



Installation, Operation, and Maintenance

Water Source Heat Pump Axiom™

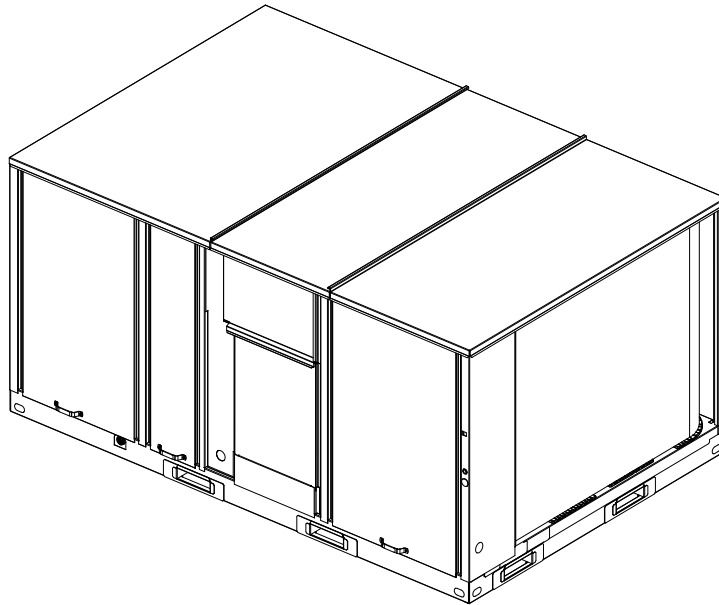
Rooftop - GWS*

3 to 20 Tons - 60 Hz

Model Numbers

GWSC036-120

GWS*150-240



▲ 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.

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TRANE
TECHNOLOGIES™



Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

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

The three types of advisories are defined as follows:



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



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



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

Important Environmental Concerns

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

Important Responsible Refrigerant Practices

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

⚠ WARNING

Proper Field Wiring and Grounding Required!

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

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

⚠ WARNING

Personal Protective Equipment (PPE) Required!

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

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

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

⚠ WARNING**Follow EHS Policies!**

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

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

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Revision History

Minor updates to document.



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Model Number Description

Digit 1

G = WSHP

Digit 2 — Unit Type

W = Packaged Heat Pump

Digit 3 — Efficiency

S = Standard Efficiency

Digit 4 — Airflow Configuration

C = Convertible
D = Downflow
H = Horizontal

Digit 5, 6, 7 — Nominal Gross Cooling Capacity (MBh)

036 = 3 Ton
048 = 4 Ton
060 = 5 Ton
072 = 6 Ton
092 = 7.5 Ton
120 = 10 Ton
150 = 12.5 Ton
180 = 15 Ton
240 = 20 Ton

Digit 8 — Major Design Sequence

Digit 9 — Voltage Selection

3 = 208-230/60/3
4 = 460/60/3
W = 575/60/3

Digit 10 — Unit Controls

R = ReliaTel™ Microprocessor

Digit 11— Electric Heat Option

0 = No Electric Heat
B = 6 kW¹
C = 9 kW¹
E = 12 kW¹
G = 18 kW
J = 23 kW¹
K = 27 kW¹
N = 36 kW
P = 54 kW
R = 72 kW

Digit 12 — Minor Design Sequence

* First Sequence

Digit 13, 14 — Service Sequence

** Factory Assigned

Digit 15 — Fresh Air Selection⁶

A = Manual Outside Air Damper^{2 3}
B = Motorized Outside Air Damper 0-50%^{2 4}
C = Economizer, Dry Bulb 0-100% without Barometric Relief^{2 5}
D = Economizer, Dry Bulb with Barometric Relief⁵
E = Economizer, Reference Enthalpy without Barometric Relief⁵
F = Economizer, Reference Enthalpy with Barometric Relief⁵
G = Economizer, Comparative Enthalpy without Barometric Relief^{2 5}
H = Economizer, Comparative Enthalpy with Barometric Relief
K = Low Leak Economizer Barometric Relief
M = Low Leak Economizer with Reference Enthalpy with Barometric Relief
P = Low Leak Economizer with Comparative Enthalpy with Barometric Relief

Digit 16— Supply Fan/DriveType/Motor

0 = Standard⁷
1 = Oversized Motor^{7 8}
3 = High Efficiency Motor^{9 8}
6 = Single Zone Variable Air Volume (SZVAV)⁹
7 = Multi-Speed Indoor Fan⁹
8 = Single Zone Variable Air Volume Oversized Motor⁹
9 = Multi-Speed Oversized Motor⁹
A = Single Zone Variable Air Volume Standard Motor w/ Shaft Ground Ring⁹
B = Multi-Speed Standard Motor w/ Shaft Ground Ring⁹
C = Single Zone Variable Air Volume Oversized Motor w/ Shaft Ground Ring⁹
D = Multi-Speed Oversized Motor w/ Shaft Ground Ring⁹

Digit 17 — Hinged Service Access / Filters⁸

0 = Standard Panels/Standard Filters¹⁰
A = Hinged Access /Standard Filters¹⁰
B = Standard Panels/2" MERV 8 Filters
C = Hinged Access/2" MERV 8 Filters
D = Standard Panels/MERV 13 Filters
E = Hinged Access/MERV 13 Filters

Digit 19 — Through The Base Provisions

0 = No Through The Base Provisions
A = Through The Base Electric¹¹
D = Through The Base Utilities Access

Digit 20 — Disconnect/Circuit Breaker¹²

0 = No Disconnect/No Circuit Breaker
1 = Unit Mounted Non-Fused Disconnect¹³
2 = Unit Mounted Circuit Breaker¹³

Digit 21 — Convenience Outlet Option

0 = Without Convenience Outlet
A = Unpowered Convenience Outlet¹⁴
B = Powered Convenience Outlet¹⁴

Digit 22 — Communications Options

0 = No Communications Interface
1 = Trane® Communications Interface ¹⁵
2 = LonTalk® Communications Interface
6 = BACnet® Communications Interface
7 = Air-Fi® Wireless Communications¹⁶

Digit 23 — Refrigeration System Option

0 = Standard Refrigeration System

Digit 24 — Refrigeration Controls

0 = Without Refrigeration Controls
1 = Frostat™

Digit 25 — Smoke Detector^{17 18}

0 = No Smoke Detector
A = Return Air Smoke Detector
B = Supply Air Smoke Detector
C = Supply and Return Air Smoke Detectors
D = Plenum Smoke Detector

Digit 26 — System Monitoring Controls¹⁷

0 = No Monitoring Controls
1 = Clogged Filter Switch
2 = Fan Failure Switch
3 = Discharge Air Sensing
4 = Clogged Filter Switch and Fan Failure
5 = Clogged Switch and Discharge Air Sensing
6 = Fan Failure Switch and Discharge Air Sensing
7 = Clogged Filter Switch, Fan Failure Switch and Discharge Air Sensing
A = Condensate Drain Pan Overflow Switch
B = Clogged Filter Switch and Condensate Drain Pan Overflow Switch
C = Fan Failure Switch and Condensate Drain Pan Overflow Switch
D = Discharge Air Sensing and Condensate Drain Pan Overflow Switch
E = Clogged Filter Switch, Fan Failure Switch and Condensate Drain Pan Overflow Switch
F = Clogged Filter Switch, Discharge Air Sensing Tube and Condensate Drain Pan Overflow Switch
G = Fan Failure Switch, Discharge Air Sensing Tube and Condensate Drain Pan Overflow Switch
H = Clogged Filter Switch, Fan Failure Switch, Discharge Air Sensing and Condensate Drain Pan Overflow Switch



Model Number Description

Digit 27 — System Monitoring Controls

0 = No Monitoring Controls
A = Demand Control Ventilation (CO₂)²²
B = Low Leak Economizer with FDD (Fault Detection & Diagnostics)
C = FDD (Fault Detection & Diagnostics) with DVC (Demand Control Ventilation)

Digit 28— Unit Hardware Enhancements

0 = No Enhancements
1 = Stainless Steel Drain Pan

Digit 29 — Short Circuit Current Rating

0 = Standard SCCR
A = 65kA SCCR Option ^{19 20}

Digit 30–31

0 = Standard

Digit 32

0 = Standard Unit Controls
1 = Human Interface²¹

Digit 32–41

0 = Standard

Digit 42 — Heat Exchanger

1 = Copper Water Coil
2 = Cupro—nickel Water Coil
7 = Insulated copper heat ex/partial suction
8 = Insulated CU—NI heat ex/partial suction

Digit 43 — Freeze Protection

A = 20 °F Freezestat (Extended Range)
B = 30 °F Freezestat (Standard Range)

Digit 44 — Special

0 = Standard Unit
S = Special Unit

45 — Minor Design Sequence

*Factory Assigned

Model Number Notes

Notes:

1. Not available on 12.5 to 20 ton models.
2. Only available on 3 to 10 ton models.
3. 3 to 10 ton models - Manual outside air damper will ship factory supplied within the unit, but must be field installed.
4. Motorized outside air damper is not available on Multi-Speed or SZVAV (Single Zone Variable Air Volume)
5. On the 3 to 10 ton models the economizer with barometric relief is for downflow configured units only. Order economizer without barometric relief for horizontal configuration. Barometric relief for horizontal configured units must be ordered as field installed accessory.
6. Some field set up required.
7. Multi-stage, direct drive standard on 3 to 5 ton models. Belt drive standard on 6 and 12.5 to 20 ton models. Variable speed direct drive standard on 7.5 to 10 ton models.
8. Available factory installed on downflow AND horizontal units. Verify with ordering system.
9. Only available on 7.5 to 20 ton models, verify with ordering system.
10. Standard filters are not available with Low Leak Economizers.
11. Through-the-base electrical option or Horizontal-Side Access must be ordered with either unit mounted disconnect or circuit breaker. When adding heat, you must order Trane Electric Heat.
12. Unit mounted disconnect and circuit breakers are mutually exclusive of each other.
13. Through-the-base electric required when ordering disconnect/circuit breaker options
14. Must be ordered with Through-the-Base Electrical option or Horizontal-Side Access and either Unit Mounted Disconnect or Circuit Breaker.
15. TCI is for use with non-VariTrac™ systems and VariTrac™ systems.
16. Must be used with BACnet® open protocol.
17. Requires ReliaTel™ Options Module.
18. Option cannot be ordered in conjunction with field installed economizer on downflow units. Must be factory installed. The return air smoke detector may not fit up or work properly on the Axiom™ rooftop units when used in conjunction with 3rd party accessories (such as bolt on heat wheels, economizers, and power exhaust). Do not order the return air smoke detectors when using this type of accessory.
19. 575 VAC option is 25kA.
20. Only available on 15 to 20 ton models.
21. Human Interface is standard with FDD (Fault Detection Diagnostics). Not available on 20 ton model.
22. Demand control ventilation option includes wiring only. The CO₂ sensor is a field-installed only option.



General Information

Overview of Manual

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

This booklet describes proper installation, operation, and maintenance procedures for air cooled systems.

By carefully reviewing the information within this manual and following the instructions, the risk of improper operation and/or component damage will be minimized.

It is important that periodic maintenance be performed to help assure trouble free operation. A maintenance schedule is provided at the end of this manual.

Should equipment failure occur, contact a qualified service organization with qualified, experienced HVAC technicians to properly diagnose and repair this equipment.

Unit Inspection

As soon as the unit arrives at the job site:

- Verify that the nameplate data matches the data on the sales order and bill of lading (including electrical data).
- Verify that the power supply complies with the unit nameplate specifications.
- Visually inspect the exterior of the unit, including the roof, for signs of shipping damage.
- Visually inspect the internal components for shipping damage as soon as possible after delivery and before it is stored. Do not walk on the sheet metal base pans.
- If concealed damage is discovered, notify the carrier's terminal of damage immediately by phone and by mail. Concealed damage must be reported within 15 days.

Request an immediate joint inspection of the damage by the carrier and the consignee. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.

- Notify the appropriate sales representative before installing or repairing a damaged unit.

⚠ 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.

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 procedure.

The manufacturer will not assume any responsibility for equipment damage resulting from condensate



General Information

accumulation on the unit's electrical and/or mechanical components.

Unit Clearances

The Unit Dimensions section 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 "short-circuiting" of exhaust and economizer airflows.

Unit Description

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

The ReliaTel™ Control Module is a microelectronic control system that is referred to as "Refrigeration Module" (RTRM). The acronym RTRM is used extensively throughout this document when referring to the control system network.

This module through Proportional/Integral control algorithms perform specific unit functions that governs unit operation in response to; zone temperature, supply air temperature, and/or humidity conditions depending on the application. The stages of capacity control for these units are achieved by starting and stopping the compressors.

The RTRM is mounted in the control panel and is factory wired to the respective internal components. The RTRM receives and interprets information from other unit modules, sensors, remote panels, and customer binary contacts to satisfy the applicable request for cooling.

ReliaTel™ Control

Economizer Control Actuator

The ECA monitors the mixed air temperature, return air temperature, minimum position setpoint (local or remote), power exhaust setpoint, CO₂ setpoint, CO₂, and ambient dry bulb/enthalpy sensor or comparative humidity (return air humidity against ambient humidity) sensors, if selected, to control dampers to an accuracy of +/- 5% of stroke. The actuator is spring returned to the closed position any time that power is lost to the unit. It is capable of delivering up to 25 inch pounds of torque and is powered by 24 Vac.

RTCI – ReliaTel™ Trane Communication Interface (Optional)

This module is used when the application calls for an ICS™ building management type control system. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or ordered as

a kit to be field installed. Follow the installation instruction that ships with each kit when field installation is necessary.

RLCI – ReliaTel™ LonTalk Communication Interface (Optional)

This module is used when the application calls for an ICS™ building management type control system that is LonTalk. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or ordered as a kit to be field installed. Follow the installation instruction that ships with each kit when field installation is necessary.

RBCI – ReliaTel™ BACnet® Communication Interface (Optional)

This module is used when the application calls for an open BACnet protocol. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or as a kit to be field installed. Follow the installation instructions that ships with each kit when field installation is necessary.

RTOM – ReliaTel™ Options Module (Optional)

The RTOM monitors the supply fan proving, clogged filter, supply air temperature, exhaust fan setpoint, supply air tempering, Froststat™ and smoke detector. Refer to system input devices and functions for operation.

Trane Air-Fi® Wireless Communication Interface (Optional)

The Trane Air-Fi Wireless Communication Interface (WCI) allows for wireless communication between system controls, unit controls, and wireless sensors for Trane control products that use BACnet protocol. The WCI replaces the need for communications wire in all system applications.

System Input Devices & Functions

The RTRM must have a zone sensor or thermostat input in order to operate the unit. The flexibility of having several mode capabilities depends upon the type of zone sensor or thermostat selected to interface with the RTRM.

The descriptions of the following basic Input Devices used within the RTRM network are to acquaint the operator with their function as they interface with the various modules. Refer to the unit's electrical schematics for the specific module connections.

Note: *The following controls are available from the factory for field installation.*

Supply Fan Failure Input (Optional)

The Fan Failure Switch can be connected to sense indoor fan operation:

FFS (Fan Failure Switch) If air flow through the unit is not proven by the differential pressure switch connected to the RTOM (factory set point 0.07 " w.c.) within 40 seconds nominally, the RTRM will shut off all mechanical operations, lock the system out, send a diagnostic to ICS, and the SERVICE output will flash. The system will remain locked out until a reset is initiated either manually or through ICS.

Drain Pan Condensate Overflow Switch (Optional)

This input incorporates the Condensate Overflow Switch (COF) mounted on the drain pan and the ReliaTel™ Options Module (RTOM). When the condensate level reaches the trip point for 6 continuous seconds, the RTOM will shut down all unit function until the overflow condition has cleared. The unit will return to normal operation after 6 continuous seconds with the COF in a non-tripped condition. If the condensate level causes the unit to shutdown more than 2 times in a 3 day period, the unit will be locked-out of operation. A manual reset of the diagnostic system through the Zone Sensor or Building Automation System (BAS) will be required. Cycling unit power will also clear the fault."

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 RTOM. A diagnostic SERVICE signal is sent to the remote panel if the pressure differential across the filters is at least 0.5" w. c. The contacts will automatically open when the pressure differential across the filters decreases to approximately 0.4" 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.

Please note that 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" w.c. and open when the differential falls to 0.7" w.c.

Compressor Disable (CPR1/2)

This input incorporates the low pressure control (LPC) of each refrigeration circuit and can be activated by opening a field supplied contact installed on the LTB.

If this circuit is open before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is opened for 1 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 3 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

ReliaTel™ 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 the first three minutes of operation, the compressor will be locked out, a diagnostic communicated to ICS™ if applicable, and a manual reset will be required to restart the compressor.

High Pressure Control

ReliaTel™ Control

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

On dual circuit units, if the high pressure control opens, the compressor on the affected circuit is locked out. A manual reset for the affected circuit is required.

Power Exhaust Control (Optional)

The power exhaust fan is started whenever the position of the economizer dampers meets or exceed the power exhaust setpoint when the indoor fan is on.

The setpoint panel is located in the return air section and is factory set at 25%.

Lead/Lag Control (Dual Circuit Only)

Lead/Lag is a selectable input located on the RTRM. The RTRM is configured from the factory with the Lead/Lag control disabled. To activate the Lead/Lag function, simply cut the wire connected to J3-8 at the RTRM. When it is activated, each time the designated lead compressor is shut off due to the load being satisfied, the lead compressor or refrigeration circuit switches. When the RTRM is powered up, i.e. after a power failure, the control will default to the number one circuit compressor.

Evaporator Frost Control

This input incorporates the Frostat™ control (FOS) mounted in the indoor coil and can be activated by closing a field supplied contact installed in parallel with the FOS.

If this circuit is closed before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is closed for 1 continuous second during compressor operation, the compressor for that circuit is immediately



General Information

turned “Off”. The compressor will not be allowed to restart for a minimum of 3 minutes should the FOS open.

Frostat™ is standard on multi-speed indoor motors and single zone VAV products (SZVAV).

Smoke Detector Sensor (Optional)

This sensor is only applicable on units equipped with a RTOM. It provides high limit “shutdown” of the unit and requires a manual reset. The sensor is used to detect smoke due to fire in the air conditioning or ventilation ducts.

The supply and return air smoke detectors are designed to shut off the unit if smoke is sensed in the supply air stream or return air stream. 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 it's design function.

Important: *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.

Zone Sensors

Note: *Zone sensor required for units configured for Single Zone VAV indoor fan system control to enable Single Zone VAV functionality.*

Zone Sensor Module (ZSM) (BAYSENS107*)

This electronic 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. (Cooling Setpoint Only)

Zone Sensor (BAYSENS109*)

This electronic sensor features four system switch settings (Heat, Cool, Auto, and Off) and two fan settings (On and Auto) with four system status LED's. It is a manual or auto changeover control with dual setpoint capability. It can be used with a remote zone temperature sensor BAYSENS075*.

Programmable Zone Sensor (BAYSENS119*)

Programmable Night Setback: Auto or manual changeover with seven-day programming. Keyboard selection of Heat, Cool, Fan, Auto, or On. All programmable sensors have System On, Heat, Cool, Service LED/indicators as standard. Night Setback Sensors have one (1) Occupied, one (1) Un-occupied, and one (1) Override program per day.

Remote Zone Sensor (BAYSENS073*)

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

Remote Zone Sensor (BAYSENS074*)

This electronic 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 (BAYSENS075*)

This electronic sensor can be used with BAYSENS106*, 108*, 110*, 109* Remote Panels. When this sensor is wired to a BAYSENS109* Remote Panel, wiring must be 18 AWG Shielded Twisted Pair (Belden 8760 or equivalent). Refer to the specific Remote Panel for wiring details.

Wireless Zone Sensor (BAYSENS050)

This electronic sensor features five system settings (Auto, Off, Cool, Heat, and Emergency Heat) and with On and Auto fan settings. It is a manual or auto changeover control with dual setpoint capability. Other features include a timed override function, lockable system settings, and Fahrenheit or Celsius temperature display. Included with the wireless zone sensor will be a receiver that is to be mounted inside the unit, a mounting bracket, and a wire harness.

Thermostat (BAYSTAT150)

This thermostat is a multi-stage 3 heat/2 cool, auto-changeover digital display thermostat. It is a programmable thermostat, and a 7-day programmable stat with night setback shall be available. In addition, it is wall mounted.

Thermostat (BAYSTAT151)

This thermostat is a single-stage 1 heat/1 cool, auto-changeover digital display thermostat. It is a non-programmable, wall-mounted thermostat.

Thermostat (BAYSTAT155)

This thermostat is a multi-stage 3 heat/2 cool, auto changeover digital display thermostat. It is a non-programmable, wall-mounted thermostat, and it can be used for Economizer Operation.

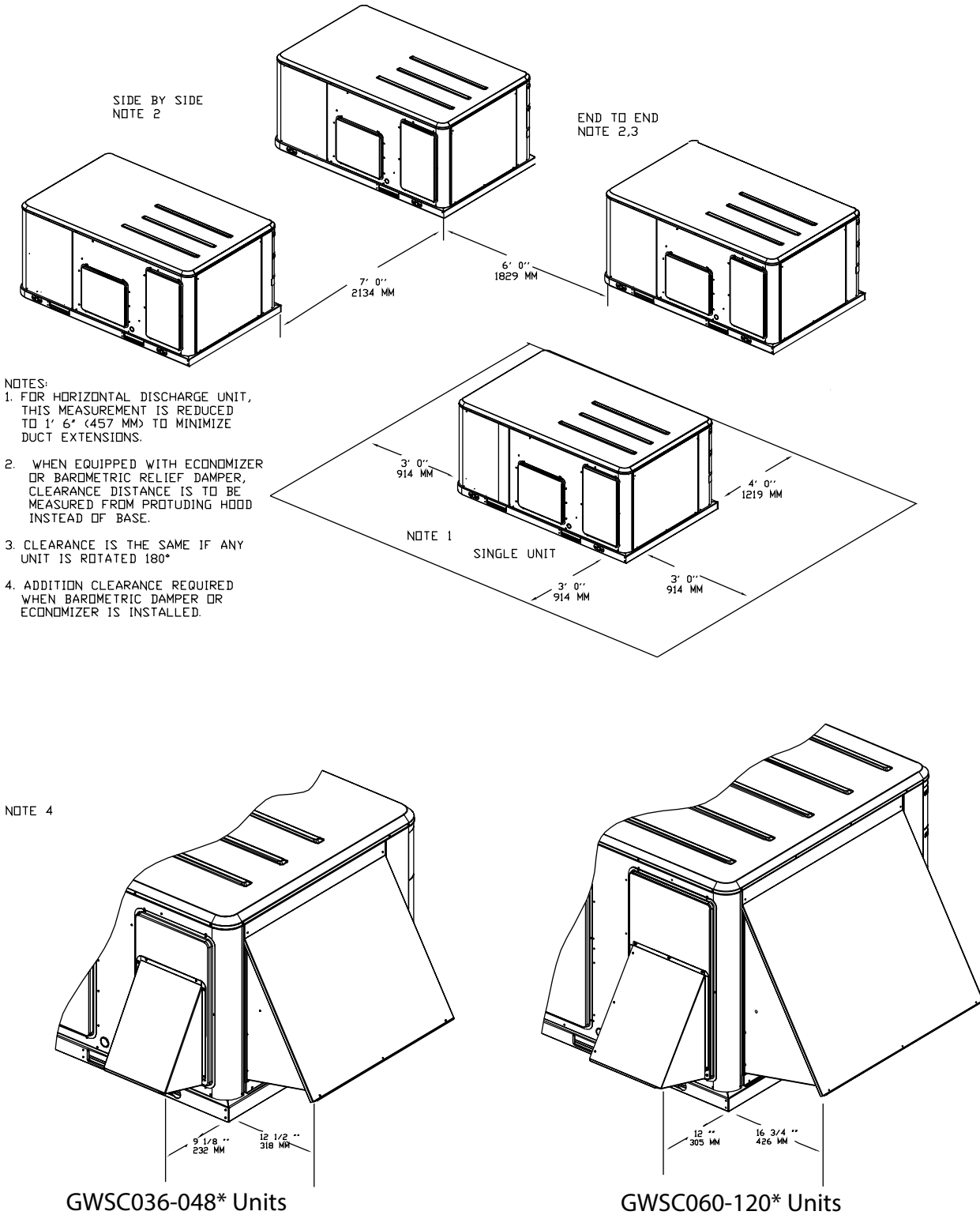
Human Interface - 5 Inch Color Touchscreen (Optional)

The 5 inch Color Touchscreen Human Interface provides an intuitive user interface to the rooftop unit that speeds up unit commissioning, shortens unit troubleshooting times, and enhances preventative maintenance measures. The human interface includes several features including

- Data trending capabilities by means of time series graphs
- Historical alarm messages
- Real-time sensor measurements
- On board system setpoints
- USB port that enables the downloading of component runtime information as well as trended historical sensor data
- Customized reports

Unit Dimensions

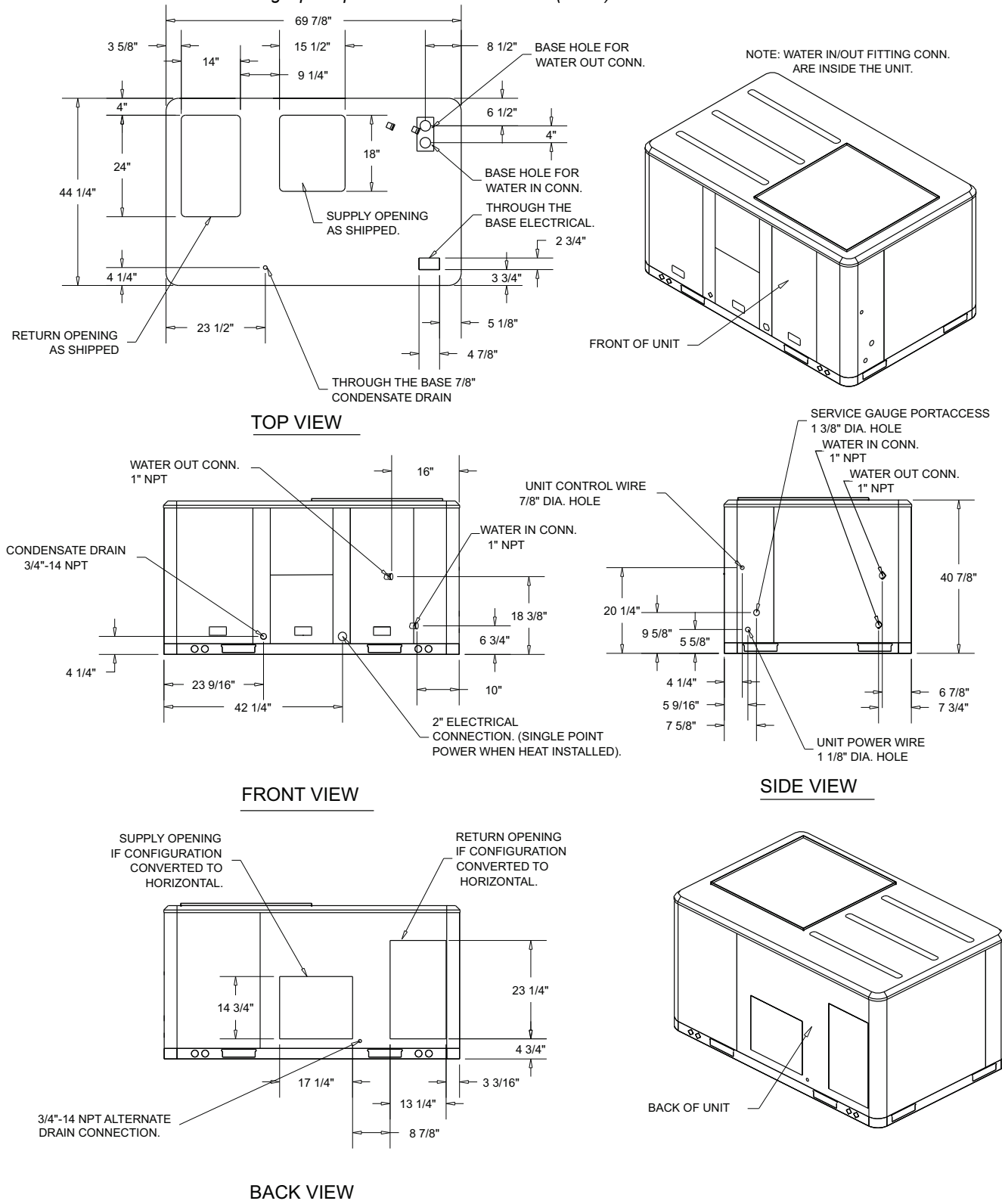
Figure 1. Typical installation clearances for single & multiple unit applications



- NOTES:
1. FOR HORIZONTAL DISCHARGE UNIT, THIS MEASUREMENT IS REDUCED TO 1' 6" (457 MM) TO MINIMIZE DUCT EXTENSIONS.
 2. WHEN EQUIPPED WITH ECONOMIZER OR BAROMETRIC RELIEF DAMPER, CLEARANCE DISTANCE IS TO BE MEASURED FROM PROTRUDING HOOD INSTEAD OF BASE.
 3. CLEARANCE IS THE SAME IF ANY UNIT IS ROTATED 180°
 4. ADDITION CLEARANCE REQUIRED WHEN BAROMETRIC DAMPER OR ECONOMIZER IS INSTALLED.

Figure 2. WSHP rooftop- 3 tons

Note: 2" electrical connection: single point power when heat installed (GWS)





Unit Dimensions

Figure 3. WSHP rooftop - 4 tons

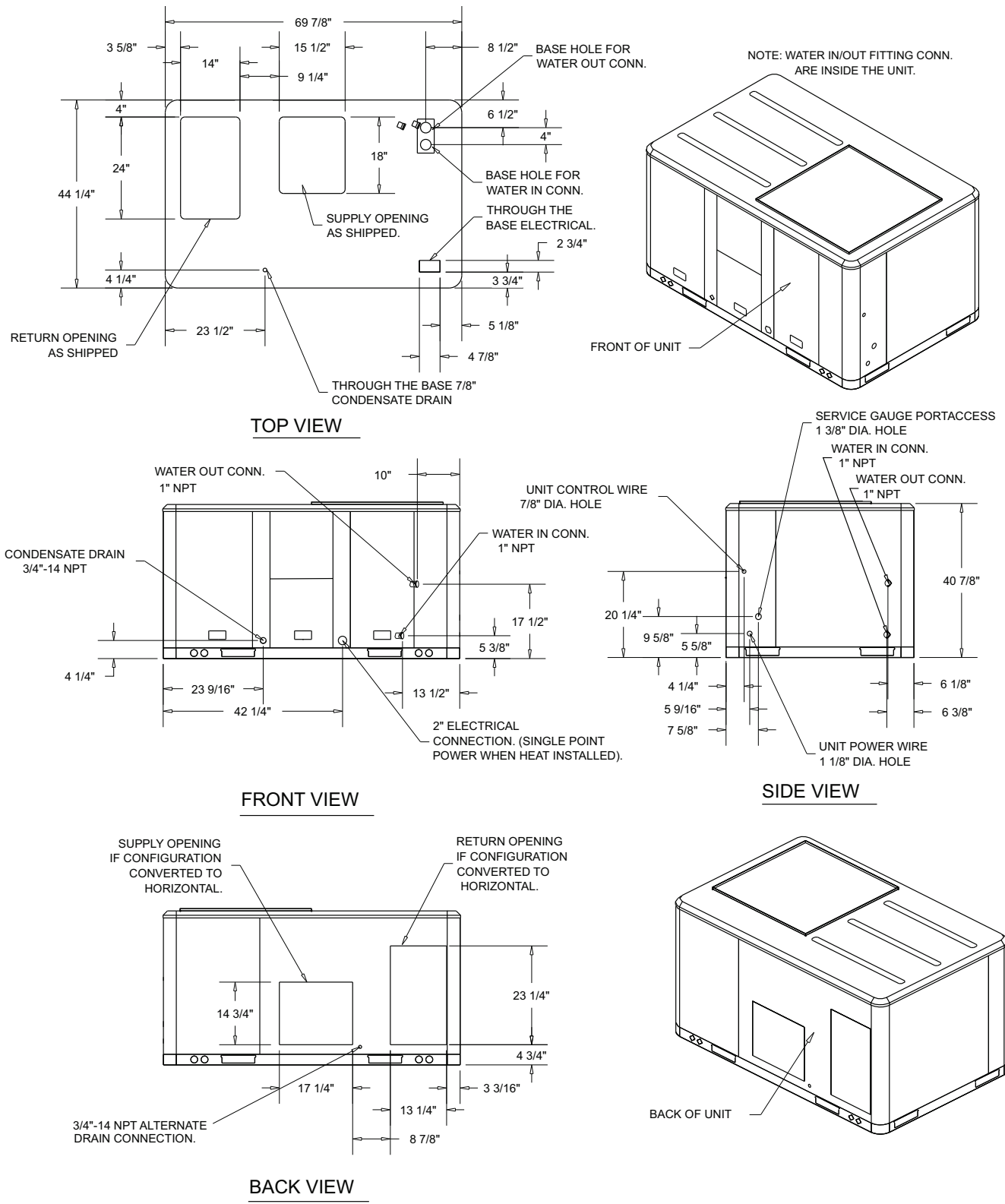


Figure 4. WSHP rooftop - 3 to 4 tons - unit clearance and roof opening

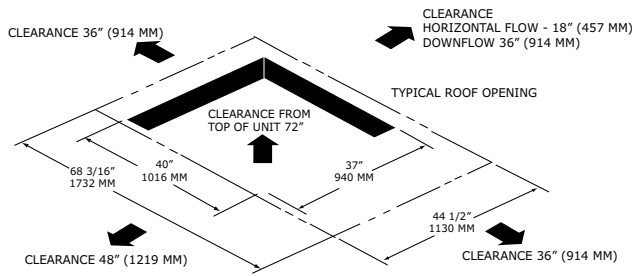


Figure 5. WSHP rooftop - 3 to 4 tons - roof curb

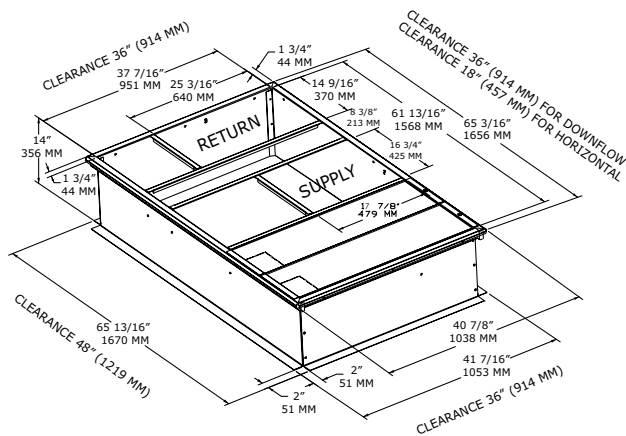


Figure 6. WSHP rooftop - 3 to 4 tons - downflow duct connections - field fabricated

Note: Reference tabular information for duct clearance to combustible materials in the application consideration chapter.

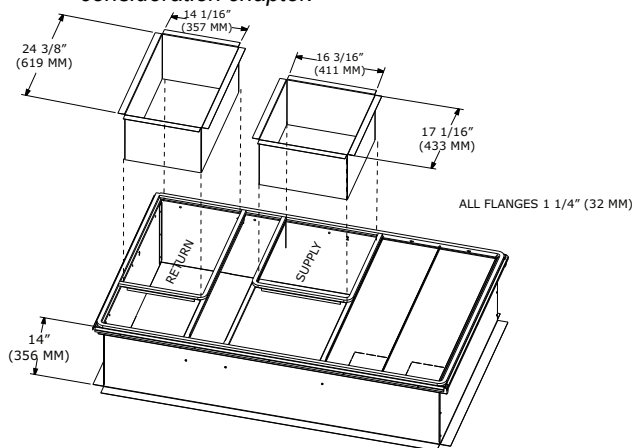


Figure 7. WSHP rooftop - 3 to 4 tons - economizer, manual or motorized fresh air damper; power exhaust

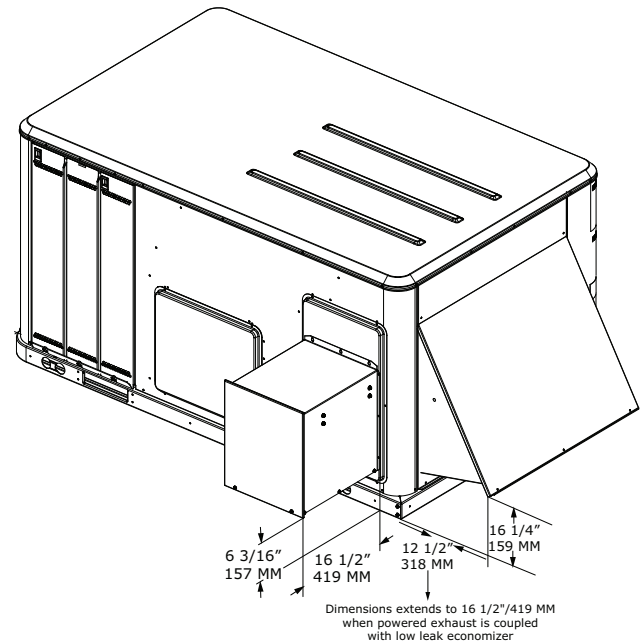
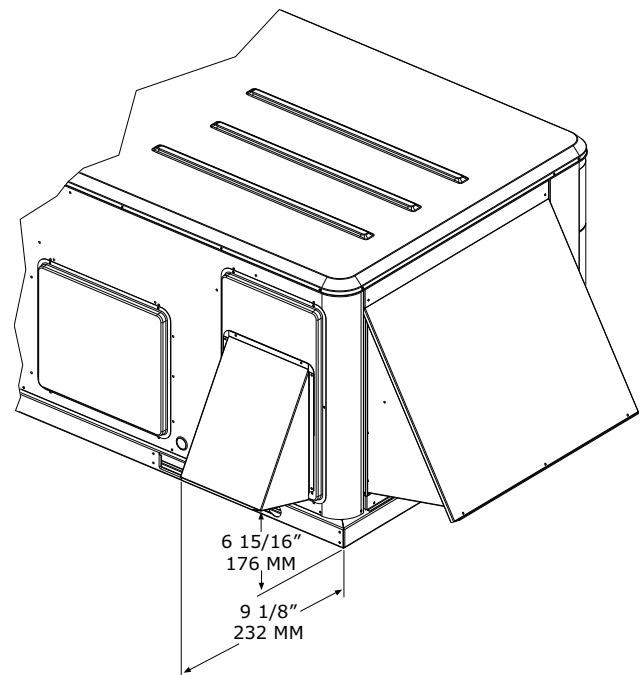


Figure 8. WSHP rooftop 3 to 4 tons - economizer & barometric relief damper hood





Unit Dimensions

Figure 9. WSHP rooftop - 3 to 4 tons - swing diameter for hinged door(s) option

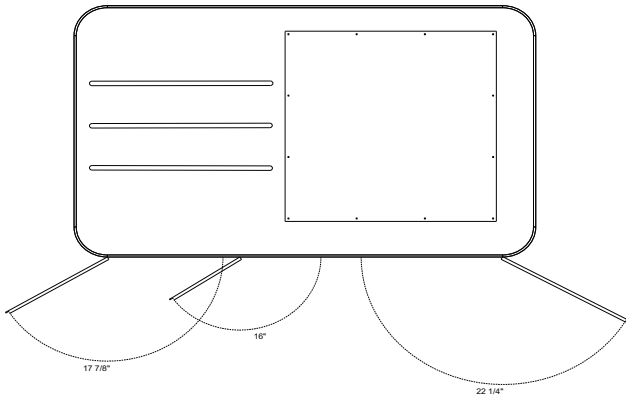
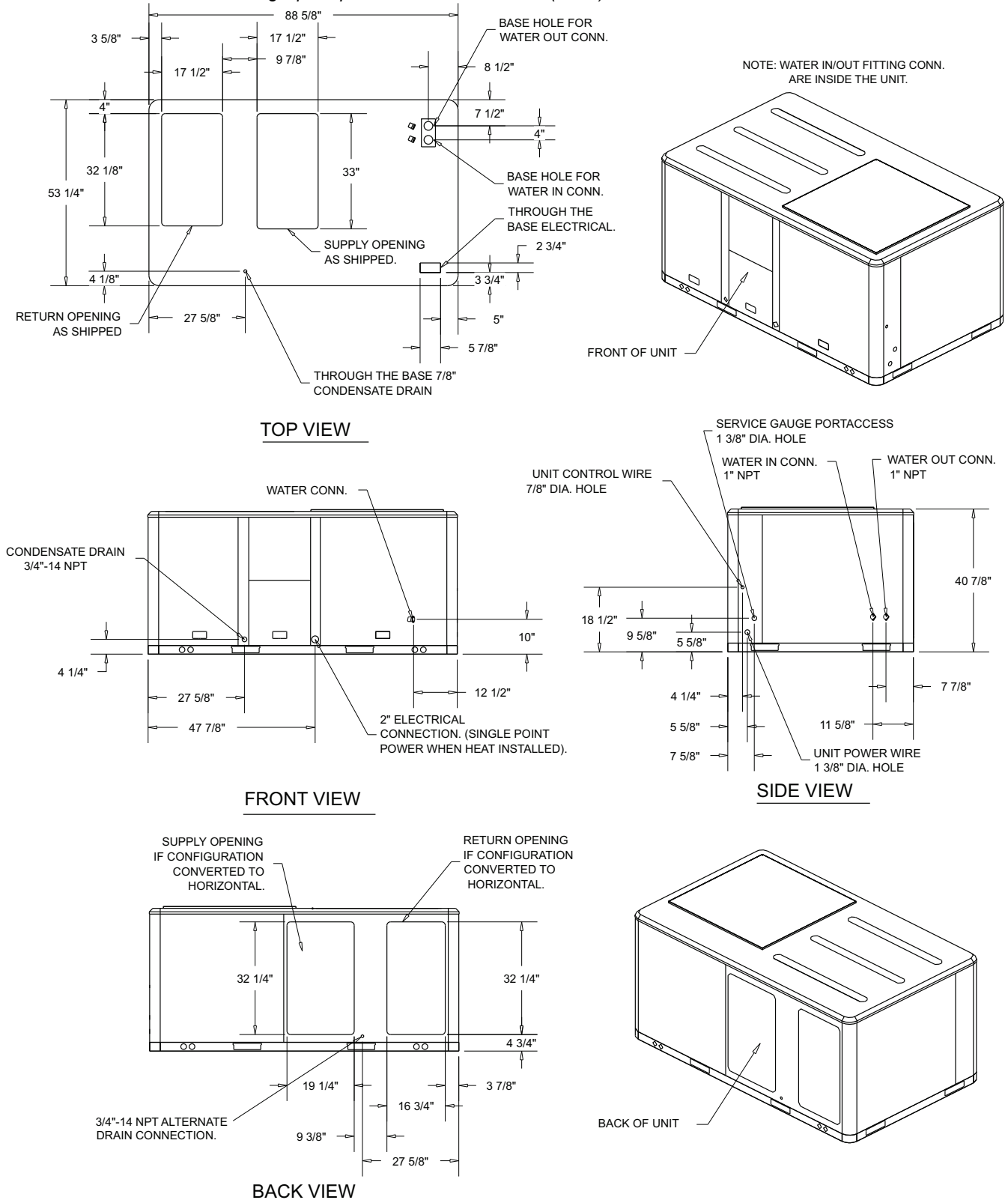


Figure 10. WSHP rooftop - 5 tons

Note: 2" electrical connection: single point power when heat installed (GWS)





Unit Dimensions

Figure 11. WSHP rooftop - 6 tons

Note: 2" electrical connection: single point power when heat installed (GWS)

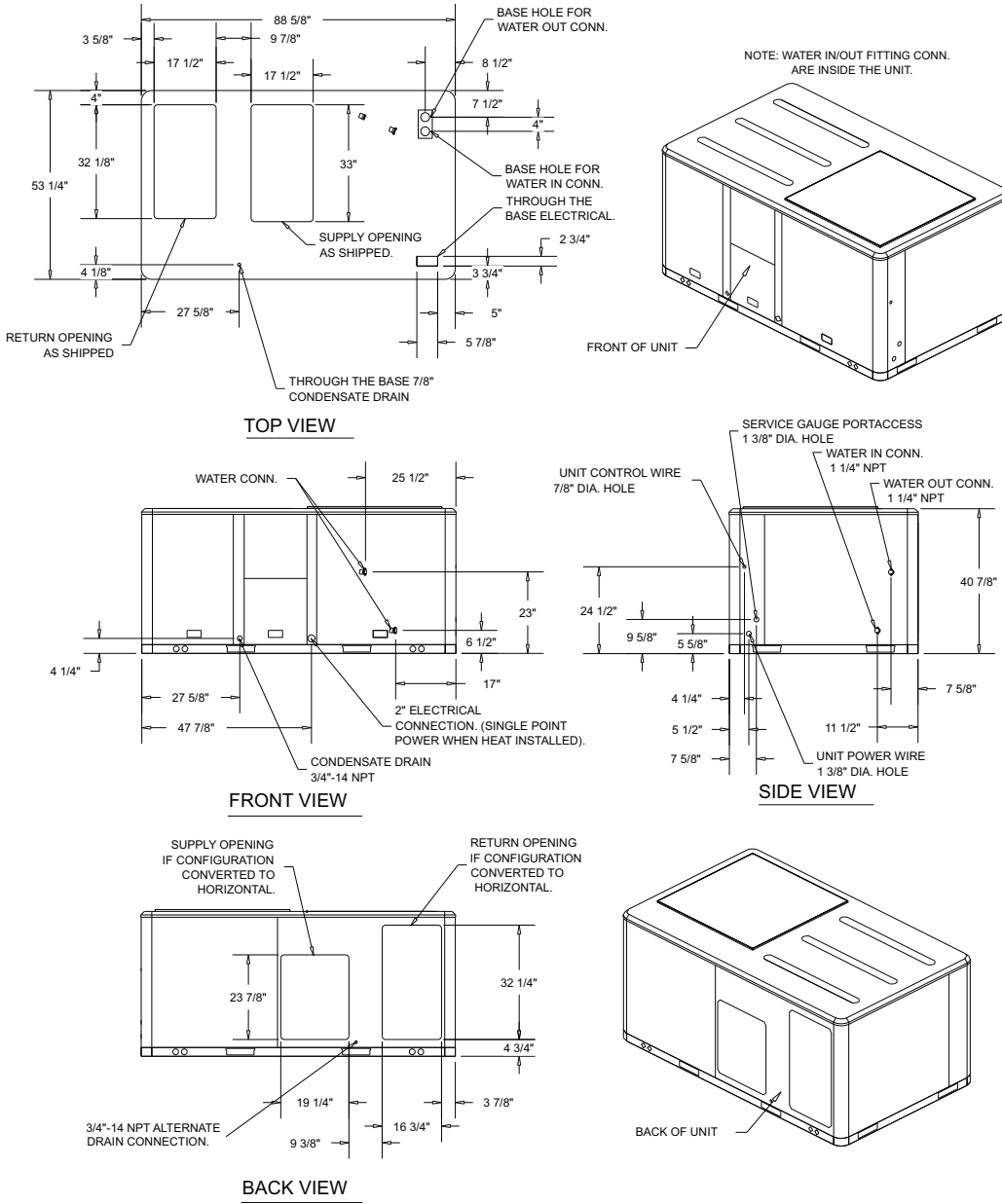
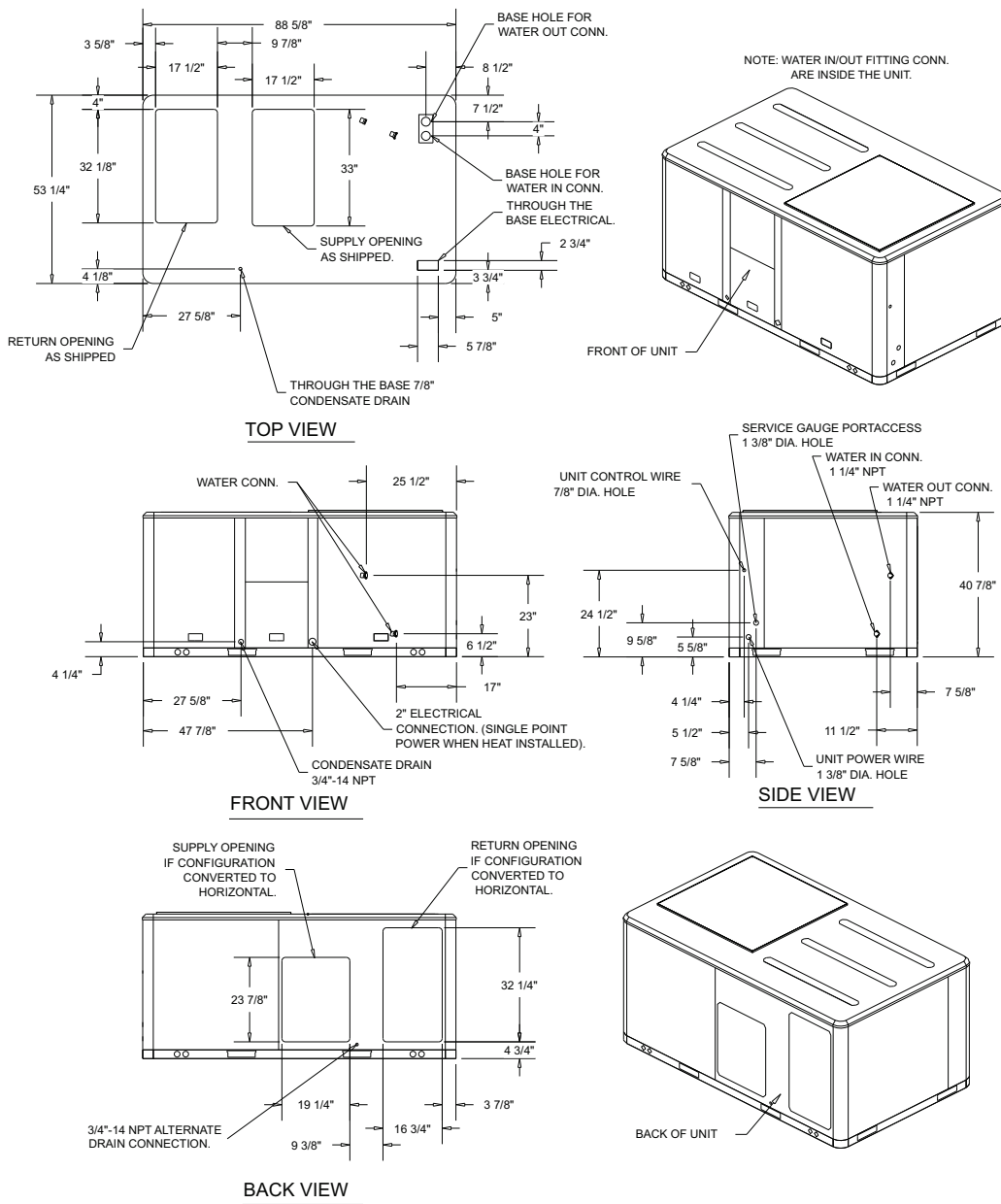


Figure 12. WSHP rooftop - 7.5 tons standard efficiency

Note: 2" electrical connections: single point power when electric heat installed.





Unit Dimensions

Figure 13. WSHP rooftop- 10 tons standard efficiency

Note: 2" electrical connections: single point power when electric heat installed.

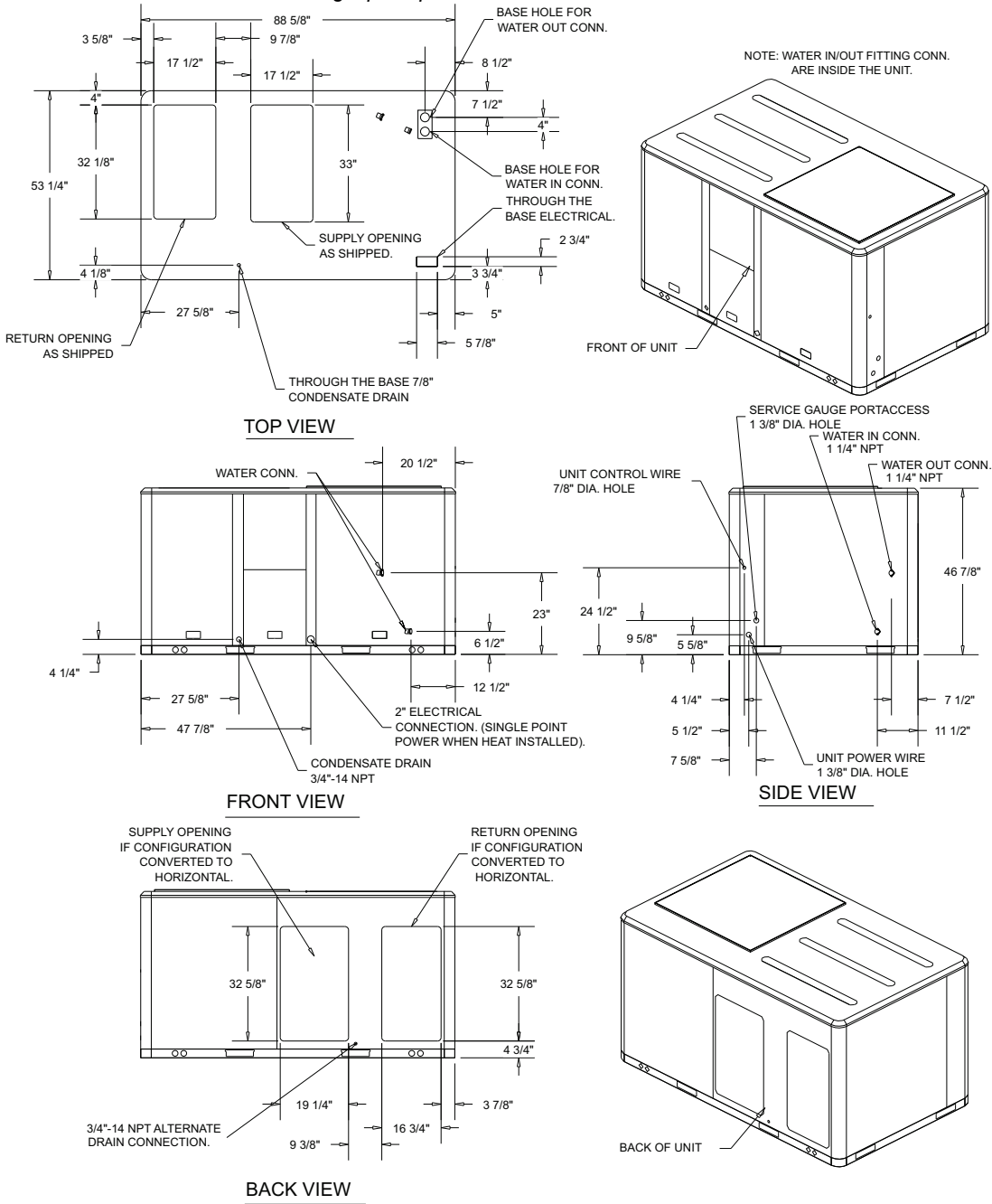


Figure 14. WSHP rooftop- 5 to 10 tons - unit clearance and roof opening

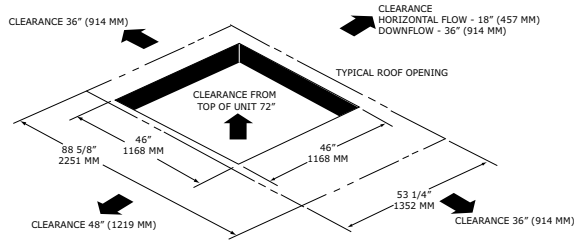


Figure 15. WSHP rooftop- 5 to 10 tons - roof curb

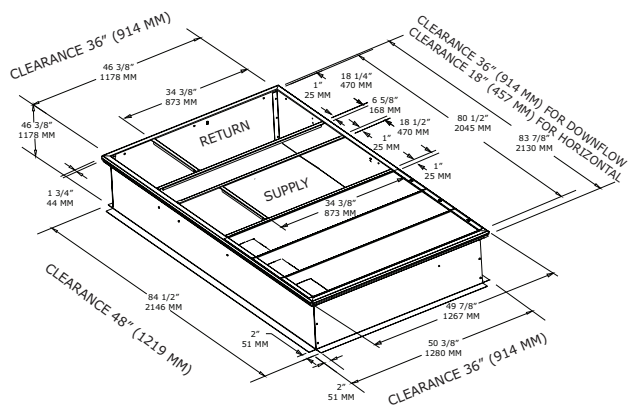


Figure 16. WSHP rooftop- 5 to 10 tons - downflow duct connections field fabricated

Note: Reference tabular information for duct clearance to combustible materials in the Installation chapter.

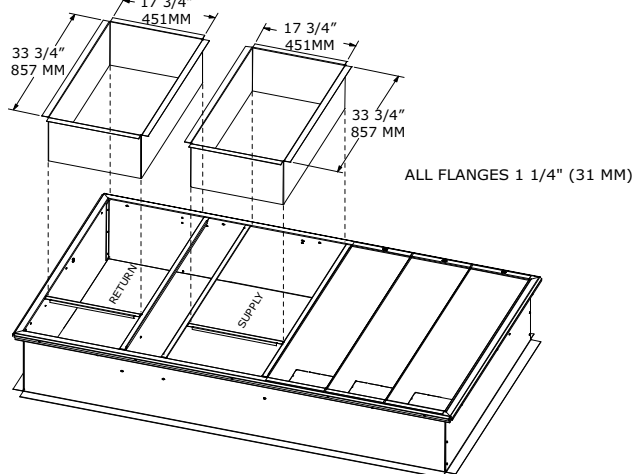


Figure 17. WSHP rooftop- 5 to 10 tons - power exhaust

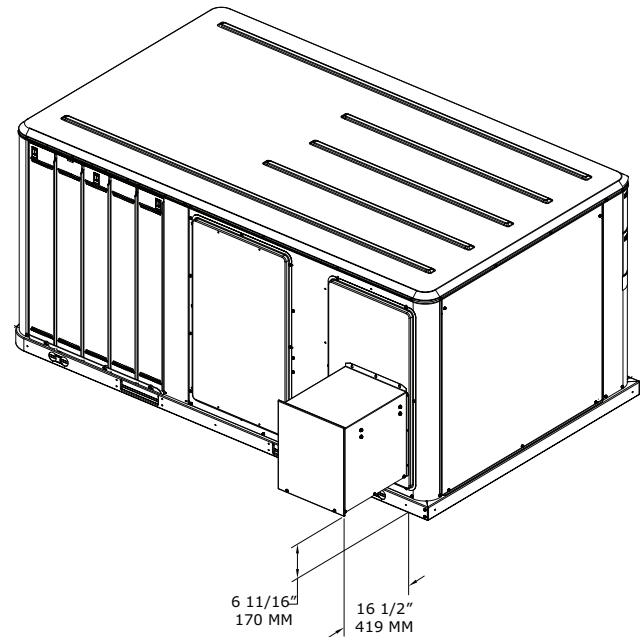
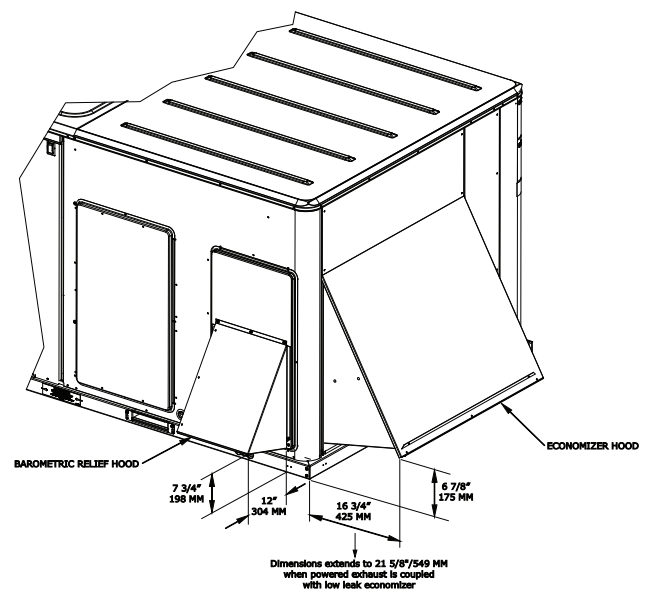


Figure 18. WSHP rooftop- 5 to 10 tons - economizer, manual or motorized fresh air damper





Unit Dimensions

Figure 19. WSHP rooftop- 5 to 10 tons - swing diameter for hinged door(s) option

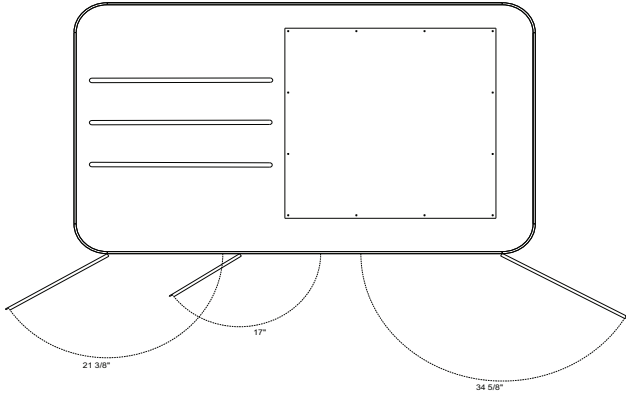
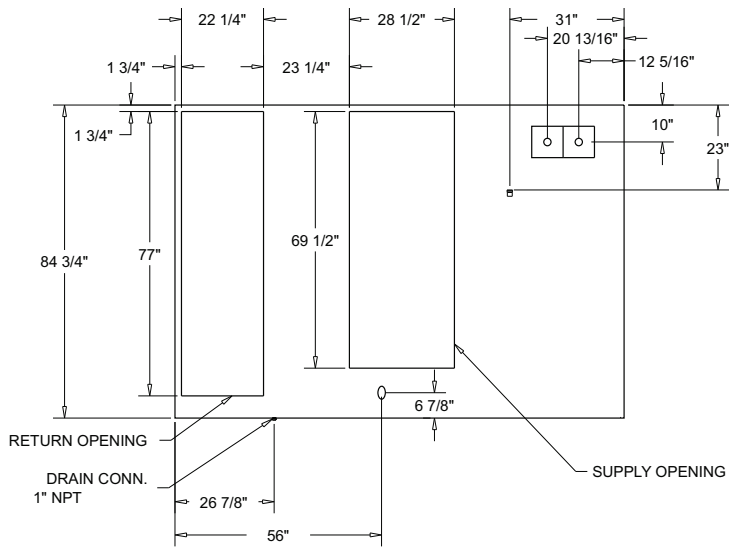
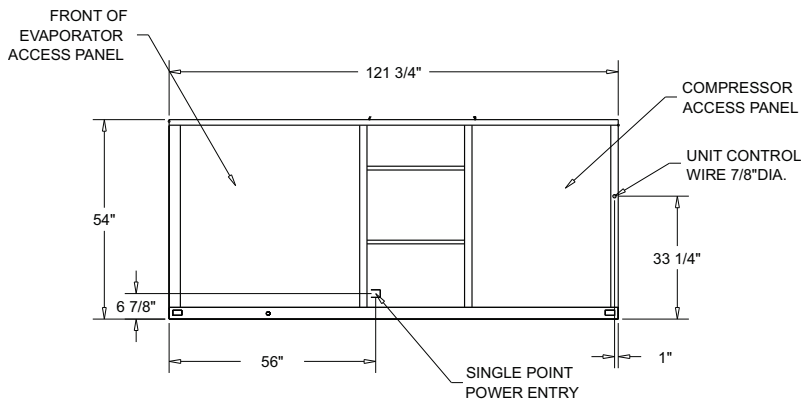


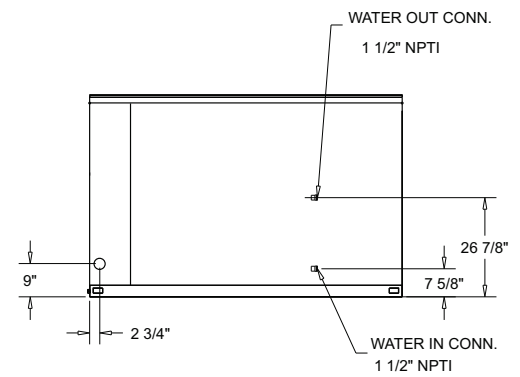
Figure 20. WSHP rooftop models - 12.5 to 15 tons



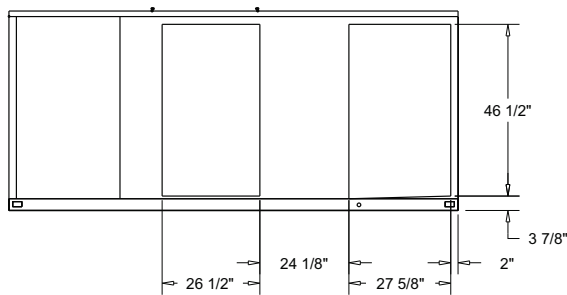
BOTTOM VIEW
(SHOWN FROM TOP)



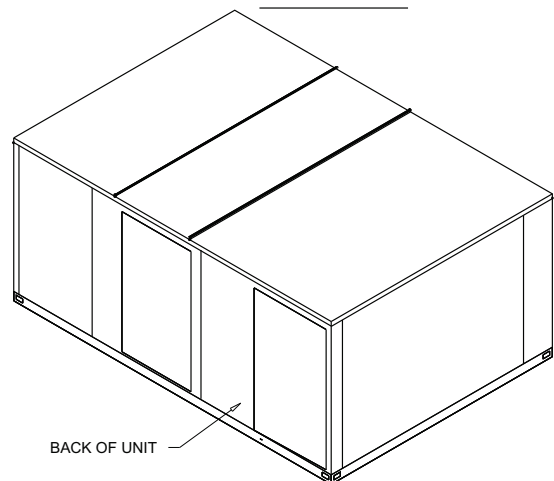
FRONT VIEW



SIDE VIEW



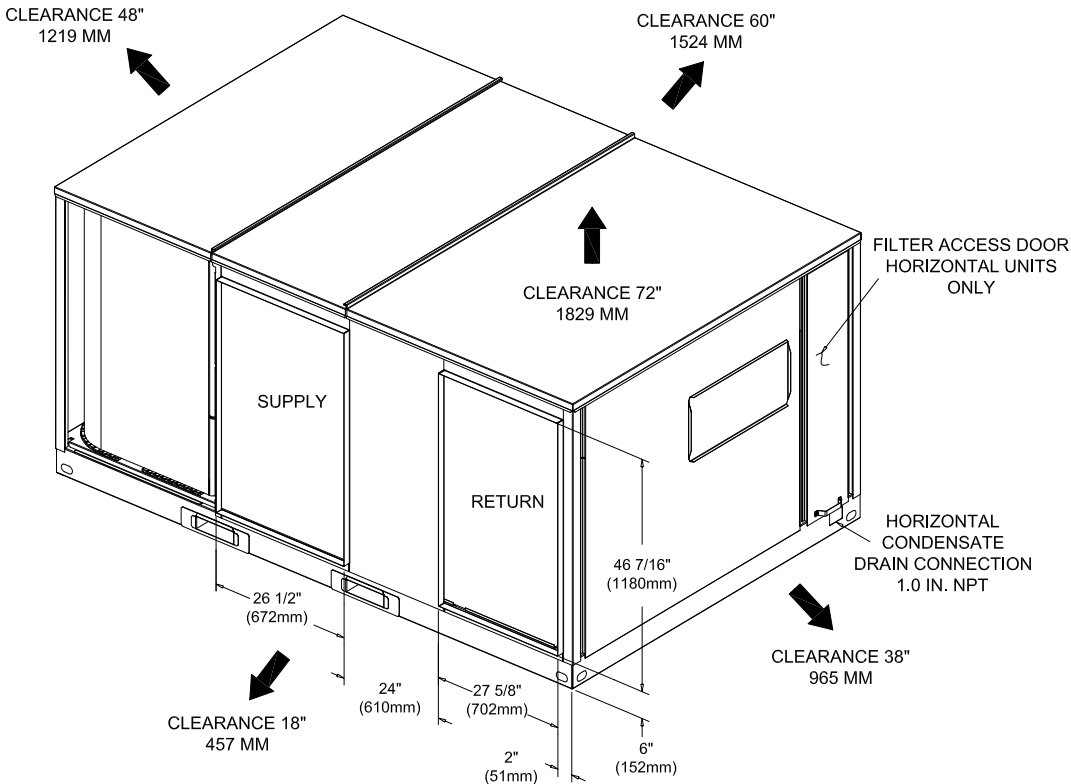
BACK VIEW





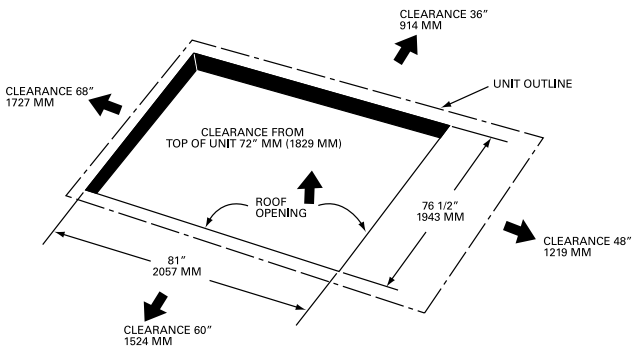
Unit Dimensions

Figure 21. WSHP rooftop models - 12.5 to 20 tons



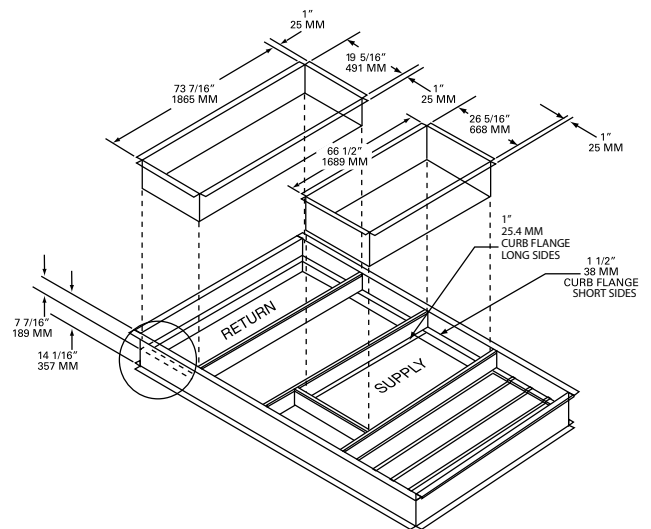
* All dimensions are in inches/millimeters.

Figure 22. WSHP rooftop models - 12.5 to 15 tons



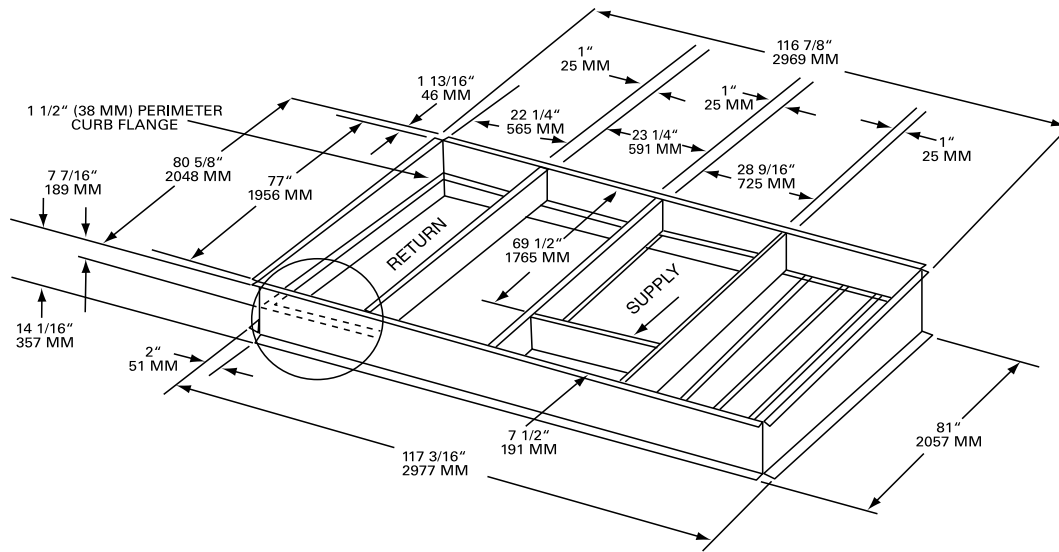
*All dimensions are in inches/millimeters.

Figure 23. WSHP rooftop models - 12.5 to 15 tons



*All dimensions are in inches/millimeters.

Figure 24. WSHP rooftop models - 12.5 to 15 tons

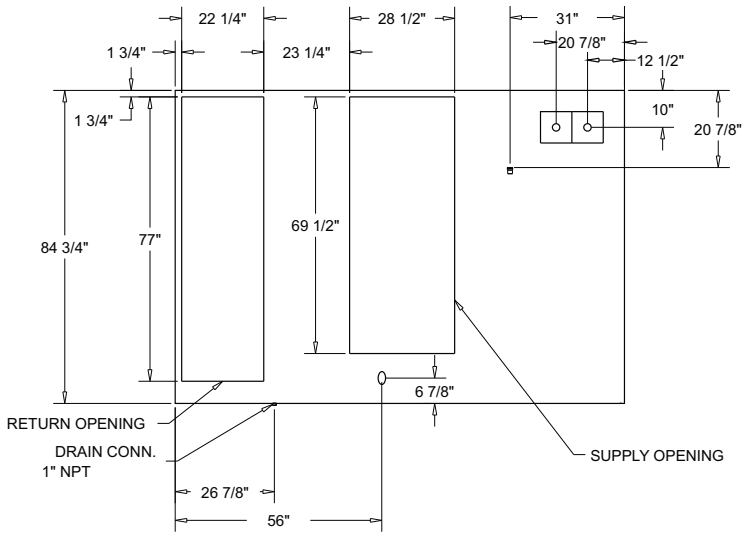


*All dimensions are in inches/millimeters.

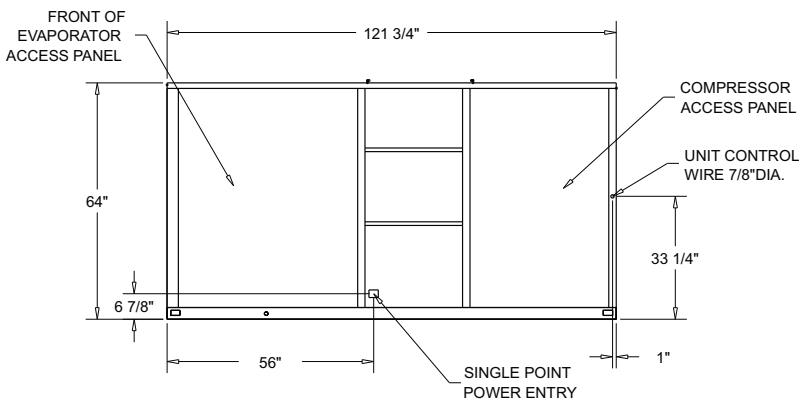


Unit Dimensions

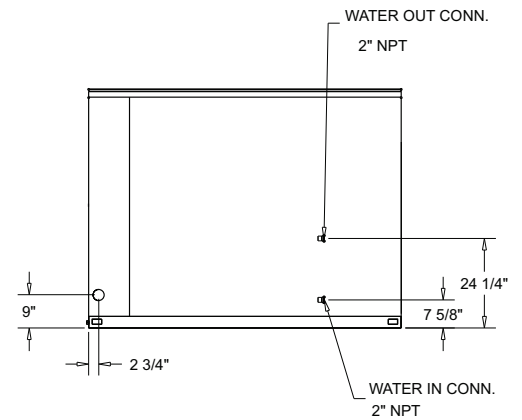
Figure 25. WSHP rooftop models - 20 tons



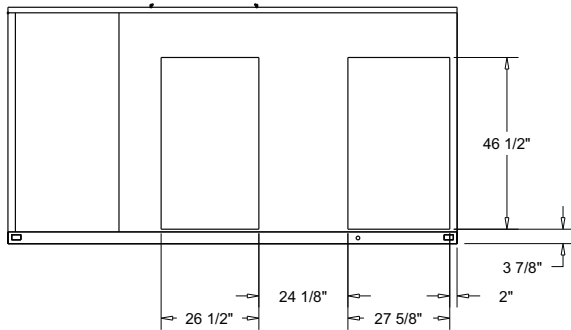
BOTTOM VIEW
(SHOWN FROM TOP)



FRONT VIEW



SIDE VIEW



BACK VIEW

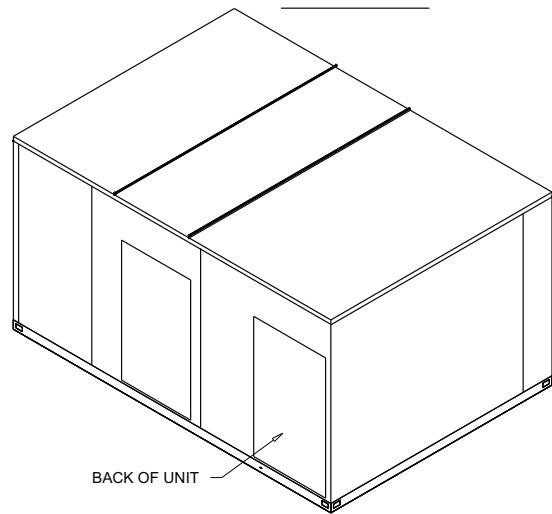
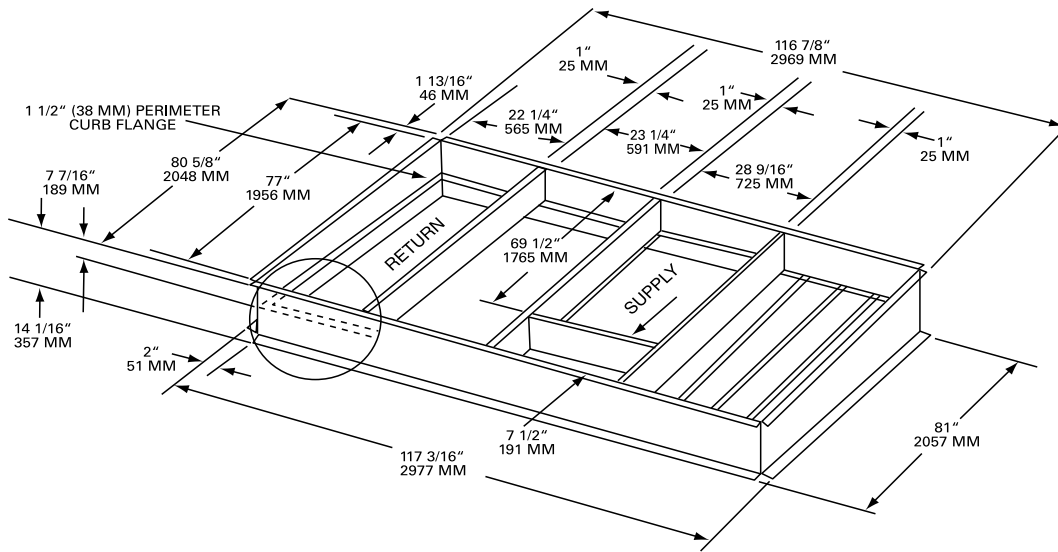
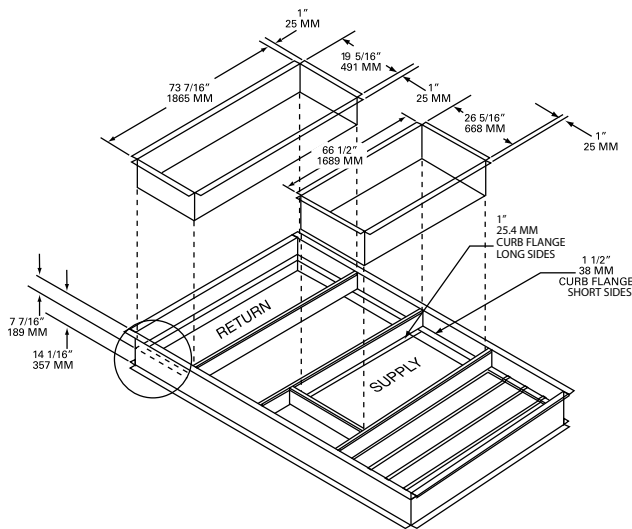


Figure 26. WSHP rooftop models - 20 tons



*All dimensions are in inches/millimeters.

Figure 27. WSHP rooftop models - 20 tons

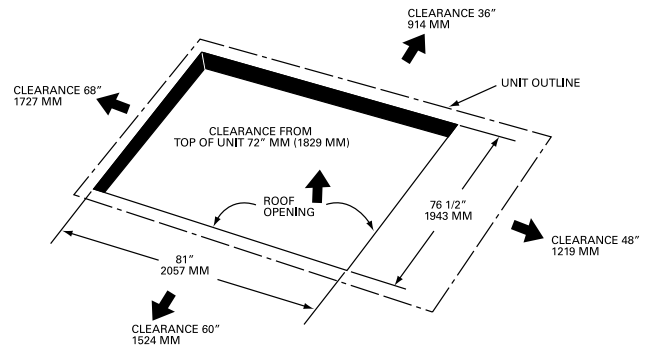


*Duct flanges mount 7-7/16" down inside the curb on the 1-1/2" curb flanges.

Roofcurb is intended for downflow use only.

*All dimensions are in inches/millimeters.

Figure 28. WSHP rooftop models - 20 tons



* All dimensions are in inches/millimeters.

Figure 29. Downflow & horizontal condensate locations

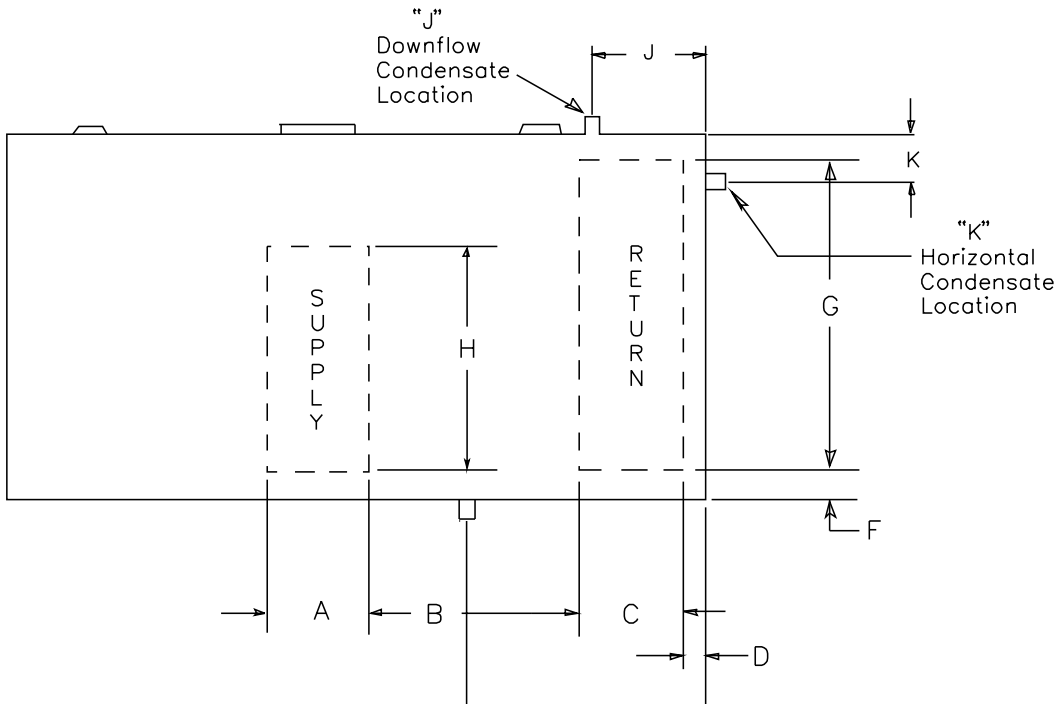


Table 1. Unit dimensions

Tons	Downflow Only							Condensate Drain Size	Condensate Drain Locations	
	A	B	C	D	F	G	H		Downflow	Horizontal
									J	K
12.5, 15, 20	26 7/16	28 3/4	19 15/16	4 1/4	4 1/4	76 5/16	68 11/16	1 NPT	26 3/4	5 3/8

Figure 30. Through the base utility locations and access panel swing clearances

TOP VIEW SHOWING THROUGH THE BASE ELECTRICAL UTILITY LOCATIONS AND ACCESS PANEL SWING CLEARANCES.

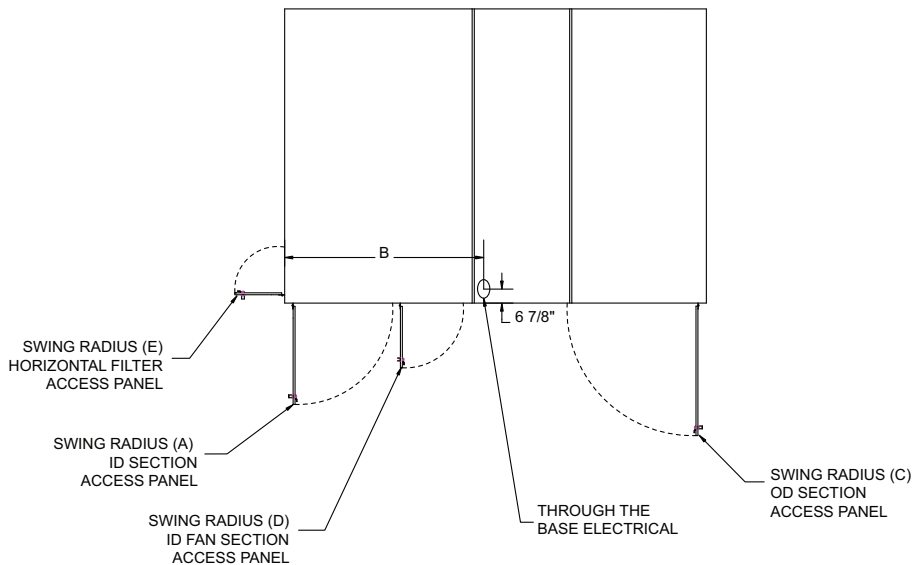


Table 2. Swing clearances

Unit Model #	A	B	C	D	E
GWSD150-180	42 3/8	48 3/8	31	N/A	N/A
GWSD240	29 1/2	56	38 1/2	18 1/2	N/A
GWSH150-180	42 3/8	N/A	31	N/A	12
GWSH240	29 1/2	N/A	38 1/2	18 1/2	14

Note: All dimensions are in inches

Unit Weights

Table 3. Typical unit weights and point loading data

Tons	Model #	Net Weight ^(a)	Corner Weights (lbs) ^(b)				Center of Gravity (in.)	
		Net	A	B	C	D	Length	Width
3	GWSC036H	507	144	122	110	130	32	21
4	GWSC048H	540	165	131	108	136	31	20
5	GWSC060H	682	228	177	114	163	38	22
6	GWSC072H	740	235	196	140	168	40	22
7.5	GWSC092H	796	252	204	163	177	41	23
10	GWSC120H	850	303	170	218	159	40	24
12.5	GWS*150E	2024	647	524	385	468	55	35
15	GWS*180E	2028	648	525	386	469	55	35
20	GWS*240E	2198	717	575	403	502	54	35

^(a) Weights are approximate.

^(b) Corner weights are given for information only. Unit is to be supported continuously by a curb or equivalent frame support.

Figure 31. Center of Gravity 3 to 10 tons

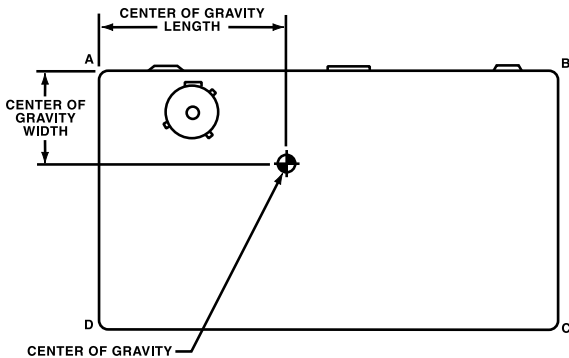
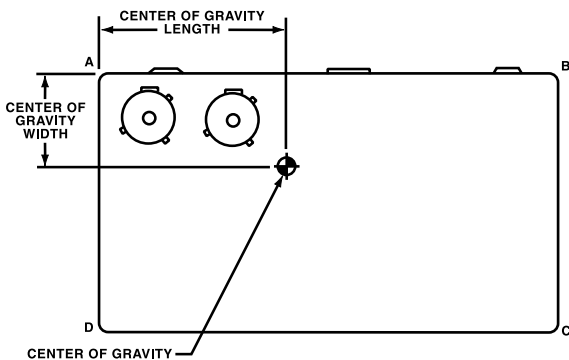


Figure 32. Center of Gravity 12.5 to 20 tons



Rigging

A Rigging illustration and Center-of-Gravity dimensional data table is shown in the weights section. Refer to the typical unit operating weights table before proceeding.

⚠ 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.

1. Remove the shipping crate from around the unit. Do not remove the crating from the top of the unit.
2. Rig the unit as shown in rigging and center of gravity data. 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.
3. Install a lifting bar, as shown in rigging and center of gravity data, 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.

NOTICE

Unit Damage!

Unit damage will occur if fork lifting is attempted once the pallet has been removed.

4. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.
5. Removal of the base pallet must be completed before unit can be set. Prior to lifting the unit, remove the 6 fork pockets from the base rails and 4 wood screws from the lifting lug corners. The unit will then separate from the pallet when lifted.
6. Lift the unit and position it into place.
7. 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.

Figure 33. Rigging and center of gravity data 3 to 10 tons

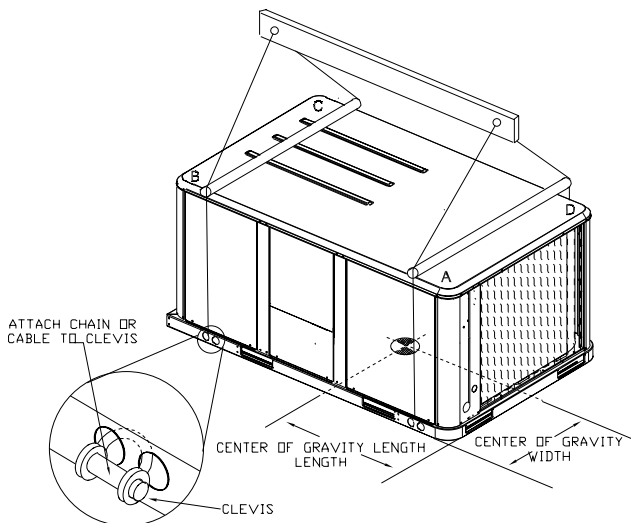
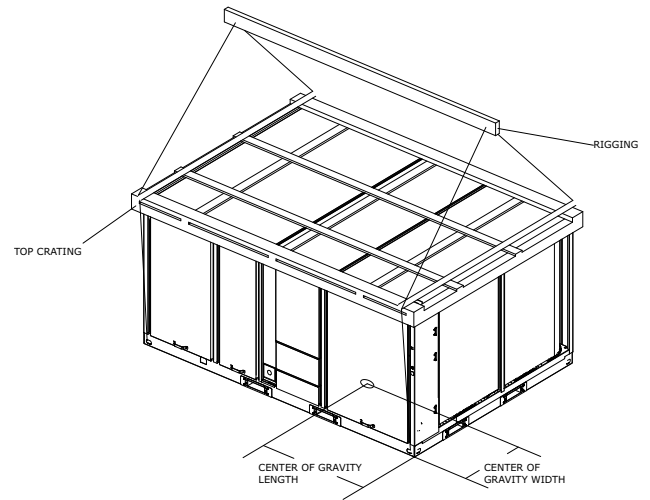


Figure 34. Rigging and center of gravity data 12.5 to 20 tons





Installation

Foundation

NOTICE

Water Damage!

Failure to follow instructions below could result in equipment and property damage.

Non-factory penetrations through the base of this unit are not allowed. Any penetration in the base of the unit may affect the water tight integrity of the unit and lead to water leaks into the conditioned space.

Notes:

- For units with optional Condensate Overflow Switch (COF), the switch will not work properly if unit is not level or slightly sloped toward switch.
- To assure proper condensate flow during operation the unit and the curb must be level.

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 Unit Weights section 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.

For rooftop applications, ensure the roof is strong enough to support the combined unit and support structural weight.

⚠ 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.

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

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.

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.

Roof Curb

The roof curbs for these units consists of a "full perimeter" enclosure to support the unit just inside of the unit base rail.

Before installing any roof curb, verify:

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

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

Note: To ensure proper condensate flow during operation, as well as proper operation of the condensate overflow switch (if equipped), 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.

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.

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 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.
- Rig 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.

Note: *Condensate Overflow Switch (if equipped) will not work if unit is not level or slightly sloped toward switch.*

Factory Installed Economizer

- Ensure the standard economizer has been pulled out into the operating position. Refer to the economizer Installation Instructions for proper setup.

Note: *Low leak economizers do not pull out. Refer to low leak economizers installation instructions for proper setup.*

- Install all access panels.

Electric Heat Requirements

- Verify that the power supply complies with the electric heater specifications on the unit and heater nameplate.
- Inspect the heater junction box and control panel; tighten any loose connections.
- Check electric heat circuits for continuity.

Temperature Limit Switch Usage for Electric Heat Units

Note: *Applies only to 3 to 10 ton units.*

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 TCO-A limit switch, which is wire tied near the terminal block in the heater compartment if horizontal discharge configuration is used.

Condensate Drain Configuration

An evaporator condensate drain connection is provided on each unit. Refer to the Unit Dimensions section for the appropriate drain location.

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 35, p. 36](#).

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”.

To convert drain condensate out the front of unit - 3 to 10 ton units:

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 - 3 to 10 ton units:

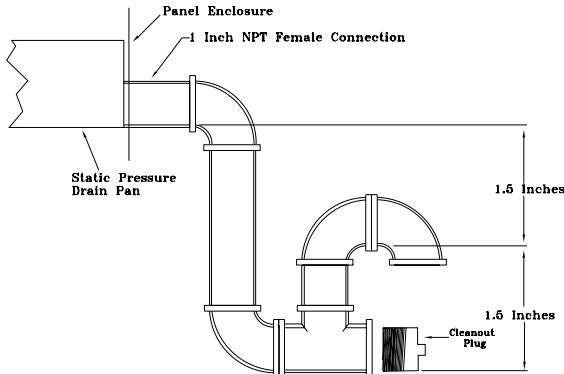
1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit.
4. Place on a level surface in the position it was removed from the unit.
5. Remove the plug knockout in the bottom of the drain pan 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.

Installation

- 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 the figure below.

Figure 35. Condensate trap installation



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

Each unit ships with 2 inch filters installed. The quantity of filters is determined by unit size. Access to the filters is obtained by removing the filter access panel.

Refer to the unit Service Facts (shipped with each unit) for filter requirements.

Note: Do not operate the unit without filters.

Horizontal Discharge Conversion

GWSC036H, GWSC048H

Note: 3 to 4 ton units supply cover to supply opening and return cover to return opening.

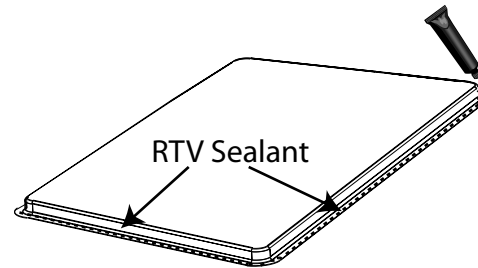
- Supplies Needed by Installer for Conversion: 3 oz. tube of High Temperature RTV sealant. (500°F/260°C: Similar to Dow Corning 736)

Important: 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:

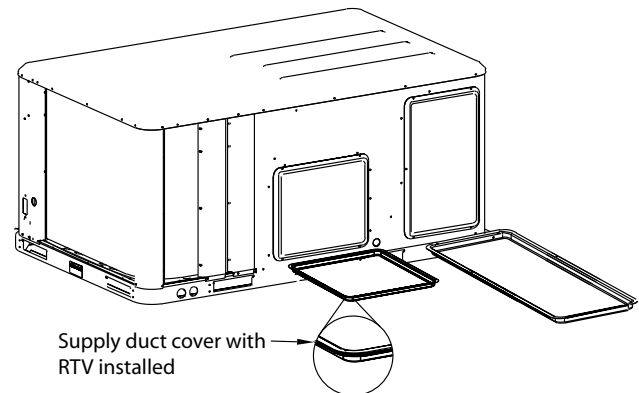
- Remove RETURN and SUPPLY duct covers.
- Locate supply cover. Apply ¼ in. (6mm.) continuous bead of 500°F RTV sealant to the flange as shown in the following drawing.

Figure 36. Supply duct cover



- Position SUPPLY DUCT COVER as shown, rotate 90 degrees to allow entrance into supply opening.
- Slide SUPPLY DUCT COVER into duct openings until inward edge of duct cover engages with the 2 retaining clips on the duct flanges. Secure the outward edge of each duct cover with 2 screws.

Figure 37. Supply and return openings



- 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 out-ward edge of the duct cover with two screws.

Note: Certain unit/electric heater combinations require a limit switch change out for horizontal airflow applications. Refer to the following instructions to determine if this process is required for the unit undergoing installation.

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

GWSC060H, GWSC072H, GWSC092H, GWSC120H

Note: 5 tons units supply cover to return opening and return cover to supply opening.

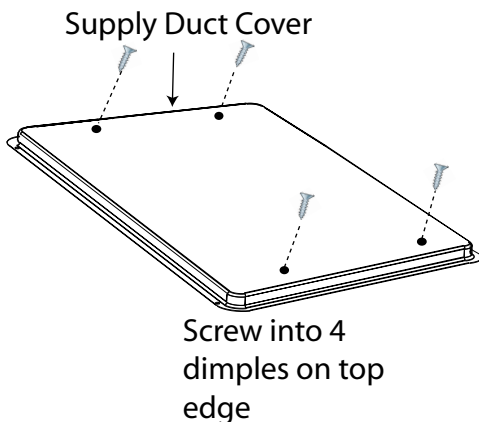
Supplies needed by installer for conversion: 3 oz. tube of high Temperature RTV sealant. (500°F/260°C: Similar to Dow Corning 736)

Important: 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:

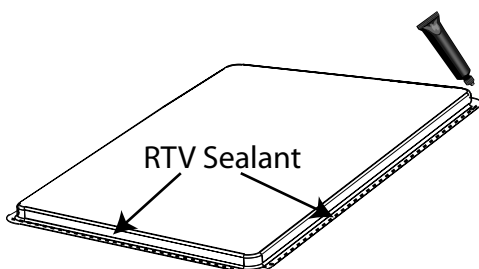
1. Remove RETURN and SUPPLY duct covers.
2. Place SUPPLY DUCT COVER over downflow return opening. (insulation side down)
3. Using self-drilling screws, (or screws removed from duct cover), screw through dimples to attach Duct Cover to base.

Figure 38. Supply duct cover



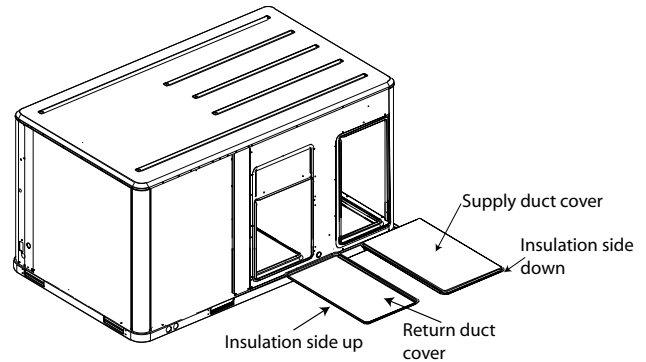
4. On original RETURN DUCT COVER, apply 1/4" (6mm.) continuous bead of 500°F RTV sealant around flange (opposite insulation side), as shown.

Figure 39. 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.

Figure 40. Supply and return openings



Note: If unit is equipped with Return Air Smoke Detector, refer to field conversion instructions for horizontal discharge before installing return air duct.

Note: Certain unit/electric heater combinations require a limit switch change out for horizontal airflow applications. Refer to the following instructions to determine if this process is required for the unit undergoing installation.

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

TCO-A Instructions

Note: Applies to only 3 to 10 ton units.

If the unit being installed is listed in the following table and is equipped with the corresponding model number of factory installed electric heater package in the table, the limit control TCO-A must be replaced with the extra limit control shipped in the heater compartment. Replace TCO-A following the instructions in steps 1 through 3 below. If the unit being installed does not have a factory installed electric heater package or is equipped with a factory installed electric heater model that does not correspond to any in this table, skip steps 1 through 3 and go on to next step in the installation process.

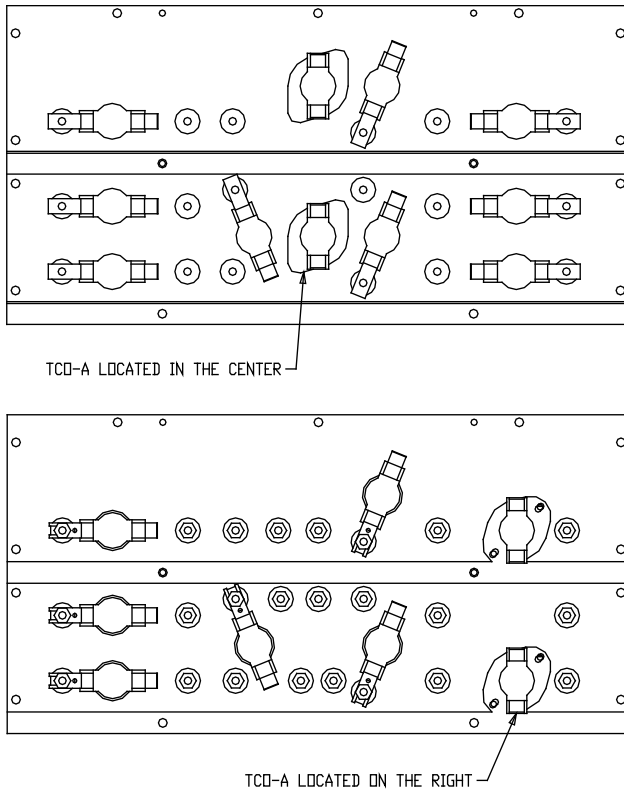
Table 4. TCO-A replaced for horizontal duct configuration

Unit Model Number	Electric Heater Model Number	TCO-A location
GWSC092H3	BAYHTRU336	Center
GWSC092H4	BAYHTRU436	Center
GWSC120H4	BAYHTRA454	Right
GWSC120HW	BAYHTRAW36, W54	Right
GWSC072H3	BAYHTRW327, 336	Center
GWSC072H4	BAYHTRU427, 436	Center
GWSC072HW	BAYHTRWW27, W36	Center

1. Remove the heater section access panel and open the electric heater dead front panel.

- TCO-A is the limit control located in the central or right part of the heater mounting plate and that is located on the bottom of the two heater element assemblies. To replace this device, first remove the two wires connected to the terminals. Next, remove the two screws which secure it to the heater element mounting plate. Once TCO-A has been removed from the heater element mounting plate, discard this device.

Figure 41. TCO-A location



- Obtain the replacement TCO-A which is secured by a wire tie near the electric heater terminal block in the heater compartment. Attach it to the heater element mounting plate with the two screws that were removed in step 2 above. Connect the two wires that were unhooked in step 2 to the terminals on the new TCO-A. Refer to the heater package wiring diagram to assure that the wiring is connected properly.
- Close the electric heater dead front panel and replace heat section access panel.

Electrical Requirements

⚠ 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.

Main Electrical Power Requirements

- 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.

Note: All field-installed wiring must comply with NEC and applicable local codes.

Low Voltage Wiring (AC & DC) Requirements

- Install the zone thermostat, with or without switching subbase.
- Connect properly sized control wiring to the proper termination points between the zone thermostat and the unit control panel.

Field Installed Power Wiring

An overall dimensional layout for the standard field installed wiring entrance into the unit is illustrated in the "Unit Dimensions," p. 14 section. To insure that the unit's supply power wiring is properly sized and installed, follow the guidelines outlined below.

Note: All field-installed wiring must comply with NEC and applicable local codes.

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.

Note: If the unit is not equipped with an optional factory installed nonfused 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.

Standard Wiring

The electrical service must be protected from over current and short circuit conditions in accordance with NEC requirements. Protection devices must be sized according to the electrical data on the nameplate.

1. If the unit is not equipped with an optional factory installed nonfused 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).
2. Location of the applicable electrical service entrance is illustrated in the "Unit Dimensions," p. 14 section. Complete the unit's power wiring connections onto either; the main terminal block HTB1 inside the unit control panel, the factory mounted nonfused disconnect switch (UCD) or circuit breaker (UCB), or the electric heat terminal block. Refer to the customer connection diagram that shipped with the unit for specific termination points.
3. Provide proper grounding for the unit in accordance with local and national codes.

Optional TBUE Wiring (Through the Base Electrical Option)

1. Location of the applicable electrical service is illustrated in the following illustration. 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 nonfused disconnect switch (UDC) or circuit breaker (UCB).

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

Figure 42. Through the base electrical option 3 to 10 tons

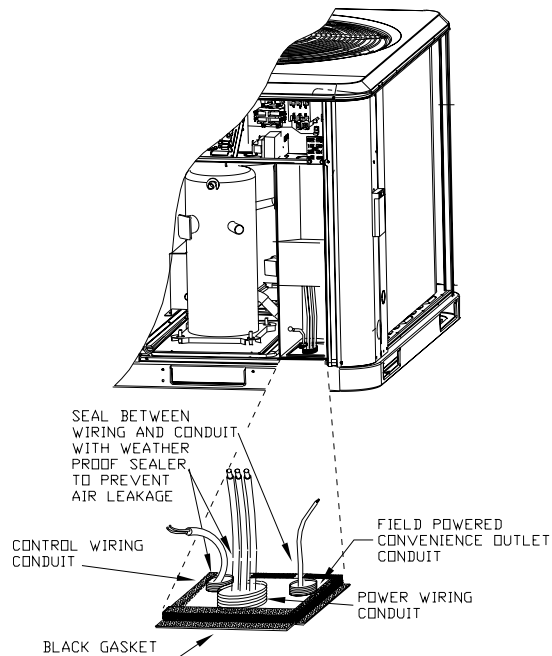
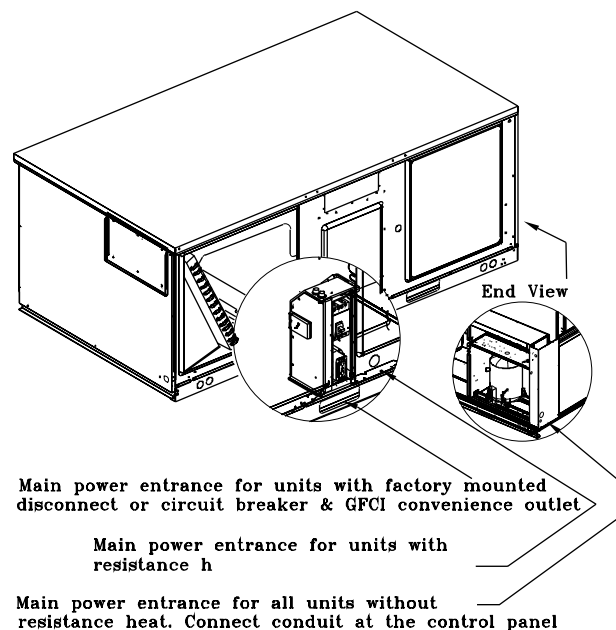


Figure 43. Through the base electrical option 12.5 to 20 tons





Installation

Field Installed Control Wiring

An overall layout of the various control options available with the required number of conductors for each control device.

Note: 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 Vac 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 transformer is located in the control panel. The circuit breaker is located on the left 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 Unit Dimensions section for the electrical access locations provided on the unit and the Electromechanical thermostat 24 Vac conductors with ReliaTel™ for AC conductor sizing guidelines.

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 three (3) ohms/conductor for the length of the run.

NOTICE

Component Failure!

Resistance in excess of 3 ohms per conductor could result in component failure due to insufficient AC voltage supply.

Do not exceed three (3) ohms per conductor for the length of the run.

3. Be sure to check all loads and conductors for grounds, shorts, and mis-wiring.
4. Do not run the AC low voltage wiring in the same conduit with the high voltage power wiring.
5. Route low voltage wiring per illustrations.

Table 5. Electromechanical thermostat 24 Vac conductors with ReliaTel™

Distance from Unit to Control	Recommended Wire Size
000 - 460 feet (000 - 140 m)	18 gauge (0.75 mm ²)
461 - 732 feet (141 - 223 m)	16 gauge (1.3 mm ²)
733 - 1000 feet (224 - 305 m)	14 gauge (2.0 mm ²)

Controls Using DC Analog Input/Outputs (Standard Low Voltage Multiconductor Wire)

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

1. The DC conductors zone sensor module wiring table 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.

Note: Resistance in excess of 2.5 ohms per conductor can cause deviations in the accuracy of the controls.

2. 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.
3. Do not run the electrical wires transporting DC signals in or around conduit housing high voltage wires.

Table 6. DC conductors zone sensor module wiring

Distance from Unit to Control	Recommended Wire Size
0 - 150 feet (0 - 45.7 m)	22 gauge (0.33 mm ²)
151 - 240 feet (46 - 73.1 m)	20 gauge (0.50 mm ²)
241 -385 feet (73.5 - 117.3 m)	18 gauge (0.75 mm ²)
386 - 610 feet (117.7 - 185.9 m)	16 gauge (1.3 mm ²)
611 - 970 feet (186.2 - 295.7 m)	14 gauge (2.0 mm ²)

Figure 44. Reliabel™ conventional thermostat field wiring diagram

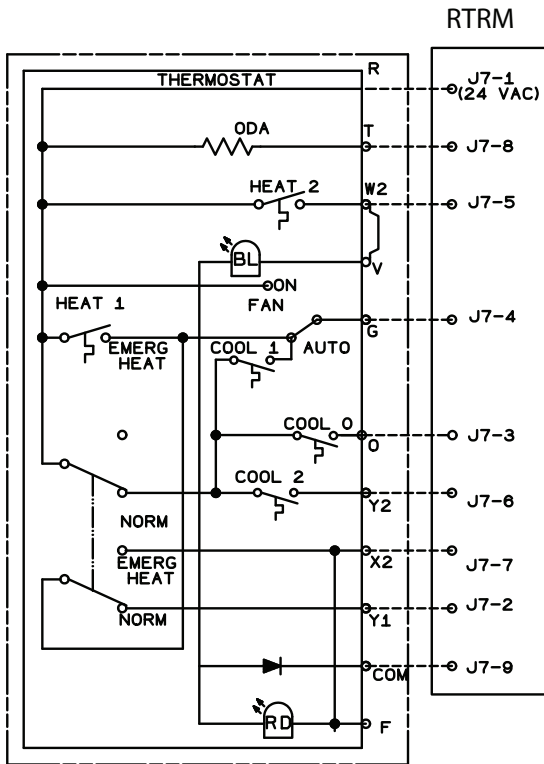


Figure 45. Typical field wiring diagrams for optional controls

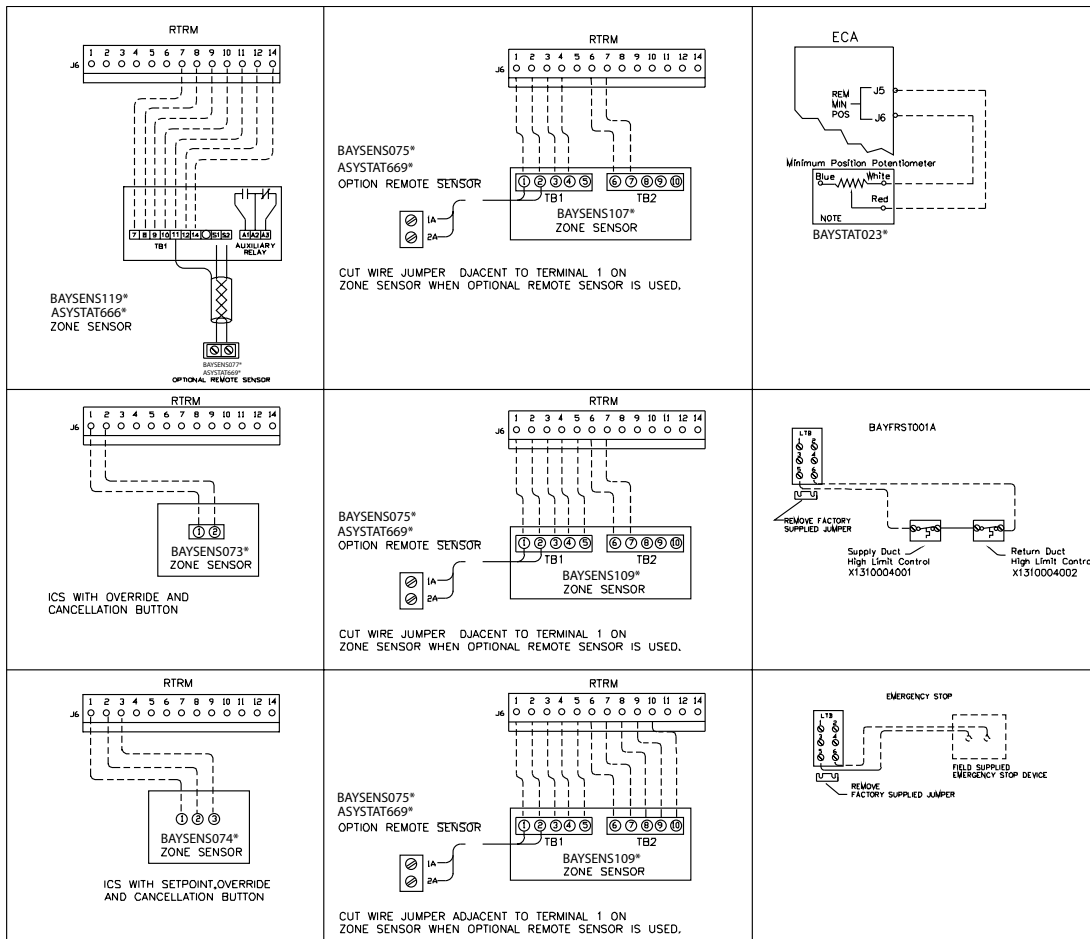


Figure 46. Control box 3 to 10 tons

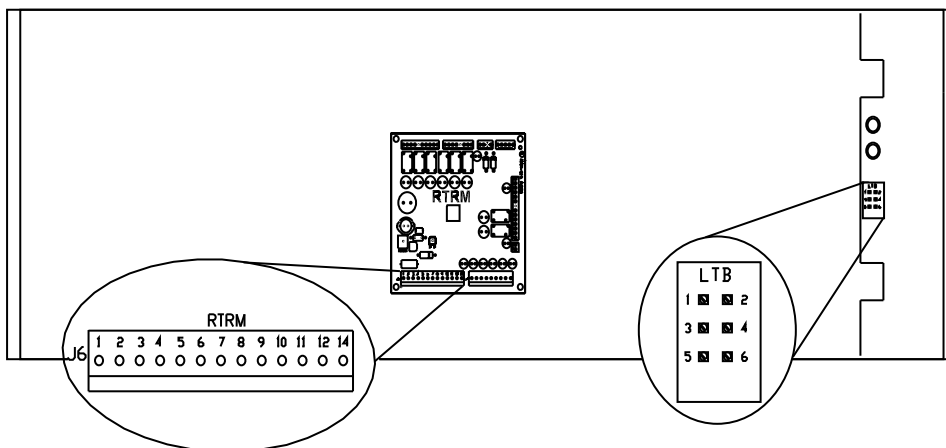
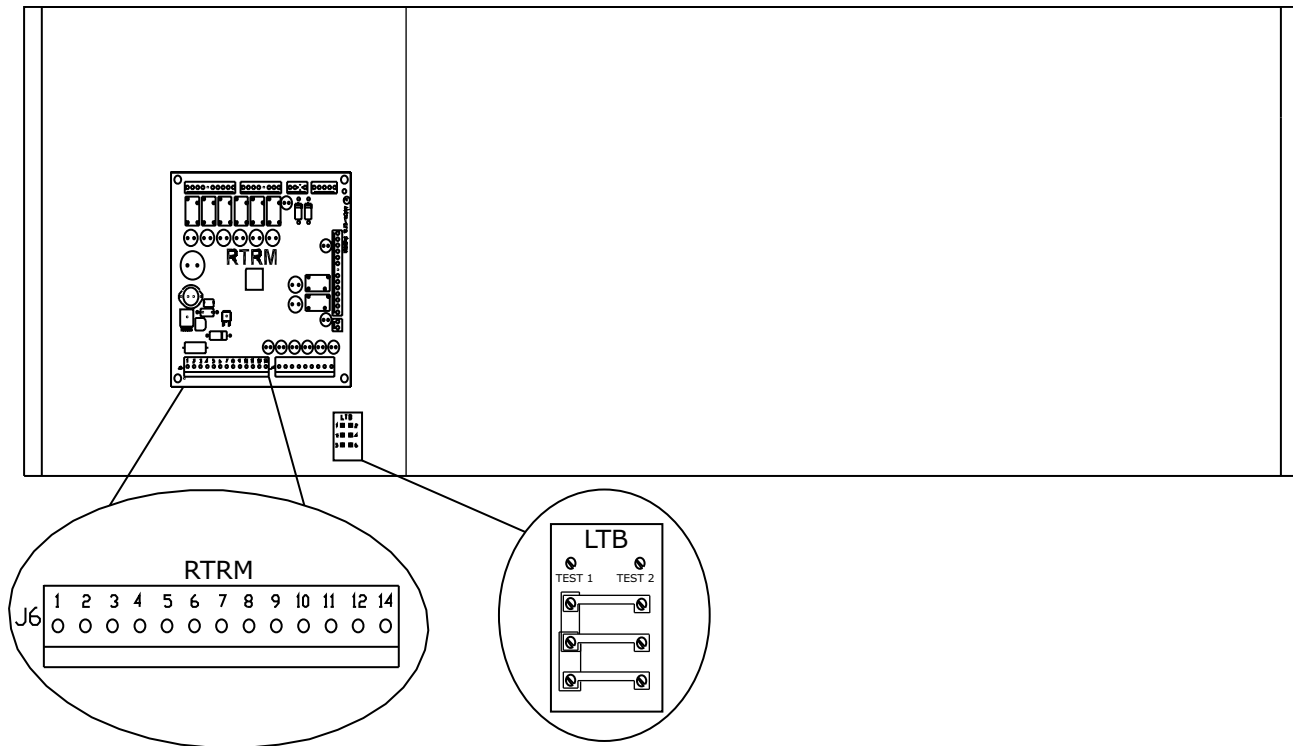


Figure 47. Control box 12.5 to 20 tons



Space Temperature Averaging

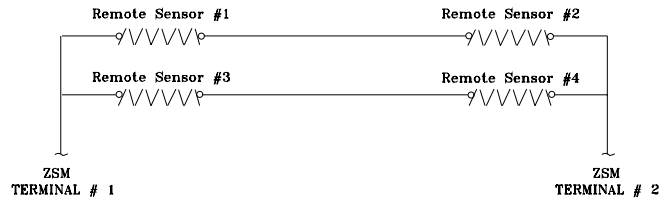
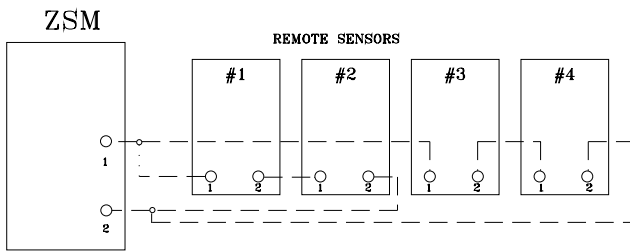
Space temperature averaging is accomplished by wiring a number of remote sensors in a series/parallel circuit.

Using the BAYSENS016* or BAYSENS075*, 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 BAYSENS075*, two sensors are required to accomplish space temperature averaging. Example #3 illustrates the circuit required for this sensor. The temperature vs. resistance table lists the temperature versus resistance coefficient for all sensing.

Figure 48. Space temperature averaging examples

EXAMPLE #1



EXAMPLE #2

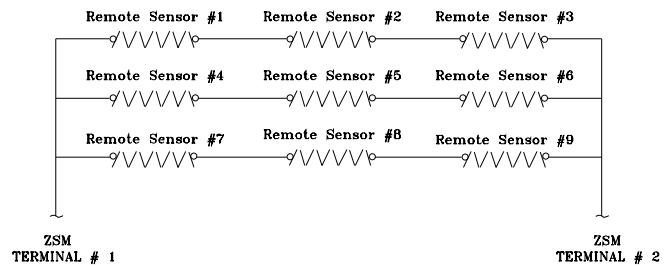
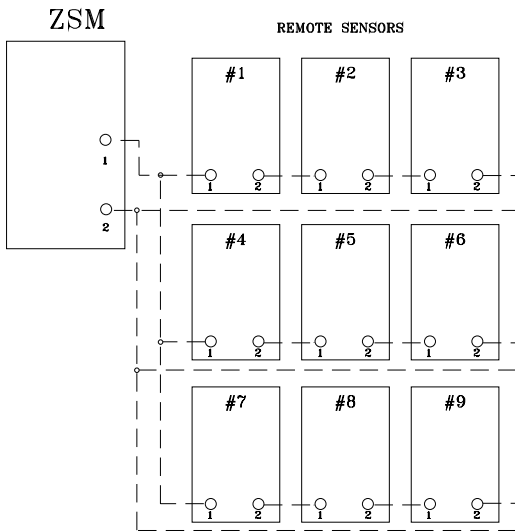


Table 7. Temperature vs. resistance

Temperature		Nominal Resistance
Degrees F°	Degrees C°	
-20°	-28.9°	170.1 K - Ohms
-15°	-26.1°	143.5 K - Ohms
-10°	-23.3°	121.4 K - Ohms
-5°	-20.6°	103.0 K - Ohms
0°	-17.8°	87.56 K - Ohms
5°	-15.0°	74.65 K - Ohms
10°	-12.2°	63.80 K - Ohms
15°	-9.4°	54.66 K - Ohms
20°	-6.7°	46.94 K - Ohms
25°	-3.8°	40.40 K - Ohms
30°	-1.1°	34.85 K - Ohms
35°	1.7°	30.18 K - Ohms
40°	4.4°	26.22 K - Ohms
45°	7.2°	22.85 K - Ohms
50°	10.0°	19.96 K - Ohms

Table 7. Temperature vs. resistance (continued)

Temperature		Nominal Resistance
Degrees F°	Degrees C°	
55°	12.8°	17.47 K - Ohms
60°	15.6°	15.33 K - Ohms
65°	18.3°	13.49 K - Ohms
70°	21.1°	11.89 K - Ohms
75°	23.9°	10.50 K - Ohms
80°	26.7°	9.297 K - Ohms
85°	29.4°	8.247 K - Ohms
90°	32.2°	7.330 K - Ohms
95°	35.0°	6.528 K - Ohms
100°	37.8°	5.824 K - Ohms

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%. Measure and record the voltage between phases 1, 2, and 3 and calculate the amount of imbalance as follows:

% Voltage Imbalance =

$$100 \left(\frac{AV - VD}{AV} \right)$$

where Average Voltage (AV);

$$AV = \left(\frac{V_{o \ell 1} + V_{o \ell 2} + V_{o \ell 3}}{3} \right)$$

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:

$$\frac{221 + 230 + 227}{3} = 2.2 \text{ percent}$$

VD (reading farthest from average) = 221

The percentage of imbalance equals:

$$100 \left(\frac{226 - 221}{226} \right) = 2.2 \text{ percent}$$

The 2.2% imbalance in this example exceeds the maximum allowable imbalance of 2.0%. This much imbalance between phases can equal as much as a 20% current imbalance with a resulting increase in motor winding temperatures that will decrease motor life. If the voltage imbalance is over 2%, 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:

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

NOTICE

Compressor Failure!

Failure to follow instruction below could result in compressor failure.

Unit must be powered and crankcase heaters energized at least 8 hours BEFORE compressors are started.

Each compressor is equipped with a crankcase heater. 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.

ReliaTel™ Controls

Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are



Installation

functional. It also checks the configuration parameters against the components connected to the system. The Liteport LED located on the RTRM module is turned “On” within one second of power-up if internal operation is okay.

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

Final Steps

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

- Check all electrical connections for tightness and “point of termination” accuracy.
- Verify that the indoor blower turn freely without rubbing and are properly tightened on the shafts.
- Check the supply fan belts for proper tension and the fan bearings for sufficient lubrication. If the belts require adjustment, or if the bearings need lubricating, refer to the maintenance section of this manual for instructions.
- 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.

Factory-Mounted Unit Options

Circuit Breaker (FIYUCB) and Unit Disconnect (FIYUDC)

⚠ 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.

Important: All phases of this installation must comply with national, state, and local codes. In addition to local codes, the installation must comply with National Electric Code - ANSI/NFPA NO. 70 latest version.

1. Field connections are made by first removing all access panels on the front of the unit. Unscrew the assembly around the outside of the disconnect switch or circuit breaker. This assembly is located between the evaporator and heat section of the unit.

For downflow configurations, the hole in the base section is for both high and low voltage power wiring on down flow units. Horizontal units will route through the front plate located directly under the circuit breaker or disconnect panel. The hole is sized for 1 1/2" conduit. Horizontal units will use the front plate located directly under the circuit breaker panel.

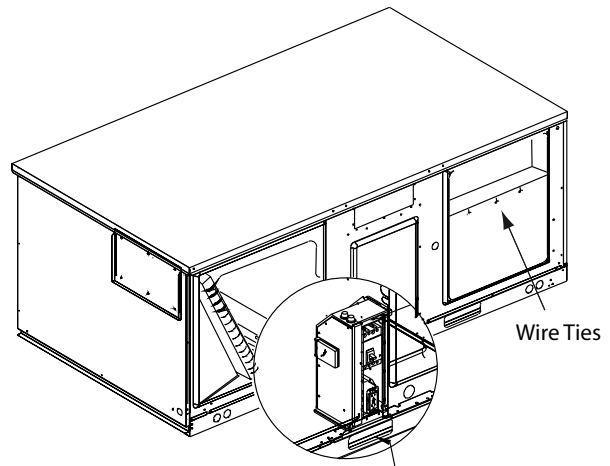
2. If the conduit required for your application is larger, remove the termination plate and connect to the larger hole using field supplied reducing washers.

3. Route the power wires and ground conductor through conduit and into the bottom of the factory installed disconnect switch or circuit breaker. Connect the power conductors to the lugs provided. Connect the ground wire to the unit ground lug.

Note: Wire size for the length of run should be determined using the circuit ampacity found on the unit nameplate and the N.E.C.

4. Route low voltage (class II), control wiring through hole in base of unit but not through high voltage conduit. Feed control wiring through bushing provided on side panel and into the flexible conduit provided in the heat section of the unit. Route wires through loose wire ties provided in unit.
5. Tighten the wire ties. Secure the excess wire bundle under the wire ties in the compressor compartment section. Do not leave excess wire in the electrical enclosure. Use the unit wiring diagram to make the low voltage connections.

Figure 49. Main power entrance for units with factory mounted disconnect or circuit breaker



Main power entrance for units with factory mounted disconnect or circuit breaker

Powered/Unpowered Convenience Outlet

⚠ 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.

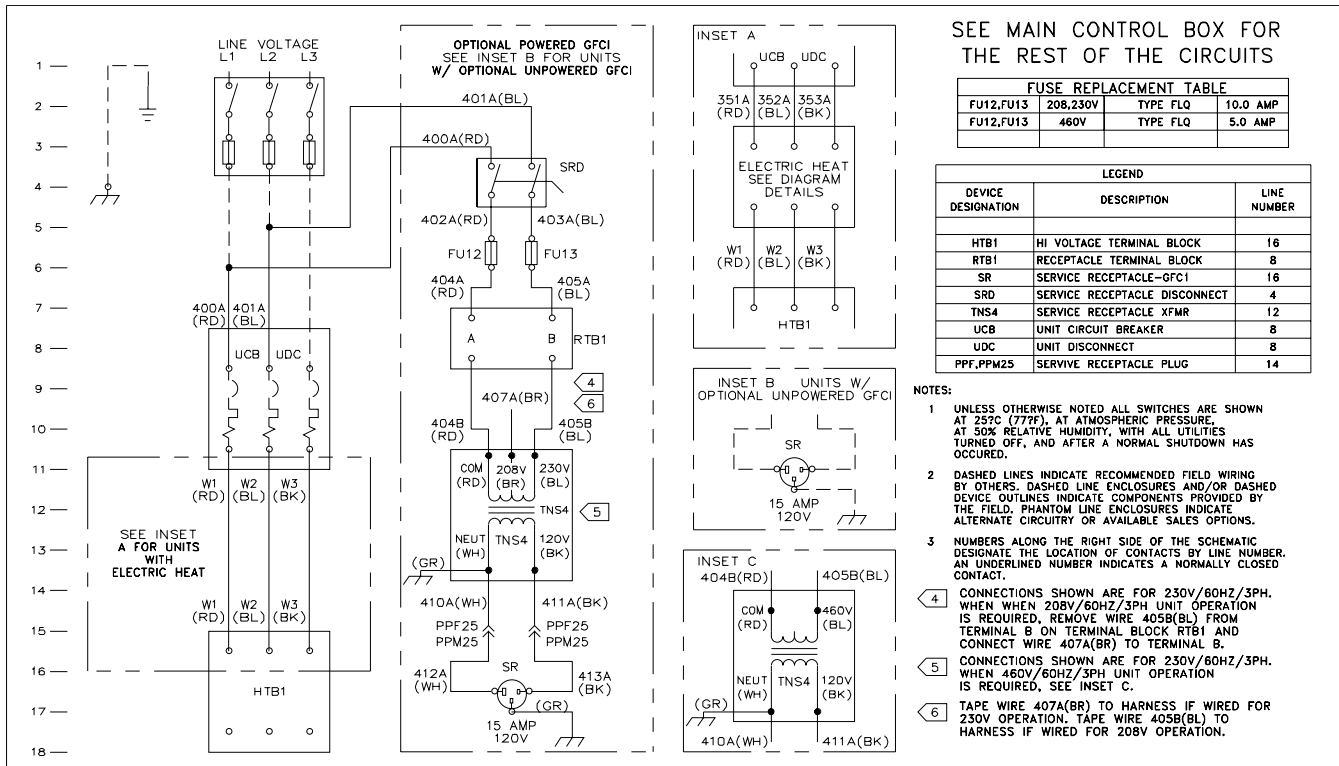
Powered Convenience Outlet Powered Option (FIYCOPO)

When the powered convenience outlet option is installed, the unit will include a dedicated transformer located in the evaporator section of the unit. Additionally, a service receptacle disconnect switch will be provided on the side wall of the evaporator section. The service receptacle switch is shipped in the OFF position.

The powered outlet comes completely wired from the factory except for 208 volt applications.

1. For 208 volt applications, disconnect and tape the blue 230 volt wire.
2. Then connect the brown 208 volt wire.

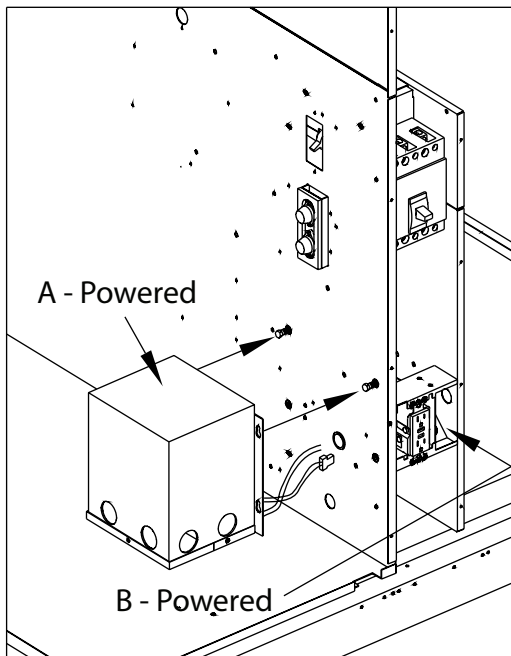
Figure 50. Wiring schematic 12.5 through 20 ton options



Unpowered Convenience Outlet Unpowered Option (FIYCOUP)

1. When the unpowered convenience outlet option is installed, remove the receptacle.
2. The field wiring should be routed through the hole in the base for downflow applications or front panel for horizontal applications then through holes provided in the "J" box (bottom for EMT and top for flexible conduit).
3. Connect the three (3) wires to terminals inside outlet box.

Figure 51. Power options



Return Air Smoke Detector 3 to 10 Tons

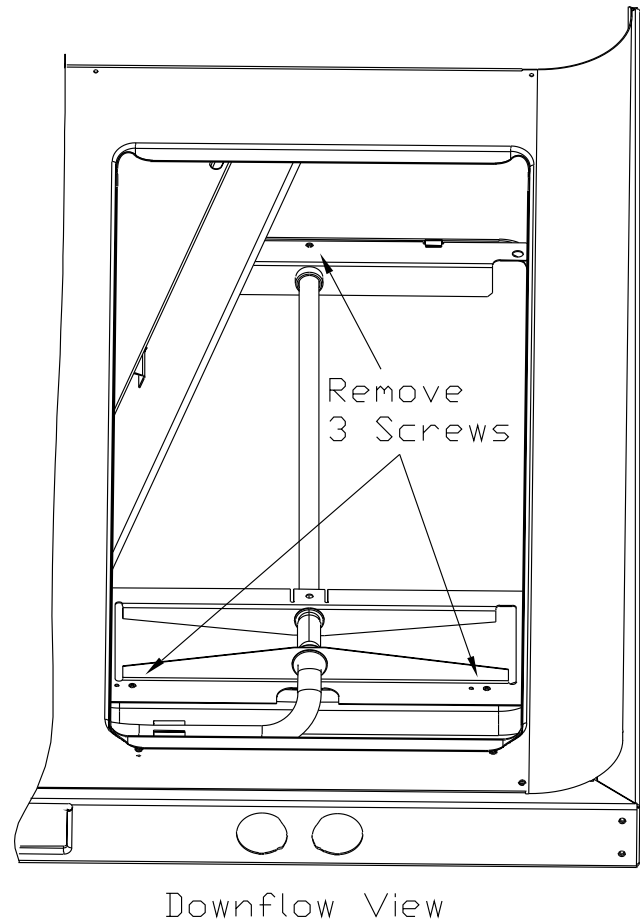
The factory installed Return Air Smoke Detector is installed in the downflow discharge position. No additional field setup is required.

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 3 screws from the mounting brackets. Refer to downflow view for screw locations.

Note: Refer to downflow view for screw locations.

Figure 52. Downflow view



3. Lift the tube and bracket from the downflow duct opening. Rotate the tube and bracket assembly 180° degrees ensuring that the holes on the copper sensing tube face away from the unit and face the return air ductwork.

Note: Refer to horizontal views below.

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

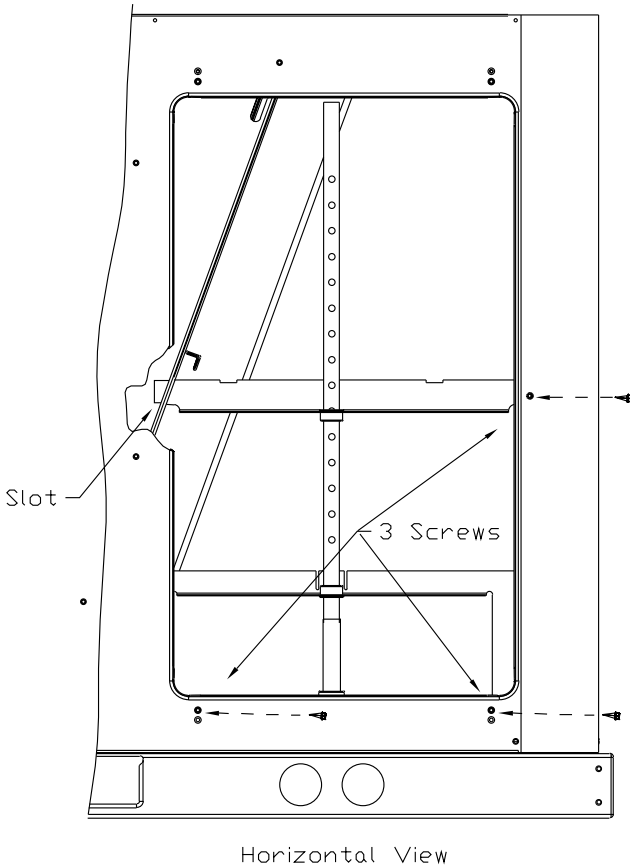
4. Slide the top bracket down the copper sensing tube, insert the tab on the left side into the slot on the indoor coil block off and secure the right side of the bracket with one of the 3 screws removed in step 2.

Note: Refer to horizontal view.

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

Note: Refer to horizontal views below.

Figure 53. Horizontal view



Return Air Smoke Detector 12.5 to 20 Tons

Prerequisite

Note: The following field installation instructions apply to downflow only. Horizontal return air smoke detectors require no field installation.

When a unit is ordered with a downflow economizer and a return air smoke detector as factory installed options, the return air smoke detector cannot be completely installed because the economizer, when it is in the shipping position, is occupying the space where the return air smoke detector is to be installed.

The partial assembly and set-up required for each factory installed economizer must be completed up to the point where the barometric relief hood is to be installed into the unit. Prior to this operation, go to Step 5 of this instruction and perform the operations described there. After this is completed, the economizer installation is to be completed in its entirety as outlined in the installation guide.

Smoke Detector Installation

Important: The shipping screw that holds the barometric relief damper must be removed before proceeding with the smoke detector installation.

After completion of the economizer installation as outlined above, proceed with the installation of the return air smoke detector as follows:

⚠ 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.

⚠ 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.

1. Remove the smoke detector assembly from its shipping position in the indoor fan compartment. This assembly is attached with three screws to the indoor fan board near the top of the unit.
2. Remove and discard the shipping bracket from the smoke detector assembly. This is the angled piece of sheet metal that secured the smoke detector assembly to the interior parts of the unit during shipment.
3. Place the end of the smoke detector 16 inch metal exhaust tube provided into the bottom hole in the back of the smoke detector. Line up the tab in the exhaust tube with one of the slots in the detector and insert the tube until the tube can be rotated. Rotate the tube 45 degrees to lock it in place.

Figure 54. Brackets

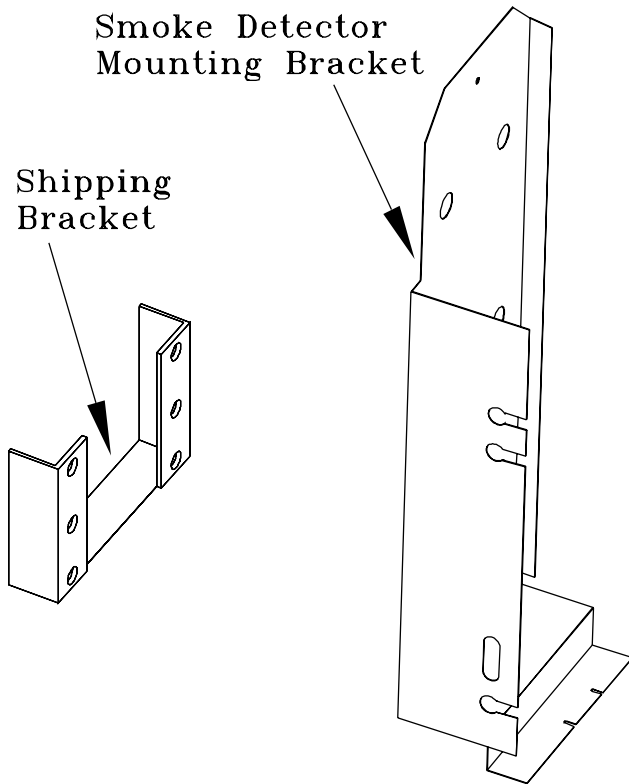
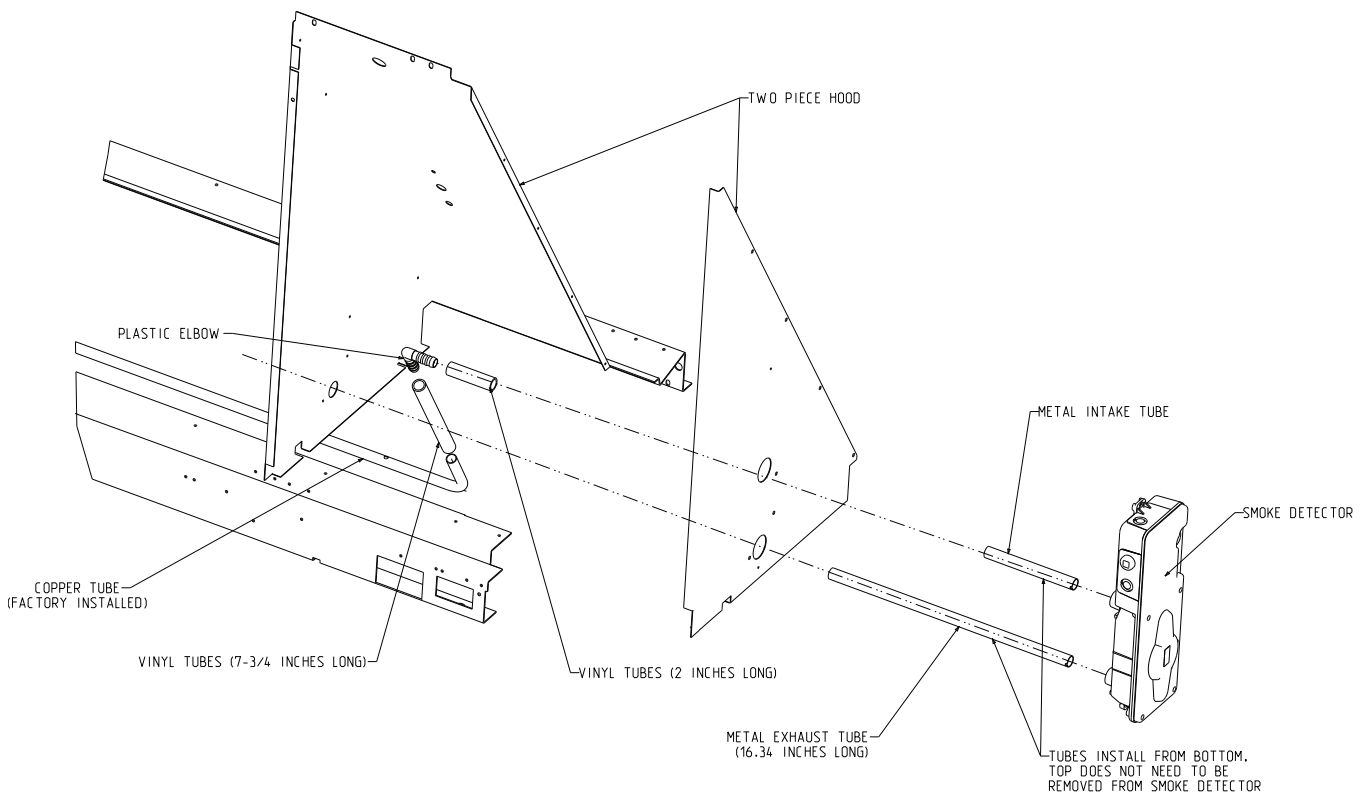


Figure 55. Return air smoke detector for downflow units





Factory-Mounted Unit Options

- Slide one 2" piece of the vinyl tubing provided onto the short smoke detector inlet tube which protrudes out of the back side of the smoke detector. Push this piece of vinyl tubing onto the inlet tube until it contacts the end of the plastic extension on the backside of the smoke detector.
- Slide the long piece of vinyl tubing provided onto one leg of the plastic barbed elbow provided. Slide the other end of this piece of vinyl tubing with the elbow attached approximately 1" onto the end of the copper sampling tube installed in the unit's return air opening. Position the leg of elbow without the vinyl tubing such that it points toward the front side of the unit (directly out of the unit toward the filter access panel).
- Mount the smoke detector assembly into the unit. Align the smoke detector (exhaust tube down) with the holes in the outer panel of the barometric relief hood and position the smoke detector flush on the panel.

Note: On all units there is a hole with a plastic snap bushing located on the inner vertical side of the barometric relief hood that the long exhaust tube must pass through. Be sure that the exhaust tube is aligned with this hole before positioning the smoke detector flush on the outer panel of the barometric relief hood.

- Secure the smoke detector to the hood with two #10-16 x 3/4" sheet metal screws provided.

Note: In order to perform the last part of this operation, it will be necessary to remove the barometric relief filter, open the barometric relief damper, and reach inside through the barometric relief outlet to access and connect the copper exhaust elbow to the smoke detector exhaust tube.

- Connect the leg of the plastic elbow without the vinyl tubing attached that was installed in Step 5 to the smoke detector inlet tube pushing it onto the piece of vinyl tubing attached to the inlet tube.
- Refer to "Return Air Smoke Detector 12.5 to 20 Tons," p. 50 for wire connections of return air smoke detector to the unit wiring harness.
- This completes the installation of the return air smoke detector. If the unit's air filter(s) and/or barometric relief filter were removed to ease installation of the smoke detector, they need to be replaced at this time.

Airflow & Sampling

Refer to the instructions provided below regarding unit airflow to assure that the return air smoke detector will function properly.

Important: The return air smoke detector is designed to shut off the unit if smoke is sensed in the return air stream. 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 detector from performing its design function.

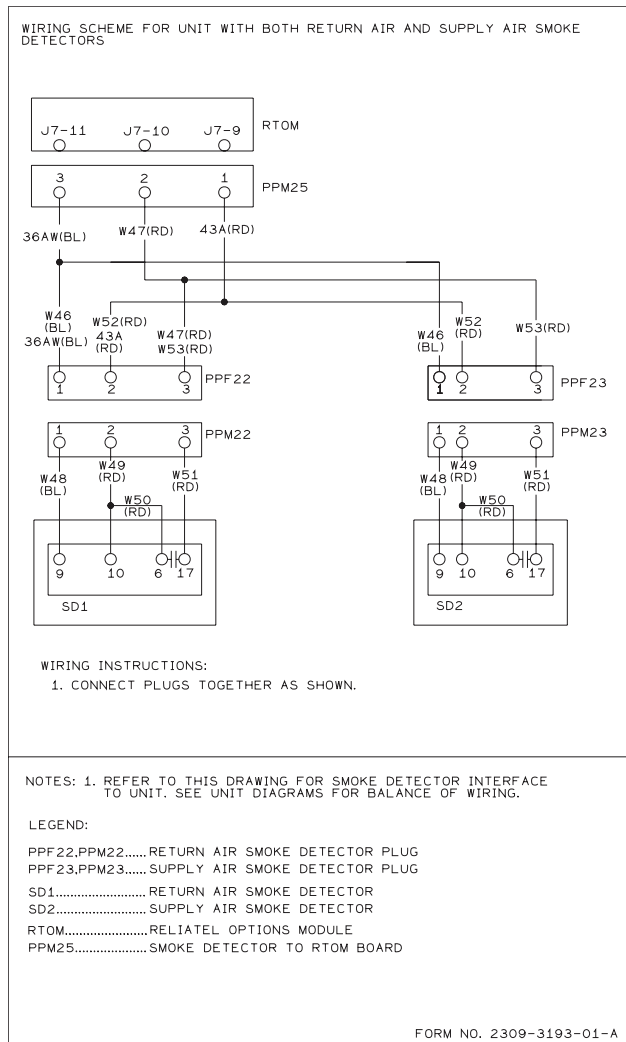
In order for the return air smoke detector to properly sense smoke in the return air stream, the air velocity entering the unit must be between 500 and 4000 feet per minute.

Notes:

- 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.

Important: Refer to the service literature provided for testing and other information about the smoke detector or if problems are encountered.

Figure 56. Smoke detector wiring scheme



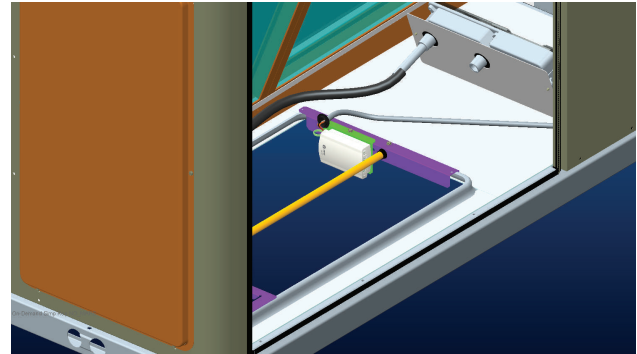
Air-Fi® Wireless Communication Interface (WCI) – 3 to 10 Ton Units

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:

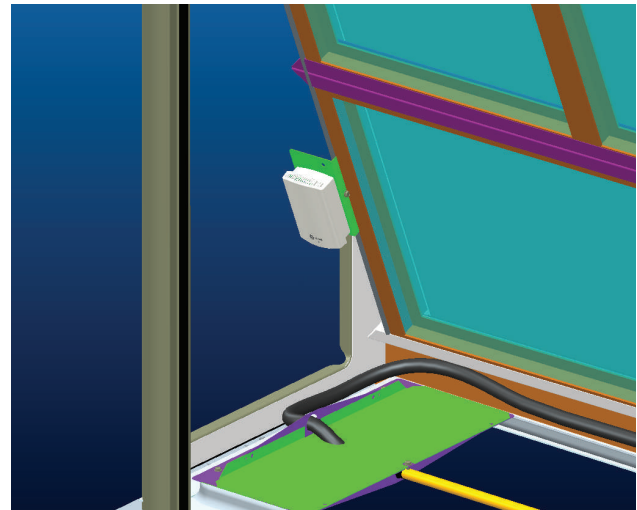
1. If the unit has an economizer, it must be pulled out in the operating position.
2. Remove the screw from the mounting bracket. Refer to downflow view for screw and bracket location.

Figure 57. Wireless communication interface - downflow - 3 to 10 ton units



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

Figure 58. Wireless communication interface - horizontal - 3 to 5 ton units



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

Air-Fi® Wireless Communication Interface (WCI) – 12.5 to 20 Ton Units

When installed, the Trane Air-Fi Wireless Communication Interface is located in the evaporator section, near the return air ductwork. The exact mounting location is dependent on the airflow configuration, cabinet size, and fresh air selection.

Refer to BAS-SVX40*-EN for instructions and troubleshooting procedures.



Factory-Mounted Unit Options

Figure 59. WCI mounting location - GWSD150-240

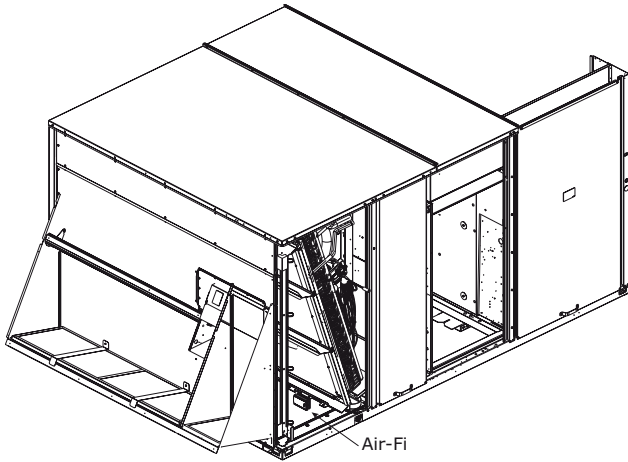


Figure 61. WCI mounting location - GWSD150-240 - with low leak economizer

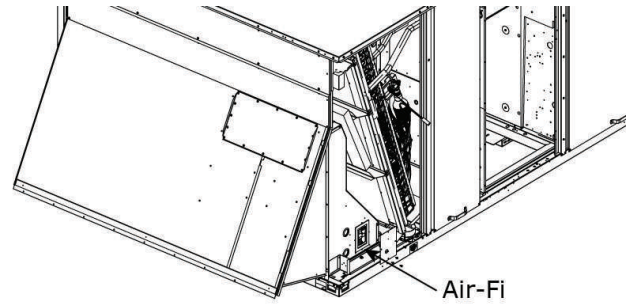
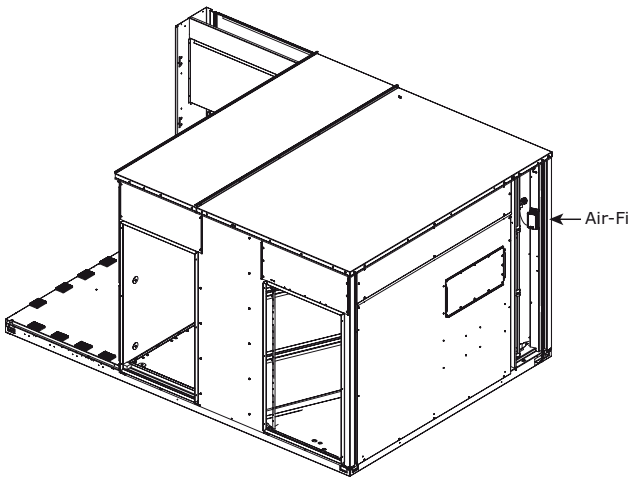


Figure 60. WCI mounting location - GWSH150-240





Pre-Start Test Modes

There are three methods in which the “Test” mode can be cycled at LTB-Test 1 and LTB-Test 2.

1. Step Test Mode - This method initiates the different components of the unit, one at a time, by temporarily shorting across the two test terminals for two to three seconds.
For the initial start-up of the unit, this method allows the technician to cycle a component “On” and have up to one hour to complete the check.
2. Resistance Test Mode - This method can be used for start-up providing a decade box for variable resistance outputs is available. This method initiates the different components of the unit, one at a time, when a specific resistance value is placed across the two test

terminals. The unit will remain in the specific test mode for approximately one hour even though the resistance is left on the test terminals.

3. Auto Test Mode - This method is not recommended for start-up due to the short timing between individual component steps. This method initiates the different components of the unit, one at a time, when a jumper is installed across the test terminals. The unit will start the first test step and change to the next step every 30 seconds. At the end of the test mode, control of the unit will automatically revert to the applied “System” control method.

For unit test steps, test modes, and step resistance values to cycle the various components, refer to the service test guide for component operation table.

Table 8. Service test guide for component operation

Test Step	Mode	Fan	Econ	Comp 1	Comp 2	Heat 1	Heat 2	Ohms
1	Fan	On	Minimum Position Off Setpoint 0%	Off	Off	Off	2.2K	
	Minimum Ventilation	On	Selectable	Off	Off	Off	Off	
2	Economizer Test Open	On	Open	Off	Off	Off	Off	3.3K
3	Cool Stage 1	On	Minimum Position	On	Off	Off	Off	4.7K
4 ^(a)	Cool Stage 2	On	Minimum Position	On	On	Off	Off	6.8K
5 ^(a)	Reheat	On	Minimum	On	On	Off	Off	33K
6 ^(a)	Heat Stage 1	On	Minimum	Off	Off	On	Off	10K
7 ^(a)	Heat Stage 2	On	Minimum	Off	Off	On	On	15K

Note: The exhaust fan will turn on anytime the economizer damper position is equal to or greater than the exhaust fan setpoint.

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

Sequence of Operation

ReliaTel™ Controls

Units are offered with the ReliaTel™ control.

ReliaTel™ control is a microelectronic control feature, which provides operating functions that are significantly different than conventional electromechanical units. The primary module is the ReliaTel™ refrigeration module (RTRM).

The RTRM provides compressor anti-short cycle timing functions through minimum “Off” and “On” timing to increase reliability, performance and to maximize unit efficiency.

Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are functioning. It checks the configuration parameters against

the components connected to the system. The LED located on the RTRM module is turned “On” within one second after power-up if all internal operations are okay.

ReliaTel™ Control Cooling without an Economizer

When the system switch is set to the “Cool” position and the zone temperature rises above the cooling setpoint control band, the RTRM energizes the (K9) relay coil located on the RTRM. When the K9 relay contacts close, the compressor contactor (CC1) coil is energized provided the low pressure control (LPC1), high pressure control (HPC1) and discharge line thermostat (TDL 1) are closed. When the CC1 contacts close, compressor (CPR1) start to maintain the zone temperature to within ± 2°F of the sensor setpoint at the sensed location.



Pre-Start

If the first stage of cooling cannot satisfy the cooling requirement, the RTRM energizes the (K10) relay coil located on the RTRM. When the (K10) relay contacts close, the compressor contactor (CC2) coil is energized provided the low pressure control (LPC2), high pressure control (HPC2) and discharge line thermostat (TDL 2) are closed. When the CC2 contacts close, compressor (CPR2) starts to maintain the zone temperature to within $\pm 2^{\circ}\text{F}$ of the sensor setpoint at the sensed location.

Multi-Speed Indoor Motor

Notes:

- Multi-speed indoor fan available only on 7.5 and 10 tons products with ReliaTel™ controls.

Models configured for the multi-speed indoor motor will be controlled via the 0-10 VDC or PWC indoor fan speed output located on the RTOM. R136 (DA COOL_FAN SPD) potentiometer on the RTOM sets the maximum motor speed. Note that the potentiometer voltage readings can be verified via 2-position harness connector located adjacent to the RTOM. The unit schematic will illustrate the exact location. Use a DC voltmeter to read the voltage between the two terminals. Provisions have been made in Service TEST Mode to allow for maximum motor speed adjustment. Motor may be adjusted using modes listed below. Reference the RPM table in the Performance Data section for fan speed.

1. TEST Mode Cool 2; 2-Step Cool applications only.

Adjust R136 potentiometer clockwise to increase or counterclockwise to decrease motor speed.

Refer to the Fan Output% list below for supply fan output associated with each unit function:

Fan Output %

- Ventilation Only 50%
- Economizer Cooling 65%
- Cool 1 (C1 Energized) 65%
- Cool 2 (C1 + C2) 100% (2-Steps of Cooling)
- Heat 100%

Variable Air Volume Applications (Single Zone VAV for 7.5 and 10 ton)

Supply Fan Output Control

Units configured for Single Zone VAV will be controlled via the 0-10 VDC Indoor Fan Speed output located on the RTOM. R136 (DA COOL_FAN SPD) potentiometer on the RTOM sets the maximum motor speed. Note that the potentiometer voltage readings can be verified via 2-position harness connector located adjacent to the RTOM. The unit schematic will illustrate the exact location. Use a DC voltmeter to read the voltage between the two terminals. Reference the RPM table in the Performance Data section for fan speed.

- Use Service TEST Mode to adjust maximum motor speed using modes listed below.

1. TEST Mode Cool 2; 2-Step Cool applications only
- Adjust DA COOL_FAN SPD potentiometer clockwise to increase or counterclockwise to decrease motor speed.
 - The control will scale the 0-10 VDC output from the RTOM linearly to control between the 50%-100% controllable range based on the space cooling demand.

Minimum Supply Fan Output

Refer to the table below for details on minimum supply fan output signals associated with each unit function.

Mode	Minimum Fan Output
Ventilation Only	50%
Economizer Cooling	65%
Cool 1	65%
Cool 2	82%
Heat	100%

Multi-Speed Fan

When economizing alone or with 1st stage cooling the indoor motor will operate at low speed. If economizing and 2nd stage cooling requested, the indoor motor will transition from low to high speed.

Verifying Proper Air Flow (Units with 5-Tap Direct Drive Indoor Fan) (3 to 5 Ton Only)

⚠ 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.

Much of the systems performance and reliability is closely associated with, and dependent upon having the proper airflow supplied both to the space that is being conditioned and across the evaporator coil.

The indoor fan motor is factory wired to operate on speed tap 1 in the cooling and heating mode for electric/electric units. For electric, heat pump units, the motor is factory wired to operate on speed tap 1 during cooling. For 3 & 4 ton electric units operating in heat mode, the minimum setting is Tap 4.

For these units, a separate tap terminal is provided to change speeds automatically between heating and cooling. The motor can be rewired for different speed settings should the application require it. Refer to the wiring

diagram that shipped in the unit and the unit fan performance tables in the Service Facts.

The indoor fan motors are specifically designed to operate within the BHP parameters listed in the fan performance tables of the unit service facts.

When verifying direct drive fan performance, the tables must be used somewhat differently than those of belt driven fans. Fan performance diagnostics can be easily recognized when these tables are used correctly.

Before starting the SERVICE TEST, set the minimum position setpoint for the economizer to 0% using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel™ Control:

Using the service test guide for component operation in the Pre-Start section, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Verifying Proper Air Flow (Units with Belt Drive Indoor Fan)

Much of the systems performance and reliability is closely associated with, and dependent upon having the proper airflow supplied both to the space that is being conditioned and across the evaporator coil.

The indoor fan speed is changed by opening or closing the adjustable motor sheave.

Before starting the SERVICE TEST, set the minimum position setpoint for the economizer to 0 percent using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel™ Control

Using the Service Test Guide in the Service test guide for component operation, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Once the supply fan has started, check for proper rotation. The direction of rotation is indicated by an arrow on the fan housing.

With the fan operating properly, determine the total system airflow (CFM) by;

1. Measuring the actual RPM,
 2. Measure the amperage at the supply fan contactor and compare it with the full load amp (FLA) rating stamped on the motor nameplate.
 - a. Calculate the theoretical BHP

$$\frac{\text{Actual Motor Amps} \times \text{Motor HP}}{\text{Motor Nameplate Amps}}$$
 - b. Using the fan performance tables in the unit Service Facts, plot the actual RPM (step 1) and the BHP (step 2a) to obtain the operating CFM.
 3. If the required CFM is too low, (external static pressure is high causing motor HP output to be below table value),
 - a. Relieve supply and/or return duct static.
 - b. Change indoor fan speed and repeat steps 1 and 2.
- To Increase Fan RPM; Loosen the pulley adjustment set screw and turn sheave clockwise.
 - To Decrease Fan RPM; Loosen the pulley adjustment set screw and turn sheave counterclockwise.
 - If the required CFM is too high, (external static pressure is low causing motor HP output to be above table value), change indoor fan speed and repeat steps 1 and 2.
 - To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure. Remove electro mechanical test mode connections (if applicable).

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.

Start Up

Economizer Start-Up

Using the service test guide for component operation table, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

1. Set the minimum position setpoint for the economizer to the required percentage of minimum ventilation using the setpoint potentiometer located on the Economizer Control Actuator (ECA).

The economizer will drive to its minimum position setpoint, exhaust fans (if applicable) may start at random, and the supply fan will start when the SERVICE TEST is initiated.

The Exhaust Fan will start anytime the economizer damper position is equal to or greater than the exhaust fan setpoint.

2. Verify that the dampers stroked to the minimum position.
3. Momentarily jump across the Test 1 & Test 2 terminals on LTB one additional time if continuing from previous component start-up or until the desired start-up component Test is started.
4. Verify that the dampers stroked to the full open position.
5. To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure. Remove electro mechanical test mode connections (if applicable).

Compressor Start-Up

1. Attach a set of service gauges onto the suction and discharge gauge ports for each circuit. Refer to the refrigerant circuit illustration in the Service Facts.

Using the Service test guide for component operation table, continue the Service Test start-up procedure for each compressor circuit.

Momentarily jump across the Test 1 & Test 2 terminals on LTB1 one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

Scroll Compressors

- a. Once each compressor has started, verify that the rotation is correct. To check rotation, use a set of refrigeration gauges hooked up to the suction and discharge pressure port. If the compressor is phased correctly the suction pressure should drop and the discharge pressure should rise when the compressor starts and runs. If a scroll compressor is rotating backwards, it will not pump, the suction and discharge pressure will not rise, and a loud rattling sound can be observed.
- b. If the electrical phasing is incorrect, before condemning a compressor, interchange any two

leads (at the compressor terminal block) to check the internal phasing. Refer to the following illustration for the compressor terminal/phase identification. If the compressor runs backward for an extended period not to exceed 5 seconds, the compressor will be damaged the motor winding can overheat and cause the motor winding thermostat to open and the oil can turn dark gray.

- c. Check the compressor oil levels. The oil level in each compressor sight glass should be visible in the compressor sightglass. This only applies to CSHD compressors, SSA and SPA compressors don't have sight glasses.

Note: SSA and SPA scroll compressors for R-410A units use Trane OIL00094. The correct oil for Trane CSHD is Trane OIL00079 or OIL00080. Compressor types are listed in the table below. The appropriate oil charge is also listed below

2. After the compressor starts and operates for approximately 30 minutes, observe the operating pressures. Compare the operating pressures to the operating pressure curve.
3. Check system superheat. Follow the instruction listed on the superheat charging curve. Superheat should be within $\pm 5^{\circ}\text{F}$ of the superheat chart value.
4. Repeat steps 1 through 4 for each refrigerant circuit.
5. To stop the Service Test, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure.

SSA and SPA scroll compressors for R-410A units use Trane OIL00094. The correct Oil for Trane CSHD is Trane OIL00079 or OIL00080. Compressor types are listed in the following table. The appropriate oil charge is also listed below.

Figure 62. Compressor terminal box

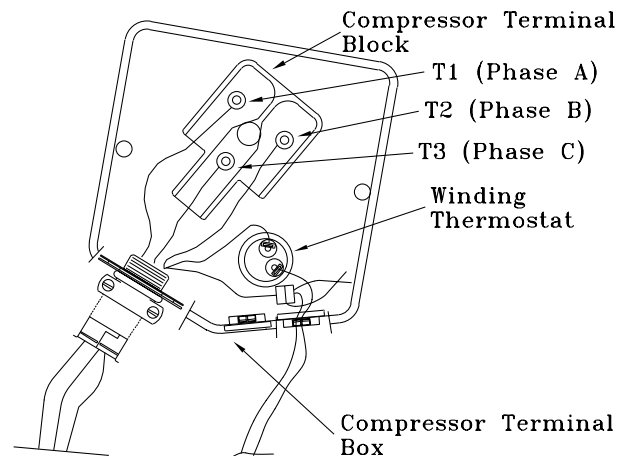


Table 9. Oil charge

Model	Circuit 1	Circuit 2
GWSC036H	25 oz	—
GWSC048H	25 oz	—
GWSC060H	25 oz	—
GWSC072H	60 oz	—
GWSC092H	54 oz	—
GWSC120H	85 oz	—
GWS*150E	56 oz	56 oz
GWS*180E	56 oz	56 oz
GWS*240E	112 oz	112 oz

Table 10. Compressor types

Tonnage	Circuit 1	Circuit 2
GWSC036H	SXA036	—
GWSC048H	SXA044	—
GWSC060H	SXA054	—
GWSC072H	SXA067	—
GWSC092H	ZPS83KCE	—
GWSC120H	ZPS104KCE	—
GWS*150E	SSA067	SSA067
GWS*180E	SSA083	SSA083
GWS*240E	CSHD125	CSHD125

Heating Start-Up

1. Clamp an amp meter around one of 1st stage heater power wires at the heater contactor.
2. Using the Service Test Guide in the service test guide for component operation table, continue the Service Test start-up procedure for each compressor circuit.

Momentarily jump across the Test 1 & Test 2 terminals on LTB one additional time if continuing from previous component start-up or until the desired start-up component Test is started.
3. Verify that the heater stage is operating properly.
4. Clamp an amp meter around one of 2nd stage heater power wires at the heater contactor (if applicable).

5. Using the Service Test Guide in the service test guide for component operation table, continue the Service Test start-up procedure for each compressor circuit. Momentarily jump across the Test 1 & Test 2 terminals on LTB one additional time if continuing from previous component start-up or until the desired start-up component Test is started.
6. Verify that the heater stage is operating properly.
7. To stop the Service Test, turn the main power disconnect switch to the “Off” position or proceed to the next component start-up procedure.

Final System Setup

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

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

Operating Pressures in Cooling/ Heating

There are many variables (airflow, air temperatures) in an air conditioning system that will affect operating refrigerant pressures and temperatures. The charts below shows approximate conditions and is based on air flow at the rated SCFM, entering air at 80.6°F(DB), 66.2°F(WB) in cooling, 68°F(DB) in heating. (+)Heating data with 35°F EWT is based on the use of an anti-freeze solution having a freezing point 20°F lower than the minimum expected entering temperature.



Start Up

Table 11. GWSC036H Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWSC036H	32°	7.2	—	—	—	—	87-100	271-345	5-7°	19-28°
	32°	9.0	—	—	—	—	89-103	273-348	4-6°	20-29°
	45°	7.2	137-157	183-233	14-17°	26-32°	105-121	291-370	7-9°	24-33°
	45°	9.0	136-157	175-223	11-14°	27-32°	107-124	293-373	6-7°	24-34°
	55°	7.2	138-159	211-268	14-17°	26-31°	118-136	306-390	8-10°	27-38°
	55°	9.0	138-158	203-258	11-14°	26-31°	122-140	309-393	7-9°	28-38°
	68°	7.2	140-161	250-318	13-17°	25-30°	139-160	325-414	9-12°	32-42°
	68°	9.0	140-161	242-308	11-14°	25-31°	144-166	328-418	8-10°	32-43°
	75°	7.2	141-162	271-345	13-17°	25-30°	153-176	335-426	10-13°	34-44°
	75°	9.0	141-162	264-336	10-13°	25-30°	158-182	337-429	8-10°	34-45°
	86°	7.2	143-165	310-395	13-16°	24-29°	180-207	347-442	11-14°	36-47°
	86°	9.0	143-165	302-385	10-13°	24-29°	186-214	348-443	9-11°	36-47°
	95°	7.2	145-167	346-441	13-16°	23-29°	—	—	—	—
95°	9.0	145-167	338-431	10-13°	24-29°	—	—	—	—	

Table 12. GWSC048H Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWSC048H	32°	9.6	—	—	—	—	88-101	268-341	5-7°	18-27°
	32°	12.0	—	—	—	—	90-103	270-343	4-6°	19-28°
	45°	9.6	140-161	182-232	13-16°	26-31°	106-122	285-363	7-9°	22-32°
	45°	12.0	140-161	175-223	10-13°	26-31°	108-125	288-366	6-7°	23-33°
	55°	9.6	141-162	210-267	13-16°	25-30°	119-137	300-381	8-10°	26-36°
	55°	12.0	141-162	202-257	10-13°	25-30°	122-141	303-385	7-8°	26-36°
	68°	9.6	142-164	251-320	13-16°	24-30°	139-160	319-406	9-12°	30-40°
	68°	12.0	142-163	243-309	10-13°	25-30°	144-165	322-409	8-10°	31-41°
	75°	9.6	143-164	275-351	12-16°	24-29°	152-175	329-418	10-13°	32-43°
	75°	12.0	142-164	267-340	10-13°	24-30°	158-182	331-422	8-10°	33-44°
	86°	9.6	144-165	317-403	12-16°	24-29°	178-205	343-436	11-14°	35-46°
	86°	12.0	144-165	308-392	10-12°	24-29°	185-212	345-439	9-11°	36-47°
	95°	9.6	145-167	354-450	12-15°	23-29°	—	—	—	—
95°	12.0	145-167	345-439	10-12°	23-29°	—	—	—	—	

Table 13. GWSC060H Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWSC060H	32°	12.0	—	—	—	—	87-100	274-348	4-5°	14-22°
	32°	15.0	—	—	—	—	89-102	275-350	3-4°	14-22°
	45°	12.0	131-151	181-230	12-15°	25-30°	105-120	293-373	5-7°	18-27°
	45°	15.0	131-151	175-223	10-12°	25-30°	108-124	295-376	4-6°	18-28°
	55°	12.0	133-153	208-264	12-15°	24-30°	119-137	310-394	7-9°	23-32°
	55°	15.0	133-153	201-256	10-12°	24-30°	123-141	312-398	6-7°	23-33°
	68°	12.0	135-155	248-316	12-15°	23-29°	140-161	331-422	9-11°	29-39°
	68°	15.0	135-155	241-307	9-12°	24-29°	145-167	334-425	7-9°	29-39°
	75°	12.0	135-156	273-347	12-15°	23-28°	154-177	342-435	10-12°	32-42°
	75°	15.0	135-156	265-337	9-12°	23-29°	160-184	344-438	8-10°	32-42°
	86°	12.0	137-158	314-400	11-14°	22-28°	181-208	354-451	11-14°	36-47°
	86°	15.0	137-157	306-390	9-11°	22-28°	188-216	356-453	9-11°	36-47°
	95°	12.0	139-160	351-446	11-14°	22-27°	—	—	—	—
95°	15.0	139-159	343-436	9-11°	22-28°	—	—	—	—	

Table 14. GWSC072H Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWSC072H	32°	14.4	—	—	—	—	85-98	268-341	5-7°	18-28°
	32°	18.0	—	—	—	—	87-100	270-343	4-6°	19-28°
	45°	14.4	133-153	186-237	13-16°	24-29°	102-117	284-362	7-9°	22-32°
	45°	18.0	133-153	178-227	10-13°	24-29°	104-120	287-365	6-7°	23-32°
	55°	14.4	135-155	215-274	13-16°	23-29°	116-133	297-379	8-10°	25-35°
	55°	18.0	134-155	207-263	10-13°	23-29°	119-137	300-382	6-8°	26-36°
	68°	14.4	136-157	256-326	12-16°	22-28°	137-157	316-402	9-12°	30-40°
	68°	18.0	136-156	248-315	10-12°	22-28°	141-162	319-406	7-9°	30-41°
	75°	14.4	137-157	279-355	12-15°	21-27°	150-173	326-415	10-12°	32-42°
	75°	18.0	136-157	271-345	10-12°	21-27°	155-178	330-419	8-10°	33-43°
	86°	14.4	138-159	320-408	12-15°	20-26°	175-202	344-437	11-14°	36-47°
	86°	18.0	138-158	312-397	9-12°	20-26°	181-209	348-442	9-11°	37-48°
	95°	14.4	140-161	358-456	12-15°	20-25°	—	—	—	—
95°	18.0	139-160	350-445	9-12°	20-26°	—	—	—	—	



Start Up

Table 15. GWSC092H Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWSC092H	32°	18.0	—	—	—	—	86-99	271-344	5-7°	17-26°
	32°	22.5	—	—	—	—	87-100	272-346	4-5°	18-27°
	45°	18.0	124-143	184-234	12-15°	24-29°	104-119	289-368	7-8°	22-31°
	45°	22.5	124-143	178-227	10-12°	24-29°	106-122	291-371	5-7°	22-32°
	55°	18.0	126-145	213-271	12-15°	24-29°	118-136	305-388	8-10°	25-35°
	55°	22.5	126-144	206-263	9-12°	24-29°	121-139	308-392	6-8°	26-36°
	68°	18.0	129-149	252-321	12-15°	23-29°	139-160	327-416	9-11°	30-40°
	68°	22.5	129-149	245-311	9-12°	23-29°	143-165	330-420	7-9°	30-41°
	75°	18.0	131-151	275-351	11-15°	23-28°	152-175	339-431	10-12°	32-43°
	75°	22.5	131-151	268-341	9-12°	23-28°	158-181	343-437	8-10°	33-44°
	86°	18.0	133-153	316-402	11-14°	22-28°	177-204	359-457	11-14°	36-47°
	86°	22.5	133-153	308-392	9-11°	22-28°	184-211	364-463	9-12°	37-49°
	95°	18.0	135-155	352-448	11-14°	22-27°	—	—	—	—
	95°	22.5	135-155	344-438	9-11°	22-27°	—	—	—	—

Table 16. GWSC120H Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWSC120H	32°	24.0	—	—	—	—	82-95	270-343	5-6°	17-25°
	32°	30.0	—	—	—	—	84-97	272-346	4-5°	17-26°
	45°	24.0	148-170	173-220	11-14°	21-27°	100-115	287-366	6-8°	20-30°
	45°	30.0	149-171	167-212	8-11°	21-27°	103-118	290-369	5-7°	21-30°
	55°	24.0	144-165	204-259	11-14°	21-27°	115-133	304-387	7-9°	24-33°
	55°	30.0	144-166	197-251	9-11°	21-27°	119-136	307-390	6-8°	24-34°
	68°	24.0	141-162	247-314	11-14°	21-26°	138-159	327-416	9-11°	28-38°
	68°	30.0	142-163	239-305	9-11°	21-26°	143-164	331-421	7-9°	29-39°
	75°	24.0	141-162	271-345	11-14°	20-26°	152-175	340-433	9-12°	30-41°
	75°	30.0	141-162	264-335	9-11°	20-26°	157-181	345-439	8-10°	31-42°
	86°	24.0	142-163	312-397	11-14°	20-26°	177-204	361-460	11-13°	34-45°
	86°	30.0	142-163	304-387	8-11°	20-26°	183-211	367-467	9-11°	35-46°
	95°	24.0	144-165	347-442	10-13°	20-25°	—	—	—	—
	95°	30.0	144-165	339-432	8-11°	20-26°	—	—	—	—

Table 17. GWS*150 Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWS*150	35°	31.0	—	—	—	—	85-98	271-344	11-13°	18-27°
	35°	38.8	—	—	—	—	86-100	272-346	9-11°	19-28°
	45°	31.0	134-154	192-244	24-31°	23-29°	100-115	284-362	12-16°	21-30°
	45°	38.8	134-154	185-236	19-24°	23-29°	102-117	285-363	10-13°	21-31°
	55°	31.0	135-156	220-280	24-30°	23-28°	116-134	299-381	14-18°	24-34°
	55°	38.8	135-156	213-271	19-24°	23-28°	119-137	301-383	12-15°	24-34°
	68°	31.0	138-158	261-333	23-29°	22-28°	140-161	321-408	17-22°	28-38°
	68°	38.8	137-158	254-323	18-24°	22-28°	144-166	323-411	14-18°	28-39°
	75°	31.0	139-160	286-364	23-29°	22-27°	155-178	334-425	19-24°	30-41°
	75°	38.8	139-160	278-354	18-23°	22-27°	159-183	336-428	15-19°	31-41°
	86°	31.0	141-162	329-419	22-29°	21-27°	180-207	355-452	21-27°	34-45°
	86°	38.8	141-162	321-408	18-23°	21-27°	185-213	359-457	17-22°	34-45°
	95°	31.0	143-164	367-467	22-28°	21-26°	—	—	—	—
95°	38.8	143-164	359-456	18-22°	21-26°	—	—	—	—	

Table 18. GWS*180 Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWS*180	35°	37.2	—	—	—	—	80-92	251-319	5-6°	17-26°
	35°	46.5	—	—	—	—	82-94	251-320	4-5°	17-26°
	45°	37.2	134-155	187-238	11-14°	22-27°	95-109	259-329	5-7°	18-28°
	45°	46.5	134-154	181-231	9-11°	22-27°	97-111	260-331	4-6°	19-28°
	55°	37.2	135-156	217-276	11-14°	22-27°	111-128	268-341	6-8°	21-30°
	55°	46.5	135-156	210-267	9-11°	22-27°	113-130	270-343	5-6°	21-30°
	68°	37.2	137-158	260-330	11-14°	21-27°	135-155	282-359	7-9°	23-33°
	68°	46.5	137-157	252-321	9-11°	21-27°	138-159	282-359	5-7°	23-33°
	75°	37.2	138-159	285-363	11-14°	21-26°	149-172	288-367	7-9°	25-34°
	75°	46.5	138-159	278-354	9-11°	21-27°	153-177	289-368	6-7°	25-34°
	86°	37.2	140-161	329-419	11-14°	20-26°	175-201	299-381	8-10°	27-37°
	86°	46.5	140-161	321-409	9-11°	20-26°	180-207	300-381	6-8°	26-36°
	95°	37.2	141-163	368-469	11-13°	20-26°	—	—	—	—
	95°	46.5	141-163	360-459	8-11°	20-26°	—	—	—	—



Start Up

Table 19. GWS*240 Operating pressures in cooling/heating

Operating Data										
Model	Entering Water Temp F	Water Flow GPM	Cooling				Heating			
			Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Rise F	Air Temp Drop DB F	Suction Pressure PSIG	Discharge Pressure PSIG	Water Temp Drop F	Air Temp Rise DB F
GWS*240	35°	—	—	—	—	—	67-77	268-341	6-7°	21-31°
	35°	—	—	—	—	—	68-79	269-343	5-6°	22-31°
	45°	49.6	112-129	178-227	12-16°	23-28°	81-93	283-361	7-9°	25-35°
	45°	62.0	112-129	172-218	10-12°	23-28°	83-95	285-362	6-7°	26-35°
	55°	49.6	112-129	207-264	12-16°	22-28°	96-110	299-380	8-10°	29-39°
	55°	62.0	112-129	200-255	10-12°	22-28°	99-114	301-384	6-8°	29-40°
	68°	49.6	114-131	250-318	12-15°	22-28°	119-137	321-409	9-12°	34-44°
	68°	62.0	114-131	242-308	10-12°	22-28°	123-142	324-412	7-9°	34-45°
	75°	49.6	115-132	275-350	12-15°	22-27°	133-153	334-425	10-12°	36-47°
	75°	62.0	115-132	267-340	10-12°	22-27°	138-158	337-429	8-10°	37-48°
	86°	49.6	117-134	318-405	12-15°	21-27°	158-181	354-451	11-14°	40-52°
	86°	62.0	117-134	310-395	9-12°	21-27°	164-188	356-454	9-11°	41-52°
	95°	49.6	119-136	357-454	12-15°	21-26°	—	—	—	—
95°	62.0	118-136	348-443	9-12°	21-26°	—	—	—	—	

Water Volume

Table 20. Water Volume

Unit Size	Water Side Volume Cubic In.	Water Side Volume Cubic In.	Water Side Volume Gallons
GWSC036H	105	0.061	0.455
GWSC048H	171	0.099	0.740
GWSC060H	251	0.145	1.084
GWSC072H	343	0.199	1.485
GWSC092H	342	0.198	1.482

Table 20. Water Volume (continued)

Unit Size	Water Side Volume Cubic In.	Water Side Volume Cubic In.	Water Side Volume Gallons
GWSC120H	686	0.397	2.971
GWS*150E	508	0.294	2.199
GWS*180E	508	0.294	2.199
GWS*240E	779	0.451	3.372

(* stands for both downflow and horizontal units.

Maintenance

Make sure all personnel are standing clear of the unit before proceeding. The system components will start when the power is applied.

Fan Belt Adjustment

The supply fan belts must be inspected periodically to assure proper unit operation.

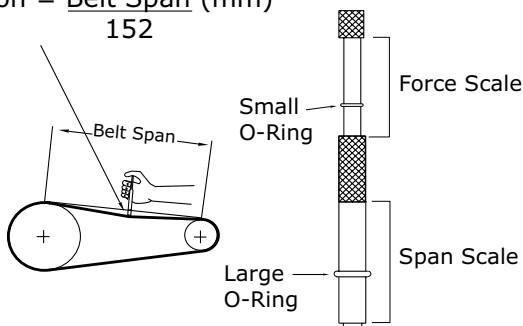
Replacement is necessary if the belts appear frayed or worn. Units with dual belts require a matched set of belts to ensure equal belt length. When installing new belts, do not stretch them over the sheaves; instead, loosen the adjustable motor-mounting base.

Once the new belts are installed, adjust the belt tension using a Browning or Gates tension gauge (or equivalent) illustrated in [Figure 63, p. 65](#).

Figure 63. Typical belt tension gauge

$$\text{Deflection} = \frac{\text{Belt Span (in.)}}{64}$$

$$\text{Deflection} = \frac{\text{Belt Span (mm)}}{152}$$



1. To determine the appropriate belt deflection:
 - a. Measure the center-to-center distance, in inches, between the fan sheave and the motor sheave.
 - b. Divide the distance measured in Step 1a by 64; the resulting value represents the amount of belt deflection for the proper belt tension.
2. Set the large O-ring on the belt tension gauge at the deflection value determined in Step 1b.
3. Set the small O-ring at zero on the force scale of the gauge.
4. Place the large end of the gauge on the belt at the center of the belt span. Depress the gauge plunger until the large O-ring is even with the of the second belt or even with a straightedge placed across the sheaves.
5. Remove the tension gauge from the belt. Notice that the small O-ring now indicates a value other than zero on the force scale. This value represents the force (in pounds) required to deflect the belt(s) the proper distance when properly adjusted.
6. Compare the force scale reading in step 5 with the appropriate "force" value in [Table 21, p. 66](#). If the force reading is outside of the listed range for the type of belts used, either readjust the belt tension or contact a qualified service representative.

Note: The actual belt deflection force must not exceed the maximum value shown in [Table 21, p. 66](#).
7. Recheck the new belt's tension at least twice during the first 2 to 3 days of operation. Readjust the belt tension as necessary to correct for any stretching that may have occurred. Until the new belts are "run in", the belt tension will decrease rapidly as they stretch.

⚠ 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.



Maintenance

Table 21. Belt tension measurements and deflection forces

Belts Cross Section	Small P.D Range	Deflection Force (Lbs.)					
		Super Gripbelts		Gripnotch		Steel Cable Gripbelts	
		Min.	Max.	Min.	Max.	Min.	Max.
A	3.0 - 3.6	3	4 1/2	3 7/8	5 1/2	3 1/4	4
	3.8 - 4.8	3 1/2	5	4 1/2	6 1/4	3 3/4	4 3/4
	5.0 - 7.0	4	5 1/2	5	6 7/8	4 1/4	5 1/4
B	3.4 - 4.2	4	5 1/2	5 3/4	8	4 1/2	5 1/2
	4.4 - 5.6	5 1/8	7 1/8	6 1/2	9 1/8	5 3/4	7 1/4
	5.8 - 8.8	6 3/8	8 3/4	7 3/8	10 1/8	7	8 3/4

Monthly Maintenance

⚠ 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.

Before completing the following checks, turn the unit OFF and lock the main power disconnect switch open. Failure to disconnect power before servicing can cause severe personal injury or death.

Filters

Inspect the return air filters. Clean or replace them if necessary. Refer to the unit Service Facts for filter information.

Condensate Overflow Switch

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

Return Air Smoke Detector Maintenance

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

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

Cooling Season

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

Record this data on an "operator's maintenance log" like the one shown in the sample maintenance log. If the operating pressures indicate a refrigerant shortage, measure the system superheat. For guidelines, refer to the "Compressor Start-Up" section.

Note: Do not release refrigerant to the atmosphere! If adding or removing refrigerant is required, the service technician must comply with all federal, state and local laws.

Heating Season

- Inspect the unit's air filters. If necessary, clean or replace them.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Inspect both the main unit control panel and heat section control box for loose electrical components and terminal connections, as well as damaged wire insulation. Make any necessary repairs.
- Verify that the electric heat system operates properly.

Coil Cleaning

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

- Compressor head pressure and amperage draw
- Water carryover
- Fan brake horsepower
- Static pressure losses

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

⚠ WARNING

Hazardous Chemicals!

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

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

Refrigerant Coils

To clean refrigerant coils, use a soft brush and a sprayer.

For evaporator coil cleaners, contact the local Trane Parts Center for appropriate detergents.

1. Remove enough panels from the unit to gain safe access to coils.
2. Straighten any bent coil fins with a fin comb.
3. For accessible areas, remove loose dirt and debris from both sides of the coil.
4. When cleaning evaporator coils, mix the detergent with water according to the manufacturer's instructions. If desired, heat the solution to 150° F maximum to improve its cleansing capability.

Important: *DO NOT use any detergents with microchannel coils. Pressurized water or air ONLY.*

5. Pour the cleaning solution into the sprayer. If a high-pressure sprayer is used:
 - a. The minimum nozzle spray angle is 15 degrees.
 - b. Do not allow sprayer pressure to exceed 600 psi.
 - c. Spray the solution perpendicular (at 90 degrees) to the coil face.
 - d. For evaporator coils, maintain a minimum clearance of 6" between the sprayer nozzle and the coil. For microchannel coils, optimum clearance between the sprayer nozzle and the microchannel coil is 1"-3".
6. Spray the leaving-airflow side of the coil first; then spray the opposite side of the coil. For evaporator coils, allow the cleaning solution to stand on the coil for five minutes.
7. Rinse both sides of the coil with cool, clean water.
8. Inspect both sides of the coil; if it still appears to be dirty, repeat Steps 6 and 7.
9. Reinstall all of the components and panels removed in Step 1; then restore power to the unit.
10. For evaporator coils, use a fin comb to straighten any coil fins which were inadvertently bent during the cleaning process.



Maintenance

Final Process

For future reference, you may find it helpful to record the unit data requested below in the blanks provided.

1) Complete Unit Model Number:

(2) Unit Serial Number:

(3) Wiring Diagram Numbers (from unit control panel):

— schematic(s)

— connection(s)

Table 22. Sample maintenance log

Refrigerant Circuit #1							Refrigerant Circuit #2				
Date	Current Ambient temp F/C	Compr. Oil Level	Suction Pressure Psig/kPa	Discharge Pressure Psig/kPa	Super heat F/C	Sub Cool F/C	Compr. Oil Level	Suction Pressure Psig/kPa	Discharge Pressure Psig/kPa	Super heat F/C	Sub Cool F/C



Troubleshooting

⚠ WARNING

Hazardous Service Procedures!

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

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

ReliaTel™ Controls

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

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

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.

1. Verify that the Liteport LED on the RTRM is burning continuously. If the LED is lit, go to Step 3.
2. If the LED is not lit, verify that 24 VAC is present between J1-1 and J1-2. If 24 VAC is present, proceed to Step 3. If 24 VAC is not present, check the unit main power supply, check transformer (TNS1). Proceed to Step 3 if necessary.
3. Utilizing “Method 1” or “Method 2” in the “System Status Checkout Procedure” section, check the following:
 - System status
 - Heating status
 - Cooling status
 If a System failure is indicated, proceed to Step 4. If no failures are indicated, proceed to Step 5.
4. If a System failure is indicated, recheck Steps 1 and 2. If the LED is not lit in Step 1, and 24 VAC is present in Step 2, the RTRM has failed. Replace the RTRM.
5. If no failures are indicated, use one of the TEST mode procedures described in the “Unit Start-Up” section to

start the unit. This procedure will allow you to check all of the RTRM outputs, and all of the external controls (relays, contactors, etc.) that the RTRM outputs energize, for each respective mode. Proceed to Step 6.

6. Step the system through all of the available modes, and verify operation of all outputs, controls, and modes. If a problem in operation is noted in any mode, you may leave the system in that mode for up to one hour while troubleshooting. Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to Steps 7 and 8.
7. If no abnormal operating conditions appear in the test mode, exit the test mode by turning the power “Off” at the main power disconnect switch.
8. Refer to the individual component test procedures if other microelectronic components are suspect.

System Status Checkout Procedure

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

Method 1

If the Zone Sensor Module (ZSM) is equipped with a remote panel with LED status indication, you can check the unit within the space. If the ZSM does not have LED’s, use Method 2. BAYSENS110*, and BAYSENS119* all have the remote panel indication feature. The LED descriptions are listed below.

LED 1 (System)

“On” during normal operation.

“Off” if a system failure occurs or the LED fails.

“Flashing” indicates test mode.

LED 2 (Heat)

“On” when the heat cycle is operating.

“Off” when the heat cycle terminates or the LED fails.

“Flashing” indicates a heating failure.

LED 3 (Cool)

“On” when the cooling cycle is operating.

“Off” when the cooling cycle terminates or the LED fails.

“Flashing” indicates a cooling failure.

LED 4 (Service)

“On” indicates a clogged filter.

“Off” during normal operation.

“Flashing” indicates an evaporator fan failure or Condensate Overflow Switch (COF) failure.



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Failure indication causes

System Failure

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

Cooling Failure

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

Service Failure

1. If the supply fan proving switch has closed, the unit will not operate (when connected to RTOM), check the fan motor, belts, and proving switch.
2. Clogged filter switch has closed, check the filters.

Simultaneous Heat and Cool Failure

1. Emergency Stop is activated.

Method 2

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

System Failure

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

Normal Operation = approximately 32 Vdc

System Failure = less than 1 Vdc, approximately 0.75 Vdc

Test Mode = voltage alternates between 32 Vdc & 0.75 Vdc

Heat Failure

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

Heat Operating = approximately 32 Vdc

Heat Off = less than 1 VDC, approximately 0.75 Vdc

Heating Failure = voltage alternates between 32 Vdc & 0.75 Vdc

Cool Failure

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

Cool Operating = approximately 32 Vdc

Cool Off = less than 1 Vdc, approximately 0.75 Vdc

Cooling Failure = voltage alternates between 32 Vdc & 0.75 Vdc

Service Failure

Measure the voltage between terminals J6-10 & J6-6.

Clogged Filter = Approximately 32 Vdc.

Normal = Less than 1 Vdc, approximately 0.75 Vdc

Fan Failure = voltage alternates between 32 Vdc & 0.75 Vdc.

Note: If the Condensate Overflow Switch is closed, the unit will not operate. Check to make sure the float position is not in a tripped condition and verify an "open" between wires connecting to RTOM J6-1, J6-2.

To use LED's for quick status information at the unit, purchase a BAYSENS110* ZSM and connect wires with alligator clamps to terminals 6 through 10. Connect each respective terminal wire (6 through 10) from the Zone Sensor to the unit J6 terminals 6 through 10.

Note: If the system is equipped with a programmable zone sensor, (BAYSENS119*), the LED indicators will not function while the BAYSENS110* is connected.

Resetting Cooling and Heating Lockouts

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

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

Method 1

To reset the system from the space, turn the "Mode" selection switch at the zone sensor to the "Off" position. After approximately 30 seconds, turn the "Mode" selection switch to the desired mode, i.e. Heat, Cool or Auto.

Method 2

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

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

Zone Temperature Sensor (ZTS) Service Indicator

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

The RTRM will ignore the closing of this Normally Open switch for 2 (±1) minutes. This helps prevent nuisance SERVICE LED indications. The exception is the LED will flash 40 seconds after the fan is turned “On” if the Fan Proving Switch is not made.

Clogged Filter Switch

This LED will remain lit the entire time that the Normally Open switch is closed. The LED will be turned off immediately after resetting the switch (to the Normally Open position), or any time that the IDM is turned “Off”.

If the switch remains closed, and the IDM is turned “On”, the SERVICE LED will be turned “On” again after the 2 (±1) minute ignore delay.

This LED being turned “On”, will have no other affect on unit operation. It is an indicator only.

Fan Failure Switch

When the “Fan Failure” switch is wired to the RTOM, the LED will remain flashing the entire time the fan proving switch is closed, indicating a fan failure, and it will shut the unit operations down.

Condensate Overflow Switch

This input incorporates the condensate overflow switch (COF) mounted on the drain pan and the ReliaTel™ options module (RTOM). When the condensate level reaches the trip point for 6 continuous seconds, the RTOM will shut down all unit function until the overflow condition has cleared. The unit will return to normal operation after 6 continuous seconds with the COF in a non-tripped condition. If the condensate level causes the unit to shut down more than 2 times in a 3 day period, the unit will be locked-out of operation. A manual reset of the diagnostic system through the zone sensor or Building Automation System (BAS) will be required. Cycling unit power will also clear the fault.

Zone Temperature Sensor (ZTS) Tests

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

Test 1: Zone Temperature Thermistor (ZTEMP)

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

Zone Temperature		Nominal ZTEMP Resistance	Nominal CSP or HSP Resistance
50 F°	10.0 C°	19.9 K-Ohms	889 Ohms
55 F°	12.8 C°	17.47 K-Ohms	812 Ohms
60 F°	15.6 C°	15.3 K-Ohms	695 Ohms
65 F°	18.3 C°	13.49 K-Ohms	597 Ohms
70 F°	21.1 C°	11.9 K-Ohms	500 Ohms
75 F°	23.9 C°	10.50 K-Ohms	403 Ohms
80 F°	26.7 C°	9.3 K-Ohms	305 Ohms
85 F°	29.4 C°	8.25 K-Ohms	208 Ohms
90 F°	32.2 C°	7.3 K-Ohms	110 Ohms

Test 2: Cooling Set Point (CSP) and Heating Set Point (HSP)

The resistance of these potentiometers are measured between the following ZSM terminals. Refer to the chart above for approximate resistances at the given setpoints.

Cool SP = Terminals 2 and 3

Range = 100 to 900 Ohms approximate

Heat SP = Terminals 2 and 5

Range = 100 to 900 Ohms approximate

Test 3: System Mode and Fan Selection

The combined resistance of the Mode selection switch and the Fan selection switch can be measured between terminals 2 and 4 on the Zone Sensor. The possible switch combinations are listed on the following page with their corresponding resistance values.

Test 4: LED Indicator Test, (SYS ON, HEAT, COOL & SERVICE)

Method 1

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

Method 2

Testing the LED with an analog Ohmmeter. Connect Ohmmeter across LED in one direction, then reverse the leads for the opposite direction. The LED should have at least 100 times more resistance in reverse direction, as

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compared with the forward direction. If high resistance in both directions, LED is open. If low in both directions, LED is shorted.

Method 3

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

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

Programmable & Digital Zone Sensor Test

Testing Serial Communication Voltage

⚠ 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. Verify 24 Vac is present between terminals J6-14 & J6-11.
2. Disconnect wires from J6-11 and J6-12. Measure the voltage between J6-11 and J6-12; it should be about 32 Vdc.
3. Reconnect wires to terminals J6-11 and J6-12. Measure voltage again between J6-11 and J6-12, voltage should flash high and low every 0.5 seconds. The voltage on the low end will measure about 19 Vdc, while the voltage on the high end will measure from approximately 24 to 38 Vdc.
4. Verify all modes of operation, by running the unit through all of the steps in the "Test Modes" section discussed in "Unit Start-Up".
5. After verifying proper unit operation, exit the test mode. Turn the fan on continuously at the ZSM, by pressing the button with the fan symbol. If the fan comes on and runs continuously, the ZSM is good. If you are not able to turn the fan on, the ZSM is defective.

Table 23. System mode and fan selection chart

Resistance Valves (Ohms)	Zone Sensor Unit/Fan Mode	Local Unit Mode	Local Fan Mode
2.32K	Off/ Auto	Off	Auto
4.87K	Cool/Auto	Cool	Auto

Table 23. System mode and fan selection chart (continued)

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

ReliaTel™ Refrigeration Module (RTRM) Default Chart

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

Unit Operation without a Zone Sensor

This procedure is for temporary operation only. The economizer functions are disabled.

⚠ 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.

1. Open and Lock the unit disconnect switch.
2. Remove the Outside Air Sensor (OAS) from the condenser section of unit.
3. Use two (2) wire nuts, to individually cap the wires.
4. Locate the RTRM (J6). Connect two (2) wires to terminals J6-1 and 2.
5. Connect the sensor (OAS) using two wire nuts to the two (2) field supplied wires that were connected to

terminals 1 and 2 on J6.

Unit Economizer Control (ECA) Troubleshooting

Table 24. Verify economizer status by economizer actuator (ECA) LED indicator:

OFF:	No Power or Failure
ON:	Normal, OK to Economize
Slow Flash:	Normal, Not OK to Economize
Fast Flash:	1/2 Second On / 2 Seconds Off:
	Error Code:
	Communications Failure
Pulse Flash:	2 Second On / 1/2 Second Off:
	Error Code:
1 Flash:	Actuator Fault

Table 24. Verify economizer status by economizer actuator (ECA) LED indicator: (continued)

2 Flashes:	CO2 Sensor
3 Flashes:	RA Humidity Sensor
4 Flashes:	RA Temp Sensor
5 Flashes:	OA Quality Sensor
6 Flashes:	OA Humidity Sensor
7 Flashes:	OA Temp Sensor
8 Flashes:	MA Temp Sensor
9 Flashes:	RAM Fault
10 Flashes:	ROM Fault
11 Flashes:	EEPROM Fault



Warranty Information

Standard Warranty

The standard water-source heat pump warranty is Trane's parts-only warranty, running 12 months from startup, not to exceed 18-months from shipment. There is a standard 5-year compressor warranty.

Extended Warranty

The optional extended warranty is a second through fifth year warranty. The time starts at the end of the standard 1 year coverage through the fifth year. These extended warranties apply only to new equipment installed in domestic Trane Commercial Systems Group sales territories and must be ordered prior to start-up.

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