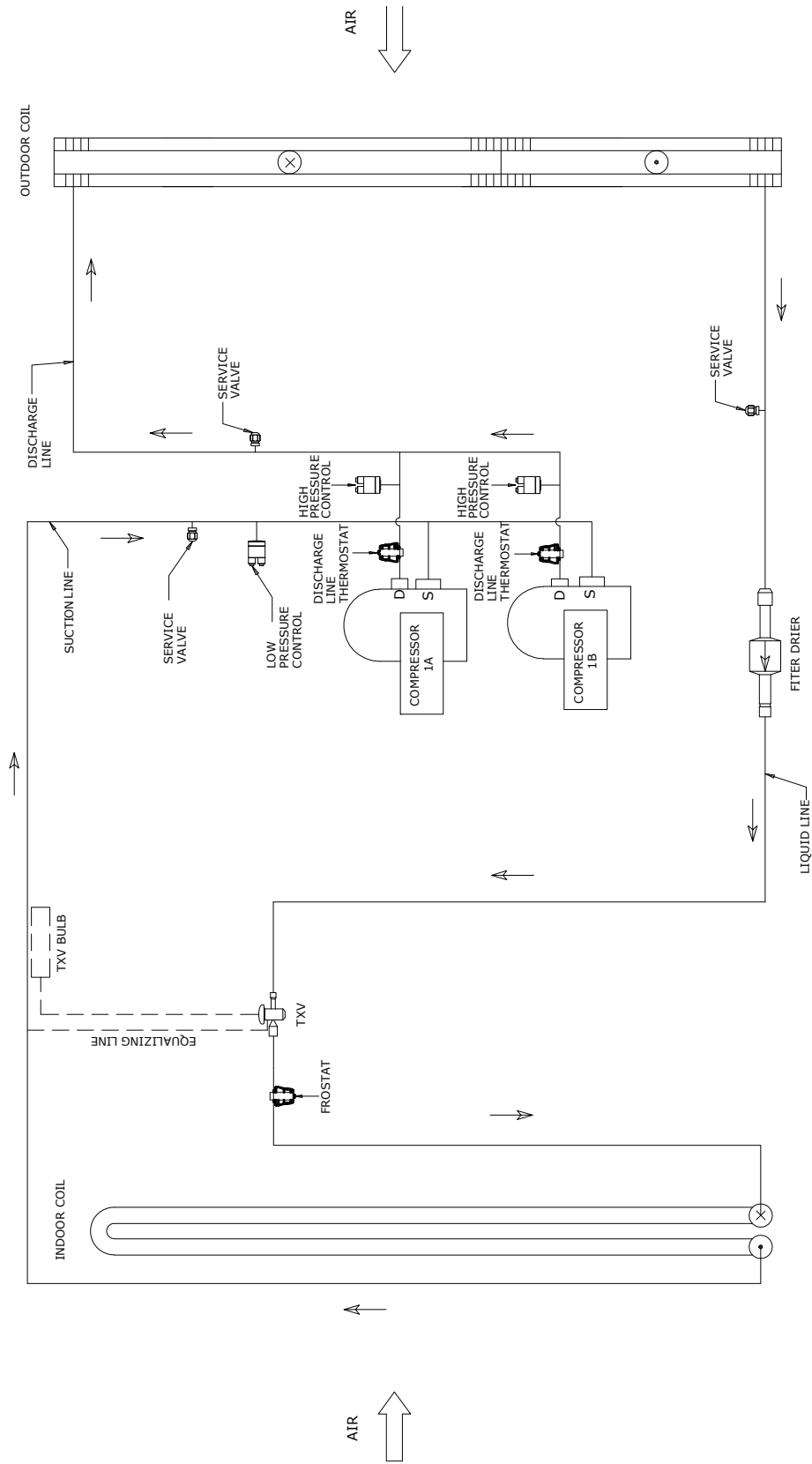


Figure 64. Piping diagram – 6 to 12.5 tons standard efficiency – hot gas reheat (YSJ072-150)

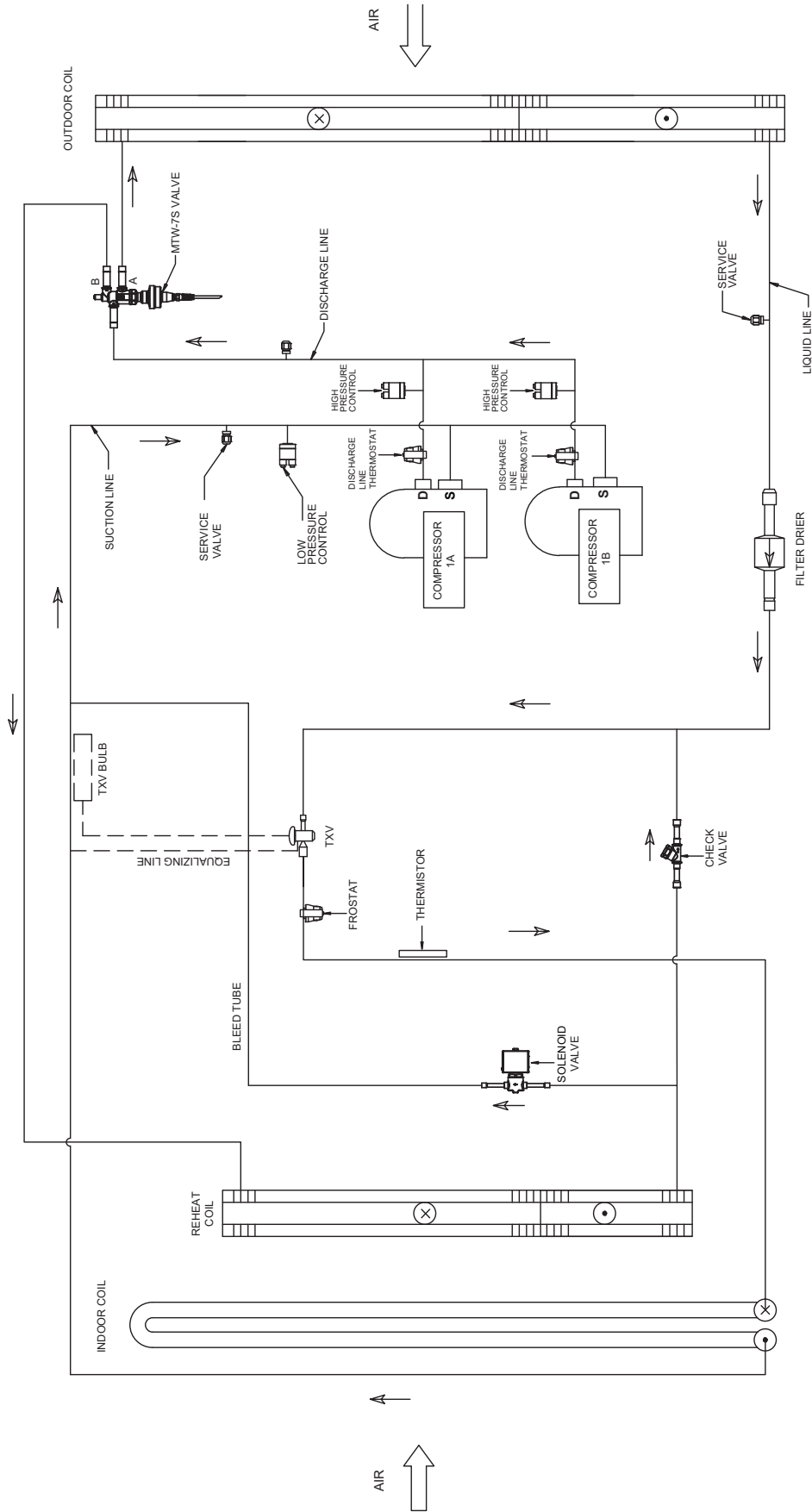


Figure 65. Piping diagram – 15 to 25 tons standard efficiency (YSJ180–300)

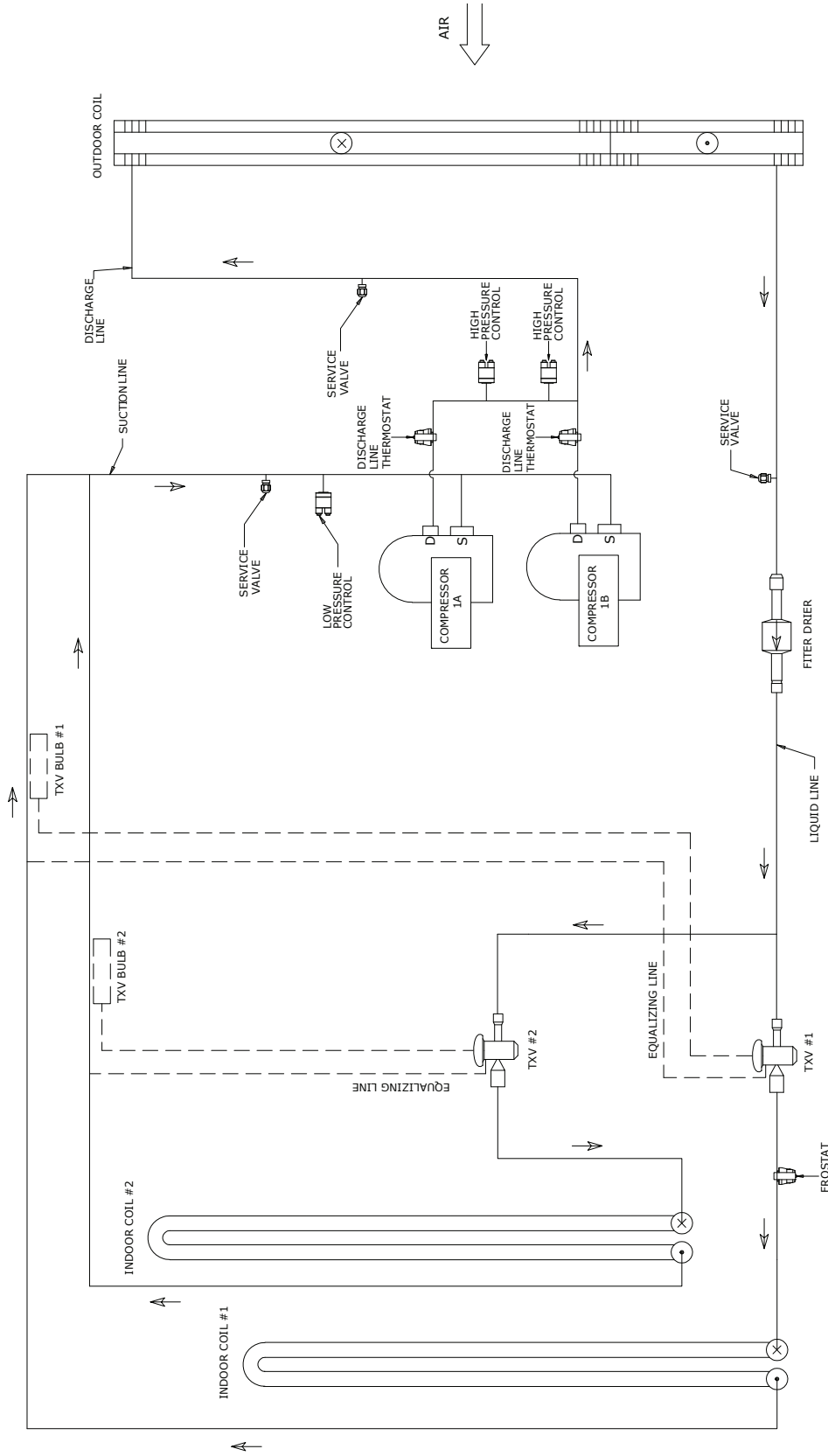


Figure 66. Piping diagram – 15 to 25 tons standard efficiency – hot gas reheat (YSJ180–300)

