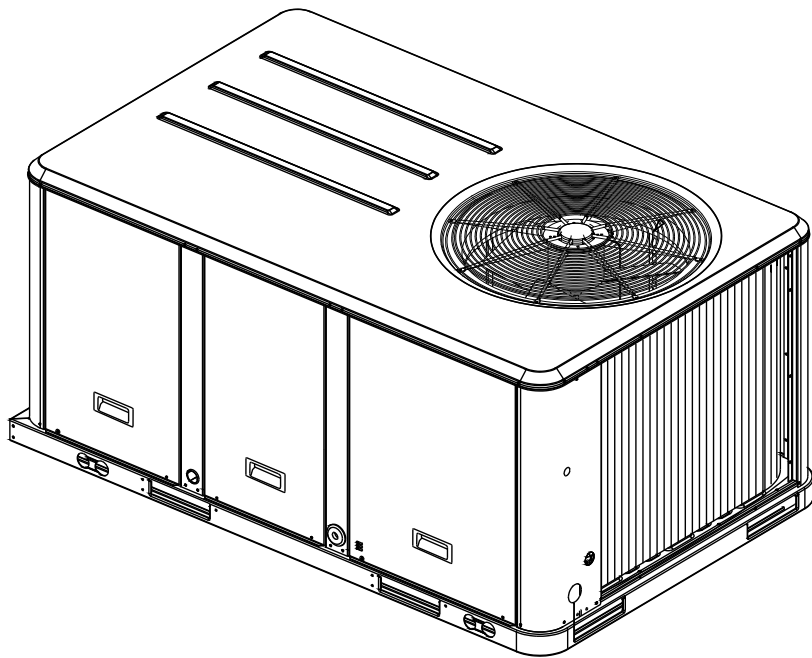


Installation Operation and Maintenance

Packaged Electric/Electric

3 - 10 Ton



Model Numbers:

TSC036A - TSC120A

THC033A - THC120A

TSC036E - TSC060E

THC036E - THC060E

TSC072E - TSC120E

August 2008

RT-SVX22E-EN

Preface and Warnings and Cautions

Hazard Identification

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

WARNING

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

CAUTION

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

CAUTION

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

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.

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

- 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.

Storage

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

1. the unit is stored before it is installed; or,
2. 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 detailed under "Starting the Unit."

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

Model Number Description

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

When ordering replacement parts or requesting service, be sure to refer to the specific model number and serial number printed on the unit nameplate.

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.

WARNING Contains Refrigerant!

System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives.

Failure to follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or serious injury or equipment damage.

Preface and Warnings and Cautions

WARNING

Hazardous Voltage w/ Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

CAUTION

R410a Refrigerant!

R-410A refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on R-410A refrigerant equipment. If service equipment is not rated for R-410A refrigerant, equipment damage or personal injury may result.

CAUTION

Equipment Damage From Ultraviolet (UV) Lights!

The manufacturer does not recommend field installation of ultraviolet lights in its equipment for the intended purpose of improving indoor air quality. High intensity C-band ultraviolet light is known to severely damage polymer (plastic) materials and poses a personal safety risk to anyone exposed to the light without proper personal protective equipment. Polymer materials commonly found in HVAC equipment that may be susceptible include insulation on electrical wiring, fan belts, thermal insulation, various fasteners and bushings. Degradation of these materials can result in serious damage to the equipment.

The manufacturer accepts no responsibility for the performance or operation of our equipment in which ultraviolet devices were installed outside of the manufacturer's factory or its approved suppliers.

CAUTION

Roof Damage!

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

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Model Number Description

T	S	C	033	A	3	R	B	A	**	C	0	0	0	A	1	0	0	0	1	A	1
1	2	3	456	7	8	9	10	11	12,13	14	15	16	17	18	19	20	21	22	23	24	25
DIGIT 1 – UNIT TYPE							DIGIT 14 – FRESH AIR SELECTION							DIGIT 19 - DISCONNECT/CIRCUIT BREAKER/PHASE MONITOR							
T	DX Cooling						0	No Fresh Air						0	No Disconnect/No Circuit Breaker No Phase Monitor						
Y	DX Cooling, Gas Heat						A	Manual Outside Air Damper 0-50% ⁵						1	Unit Mounted Non-Fused Disconnect ⁹						
W	Packaged Heat Pump ²						B	Motorized Outside Air Damper 0-50%						2	Unit Mounted Circuit Breaker ⁹						
DIGIT 2 – EFFICIENCY							C	Economizer, Dry Bulb 0-100% without Barometric Relief ⁸						DIGIT 20 - CONVENIENCE OUTLET							
S	Standard Efficiency						D	Economizer, Dry Bulb 0-100% with Barometric Relief ⁸						0	No Convenience Outlet						
H	High Efficiency						E	Economizer, Reference Enthalpy 0-100% without Barometric Relief ^{4,8}						A	Unpowered Convenience Outlet						
DIGIT 3 – AIRFLOW							F	Economizer, Reference Enthalpy 0-100% with Barometric Relief ^{4,8}						B	Powered Convenience Outlet (three-phase only) ¹⁰						
C	Convertible						G	Economizer, Comparative Enthalpy 0-100% without Barometric Relief ^{4,8}						DIGIT 21 - COMMUNICATIONS OPTIONS⁴							
DIGIT 4,5,6 – NOMINAL GROSS COOLING CAPACITY (MBh)							H	Economizer, Comparative Enthalpy 0-100% with Barometric Relief ^{4,8}						0	No Communications Interface						
033	3 Ton						DIGIT 15 - SUPPLY FAN/DRIVE TYPE/MOTOR							1	Trane Communications Interface						
036	3 Tons						0	Standard Drive ⁷						2	LonTalk® Communications Interface						
043	4 Ton						2)	Optional Belt Drive Motor ²⁰						3	Novar 2024 Controls ¹						
048	4 Tons						DIGIT 16 - HINGED SERVICE ACCESS/FILTERS							4	Novar 3051 Controls ¹ without Zone Sensor ²¹						
060	5 Tons						0	Standard Panels/Standard Filters						DIGIT 22 - REFRIGERATION SYSTEM OPTION							
063	5 Ton						A	Hinged Access Panels/Standard Filters						0	Standard Refrigeration System ¹¹						
072	6 1/4 Ton						B	Standard Panels/2” Pleated Filters						A	Expansion Valve (standard for 3- 10 Ton R410a Units)						
090	7 1/2 Ton (Single Compressor)						C	Hinged Access Panels/2” Pleated Filters						B	Standard Refrigeration System (not yet available for 3-10 Ton R410a Units)						
092	7 1/2 Ton (Dual Compressor)						DIGIT 17 - CONDENSER COIL PROTECTION							DIGIT 23 - REFRIGERATION CONTROLS							
102	8 1/2 Ton						0	Standard Coil						Note: Applicable to Digit 7 = A							
120	10 Ton						1	Standard Coil with Hail Guard						0	No Refrigeration Control ⁶						
DIGIT 7 – MAJOR DESIGN SEQUENCE							2	Black Epoxy Pre-Coated Condenser Coil						2	Frostat ¹²						
A	R-22 Refrigerant						3	Black Epoxy Pre-Coated Condenser Coil with Hail Guard						3	Crankcase Heater ³						
E	R-410A Refrigerant						4	CompleteCoat™ Condenser Coil						6	Frostat ¹² and Crankcase Heater ³						
DIGIT 8 – VOLTAGE SELECTION							5	CompleteCoat™ Condenser Coil with Hail Guard						Note: Applicable to Digit 7 = E							
1	208/230/60/1						DIGIT 18 - THROUGH THE BASE PROVISIONS							0	No Refrigeration Control ⁶						
3	208-230/60/3						0	No Through the Base Provisions						1	Frostat ¹²						
4	460/60/3						A	Through the Base Electric ⁹						2	Crankcase Heater ³						
W	575/60/3						DIGIT 19 - DISCONNECT/CIRCUIT BREAKER/PHASE MONITOR							3	Frostat ¹² and Crankcase Heater ³						
DIGIT 9 – UNIT CONTROLS							DIGIT 20 - CONVENIENCE OUTLET							DIGIT 21 - COMMUNICATIONS OPTIONS⁴							
E	Electromechanical ¹						0	No Fresh Air						0	No Convenience Outlet						
R	ReliaTel™ Microprocessor						A	Manual Outside Air Damper 0-50% ⁵						A	Unpowered Convenience Outlet						
DIGIT 10 – HEATING CAPACITY							B	Motorized Outside Air Damper 0-50%						B	Powered Convenience Outlet (three-phase only) ¹⁰						
0=No Electric Heat	E=12 kW (3 phase)						C	Economizer, Dry Bulb 0-100% without Barometric Relief ⁸						DIGIT 22 - REFRIGERATION SYSTEM OPTION							
A=5 kW (1 phase) ²	F=14 kW (1 phase) ²						D	Economizer, Dry Bulb 0-100% with Barometric Relief ⁸						0	Standard Refrigeration System ¹¹						
B=6 kW (3 phase)	G=18 kW (1&3 phase)						E	Economizer, Reference Enthalpy 0-100% without Barometric Relief ^{4,8}						A	Expansion Valve (standard for 3- 10 Ton R410a Units)						
D=10 kW (1 phase) ²	J=23 kW (3 phase)						F	Economizer, Reference Enthalpy 0-100% with Barometric Relief ^{4,8}						B	Standard Refrigeration System (not yet available for 3-10 Ton R410a Units)						
DIGIT 11 – MINOR DESIGN SEQUENCE							G	Economizer, Comparative Enthalpy 0-100% without Barometric Relief ^{4,8}						DIGIT 23 - REFRIGERATION CONTROLS							
A	First Sequence						H	Economizer, Comparative Enthalpy 0-100% with Barometric Relief ^{4,8}						Note: Applicable to Digit 7 = A							
DIGIT 12,13 – SERVICE SEQUENCE							DIGIT 15 - SUPPLY FAN/DRIVE TYPE/MOTOR							DIGIT 24 - SMOKE DETECTOR^{4,18}							
** Factory Assigned							0	Standard Drive ⁷						0	No Smoke Detector						
							2)	Optional Belt Drive Motor ²⁰						A	Return Air Smoke Detector ^{13,14}						
							DIGIT 16 - HINGED SERVICE ACCESS/FILTERS							B	Supply Air Smoke Detector						
							0	Standard Panels/Standard Filters						C	Supply and Return Air Smoke Detectors ^{13,14}						
							A	Hinged Access Panels/Standard Filters													
							B	Standard Panels/2” Pleated Filters													
							C	Hinged Access Panels/2” Pleated Filters													
							DIGIT 17 - CONDENSER COIL PROTECTION														
							0	Standard Coil													
							1	Standard Coil with Hail Guard													
							2	Black Epoxy Pre-Coated Condenser Coil													
							3	Black Epoxy Pre-Coated Condenser Coil with Hail Guard													
							4	CompleteCoat™ Condenser Coil													
							5	CompleteCoat™ Condenser Coil with Hail Guard													

Model Number Description

DIGIT 25 - MONITORING CONTROLS⁴

- 0 No Monitoring Control¹⁵
- 1 Clogged Filter Switch¹⁵
- 2 Fan Failure Switch¹⁵
- 3 Discharge Air Sensing Tube¹⁵
- 4 Clogged Filter Switch and Fan Fail Switch¹⁵
- 5 Clogged Filter Switch and Discharge Air Sensing Tube¹⁵
- 6 Fan Fail Switch and Discharge Air Sensing Tube¹⁵
- 7 Clogged Filter and Fan Fail Switches and Discharge Air Sensing Tube¹⁵
- 8 Novar Return Air Sensor¹⁶
- 9 Novar Zone Sensor²¹

Model Number Notes

- 1. Not available for 3-5 tons, R-410A Heat Pumps.
- 2. Available for R-410A units only.
- 3. Standard on all 15 SEER and 4-5 Tons Heat Pump R-22 units.
- 4. Not available with electromechanical controls.
- 5. Manual outside air damper will ship factory supplied within the unit, but must be field installed.
- 6. High pressure control is standard on all units.
- 7. Multispeed direct drive standard on single-phase and 15 SEER products. Belt drive standard on three-phase 13 SEER products.
- 8. 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.
- 9. Through the base electric required when ordering disconnect/circuit breaker options.
- 10. Requires use of Disconnect or Circuit Breaker.
- 11. Standard metering devices are TXVs.
- 12. Froststat cannot be field installed in electro-mechanical units.

- 13. The return air smoke detector may not fit up or work properly on the Precedent 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.
- 14. Return Air Smoke Detector cannot be ordered with Novar Controls.
- 15. These options are standard when ordering Novar Controls.
- 16. This option is used when ordering Novar Controls.
- 17. Includes gas piping and shutoff (field assembly required).
- 18. Not available with high temperature stat accessory.
- 19. Requires hinged access panels.
- 20. Belt Drive Optional on three-phase 15 SEER, R-410A units.
- 21. Novar Sensor utilized with digit 21 = (4) Novar 3051 Controls without Zone Sensor

General Information

Unit Nameplate

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

Compressor Nameplate

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

Unit Description

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

The condenser coils are aluminum fin, mechanically bonded to copper tubing.

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

There are two control systems offered for these units. The electro mechanical control option uses a thermostat to perform unit functions. 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.

These modules 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.

Economizer Control Actuator (Optional)

Electro Mechanical Control

The ECA monitors the mixed air temperature, ambient dry bulb temperature and local minimum position setpoint 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.

ReliaTel™ Control

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 ICSTM 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 ICSTM 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.

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.

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 schematic for the specific module connections.

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

General Information

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.

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.

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 an active call for cooling, the compressor will be locked out, a diagnostic communicated to ICS™, if applicable, and a manual reset required to restart the compressor. On dual compressor units only the affected compressor circuit is locked out.

Electromechanical Control

When the LPC is opened, the compressor for that circuit is turned off immediately. The compressor will restart when the LPC closes.

High Pressure Control (Optional — Standard on R-410A units)

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.

If four consecutive open conditions occur during an active call for cooling, the compressor will be locked out, a diagnostic communicated to ICS™, if applicable, and a manual reset required to restart the compressor. On dual compressor units only the affected compressor circuit is locked out.

Electromechanical Control

When the HPC is opened, the compressor for that circuit is turned off immediately. The compressor will restart when the HPC closes.

Power Exhaust Control (Optional)

ReliaTel Control

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

With the optional ventilation override accessory, the power exhaust fan is independent of the indoor fan.

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

Electromechanical Control

The power exhaust fan is started whenever the indoor fan is on and the adjustable damper limit switch DLS is closed.

Lead/Lag Control (Dual Circuit Only)

ReliaTel Control 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.

Zone Sensor Module (ZSM) (BAYSENS006B)

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 Module (ZSM) (BAYSENS008B)

This electronic sensor features four system switch settings (Heat, Cool, Auto, and Off) and two fan settings (On and Auto). It is a manual or auto changeover control with dual setpoint capability. It can be used with a remote zone temperature sensor BAYSENS017B.

Zone Sensor (BAYSENS010B)

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 BAYSENS017B.

Wall Mounted Relative Humidity Sensor (BAYSENS036A)

Field installed, wall mounted humidity sensor is used to control activation of the hot gas reheat dehumidification option. Humidity set points can be selected for relative humidity levels between 40% and 60% by adjusting the DEHUMID setting on the ReliaTel Options Module. See [Figure 27 on page 26](#).

Duct Mounted Relative Humidity Sensor (BAYSENS037A)

Field installed, duct mounted humidity sensor is used to control activation of the hot gas reheat dehumidification option. Humidity set points can be selected for relative humidity levels between 40% and 60% by adjusting the DEHUMID setting on the ReliaTel Options Module. See [Figure 27 on page 26](#).

Programmable Zone Sensor - (BAYSENS019B)

This 7 day programmable sensor features 2, 3 or 4 periods for Occupied or Unoccupied programming per day. If the power is interrupted, the program is retained in permanent memory. If power is off for an extended period of time, only the clock and day may have to be reset.

The Zone Sensor allows selection of 2, 3 or 4 system modes (Heat, Cool, Auto, and Off), two fan modes (On and Auto). It has dual temperature selection with programmable start time capability.

The occupied cooling set point ranges between 45 and 98 degrees Fahrenheit. The heating set point ranges between 43 and 96 degrees Fahrenheit.

A liquid crystal display (LCD) displays zone temperature, temperature set points, day of the week, time, and operational mode symbols.

The Option Menu is used to enable or disable applicable functions, i.e.; Morning Warm-up, Economizer minimum position override during unoccupied status, Fahrenheit or Centigrade, Supply air tempering, Remote zone temperature sensor, 12/24 hour time display, Smart fan, and Computed recovery.

During an occupied period, an auxiliary relay rated for 1.25 amps @ 30 volts AC with one set of single pole double throw contacts is activated.

Status Inputs (4 Wires Optional)

The ZSM can be wired to receive four (4) operating status signals from the RTRM (HEAT, COOL, SYSTEM "ON", SER-VICE).

Four (4) wires from the RTRM should be connected to the appropriate terminals (7, 8, 9 & 10) on the ZSM.

Remote Zone Sensor (BAYSENS013B)

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

Remote Zone Sensor (BAYSENS014B)

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

Remote Zone Sensor (BAYSENS016A)

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 (BAYSENS017B)

This electronic sensor can be used with BAYSENS006B, 008B, 010B, 019B Remote Panels. When this sensor is wired to a BAYSENS019B Remote Panel, wiring must be 18 AWG Shielded Twisted Pair (Belden 8760 or equivalent). Refer to The specific Remote Panel for wiring details.

Electro Mechanical Control

The unit must have a Thermostat to operate.

- BAYSTAT036A
 - Single Stage - 1 Heat/1 Cool
- BAYSTAT037A
 - Multi Stage - 2 Heat/2 Cool - Can be Used for Economizer Operation
- BAYSENS025A
 - Remote sensor for BAYSTAT036A and BAYSTAT037A

High Temperature Sensor (BAYFRST001A)

This sensor connects to the RTRM Emergency Stop Input on the LTB and provides high limit "shutdown" of the unit. The sensor is used to detect high temperatures due to fire in the air conditioning or ventilation ducts. The sensor is designed to mount directly to the sheet metal duct. Each kit contains two sensors. The return air duct sensor (X1310004001) is set to open at 135 F. The supply air duct sensor (X1310004002) is set to open at 240 F. The control can be reset after the temperature has been lowered approximately 25 F below the cutoff setpoint.

General Information

Evaporator Frost Control (ReliaTel™ Option)

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

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 FOS close.

(Electro Mechanical Option)

This input incorporates the Froststat™ control (FOS) mounted in the indoor coil circuit and can be activated by opening a field supplied contact installed in series with the FOS.

If this circuit is open before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is opened during compressor operation, the compressor for that circuit is immediately turned "Off". The compressor will restart when the FOS closes.

Discharge Line Temp Switch (DLTS)

For all THC048E & 060E models. The DLTS is looped in series with HPC and LPC. It prevents compressor from overheating (over 300 F dome temp) in case of ID fan failure (cooling) or OD fan failure (heating).

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.

Note: *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.

Note: *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.*

Note: *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.

There are certain models, however, if operated at low airflow, will not develop an airflow velocity that falls within the required 500 to 4000 feet per minute range. For these models, the design airflow shall be greater than or equal to 1000 feet per minute MINIMUM.

Phase Monitor (Optional) ReliaTel Control Only

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

Pre-Installation

WARNING **Fiberglass Wool !**

Product contains fiberglass wool. 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. Glass wool fibers may also cause respiratory, skin or eye irritation.

Precautionary Measures

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

First Aid Measures

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

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

Heater Inspection

WARNING **Hazardous Voltage!**

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Remove power to the unit and gain access to the electric heat elements by removing the horizontal supply cover. Visually inspect the heater elements for the following.

- Elements that are no longer secured to the white ceramic insulator.
- Elements touching each other or touching metal.
- Severely kinked, drooping, or broken elements.

If an element has detached from its ceramic insulator, carefully put it back into place.

Replace the heater elements if they present symptoms noted in item 2 or 3 above.

Unit Dimensions

Unit Clearances

Figure 1 illustrates the minimum operating and service clearances for either a single or multiple unit installation.

These clearances are the minimum distances necessary to assure adequate serviceability, cataloged unit capacity, and peak operating efficiency.

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

Figure 1. Typical Installation Clearances for Single & Multiple Unit Applications

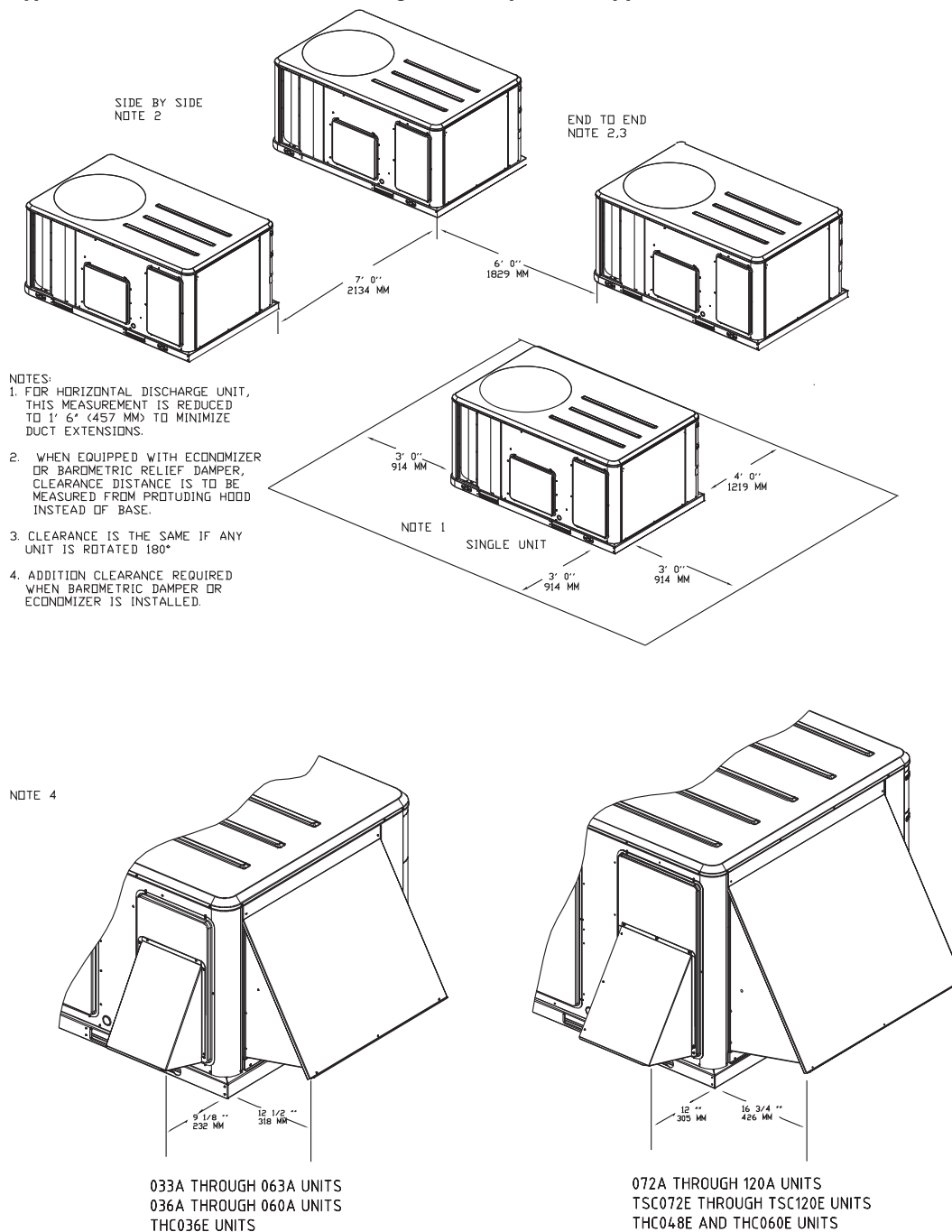


Figure 2. Unit Dimensional Data THC033A, T(H/S)C036A, THC043A, T(H/S)C048A, TSC060A

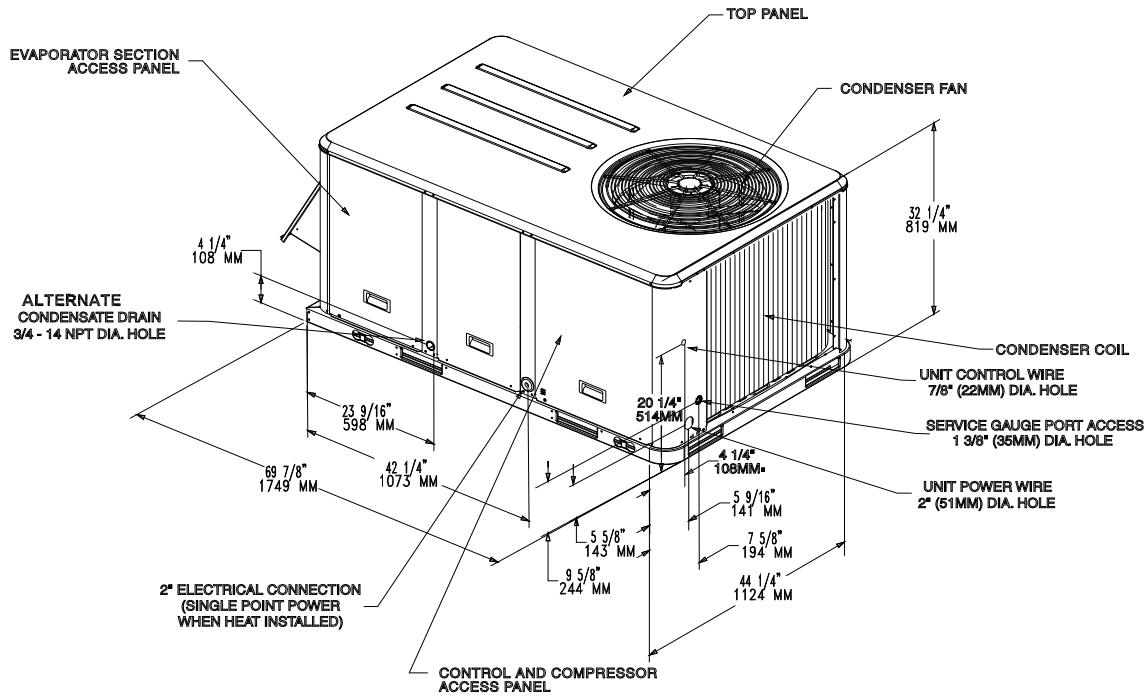
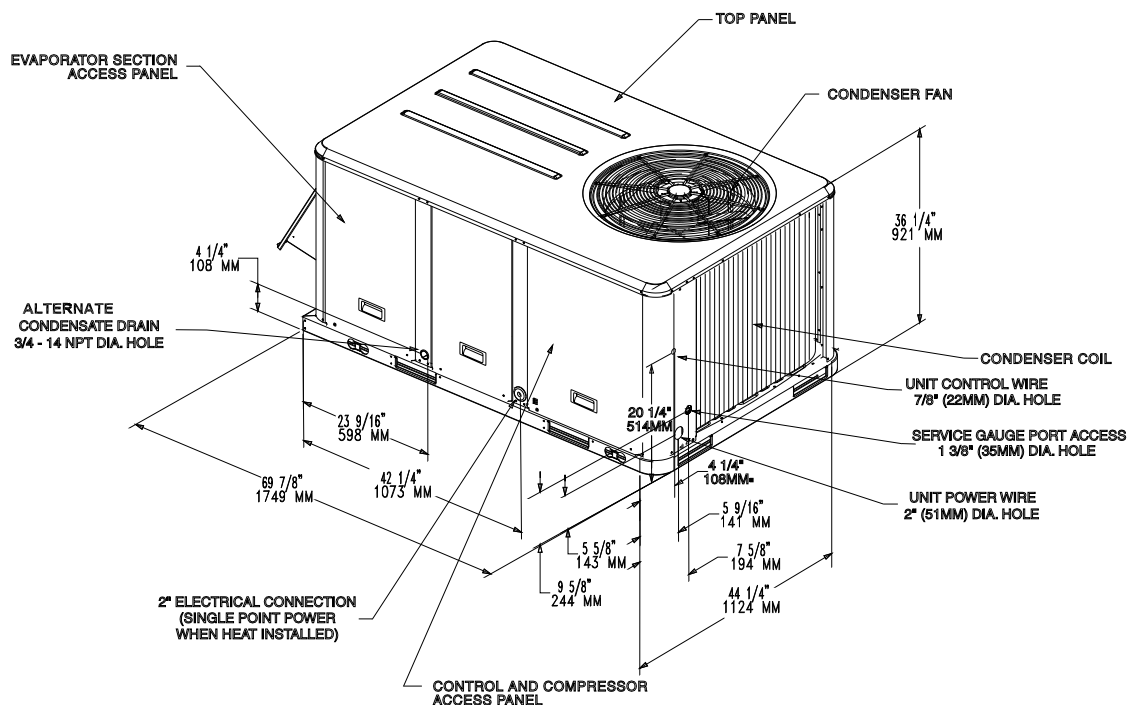


Figure 3. THC060A, THC063A TSC036E-TSC060E, THC036E



Unit Dimensions

Figure 4. Unit Dimensional Data T(H/S)C072A, TSC090A, TSC092A, THC048E, THC060E, TSC072E

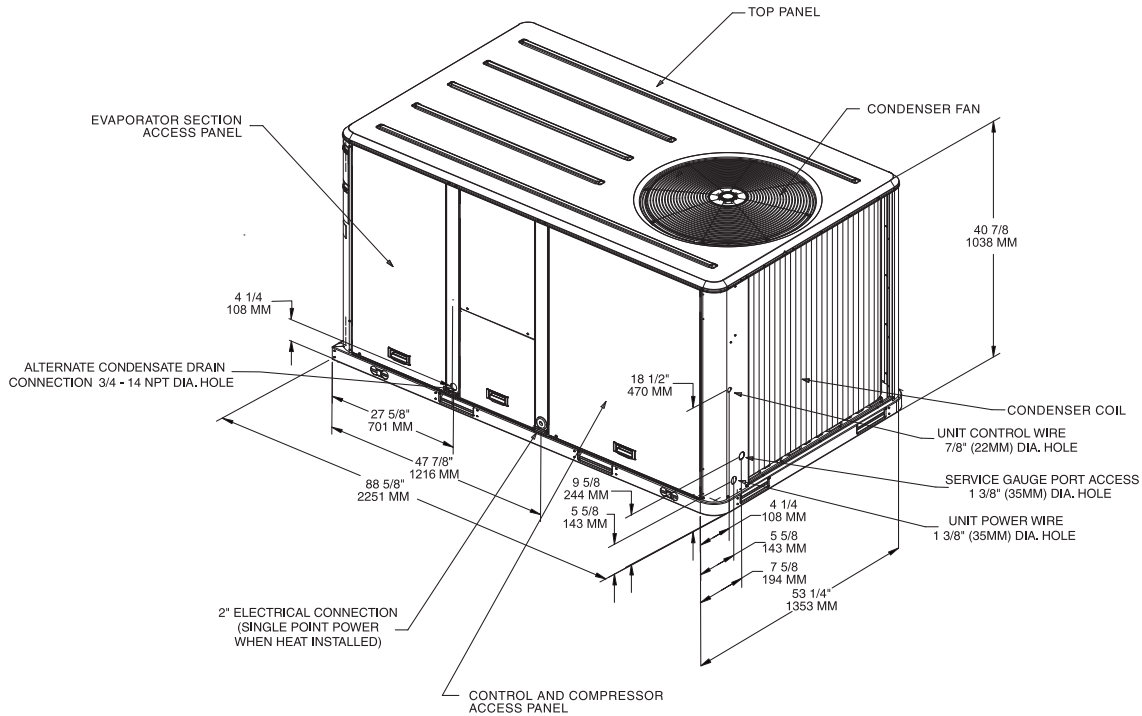
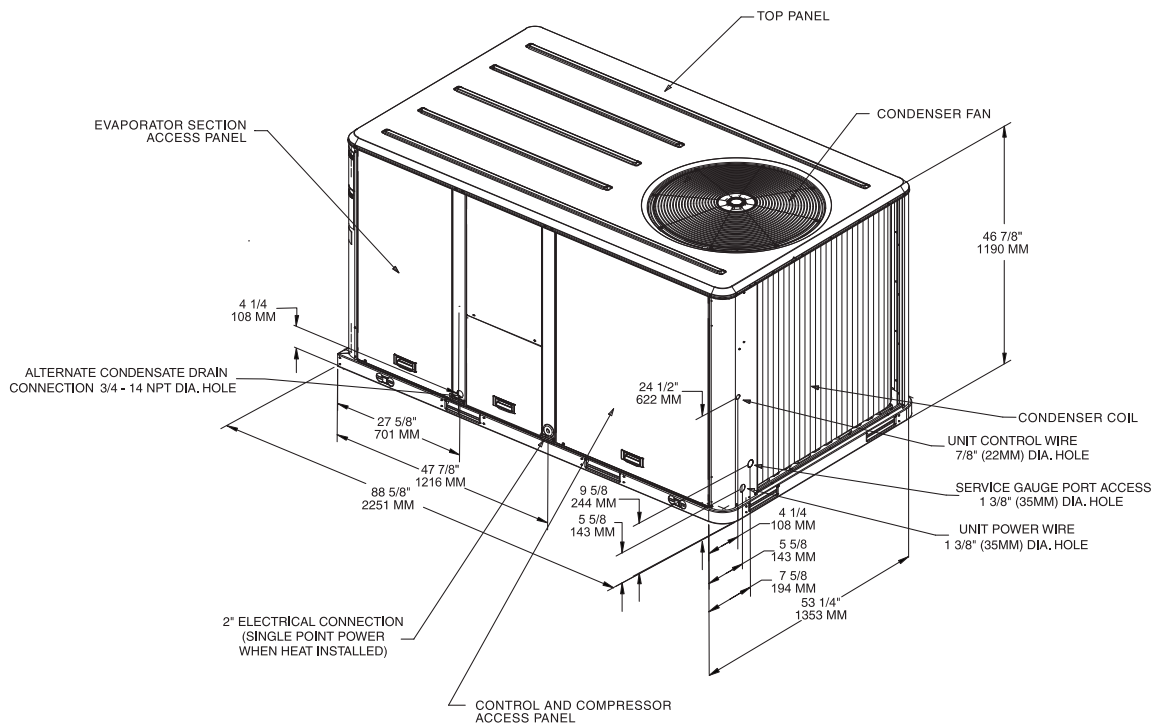


Figure 5. Unit Dimensional Data THC092A, T(H/S)C102A, T(H/S)C120A, TSC092E, TSC102E, TSC120E



Installation

⚠️ WARNING Heavy Objects!

Do not use cables (chains or slings) except as shown. Each of the cables (chains or slings) used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift. Other lifting arrangements may cause equipment or property-only damage. Failure to properly lift unit may result in death or serious injury.

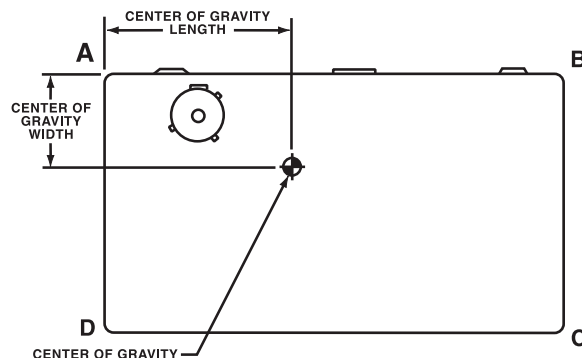
⚠️ WARNING Improper Unit Lift!

Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in death or serious injury or possible equipment or property-only damage.

Table 1. Typical Weights & Point Loading Data

Unit Model	Net Weight (lbs)	Corner Wt. (lbs)				Center of Gravity (In.)	
		A	B	C	D	Length	Width
TSC036A(1,3,4,W)*	409	132	104	79	94	31	19
TSC036E(1,3,4,W)*	480	157	122	95	107	31	19
TSC048A1*	434	140	110	91	94	32	19
TSC048A(3,4,W)*	421	135	109	90	88	33	19
TSC048E(1,3,4,W)*	511	167	129	101	114	31	19
TSC060A(1,3,4,K,W)*	451	149	114	88	99	31	18
TSC060E(1,3,4,W)*	561	183	142	111	125	31	19
TSC072A(3,4,K,W)*	681	236	177	119	150	38	21
TSC072E	755	295	136	209	115	40	23
TSC090A(3,4,K,W)*	675	218	188	129	140	42	21
TSC092A(3,4,W)*	756	261	202	131	162	39	21
TSC092E	866	358	147	252	109	41	22
TSC102A(3,4,K,W)*	835	281	223	149	181	40	21
TSC102E	905	359	161	265	120	42	23
TSC120A(3,4,K,W)*	880	298	238	158	187	40	21
TSC120E	996	388	185	281	142	41	23
THC036A1*	426	139	108	84	95	32	19
THC033A(3,4,W)*	457	139	108	84	95	32	19
THC036A(3,4,W)*	426	139	108	84	95	32	19
THC036E1, E3, E4	472	109	85	186	92	40	26
THC048A1*	468	146	113	97	111	31	20
THC048E1, E3, E4	653	155	127	248	123	40	25
THC043A(3,4,W)*	468	146	113	97	111	31	20
THC048A(3,4,W)*	468	146	113	97	111	31	20
THC060A1*	518	165	124	105	124	31	19
THC060A(3,4,W)*	506	164	121	100	122	31	19
THC060E1, E3, E4	676	204	74	327	71	41	26
THC063A(3,4,W)*	506	164	121	100	122	31	19
THC072A(3,4,W)*	718	235	182	128	173	38	22
THC092A(3,4,W)*	857	289	222	148	197	38	21
THC102A(3,4,W)*	893	294	233	159	207	39	22
THC120A(3,4,W)*	982	323	253	178	229	39	22

Figure 6. Corner weights



Installation

Figure 7. Rigging and center of gravity

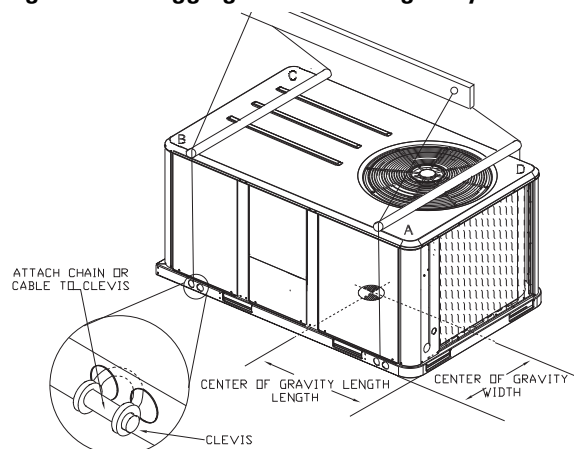


Table 2. Accessory weights

Accessory	Net Weight	
	3-5 Tons	6-10Tons
Economizer	26	36
Barometric Relief	7	10
Powered Exhaust	-	80
Motorized Outside Air Damper	20	30
Manual Outside Air Damper	16	26
Roof Curb	70	115
Smoke Detector, Return	7	7
Smoke Detector, Supply	5	5
Coil Guards	12	20
Hinged Doors	10	12
Powered Convenience Outlet	38	38
Through the Base Electrical	8	13
Through the Base Gas	5	5
Electric Heaters	15	15
Unit Mounted Circuit Breaker	5	5
Unit Mounted Disconnect	5	5
Novar Control	8	8
Dehumidification (Hot Gas Reheat) Coil	15	25
Discharge Air Tube	3	3
All Zone Sensors	3	1
Hard Start Kit	3	N/A

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

Foundation

Horizontal Units

If the unit is installed at ground level, elevate it above the snow line. Provide concrete footings at each support location with a “full perimeter” support structure or a slab foundation for support. Refer to [Table 1, “Typical Weights & Point Loading Data,”](#) on page 16 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. Refer to [Table 1, p. 16](#) for the unit operating weights. If anchoring is required, anchor the unit to the roof with hold-down bolts or isolators.

Check with a roofing contractor for proper waterproofing procedures.

Figure 8. 3-5 ton Horizontal Unit (except THX048-060E) Supply & Return Air Openings

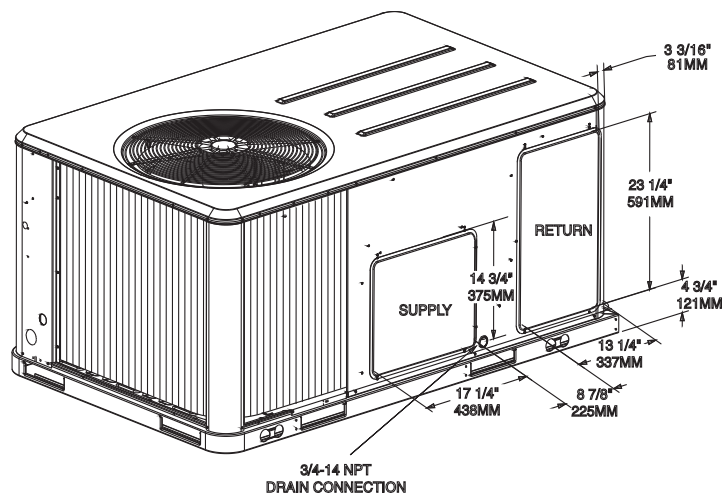


Figure 9. 3-5 ton Downflow Unit (except THX048-060E) Supply & Return Air Openings

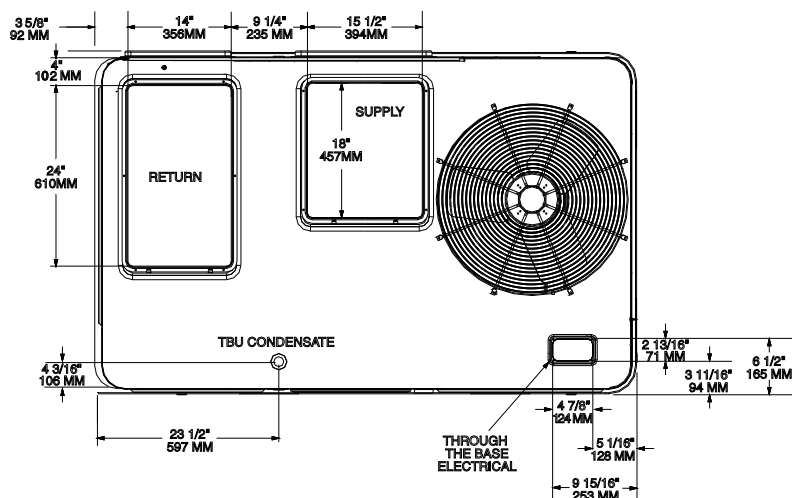
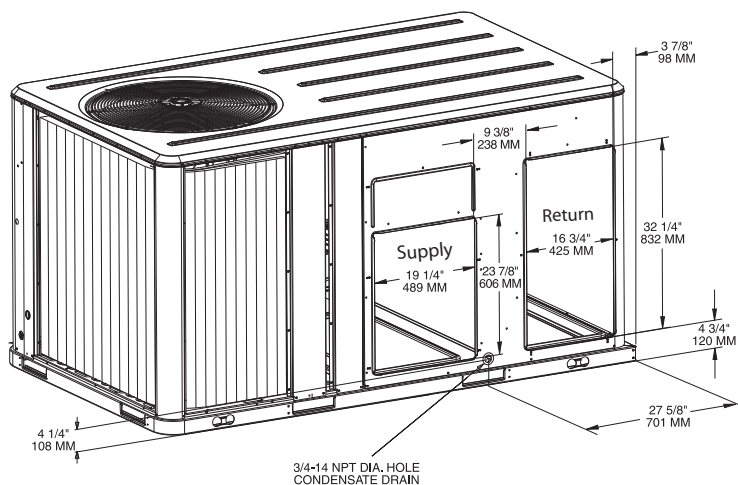
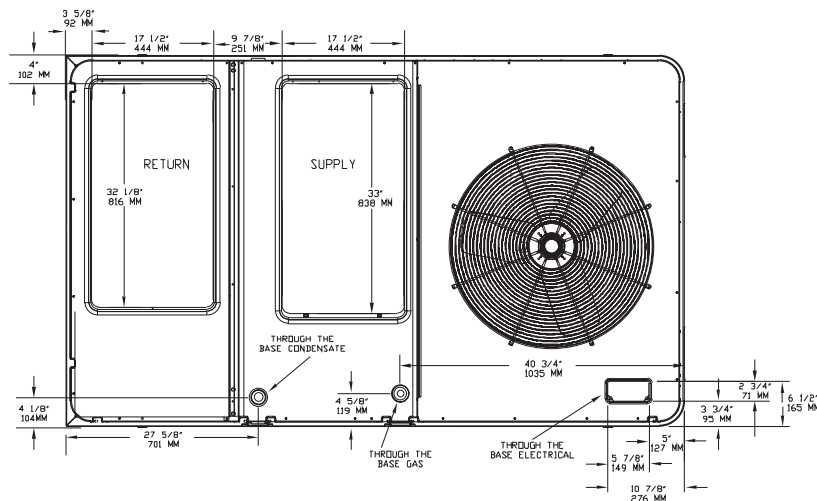


Figure 10. 6-10 ton THX048-060E Horizontal Unit Supply & Return Air Openings



Installation

Figure 11. 6-10 ton and THC048-060E Downflow Unit Supply & Return Air Openings



Ductwork

Figure 8, p. 18 illustrates the supply and return air openings as viewed from the rear of the unit.

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.

Roof Curb

Downflow

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

Before installing any roof curb, verify;

- it is the correct curb for the unit,
- it includes the necessary gaskets and hardware,
- the purposed installation location provides the required clearance for proper operation,

- the curb is level and square. The top surface of the curb must be true to assure an adequate curb-to-unit seal.

⚠ WARNING Combustible Materials!

Maintain proper clearance between the unit heat exchanger, vent surfaces and combustible materials. Refer to unit nameplate and installation instructions for proper clearances. Improper clearances could result in a fire hazard. Failure to maintain proper clearances could result in death or serious injury or property damage.

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

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

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

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

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

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

If a Curb Accessory Kit is not used:

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

Rigging

A Rigging illustration and Center-of-Gravity dimensional data table is shown in [Figure 7, p. 17](#). Refer to the typical unit operating weights table before proceeding.

1. Remove all drill screws fastening wood protection to metal baserail. Remove all screws securing wooden protection to wooden top crate.
2. Remove Wooden Top Crate.

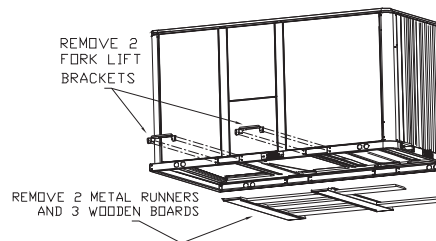
⚠ WARNING Heavy Objects!

Do not use cables (chains or slings) except as shown. Each of the cables (chains or slings) used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift. Other lifting arrangements may cause equipment or property-only damage. Failure to properly lift unit may result in death or serious injury. See details below.

3. Rig the unit as shown in [Figure 7, p. 17](#). Attach adequate strength lifting slings to all four lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
4. Install a lifting bar, as shown in [Figure 7, p. 17](#), to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
5. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.

6. Lift the unit enough to allow the removal of two Fork Lift brackets and hardware. Remove the two Fork Lift brackets, two metal runners and three wooden boards as shown in the following Figure.

Figure 12. Fork pocket



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.

General Unit Requirements

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

- Check the unit for shipping damage and material shortage; file a freight claim and notify appropriate sales representative.
- Verify correct model, options and voltage from unit nameplate.
- Verify that the installation location of the unit will provide the required clearance for proper operation.
- Assemble and install the roof curb (if applicable). Refer to the latest edition of the curb installers guide that ships with each curb kit.
- Fabricate and install ductwork; secure ductwork to curb.

- Install pitch pocket for power supply through building roof. (If applicable)
- Rigging the unit.
- Set the unit onto the curb; check for levelness.
- Ensure unit-to-curb seal is tight and without buckles or cracks.
- Install and connect a condensate drain line to the evaporator drain connection.

Factory Installed Economizer

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

Horizontal Discharge Conversion

3 Through 5 Ton Units

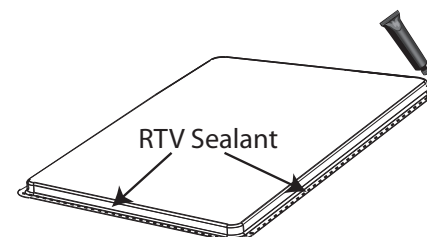
Supplies Needed by Installer for Conversion: 3 oz. tube of High Temperature RTV sealant. (500°F/ 260°C : Similar to Dow Corning 736)

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

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

1. Remove RETURN and SUPPLY duct covers.
2. Locate supply cover. Apply ¼ in. (6mm.) bead of RTV sealant to the flange as shown.
3. Position duct cover as shown, rotate 90 degrees to allow entrance into supply opening.

Figure 13. Duct cover



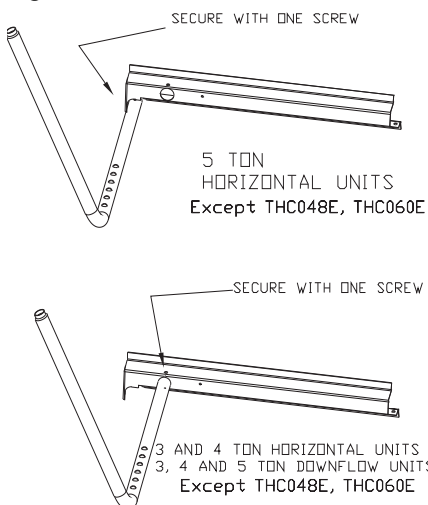
Installation

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

- Slide duct covers 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.

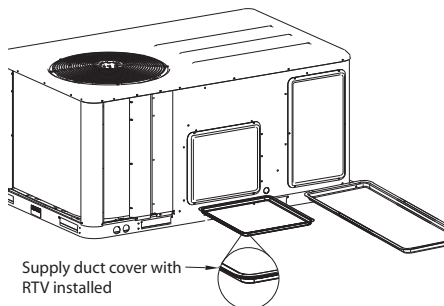
Note: If unit is equipped with Discharge Air Sensing option refer to the following figure for proper tube positioning based on unit tonnage.

Figure 14.



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

Figure 15. Duct cover with gasket



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.

Horizontal Discharge Conversion

6 Through 10 Ton Units

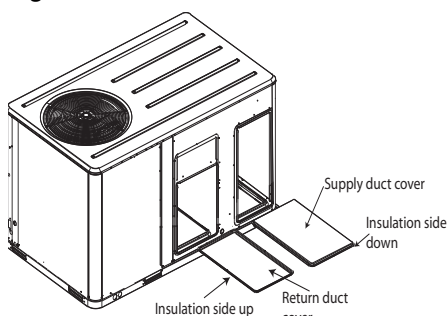
Supplies Needed by Installer for Conversion: 3 oz. tube of High Temperature RTV sealant.

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

If a unit is to be converted to Horizontal discharge, the following conversion must be preformed:

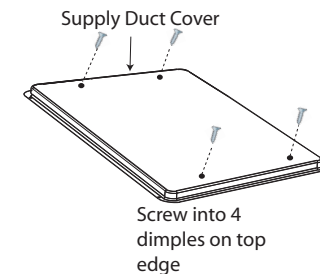
- Remove the RETURN and SUPPLY DUCT covers.
- Place SUPPLY DUCT cover over downflow return opening. (Insulation side down)

Figure 16. Duct cover



- Using self-drilling screws (or screws removed from duct cover) screw through dimples to attach Duct Cover to base.

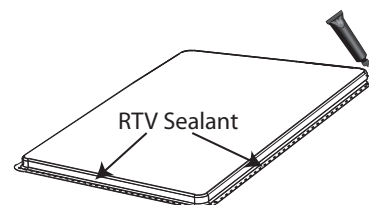
Figure 17. Duct cover



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

- On original RETURN DUCT cover apply 1/4" (6mm.) continuous bead of 500°F RTV sealant around flange. (Opposite insulation side)

Figure 18.



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

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

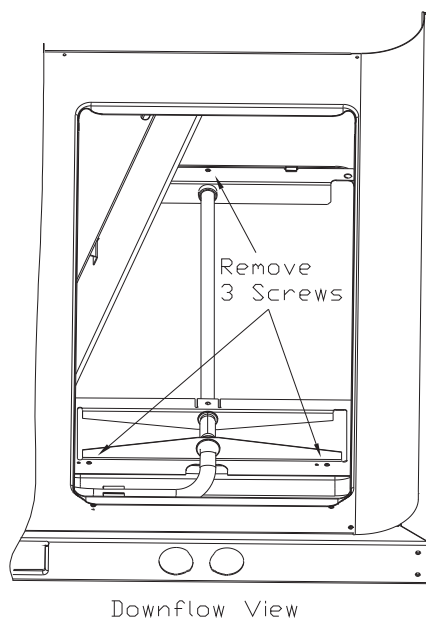
Return Air Smoke Detector

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.

Figure 19. Downflow view



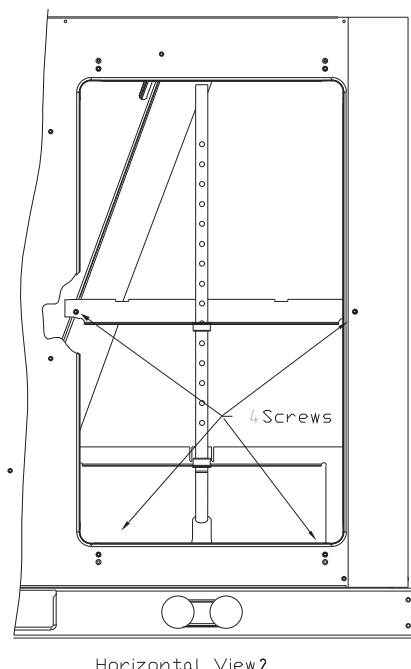
3. Lift the tube and bracket from the downflow duct opening. Rotate the tube and bracket assembly 180 degrees ensuring that the holes on the copper sensing tube face away from the unit and face the return air ductwork. Refer to Horizontal View.

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. For TSC036A-060A, THC033A-060A, TSC036E-060E, and THC036E units insert the tab on the left side into the slot on the indoor coil blockoff and secure the right side of the bracket with one of the 3 screws removed in step 2. Refer to Horizontal View 1. For

TSC072A-120A, THC072A-120A, THC048E-060E and TSC072E-120E units secure the tab on left side to the indoor coil blockoff with one of the screws removed in step 2 and secure the right side of the bracket with one of the screws removed from the access panel. Refer to Horizontal View 2.

Figure 20. Horizontal view 2



5. Using the remaining 2 screws removed in step 2, secure the bottom bracket. Refer to Horizontal View.

Note: Larger diameter holes on bottom bracket line up with the dimples on the rear panel. The smaller diameter holes line up with the screw holes in the rear panel.

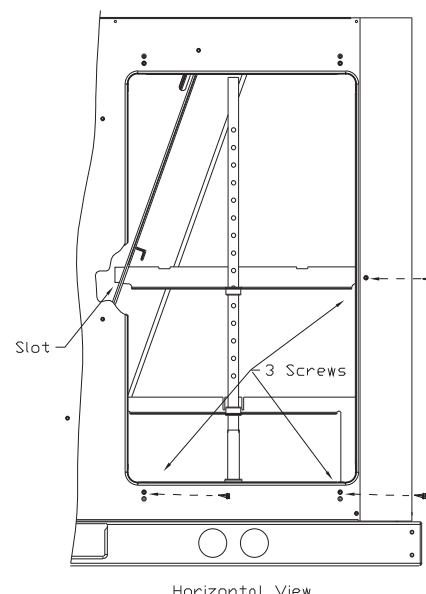
Main Electrical Power Requirements

⚠ WARNING Hazardous Service Procedures!

The maintenance and troubleshooting procedures recommended in this section of the manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided

throughout this manual concerning these procedures. When possible, 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

Figure 21. Horizontal view



electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks. Failure to follow all of the recommended safety warnings provided, could result in death or serious injury.

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.

Installation

WARNING **Ground Wire!**

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

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.

Condensate Drain Configuration

An evaporator condensate drain connection is provided on each unit. Refer to [Figure 8, p. 18](#) and [Figure 10, p. 18](#) for the appropriate drain location.

The condensate drain pan is factory installed to drain condensate to the back side of the unit. See [Figure 8, p. 18](#) and [Figure 10, p. 18](#). It can be converted to drain condensate out the front side of the unit or through the base.

To convert drain condensate out the front of unit:

1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit and rotate 180°.

4. Slide the condensate drain pan back into the unit, align the drain with the grommeted opening in the rear support panel and push until the coupling is seated in the grommet.
5. Replace the front support panel by aligning the panel with tabs in the raceway. Align the condensate drain pan support in the grommeted hole as the panel is put in place.
6. Replace evaporator access panel and supply air access panels.

To convert drain condensate through the base of unit:

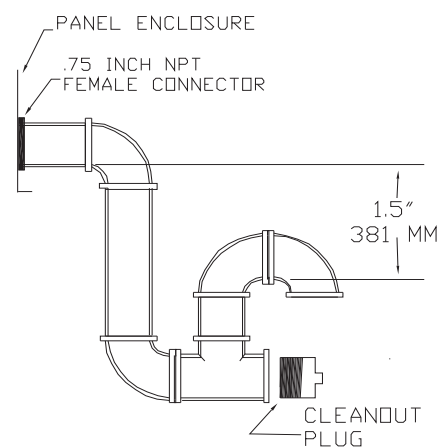
1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit.
4. Place on a level surface in the position it was removed from the unit.
5. Remove the plug knockout in the bottom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

A condensate trap must be installed at the unit due to the drain connection being on the "negative pressure" side of the fan. Install the

P-Trap using the guidelines in [Figure 22, p. 23](#).

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

Figure 22. Condensate trap installation



Filter Installation

Each unit ships with one inch filters. The quantity of filters is determined by unit size. Access to the filters is obtained by removing the indoor fan access panel. To modify the unit's filter rack to accept two inch filters, remove the L-shaped angle attachment screws and rotate the angles 90 degrees.

Reinstall the screws and insert new filters. Refer to the unit Service Facts (shipped with each unit) for filter requirements.

Note: Do not operate the unit without filters.

Field Installed Power Wiring

An overall dimensional layout for the field installed wiring entrance into the unit is illustrated in ["Unit Dimensions," p. 13](#). To insure that the unit's supply power wiring is properly sized and installed, follow the following guidelines.

Note: All field installed wiring must conform to NEC guidelines as well as State and 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.

CAUTION Possible Equipment Damage!

Use copper conductors only. Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors may result in equipment damage.

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

Standard Wiring

1. Location of the applicable electrical service entrance is illustrated in "Unit Dimensions," p. 13. Complete the unit's power wiring connections at Compressor Contactor # 1 (CC1) inside the unit control panel. Refer to the customer connection diagram that is shipped with the unit for specific termination points
2. Provide proper grounding for the unit in accordance with local and national codes.

Main Unit Power

Optional TBUE Wiring (Through the Base Electrical Option)

1. Location of the applicable electrical service is illustrated below. Refer to the customer connection diagram that is shipped with the unit for specific termination points. The

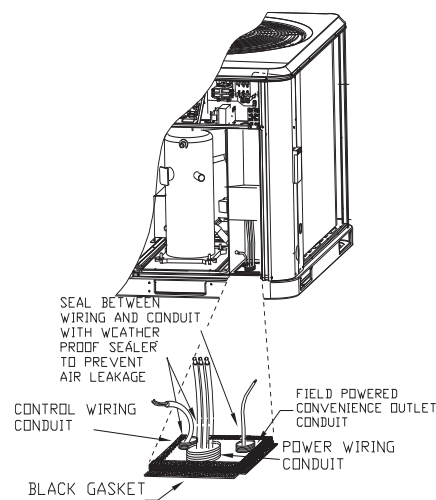
termination points, depending on the customer option selected would be a factory mounted nonfused disconnect switch (UDC) or circuit breaker (UCB). If neither a factory mounted nonfused disconnect switch (UDC) or circuit breaker (UCB) was factory mounted, field wiring connections should be terminated in the control box at Compressor Contactor # 1 (CC1).

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

Note: Black Gasket is shipped from the factory and is located in the literature Ship With bag in the control box. Apply Black Gasket around conduit plate on all 4 sides after installation to prevent air leakage from the building entering the electrical enclosures.

Note: Seal between wiring and conduit with Black Gasket or weather proof sealer to prevent air leakage from the building entering the electrical enclosures. Also seal around conduit and wiring at all roof and curb penetrations.

Figure 23.



Field Installed Control Wiring

An overall layout of the various control options available with the required number of conductors for each control device is illustrated in Figure 24, p. 25.

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

⚠ WARNING Hazardous Voltage w/ Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Failure to disconnect power before servicing can cause severe personal injury or death.

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 "Unit Dimensions," p. 13 for the electrical access locations provided on the unit and Table 3 or Table 4 for AC conductor sizing guidelines, and;

1. Use copper conductors unless otherwise specified.
2. Ensure that the AC control wiring between the controls and the unit's termination point does not

Installation

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

Note: Resistance in excess of 3 ohms per conductor may cause component failure due to insufficient AC voltage supply.

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

- Do not run the AC low voltage wiring in the same conduit with the high voltage power wiring.
- Route low voltage wiring per illustrations on page 22.

Table 3. Electromechanical Thermostat 24V AC Conductors with Reliatel

Distance from Unit to Control	Recommended Wire Size
000 - 460 feet	18 gauge
000 - 140 m	.75 mm ²
461 - 732 feet	16 gauge
141 - 223 m	1.3 mm ²
733 - 1000 feet	14 gauge
224 - 305 m	2.0 mm ²

Table 4. Electromechanical Thermostat 24V AC Conductors with Electromechanical Unit

Distance from Unit to Control	Recommended Wire Size
0 - 30 feet	22 gauge
0 - 9.1 m	.33 mm ²
31 - 50 feet	20 gauge
9.5 - 15.2 m	.50mm ²
51 - 75 feet	18 gauge
15.5 - 22.9 m	.75 mm ²

Table 4. Electromechanical Thermostat 24V AC Conductors with Electromechanical Unit

Distance from Unit to Control	Recommended Wire Size
76 - 125 feet	16 gauge
23.1 - 38.1 m	1.3 mm ²
126 - 200 feet	14 gauge
38.4 - 60.9 m	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," p. 13 for the electrical access locations provided on the unit.

- Table 5 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.

- Ensure that the wiring between controls and the unit's termination point does not exceed two and a half (2.5) ohms/conductor for the length of the run.
- Do not run the electrical wires transporting DC signals in or around conduit housing high voltage wires.
- Route low voltage wiring per illustrations on page 22.

Figure 24. Typical field wiring diagrams for Electro Mechanical

ELECTRO MECHANICAL THERMOSTAT ELECTRIC / ELECTRIC UNITS

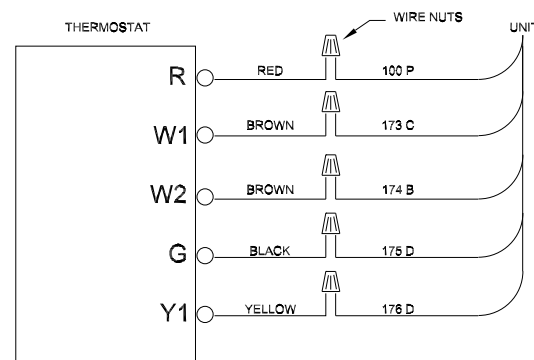
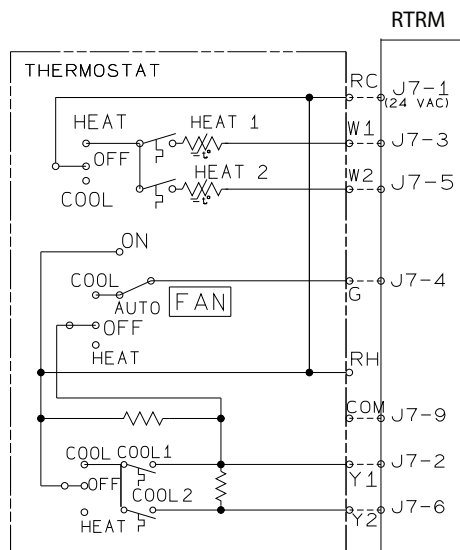


Table 5. Zone Sensor Module wiring

Distance from Unit to Control	Recommended Wire Size
0 - 150 feet	22 gauge
0 - 45.7 m	.33 mm ²
151 - 240 feet	20 gauge
46 - 73.1 m	.50 mm ²
241 - 385 feet	18 gauge
73.5 - 117.3 m	.75 mm ²
386 - 610 feet	16 gauge
117.7 - 185.9 m	1.3 mm ²
611 - 970 feet	14 gauge
186.2 - 295.7 m	2.0 mm ²

Figure 25. ReliaTel conventional thermostat field wiring diagrams



Note: If digit 9 in the unit model number equals "E" (Electro Mechanical Control), accessory relay BAY24X042 is required if the thermostat does not energize the fan circuit in the heating mode. See Figure 1 for wiring information.

Figure 26. Typical field wiring diagram for Electro Mechanical Thermostat

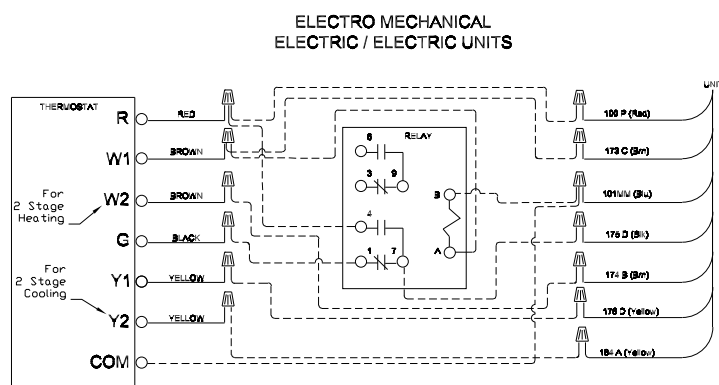


Figure 27. ReliaTel options module

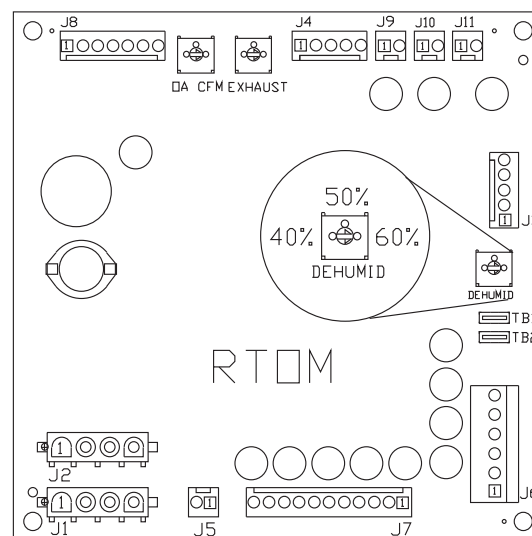


Figure 28. ReliaTel relative humidity sensor (dehumidification option)

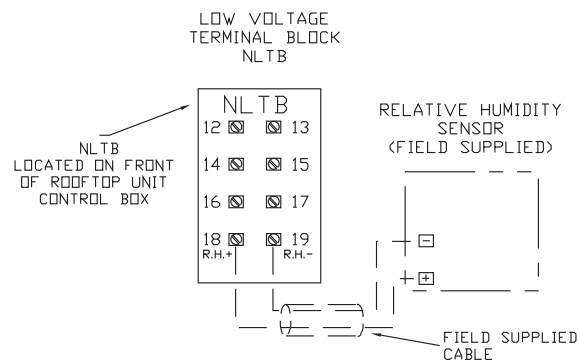
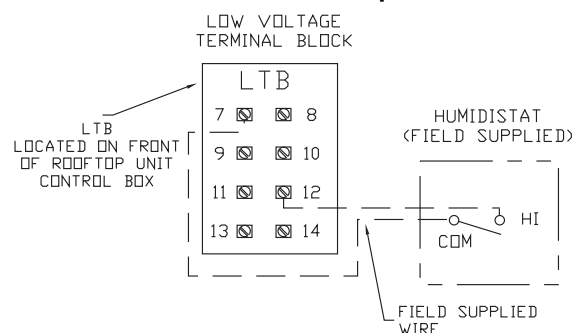


Figure 29. ReliaTel humidistat (dehumidification option)



Installation

Figure 30. Electro mechanical control customer low voltage routing

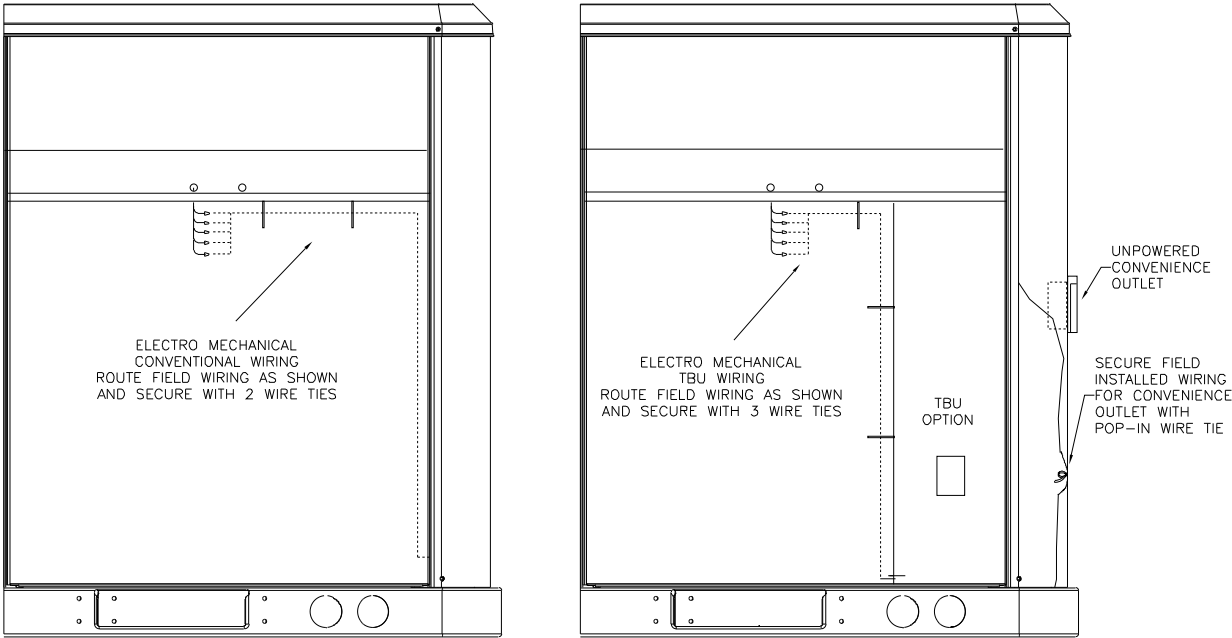
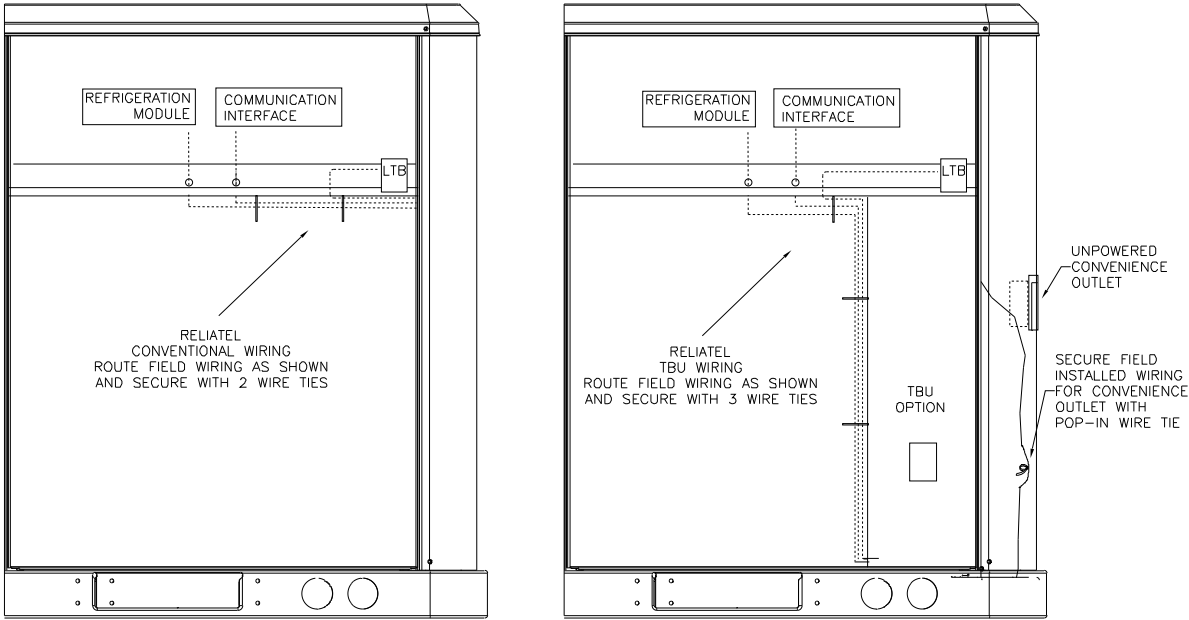


Figure 31. ReliaTel control customer low voltage routing



Smoke Detector Customer Low Voltage Wiring

When interlocking System Sensor smoke detectors together, all of the detectors must be powered from the same power supply. If the smoke detectors are powered up by different power supplies, harmonics are set up and will fry the boards in some, if not all, of the detectors.

If multiple smoke detectors are required, all detectors must be disconnected from the HVAC unit power supply and connected together from another single source supply.

Note: Do not interconnect any smoke detectors together that have separate power supplies. Do not exceed ten smoke detectors on one power supply.

Note: Multiple System Sensor smoke detectors are connected together using terminals 1 and 12 on each detector.

If you have supply and return smoke detectors in all HVAC units, you can connect a maximum of 5 HVAC units (10 detectors) up to one power supply. See the following field wiring example.

Figure 32. Up to 5 HVAC units

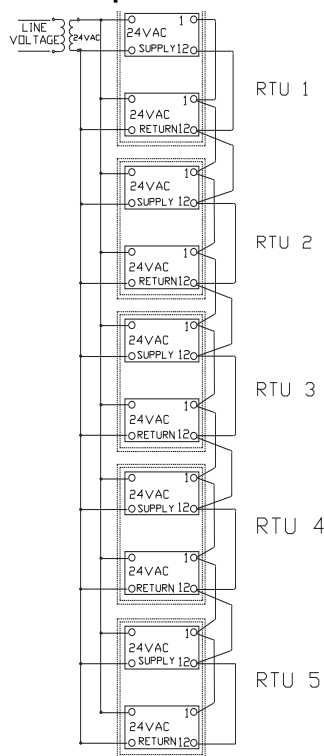
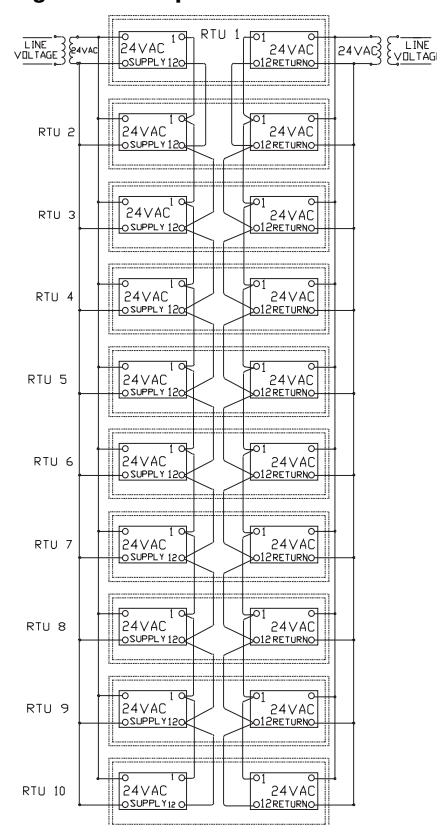


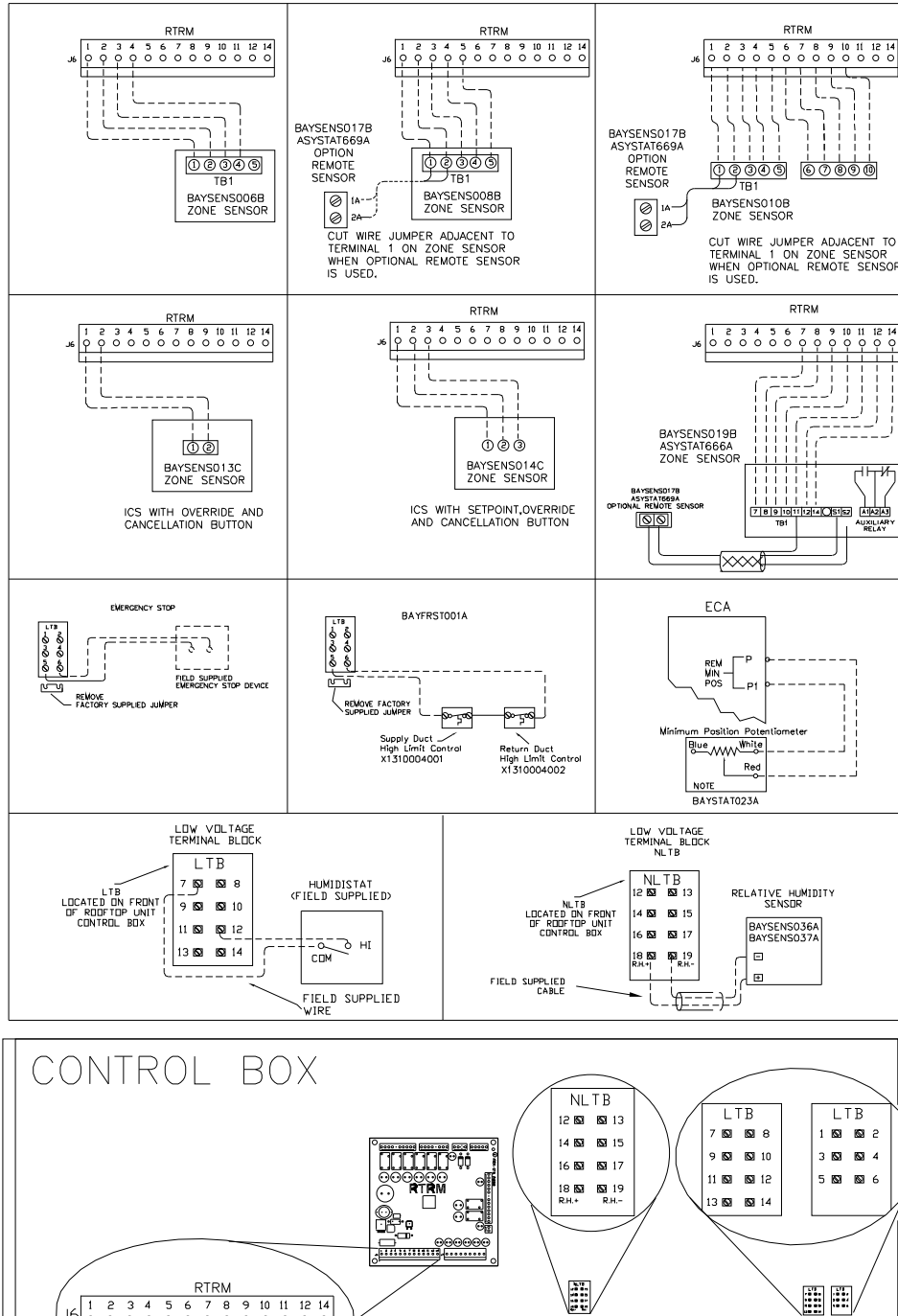
Figure 33. Up to 5 HVAC units



If you have more than 5 HVAC units, you can connect all the supplies together on one power supply (up to 10 HVAC units), and all the returns together (up to 10 HVAC units) on another power supply. See the following field wiring example.

Installation

Figure 34. Typical field wiring diagram for optional controls (ReliaTel only)



Space Temperature Averaging

(ReliaTel™ only)

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

Using the BAYSENS016* or BAYSENS017*, at least four sensors are required to accomplish space temperature averaging.

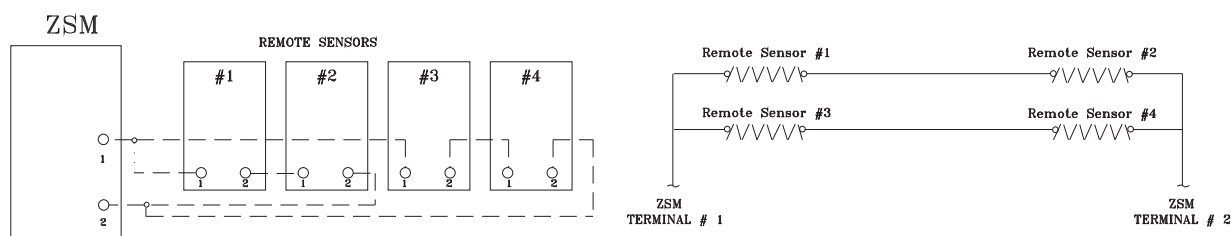
Example #1 illustrates two series circuits with two sensors in each circuit wired in parallel. The square of any number of remote sensors is required.

Example #2 illustrates three sensors squared in a series/parallel circuit. Using BAYSENS032*, two sensors are required to accomplish space temperature averaging.

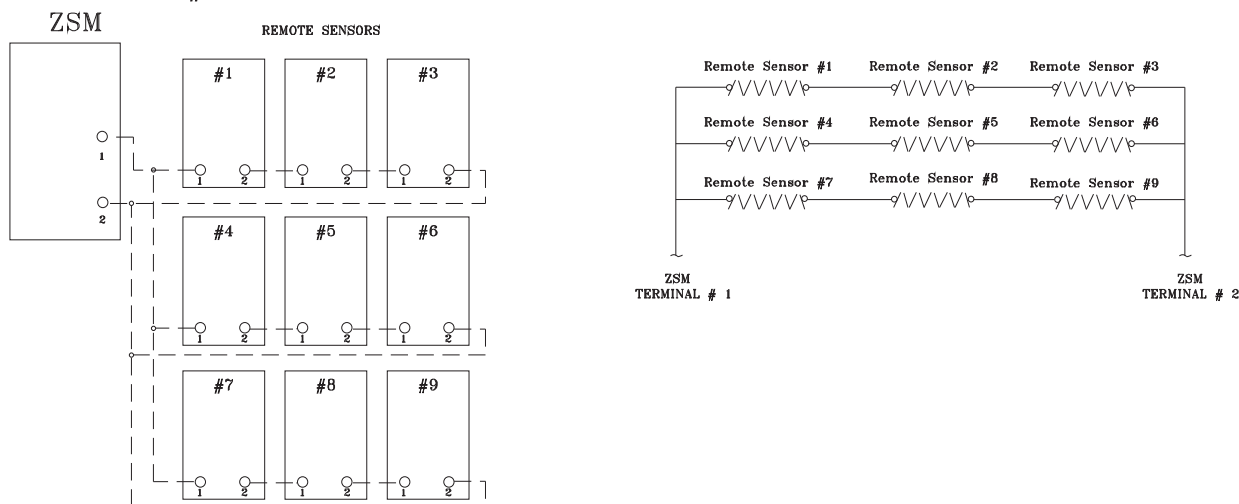
Example #3 illustrates the circuit required for this sensor. [Figure 8, p. 18](#) lists the temperature versus resistance coefficient for all sensors.

Figure 35. Examples

EXAMPLE #1



EXAMPLE #2



EXAMPLE #3



Installation

Table 6. Temperature vs. resistance

Temperature		
Degrees F°	Degrees C°	Nominal Resistance
-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
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

Pre-Start

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

WARNING **Hazardous Voltage w/ Capacitors!**

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 an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

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

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:

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

$$AV \text{ (Average Voltage)} = \frac{\text{Volt 1} + \text{Volt 2} + \text{Volt 3}}{3}$$

V1, V2, V3 = Line Voltage Readings

VD = Line Voltage reading that deviates the farthest from the average voltage.

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

$$\frac{221 + 230 + 227}{3} = 226 \text{ Avg.}$$

VD (reading farthest from average) = 221

The percentage of Imbalance equals:

$$100 \times \frac{226 - 221}{226} = 2.2\%$$

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.

WARNING **Live Electrical Components!**

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

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when

Pre-Start

performing service procedures with the electrical power energized.

- 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 (Optional-Standard with THC036-060E and TSC072-120E)

Each compressor can be 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.

WARNING

Live Electrical Components!

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

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

ReliaTel Controls

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

Table 7. Service test guide for component operation

Test Step	Mode	Fan	Econ (Note 2)	Comp1	Comp 2	Heat 1	Heat 2	Ohms
1	Fan	On	Minimum Position Setpoint 0%	Off	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	(Note 1) On	Off	Off	Off	4.7K
4 (Note 3)	Cool Stage 2	On	Minimum Position	(Note 1) On	(Note 1) On	Off	Off	6.8K
5 (Note 3)	Reheat	On	Minimum	On	On	Off	Off	33K
6 (Note 3)	Heat Stage 1	On	Minimum	Off	Off	On	Off	10K
7 (Note 3)	Heat Stage 2	On	Minimum	Off	Off	On	On	15K

Notes:

1 - The condenser fans will operate any time a compressor is "On."

providing the outdoor air temperatures are within the operating values.

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

3 - Steps for optional accessories and non-applicable modes in unit will be skipped.

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 [Table 7](#).

Electro Mechanical Controls

Upon power initialization, the Gas Ignition Module (IGN) performs self-diagnostic checks to insure that all internal controls are functional. It also checks the configuration parameters against the components connected to the system. The System LED located on the IGN module is turned "On" within one second of power-up if internal operation is okay.

Electromechanical Controls Test Procedure

See unit schematic for correct wire numbers.

Fan Test and Minimum Ventilation

Connect red thermostat wire (R) to black thermostat wire (G).

Economizer Cooling

Connect a jumper wire across OTS on Economizer Control (ECA).

Connect red thermostat (R) wire to yellow thermostat wire (Y1).

Cool 1

Connect red thermostat wire (R) to yellow thermostat wire (Y1).

Cool 2

Connect red thermostat wire (R) to yellow thermostat wire (Y2).

Heat 1

Connect red thermostat wire (R) to brown thermostat wire (W1).

Heat 2

Connect red thermostat wire (R) to brown thermostat wire (W2).

RT-SVX22E-EN

Start-Up

Verifying Proper Air Flow

(Units with Two Speed Direct 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 motor is factory wired to operate on low speed in the cooling and heating mode. It can be rewired for high speed operation should the application require it. Refer to the wiring diagram that shipped in the unit.

The indoor fan motors are specifically designed to operate within the BHP parameters listed in the fan performance tables of the unit Service Facts. By understanding that these motors will safely work within these conditions, before an oversized motor is required, will allow the air distribution system to be set up properly and diagnostics enhanced should a problem occur.

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 percent using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel Control

Using the Service Test Guide in [Table 7](#), momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Electro Mechanical Control

Using the Service Test Guide perform the proper test mode connections.

With the fan operating properly, determine the total system external static pressure (inches w.c.) by;

1. Measuring the supply and return duct static pressure,
2. Using the accessory pressure drop table in the Service Facts, calculate the total static pressure drop for all of the accessories installed on the unit; i.e., curb, economizer, etc.

Note: *Static pressure is based on desired CFM and may not be actual static pressure.*

3. Add the total accessory static pressure drop (step 2) to the duct external static pressure (step 1). The sum of these two values represents the total system external static pressure.
4. 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

Actual Motor Amps X Motor HP

Motor Nameplate Amps

- b. Using the fan performance tables in the unit Service Facts, plot the total external static pressure (step 3) and the BHP (step 4a) to obtain the operating CFM.
- c. When plotted, if the two values can not be interpolated correspondingly, the static pressure will most likely be the least accurate measurement. Because of the direct drive motor operation, the RPM performance is relatively constant making the operating current a very reliable diagnostic tool.

- Example: W_D060 single phase, low speed.

Actual Motor Amp (5.25) = .99%

Motor Nameplate Amps (5.3)

0.99 X Motor HP (0.6) = .59 BHP

The actual external static pressure is approximately 0.45" w.c., airflow equals 2100 CFM.

If the static pressure reading was higher, motor current would have to be lower proportionately to get an accurate CFM measurement in direct drive applications.

5. 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 to "High" and repeat steps 1 through 4.
6. If the required CFM is too high, (external static pressure is low causing motor HP output to be above table value), increase supply and/or return duct static.
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.

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 [Table 7](#), momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Electro Mechanical Control

Using the Service Test Guide perform the proper test mode connections.

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

Actual Motor Amps X Motor HP

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.

Verifying Proper Air Flow

(Units with 5-Tap Direct 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 motor is factory wired to operate on speed tap 1 in the cooling and heating mode for electric/electric units. For Gas/Electric units, the motor is factory wired to operate on speed tap 1 during cooling. For 3 & 4 ton Gas/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 percent using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel Control

Using the Service Test Guide in [Table 7](#), momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Electro Mechanical Control

Using the Service Test Guide perform the proper test mode connections.

With the fan operating properly, determine the total system external static pressure (inches w.c.) by the following method:

1. Measure the supply and return duct static pressure and sum the resulting absolute values,
2. Use the accessory pressure drop table in the Service Facts, to calculate the total static pressure drop for all of the accessories installed on the unit; i.e., curb, economizer, etc.

Note: *Accessory static pressure drop is based on desired CFM and may not be actual static pressure drop.*

3. Add the total accessory static pressure drop (step 2) to the duct external static pressure (step 1). The sum of these two values represents the total system external static pressure.

Using the Fan Performance Tables in the Service Facts, look up the selected speed tap setting and match the measured ESP to determine the approximate CFM.

If the required CFM is too low, (external static pressure is high) do one or both of the following and repeat procedure:

- a. Relieve supply and/or return duct static.
- b. Change indoor fan speed tap to a higher value

If the required CFM is too high, (external static pressure is low), do one or both of the following and repeat procedure:

- a. Increase supply and/or return duct static.
- b. Change indoor fan speed tap to a lower value.

Note: *Minimum setting for units with Gas or Electric Heat is 320 CFM per Ton. For 3 & 4 Ton Gas Heat units operating in heating mode the heat speed set cannot be lower than Speed Set 4.*

4. To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure.

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.

There are certain models however, if operated at low airflow, will not develop an airflow velocity that falls within the required 500 to 4000 feet per minute range. For these models, the design airflow shall be greater than or equal to the minimum CFM specified in the table provided below. Failure to follow these instructions will prevent the smoke detector from performing its design function.

Economizer Start-Up

ReliaTel Control

Using the Service Test Guide in [Table 7](#), momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Electro Mechanical Control

Using the Service Test Guide perform the proper test mode connections.

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 (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.

WARNING Rotating Components!

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

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.

ReliaTel Control

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.

Electro Mechanical Control

Using the Service Test Guide perform the proper test mode connections.

3. Verify that the dampers stroked to the full open position.
4. 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.

ReliaTel Control

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.

Electro Mechanical Control

Using the Service Test Guide perform the proper test mode connections.

Scroll Compressors

- a. Once each compressor has started, verify that the rotation is correct. If a scroll compressor is rotating backwards, it will not pump and a loud rattling sound can be observed.
 - b. If the electrical phasing is correct, before condemning a compressor, interchange any two leads (at the compressor Terminal block) to check the internal phasing. If the compressor runs backward for an extended period (15 to 30 minutes), the motor winding can overheat and cause the motor winding thermostat to open.
2. After the compressor and condenser fan have started and operated for approximately 30 minutes, observe the operating pressures. Compare the operating pressures to the operating pressure curve in the Service Facts.
 3. Check system superheat. Follow the instruction listed on the superheat charging curve in the Service Facts.

Superheat should be within ± 5 F of the superheat chart value.
 4. Repeat steps 1 through 4 for each refrigerant circuit.
 5. To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure. Remove electro mechanical test mode connections (if applicable).

Dehumidification Option

Momentarily jump across the Test 1 and Test 2 terminals of the LTB1 until the unit enters test mode 7. (See [Table 6](#).) Once the unit is in the reheat test mode, verify that the 3 way valve has shifted to the reheat position and that the supply temperature rises 10 deg F more than when in cooling mode stage 2.

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

1. Clamp an amp meter around one of 1st stage heater power wires at the heater contactor.

WARNING

Live Electrical Components!

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

2. *ReliaTel Control*-Using the Service Test Guide in Table 5, 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.

Electro Mechanical Control-Using the Service Test Guide perform the proper test mode connections;

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. *ReliaTel Control*-Using the Service Test Guide in Table 5, 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.

Electro Mechanical Control-Using the Service Test Guide perform the proper test mode connections;

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. Remove electro mechanical test mode connections (if applicable).

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 and condenser grilles are secured in place.
- Close the main disconnect switch or circuit protector switch that provides the supply power to the unit's terminal block or the unit mounted disconnect switch.

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

Maintenance

Fan Belt Adjustment - Belt Drive Units

⚠️ WARNING Rotating Components!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

The 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 removing or installing the new belts, do not stretch them over the sheaves. Loosen the belts using the belt tension adjustment bolts on the motor mounting base.

Once the new belts are installed, using a Browning or Gates tension gauge (or equivalent) illustrated in Figure 36; adjust the belt tension as follows;

- To determine the appropriate belt deflection;
 - Measure the center-to-center shaft distance (in inches) between the fan and motor sheaves.
 - Divide the distance measured in Step 1a by 64; the resulting value represents the amount of belt deflection that corresponds to the proper belt tension.
- Set the large O-ring on the belt tension gauge at the deflection value determined in Step 1b.
- Set the small O-ring at zero on the force scale of the gauge plunger.
- Place the large end of the gauge at the center of the belt span; then depress the gauge plunger until the large O-ring is even with the top of the next belt or

even with a straightedge placed across the fan and motor sheaves. Refer to Figure 9.

- Remove the belt tension gauge. The small O-ring now indicates a number other than zero on the plunger's force scale. This number represents the force (in pounds) required to give the needed deflection.
- Compare the "force" scale reading (Step 5) with the appropriate "force" value listed in Table 7. If the "force" reading is outside the range, readjust the belt tension.

Note: Actual belt deflection "force" must not exceed the maximum "force" value shown in Table 7.

- Recheck the belt tension at least twice during the first 2 to 3 days of operation. Belt tension may decrease until the new belts are "run in".

Figure 36. Belt tension gauge

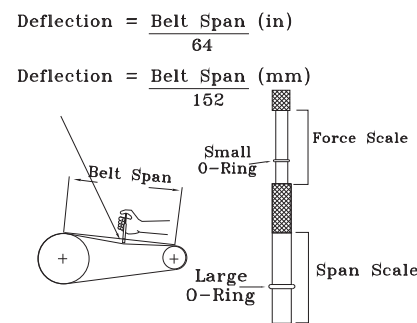


Table 8. Belt Tension Measurement and Deflection

		Deflection Force (Lbs.)					
Belts Cross Section	Small P.D Range	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
	3.4 - 4.2	4	5 1/2	5 3/4	8	4 1/2	5 1/2
B	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

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

⚠️ WARNING Rotating Components!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

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.

Filters

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

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 and condenser coils for dirt, bent fins, etc. If the coils appear dirty, clean them according to the instructions described in "Coil Cleaning" later in this section.
- Manually rotate the condenser fan(s) to ensure free movement and check motor bearings for wear. Verify that all of the fan mounting hardware is tight.
- Inspect the F/A-R/A damper hinges and pins to ensure that all moving parts are securely mounted. Keep the blades clean as necessary.
- Verify that all damper linkages move freely; lubricate with white grease, if necessary.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- 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 [Table 9 on page 42](#). 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.
- Clean burner area, verify gas heat system operates properly.

Coil Cleaning

Regular coil maintenance, including annual cleaning, enhances the unit's operating efficiency by minimizing: compressor head pressure and amperage draw; evaporator water carryover; fan brake horsepower, due to increase static pressure losses; airflow reduction.

At least once each year, or more often if the unit is located in a "dirty" environment, clean the evaporator

and condenser coils using the instructions outlined below. Be sure to follow these instructions as closely as possible to avoid damaging the coils.

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

Hail Guard Removal

- Unlatch hail guard.
- Pull the top of the hail guard outward until the fastener studs are free of the retaining nuts.
- Lift the hail guard from the lower retaining bracket and set aside.

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

WARNING Hazardous Chemicals!

Coil cleaning agents can be either acidic or highly alkaline. Handle chemical carefully. Proper handling should include 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. Failure to follow all safety instructions could result in death or serious injury.

1. Remove enough panels from the unit to gain access to the coil.
2. Protect all electrical devices such as motors and controllers from any over spray.
3. Straighten any bent coil fins with a fin comb.
4. Mix the detergent with water according to the manufacturer's instructions. If desired, heat the solution BUT DO NOT EXCEED 150 F maximum to improve its cleansing capability.

Maintenance

WARNING

Hazardous Pressures!

Coils contain refrigerant under pressure. When cleaning coils, maintain coil cleaning solution temperature under 150°F to avoid excessive pressure in the coil. Failure to follow these safety precautions could result in coil bursting, which could result in death or serious injury.

Do not heat the detergent-and-water solution above 150°F. Hot liquids sprayed on the exterior of the coil will raise the coil's internal pressure and may cause it to burst. Failure to follow proper procedures can result in personal illness or injury or severe equipment damage.

5. Pour the cleaning solution into the sprayer. If a high-pressure sprayer is used:
 - a. do not allow sprayer pressure to exceed 600 psi.
 - b. the minimum nozzle spray angle is 15 degrees.
 - c. maintain a minimum clearance of 6" between the sprayer nozzle and the coil.
 - d. spray the solution perpendicular (at 90 degrees) to the coil face.
6. Spray the leaving-airflow side of the coil first; then spray the opposite side of the coil. Allow the cleaning solution to stand on the coil for five minutes.
7. Rinse both sides of the coil with cool, clean water.
8. Inspect both sides of the coil; if it still appears to be dirty, repeat Steps 6 and 7.
9. Reinstall all of the components and panels removed in Step 1 and any protective covers installed in step 2.

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

Hail Guard Reinstallation

- To reinstall the hail guard, locate the bottom of the hail guard in the lower bracket and secure it to the upper unit bracket with the attached fasteners.

Note: Secure hail guard latches.

Figure 37.

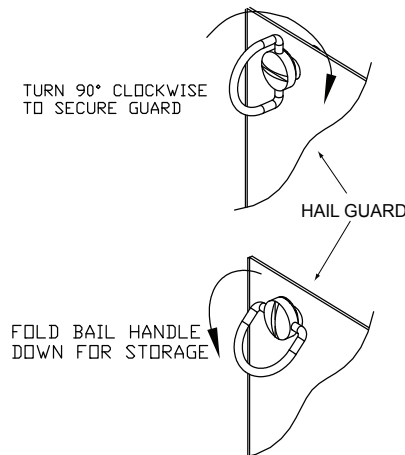
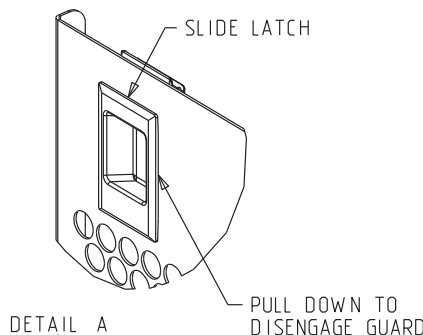


Figure 38.



10. Restore the unit to its operational status and check system operation.

For units with the Dehumidification Option

For access to the leaving face of the evaporator, locate the reheat coil, locking bracket above the reheat coil. This bracket attaches the reheat coil to the Evaporator top blockoff. Initially there are 2 screws approximately 2 inches from the top of the unit.

Remove and discard the screw on the left, which is in place for shipping. Loosen the screw on the right. Do not remove. Slide the locking bracket towards the front of the unit to unlock the coil. Pivot the reheat coil to the vertical position to access the evaporator face.

Note: Clean the reheat coil on the same interval and method as the evaporator coil.

Replace the reheat coil to its proper location once cleaning is complete. Align the screw heads in the top of the reheat coil with the slots in the evaporator top blockoff. Press the coil assembly into place and verify that the reheat coil is flush against the evaporator top blockoff. Set the locking bracket on the top of the reheat coil flush with the evaporator coil top blockoff.

Apply pressure to the center of the bracket and slide the bracket towards the rear of the unit. Tighten the screw to secure the bracket and the coil in place.

Annual Maintenance

- Clean and repaint any corroded surface.

Final Process

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

Complete Model Number

Unit Serial Number

Wiring Diagram Numbers (from unit control panel)

Schematics

Connections

Table 9. Sample maintenance log

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

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

Trouble Shooting

ReliaTel Control

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

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

WARNING

Live Electrical Components!

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

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

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 Diagnostic" 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.

BAYSENS010B, BAYSENS011B, BAYSENS019A, BAYSENS020A, BAYSENS021A & BAYSENS023A 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

Below is the complete listing of failure indication causes.

System failure

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

Cooling Failure

1. Cooling and heating set point (slide pot) on the zone sensor has failed. Refer to the "Zone Sensor Test Procedure" section.
2. Zone temperature thermistor ZTEMP on ZTS failed. Refer to the "Zone Sensor Test Procedure" section.
3. CC1 or CC2 24 VAC control circuit has opened, check CC1 & CC2 coils, and any of the controls below that apply to the unit (HPC1, HPC2).
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 J1-1 & 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.

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

Note: *If the system is equipped with a programmable zone sensor, (BAYSENS019A, BAYSENS020A or BAYSENS023A), the LED indicators will not function while the BAYSENS010A is connected.*

Resetting Cooling and Ignition 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 Ignition 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 (\pm 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 (\pm 1) minute ignore delay.

Trouble Shooting

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.

Zone Temperature Sensor (ZTS) Test

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.

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

Table 10. Cooling setpoint and heating setpoint

Zone Temperature		Nominal ZTEMP Resistance
50 F°	10.0 C°	19.9 K-Ohms
55 F°	12.8 C°	17.47 K-Ohms
60 F°	15.6 C°	15.3 K-Ohms
65 F°	18.3 C°	13.49 K-Ohms
70 F°	21.1 C°	11.9 K-Ohms
75 F°	23.9 C°	10.50 K-Ohms
80 F°	26.7 C°	9.3 K-Ohms
85 F°	29.4 C°	8.25 K-Ohms
90 F°	32.2 C°	7.3 K-Ohms

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 below 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 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.

Relative Humidity Sensor Test

This component is measured by measuring the mA output signal on the Relative Humidity Sensor. Verify accuracy of the sensor annually. If the output reading is 0 mA, first verify that power is applied to the

sensor. A reading of 4 mA corresponds to 0% RH and 20 mA corresponds to 100% RH.

% RH	mA
30	8.8
40	10.4
50	12.0
60	13.6
70	15.2
80	16.8

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

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, 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.

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 and condenser fan cycling functions are disabled.

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

ReliaTel Control

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 Seconds On / 1/2 Second Off:

Error Code:

- 1 Flash: Actuator Fault
- 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

Electro Mechanical Control

WARNING Live Electrical Components!

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

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

Cooling Failure

1. Cooling and heating set point (slide pot) on the thermostat has failed.
2. 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, LPC1, LPC2, Froststat™).

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.

Method 1

To reset the system from the space, turn the "Mode" selection switch at the thermostat 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".

Unit Economizer Control (ECA) Test Procedures

Electro Mechanical Control

This series of tests will allow you to diagnose, and determine where, and if a problem exists in the system economizer operation. Test 1 determines if the problem is in the Unit, or if it is in the ECA. Test 2 tests sensor inputs. Test 3 tests the resistors and sensors. Conduct the tests in numerical order until problem is found.

Test 1

Verifying that the economizer actuator (ECA) is functional:

1. Using the "Test Mode" described in the "System Start-Up" section, put the unit into the economizer mode and verify that the economizer actuator (ECA) drives fully open (approximately 90 seconds).
2. If the ECA is not driving the dampers, verify that 24 VAC is between the ECA terminals TR and TR1 is present. If 24 volts is not present, a wiring or terminal problem exists from the control transformer. Make any necessary repairs, see wiring diagrams to troubleshoot.

Trouble Shooting

3. If 24 VAC is present, adjust the minimum position potentiometer fully clockwise. If the actuator does not drive, the economizer actuator is bad. Replace the ECA.

Test 2

Testing the ECA resistors and sensors

1. Testing the Mixed Air Sensor (MAS). Disconnect the wires connected to T and T1 on the ECA, and;
 - a. Measure the resistance of the sensor between the wires 180B and 181B.
 - b. Measure the temperature at the MAS location. Using the Temperature versus Resistance chart, verify the accuracy of the MAS.

Replace the sensor if it is out of range.

2. Testing the Outdoor Air Switch. If the temperature is above 60 degrees, it will need to be chilled. Measure the resistance of the sensor on the ECA SO and +.

The resistance should be approximately 390 Ohms.

Replace the Switch if it is open.

Replace the ECA if it is out of range.

3. Testing the R1 Resistance.
Measure the resistance of the sensor on the ECA SR and +.
The resistance should be approximately 420 Ohms.
Replace the ECA if it is out of range.

4. Testing the R2 Resistance.
Measure the resistance of the sensor on the ECA P and P1.
The resistance should be approximately 130 Ohms.
Replace the ECA if it is out of range.

Wiring Diagrams

Note: For easier access, published unit wiring diagrams (individual, separate diagrams for unitary product lines) will become available via e-Library instead of through wiring manuals after 2007. For diagrams prior to 2008 please refer to wiring diagram books T_C-SVE001C-EN or T_C-SVE001C-EN for cooling only units.

Drawing Number	Description
4366-1019	Power Schematic - 230v/60hz/1ph — 2 - 5 Ton Cooling Only
4366-1020	Power Schematic - 230v/60hz/3ph — 2 - 7.5 Ton Cooling Only / Belt Drive Motor
4366-1022	Power Schematic - 230v/60hz/3ph — 2 - 5 Ton Cooling Only / Direct Drive Motor
4366-1023	Power Schematic - 460-575v/60hz/3ph — 2 - 7.5 Ton Cooling Only / Belt Drive Motor
4366-1025	Power Schematic - 460-575v/60hz/3ph — 2 - 5 Ton Cooling Only / Direct Drive Motor
4366-1026	Control Diagram — 2 - 7.5 Ton Cooling Only - with ReliaTel
4366-1028	Control Diagram — 2 - 3 Ton Cooling Only / Direct Drive Motor - with Electromechanical
4366-1030	4 - 5 Ton Cooling Only / Direct Drive Motor - with Electromechanical
4366-1031	Through The Base Utilities Schematic
4366-1037	Power Schematic - 230v/60hz/3ph — 7.5 - 10 Ton Cooling Only / Dual Compressor
4366-1038	Power Schematic - 460-575v/60hz/3ph — 7.5 - 10 Ton Cooling Only / Dual Compressor
4366-1040	6 - 7.5 Ton Cooling Only / Belt Drive Motor - with Electromechanical
4366-1041	Control Diagram — 7.5 - 10 Ton Cooling Only / Dual Compressor - with Electromechanical
4366-1044	Control Diagram — 7.5 - 10 Ton Cooling Only / Dual Compressor - with ReliaTel
4366-1047	Novar Schematic — 3051
4366-1048	CO2 Sensor/Ventilation override schematic - with ReliaTel
4366-1084	9.0 & 18.0 KW - 208-240v/60hz/3ph — BAYHTRS309A, BAYHTRS318A, BAYHTRT309A, BAYHTRT318A Electric Heater
4366-1086	54.0 KW - 208-240/60hz/3ph — BAYHTRT354 Electric Heater
4366-1087	9.0 & 18 KW - 480-600v/60hz/3ph — BAYHTRS409A, BAYHTRT409A, BAYHHTRSW09A, BAYHTRS418A, BAYHTRT418A, BAYHTRSW18A, BAYHTRTW18A Electric Heater
4366-1089	27.0 & 36.0 KW - 208-240/60hz/3ph — BAYHTRS327A, BAYHTRT327A, BAYHTRS336A, BAYHTRT336A Electric Heater
4366-1090	54.0 KW - 480-600v/60hz/3ph — BAYHTRT454A, BAYHTRTW54A Electric Heater
4366-1091	5.0 KW - 208-240v/60hz/1ph — BAYHTRR105A Electric Heater
4366-1092	10.0 KW - 208-240v/60hz/1ph — BAYHTRR110A Electric Heater
4366-1093	13.8 KW - 208-240v/60hz/1ph — BAYHTRR114A Electric Heater
4366-1094	12.0 & 17.4 KW - 208-240v/60hz/3ph — BAYHTRR312A, BAYHTRR318A Electric Heater
4366-1095	23.0 KW - 208-240v/60hz/3ph — BAYHTRR323A Electric Heater
4366-1096	6.0 KW - 208-600v/60hz/3ph — BAYHTRR306A, BAYHTRR406A, BAYHTRRW06A Electric Heater
4366-1097	12.0, 17.4 & 23.0 KW - 480-600v/60hz/3ph — BAYHTRR412A, BAYHTRR418A, BAYHTRR423A, BAYHTRRW12A, BAYHTRRW18A, BAYHTRRW23A Electric Heater
4366-1098	17.6 KW - 208-240v/60hz/1ph — BAYHTRR118A Electric Heater
4366-1099	Novar Schematic 2024 - with ReliaTel
4366-1505	230v/60hz/1ph — 2 - 3 Ton Cooling Only / Direct Drive Motor - with Electromechanical
4366-1506	Connection Diagram - 230v/60hz/1ph — 2 -5 Ton Cooling Only - with ReliaTel
4366-1507	208-230,460,575v/60hz/3ph — 2 - 3 Ton Cooling Only / Direct Drive Motor - with Electromechanical
4366-1508	Connection Diagram - 230-460-575v/60hz/3ph — 2 - 5 Ton Cooling Only / Direct Drive Motor - with ReliaTel
4366-1509	Connection Diagram - 208-230,460,575v/60hz/3ph — 2 - 5 Ton Cooling Only / Belt Drive Motor - with ReliaTel
4366-1524	Connection Diagram - 208-230,460,575v/60hz/3ph — 2 - 5 Ton Cooling Only / Belt Drive - with Electromechanical
4366-1527	230v/60hz/1ph — 4 - 5 Ton Cooling Only / Direct Drive Motor - with Electromechanical
4366-1528	208-230,460-575v/60hz/3ph — 4 - 5 Ton Cooling Only / Direct Drive Motor - with Electromechanical
4366-1533	208-230,460,575v/60hz/3ph — 7.5 - 10 Ton Cooling Only - Dual Compressor - with Electromechanical
4366-1534	Connection Diagram - 208-230,460,575v/60hz/3ph — 7.5 - 10 Ton Cooling Only / Dual Compressor - with ReliaTel

Wiring Diagrams

Drawing Number	Description
4366-1536	208-230,460,575v/60hz/3ph — 6 - 7.5 Ton Cooling Only - Single Compressor - with Electromechanical
4366-1541	Connection Diagram - 208-230,460,575v/60hz/3ph — 6 - 7.5 Ton Cooling Only / Belt Drive Motor - with ReliaTel
4366-4558	208v/1ph — 3 - 5 Ton Cooling Only - Direct Drive (X13) Motor - with Electromechanical
4366-4559	Connection Diagram - 230v/60hz/1ph — 3 - 5Ton Cooling Only / Direct Drive (X13) Motor - with ReliaTel
4366-4566	230v/60hz/3ph — 3-5 Ton Cooling Only/Direct Drive (X13) Motor - with Electromechanical
4366-4568	Control Diagram — 230v/60hz/1ph 230v, 460v/60hz/3ph — 3 - 5 Ton Cooling Only / Direct Drive (X13) Motor - with ReliaTel
4366-4574	Power Schematic - 230v/60hz/1ph — 3 - 5 Ton Cooling Only / Direct Drive Motor(X13) motor
4366-5161	Power Schematic - 230v/60hz/3ph — 3 - 5 Ton Cooling Only / Direct Drive Motor(X13) motor
4366-5162	Power Schematic - 460v/60hz/3ph — 3 - 5 Ton Cooling Only / Direct Drive Motor(X13) motor
4366-5181	230v/3ph — 3-5 Ton Cooling Only - Direct Drive (X13) Motor - with Electromechanical
4366-5182	Connection Diagram - 230v/60hz/3ph — 3 - 5Ton Cooling Only / Direct Drive (X13) Motor - with ReliaTel
4366-5198	460v/3ph — 3-5 Ton Cooling Only - Direct Drive (X13) Motor - with Electromechanical
4366-5199	Connection Diagram - 460v/60hz/3ph — 3 - 5Ton Cooling Only / Direct Drive (X13) Motor - with ReliaTel

Limited Warranty

Electric Air Conditioner

**TCY, TCX, TCC, TCD, TCH,
TCM,**

TCP, TSC and THC (Parts Only)

Models Less Than 20 Tons for Residential Use*

This limited warranty is extended by American Standard Inc., to the original purchaser and to any succeeding owner of the real property to which the Combination Gas Electric Air Conditioner is originally affixed, and applies to products purchased and retained for use within the U.S.A. and Canada.

If any part of your Combination Gas Electric Air Conditioner fails because of a manufacturing defect within five years from the date of the original purchase, Warrantor will furnish without charge the required replacement part. Any local transportation, related service labor, diagnosis calls, air filters, refrigerant and related items are not included.

If the sealed motor-compressor fails because of a manufacturing defect within five years from the date of original purchase, Warrantor will furnish without charge the required replacement compressor. Any local transportation, related service labor, diagnosis calls, refrigerant and related items are not included.

In addition, if the steel heat exchanger fails because of a manufacturing defect within the sixth through tenth year from the date of original purchase, Warrantor will furnish without charge a replacement heat exchanger. Any local transportation, related service labor and diagnosis calls are not included.

This limited warranty does not cover failure of your combination gas electric air conditioner if it is damaged while in your possession, failure attributable or caused by unreasonable use of the combination gas electric air conditioner and/or failure to properly maintain the combination gas electric air conditioner as set forth in the Use and Care manual.

This limited warranty applies to product installed on or after 10/1/2001 where product is manufactured after 1/1/2000. This limited warranty is not retroactive to any installations prior to 10/1/2001 or on product produced prior to 2000.

THE LIMITED WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, AND IN NO EVENT SHALL WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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

Parts will be provided by our factory organization through an authorized service organization in your area listed in the yellow pages. If you wish further help or information concerning this limited warranty, contact:

American Standard Inc.

2701 Wilma Rudolph Blvd.

Clarksville, TN 37040-1008

Attention: Manager, Product Service
GW-618-4001

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

Limited Warranty

Electric Air Conditioner

**TCY, TCX, TCC, TCD, TCH,
TCK, TCM, TCP,**

TSC and THC (Parts Only) Models Less Than 20 Tons for Commercial Use*

This warranty is extended by American Standard Inc., to the original purchaser and to any succeeding owner of the real property to which the Combination Gas Electric Air Conditioner is originally affixed, and applies to products purchased and retained for use within the U.S.A. and Canada. There is no warranty against corrosion, erosion or deterioration.

If any part of your Combination Gas Electric Air Conditioner fails because of a manufacturing defect within one year from the date of the original purchase, Warrantor will furnish without charge the required replacement part.

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

In addition, if the steel heat exchanger fails because of a manufacturing defect within the second through fifth year from the date of original purchase, Warrantor will furnish without charge a replacement heat exchanger.

Warrantor's obligations and liabilities under this warranty are limited to furnishing F.O.B. Warrantor factory or warehouse at Warrantor designated shipping point, freight allowed to Buyer's city, replacement parts for Warrantor's products covered under this warranty. Warrantor shall not be obligated to pay for the cost of lost refrigerant. No liability shall attach to Warrantor until products have been paid for and then liability shall be limited solely to the purchase price of the equipment under warranty shown to be defective.

THE WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, AND IN NO EVENT SHALL WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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

American Standard Inc.

2701 Wilma Rudolph Blvd.

Clarksville, TN 37040-1008

Attention: Manager, Product Service

GW-606-4800

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

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Date	08/08
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The manufacturer has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.