



## TECHNICAL GUIDE

**r-410A**

**ZZ Series**

**15 Ton**

**60 Hz (Export Only)**



ZZ 15 TON



## Description

### ASHRAE 90.1 COMPLIANT

YORK® Sun™ Pro units are convertible single packages with a common footprint cabinet. The 15 ton unit has two compressors with independent refrigeration circuits to provide 2 stages of cooling. The unit was designed for light commercial applications and can be easily installed on a roof curb, slab, or frame.

All Sun™ Pro units are self-contained and assembled on rigid full perimeter base rails allowing for 3-way forklift access and overhead rigging. Every unit is completely charged, wired, piped, and tested at the factory to provide a quick and easy field installation.

Sun™ Pro units in all tonnage sizes are convertible between side airflow and down airflow, with corresponding economizer if economizer option is desired.

Sun™ Pro units are available in the following configurations: cooling only, cooling with electric heat and cooling with gas heat. Electric heaters are available as factory-installed options or field-installed accessories.

All units provide constant supply air volume.

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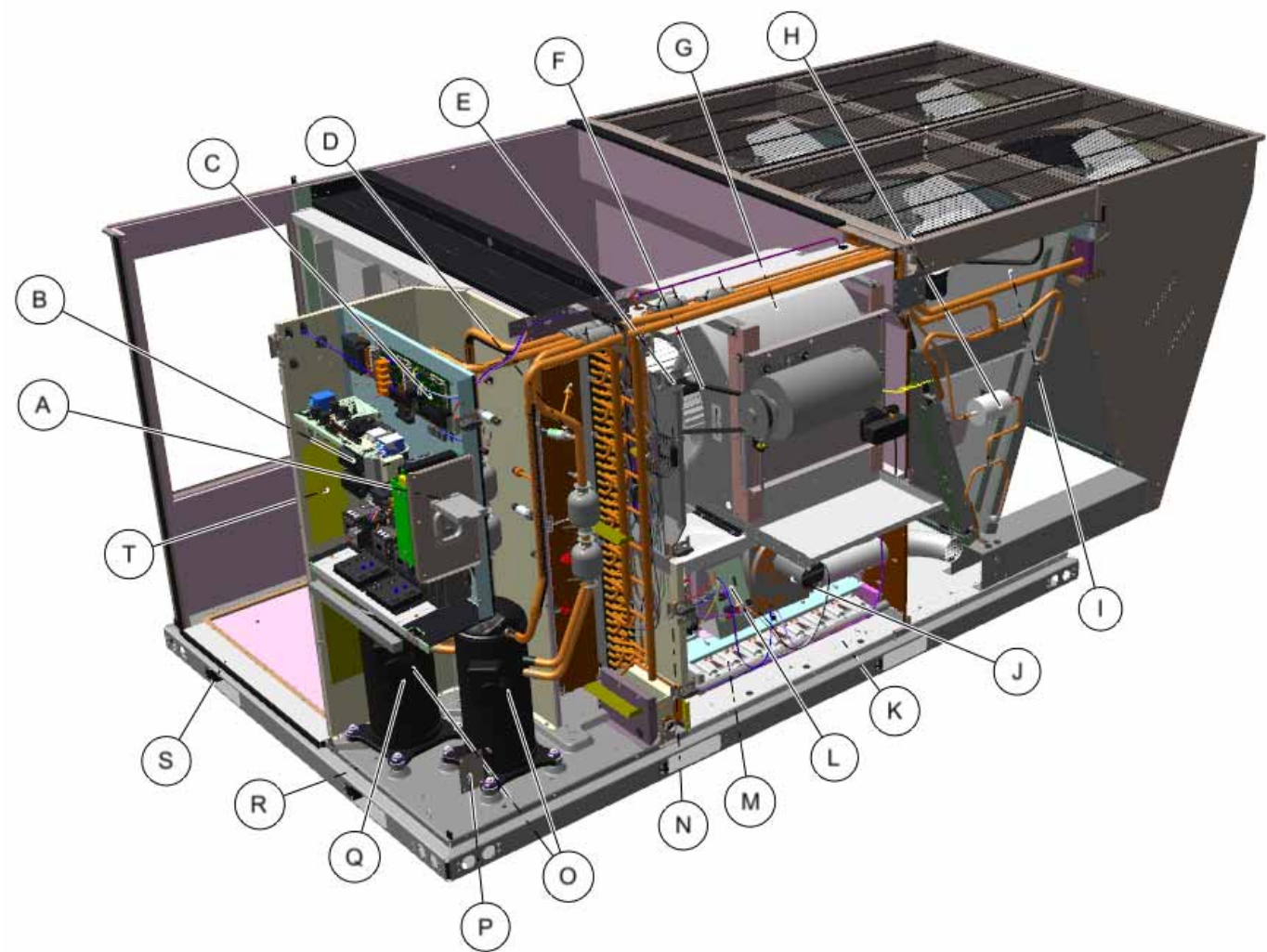
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Component Location

Cooling With Gas Heat (15 Ton)



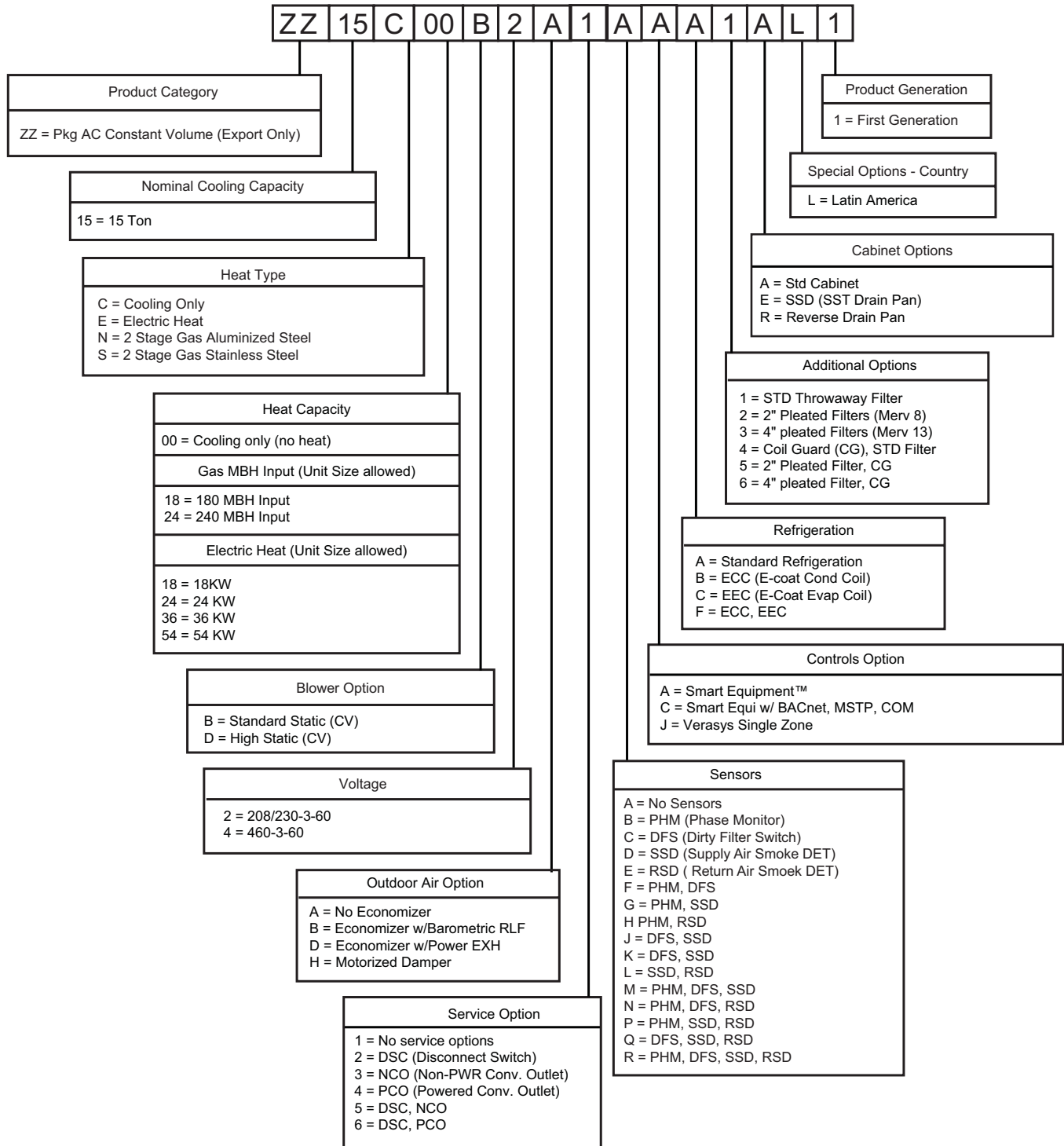
**Component location table**

Item	Description
A	Disconnect location (optional disconnect switch)
B	Terminal block for high-voltage connection
C	Smart Equipment™ control board with screw connector for thermostat wiring and network connections
D	Filter access (2 in. or 4 in. filter options)
E	Toolless door latch
F	Belt-drive blower motor
G	Slide-out motor and blower assembly for easy adjustment and service
H	Filter drier (solid core)
I	Micro-channel aluminum tube/aluminum fin condenser
J	Power ventor motor
K	Slide out drain pan with 1 inch NPT, female connection
L	Intelligent control board for safe and efficient operation
M	Two-stage gas heating to maintain warm, comfortable temperature
N	20-gauge aluminized steel tubular heat exchanger for long life (stainless steel option)
O	Dual stage cooling for maximum comfort
P	Side entry power and control knockouts
Q	Compressor #1 access
R	Roof curbs in eight-inch and fourteen-inch heights <sup>1</sup>
S	Base rails with forklift slots (three sides) and lifting holes
T	Second model nameplate inside hinged access panel

1. Roof curbs in eight and fourteen inch heights. Roof curbs for transitioning from York® Sunline™ footprint to the ZZ series foot prints are also available as a field installed accessory.

## Nomenclature

### Nomenclature for ZZ 15 Ton



## Features and Benefits

### Standard Features

- **Service Friendly** - The Sun™ Pro incorporates a number of key features for ease of serviceability.

The motor and blower slide out of the unit as a common assembly. This facilitates greater access to all the indoor airflow components, thus simplifying maintenance and adjustment.

Service time is reduced through the use of hinged, toolless panels. Such panels provide access to frequently inspected components and areas, including the control box, compressors, filters, indoor motor & blower, and the heating section. The panels are screwed in place at the factory to prevent access by children or other unauthorized persons. It is recommended that the panels be secured with screws once service is complete.

Service windows have been placed in both condenser section walls. Rotation of the cover allows easy access to the condenser coils for cleaning or inspection.

The Smart Equipment™ control board provides alarm messages to help quickly identify any faults.

All units use four filters of the same standard size. This standardization simplifies selections for filter replacement.

The non-corrosive drain pan slides out of the unit to permit easy cleaning. The drain pan is accessed by removing the drain pan cover plate on the rear of the unit. Once the plate is removed, the drain pan slides out through the rear of the unit.

All Sun™ Pro units have a second model nameplate located inside the control access door. This is to prevent deterioration of the nameplate through weathering.

- **Coil Technology** – All ZZ condensers utilize Micro-Channel “all-aluminum” condensers which provide improved heat transfer capabilities and reduced charge volumes. All evaporators utilize a conventional copper tube/aluminum fin design for proven reliability and performance.
- **Environmentally Aware** - For improved Indoor Air Quality, a combination of aluminum foil faced and elastomeric rubber insulations are used exclusively throughout the units.
- **Balanced Heating** - The Sun™ Pro two stage gas heating offers "Ultimate Heating Comfort" with a balance between 1st and 2nd stage gas heating to provide a well maintained desired temperature.

Unit Tonnage	1st. Stage	2nd. Stage
15 Ton	60% of Heating Capacity	100% of Heating Capacity

- **Convertible Airflow Design** – The side duct openings are covered when they leave the factory. If a side supply/return is desired, the installer simply removes the two side duct covers from the outside of the unit and installs them over the down shot openings. No panel cutting is required. Convertible airflow design allows maximum field flexibility and minimum inventory.

- **System Protection** - Suction line freezestats are supplied on all units to protect against loss of charge and coil frosting when the economizer operates at low outdoor air temperatures while the compressors are running. Every unit has solid-core liquid line filter-driers and high and low-pressure switches. Internal compressor protection is standard on all compressors. Phase Monitors are standard on units with Scroll compressors. This accessory monitors the incoming power to the unit and protects the unit from phase loss and reversed phase rotation.
- **Advanced Controls** - Smart Equipment™ control boards have standardized a number of features previously available only as options or by utilizing additional controls.

### CAUTION

The Smart Equipment™ control board used in this product will effectively operate the cooling system down to 0°F when this product is applied in a comfort cooling application for people. An economizer is typically included in this type of application. When applying this product for process cooling applications (computer rooms, switchgear, etc.), please call the applications department for Ducted Systems @ 1-877-874-SERV for guidance. Additional accessories may be needed for stable operation at temperatures below 30°F.



- **Units will come with the new state of the art Smart Equipment™ control system.** The new unit control incorporates the best of the already proven controls and creates a more robust, intelligent control. The goal of this control is to utilize cutting edge technology making the equipment easier to install, operate, and service. All units are Factory commissioned, configured, and run tested.
- **Versatile** - The Smart Equipment™ control can be configured to use with a standard thermostat (easy to connect screw terminals), A zone sensor, or can be setup



to communicate with multiple BAS communication protocols to integrate with building automation systems.

- **Reduce field installed complexity** - Each unit comes equipped with factory installed supply air, return air, and outdoor air temperature sensors providing key temperature readings thus reduce field installed complexity.
- **On-board USB Port** - The new control comes with a long list of features including data logging, current and previous system faults and software update capabilities using the on board USB port and common flash drive. Energy use monitoring capabilities allow custom tailoring to allow a system to work more efficiently at all times and occupancy levels. Self test and start-up reports also available from the board VIA the USB port.
- **Embedded LCD Display** - The board has a easy to read, built-in LCD display and easy to use navigation joystick and buttons allowing the user to quickly navigate the menus displaying unit status, options, current function, supply, return and outdoor temperatures, fault codes and other information.
- **Safety Monitoring** - The control monitors the outdoor, supply, and return air temperatures and the high and low pressure switch status on the independent refrigerant circuits. On units with heating the gas valve and high temperature limit switches are monitored on gas and electric heating units. The control also monitors the voltage supplied to the unit and will protect the unit if low voltage due to a brown out, or other electrical issue occurs.
- **Low Ambient** - An integrated low-ambient control allows units to operate in the cooling mode down to 0°F outdoor ambient without additional components or intervention. Optionally, the control board can be programmed to lockout the compressors when the outdoor air temperature is low or when free cooling is available.
- **Anti-Short Cycle Protection** - To aid compressor life, an anti-short cycle delay is incorporated into the standard control. Compressor reliability is further ensured by programmable minimum run times. For testing, the anti-short cycle delay can be temporarily overridden with the push of a button.
- **Fan Delays** - Fan on and fan off delays are fully programmable. Furthermore, the heating and cooling fan delay times are independent of one another. All units are programmed with default values based upon their configuration of cooling and/or heating capacity.
- **Nuisance Trip Protection and Three Strikes** - To prevent nuisance calls, the control board uses a three times, you're out philosophy. The high, low-pressure switch, anti-freeze protection, low voltage or heating high limit must trip three times within two hours before the unit control board will lock out the associated compressor. An alarm message will be displayed on the LCD screen.
- **Lead-Lag** - An integrated Lead-Lag option allows equal run time hours on all compressors, thereby extending the life of all compressors. This option is selectable on the unit control board.

- **Low Limit Control (LLC)** - To prevent the supply air from dropping below a specified set point, when there is a demand for cooling during cold outside conditions. (Programmable Set point)
- **Reliable** - From the beginning - All units undergo computer automated testing before they leave the factory. Units are tested for refrigerant charge and pressure, unit amperage, and 100% functionality. For the long term - All units are painted with a long lasting, powder paint that stands up over the life of the unit. The paint used has been proven by a 750-hour salt spray test.
- **Full Perimeter Base Rails** - The permanently attached base rails provide a solid foundation for the entire unit and protect the unit during shipment. The rails offer rigging holes so that an overhead crane can be used to place the units on a roof.
- **Easy Installation** - Gas and electric utility knockouts are supplied in the unit underside as well as the side of the unit. Utility connections can be made quickly and with a minimum amount of field labor. All units are shipped with 2" throw-away filters installed.
- **Wide Range of Indoor Airflows** - All supply air blowers are equipped with a belt drive that can be adjusted to meet the exact requirements of the job. A high static drive option is available for applications with a higher CFM and/or static pressure requirement.
- **Warranty** - All models include a 1-year limited warranty on the complete unit. Compressors and electric heater elements each carry a 5-year warranty. Aluminized steel (10 yr.) and stainless steel tubular heat exchangers carry a 15- year warranty.

## Factory Installed Options

YORK® offers several equipment options factory installed, for the Sun™ Pro line.

- **Optional Factory Installed Economizers** - Sun™ Pro units offer a variety of optional factory installed economizers with low leak dampers. The outdoor air dry bulb sensor enables economizer operation if the outdoor air temperature is less than the set point of the economizer logic module. See economizer options section to determine the correct economizer for your application.
- **Down flow / End Return Economizers (with barometric relief and fresh air hood)** - All units offer a variety of optional factory installed down flow economizers that are shipped, installed and wired with low leak dampers designed to meet ASHRAE 90.1, AMCA 511 Class 1A damper, and the International Energy Conservation Code (IECC) certification requirements by achieving leakage rates of 3 CFM/sq. ft. at 1" of static pressure. Each economizer goes through a rigorous 60,000 cycle test. Dry bulb, single enthalpy, and dual enthalpy (with field installed kit) can be selected. The economizer has spring return, fully modulating damper actuators and is capable of introducing up to 100% outdoor air. As the outdoor air intake dampers open, the return air dampers close. The changeover from mechanical refrigeration to economizer operation is regulated by the outdoor air dry

bulb temperature or the outdoor air enthalpy input. The optional (field installed) single or dual enthalpy kits provide additional inputs to monitor outdoor air/ or return air humidity and temperature for true enthalpy control. The installer needs only to assemble the outdoor air hood, attach the enthalpy control the hood and mount the hood to the unit (Hood and control are provided).

- **Power Exhaust** - This factory option allows down flow or horizontal end return economizer operation. **The power exhaust must be removed from the unit and mounted in the horizontal end return duct work when applying the product in the horizontal, end return configuration.**
- **Motorized Outdoor Air Damper** - The motorized outdoor air damper includes a slide-in/plug-in damper assembly with an outdoor air hood and filters. The outdoor air dampers open to the preset position when the indoor fan motor is energized. The damper has a range of 0% to 100% outdoor air entry.
- **Alternate Indoor Blower Motor** - For applications with high static restrictions, units are offered with optional indoor motors that provide higher static output and/or higher airflow, depending upon the installer's needs.
- **Aluminized Steel Gas Heat Exchanger** - For applications in non-corrosive environments.
- **Stainless Steel Gas Heat Exchanger** - For applications in corrosive environments, this option provides a full stainless steel heat exchanger assembly.
- **Stainless Steel Drain Pan** - An optional rust-proof stainless steel drain pan is available to provide years of trouble-free operation in corrosive environments.
- **Electric Heaters** - The electric heaters range from 3kW to 54kW and are available in all the voltage options of the base units. All heaters are intended for single point power supply.
- **Disconnect Switch** - For gas heat units and cooling units with electric heat, a HACR breaker sized to the unit is provided. For cooling only units, a switch sized to the largest electric heat available for the particular unit is provided. Factory installed option only.
- **Convenience Outlet - (Non-Powered/Powered)** - This option locates a 120V single-phase GFCI outlet with cover, on the corner of the unit housing adjacent to the compressors. The "Non-powered" option requires the installer to provide the 120V single-phase power source and wiring. The "Powered" option is powered by a stepdown transformer in the unit. Factory installed option only.
- **Smoke Detectors** - The smoke detectors stop operation of the unit and provide a fault message to the control board. Smoke detectors are available for both the supply and/or return air configurations.
- **Filters** - 2" Pleated MERV 8 or 4" Pleated MERV 13 are available to meet LEED requirements. A 2" Throwaway is shipped as standard.

## ⚠ WARNING

Factory-installed smoke detectors may be subjected to extreme temperatures during "off" times due to outside air infiltration. These smoke detectors have an operational limit of -4°F to 158°F. Smoke detectors installed in areas that could be outside this range will have to be relocated to prevent false alarms.

- **Phase Monitors** - Designed to prevent unit damage. The phase monitor will shut the unit down in an out-of phase condition. **(Standard on units with Scroll Compressors.)**
- **Coil Guard** - Customers can purchase a coil guard kit to protect the condenser coil from damage. Additionally, this kit stops animals and foreign objects from entering the space between the inner condenser coil and the main cabinet. This is not a hail guard kit.
- **Dirty Filter Switch** - This kit includes a differential pressure switch that energizes the fault light on the unit thermostat, indicating that there is an abnormally high pressure drop across the filters. Factory installed option or field installed accessory.
- **E-Coat Condenser Coils** - The condenser coils are coated with an epoxy polymer coating to protect against corrosion.
- **E-Coat Evaporator Coils** - The evaporator coils are coated with an epoxy polymer coating to protect against corrosion.

## Control Options

- **Smart Equipment™ with Communication Option Control** - The York® Smart Equipment™ with Communication Option Control is factory installed. It includes all the features of the Smart Equipment™ control with an additional gateway to BACnet MS/TP (programmable to Modbus or N2 protocols).
- **FDD (Fault Detection and Diagnostics) - Refrigerant side** A factory installed control system option on the commercial equipment that constantly monitors refrigerant circuit pressures, refrigerant circuit temperatures, as well as the environmental temperatures and humidity via multiple sensor inputs.
  - Provides a building owner, technician or contractor with the operational characteristics of the RTUs entire refrigerant circuit to ensure the unit is functioning at its specified performance level.
  - Provides alarms if the unit is not functioning optimally.
  - Remotely accessible via the Mobile Access Portal (MAP) gateway as well as scrolled on the UCB LCD screen.
- **Novar® BAS Control** - The Novar® building automation system controller is factory installed. Includes supply air sensor, return air sensor, dirty filter indicator switch, and air proving switch.
- **CPC BAS Control** - The Computer Process Controls Model 810-3060 ARTC Advanced Rooftop building

automation system controller is factory installed. Includes supply air sensor, return air sensor, with optional dirty filter indicator switch and air proving switch.

- **Honeywell BAS Control** - The Honeywell W7750C building automation system controller is factory installed. Includes air supply sensor, return air sensor, with optional dirty filter indicator switch, and air proving switch.
- **Verasys** - Verasys provides a simple user experience with configurable self-recognizing controllers without the need for any additional tools. Verasys creates enhanced integration of HVACR equipment, zoning, and controls. Contractors are able to offer a complete bundled solution of equipment and controls to serve the light commercial market.

## Field Installed Accessories

YORK® offers several equipment accessories for field installation, for the Sun™ Pro line.

- **Down flow and End Return Economizers (with fresh air hood and barometric relief)** - All units offer a variety of optional factory installed down flow economizers that are shipped, installed and wired with low leak dampers designed to meet ASHRAE 90.1, AMCA 511 Class 1A damper, and the International Energy Conservation Code (IECC) certification requirements by achieving leakage rates of 3 CFM/sq. ft. at 1" of static pressure. Each economizer goes through a rigorous 60,000 cycle test. Dry bulb, single enthalpy, and dual enthalpy (with field installed kit) can be selected. The economizer has spring return, fully modulating damper actuators and is capable of introducing up to 100% outdoor air. As the outdoor air intake dampers open, the return air dampers close. The changeover from mechanical refrigeration to economizer operation is regulated by the outdoor air dry bulb temperature or the outdoor air enthalpy input. The dual enthalpy kit provides a second input used to monitor the return air (field installed). The installer needs only to assemble the outdoor air hood, attach the enthalpy control the hood and mount the hood to the unit (Hood and control are provided).
- **Single or Dual Enthalpy Control, Accessories** - These kits contain the required components to convert a dry bulb economizer to a single enthalpy and/or dual enthalpy economizer.
- **Barometric Relief Damper** - Zero to 100% capacity barometric relief dampers for use with horizontal flow, or field installed economizers.
- **Power Exhaust** - This accessory installs in the unit with a down flow or horizontal end return economizer. Power exhaust plugs into the connector in the unit bulkhead. **User must purchase the 1EH0408 barometric relief and hood kit when applying the product in a horizontal flow application. The power exhaust must be mounted in the horizontal end return ductwork.**
- **Manual Outdoor Air Damper** - Like the motorized outdoor air damper, each manual outdoor air damper includes a slide-in damper assembly with an outdoor air hood and filters. Customers have a choice of dampers with ranges of 0% to 100% or 0% to 35% outdoor air entry.
- **Motorized Outdoor Air Damper** - The motorized outdoor air damper includes a slide-in/plug-in damper assembly with an outdoor air hood and filters. The outdoor air dampers open to the preset position when the indoor fan motor is energized. The damper has a range of 0% to 100% outdoor air entry. Factory installed option or field installed accessory.
- **Smoke Detectors** - The smoke detectors stop operation of the unit by interrupting power to the control board if smoke is detected within the air compartment.
- **CO<sub>2</sub> Sensor** - Senses CO<sub>2</sub> levels and automatically overrides the economizer when levels rise above the preset limits.
- **Dirty Filter Switch** - This kit includes a differential pressure switch that energizes the fault light on the unit thermostat, indicating that there is an abnormally high pressure drop across the filters.
- **Coil Guard** - Field installed decorative wire coil guard.
- **Hail Guard** - This kit includes a sloped hood which installs over the outside condenser coil and prevents damage to the coil fins from hail strikes. Field installed accessory only.
- **Flue Exhaust Extension Kit** - In locations with wind or weather conditions which may interfere with proper exhausting of furnace combustion products, this kit can be installed to prevent the flue exhaust from entering nearby fresh air intakes.
- **Gas Heat High Altitude Kit** - This kit converts a gas heat unit to operate at high altitudes, 2,000 to 6,000 feet. Conversion kits are available for natural gas and propane.
- **Gas Heat Propane Conversion Kit** - This kit converts a gas-fired heater from natural gas to propane. It contains the main burner orifices and gas valve replacement springs.
- **Gas Piping Kit** - Contains pipe nipples, fittings and gas cock required for gas supply connection with external shut off.
- **Electric Heaters** - The electric heaters range from 3kW to 54kW and are available in all the voltage options of the base units. The 54kW/208-240 volt, field-installed heater kit is not available with VAV units due to a lack of space to accommodate the heater's fuse block accessory. All heaters are dual staged. Cooling units include an adapter panel for easy installation of the electric heaters. Necessary hardware and connectors are included with the heaters. All heaters are intended for single point power supply.
- **Metal Frame Filter Kit** - Metal frame with polyester filter medium.
- **Permanent Filters** - Permanent filters are available.
- **Roof Curbs** - The roof curbs have insulated decks and are shipped disassembled. The roof curbs are available in 8" and 14" heights. For applications with security concerns, burglar bars are available for the duct openings of the roof curbs.
- **Roof Curb Transition** - Single Piece Adapter (10" High) - Roof curbs for transitioning from Sunline™ units to Sun™ Pro units. Fits 7.5 to 12.5 Sunline™ roof curbs only.
- **Burglar Bars** - Mount in the supply and return openings to prevent entry into the duct work.
- **Thermostat** - The units are designed to operate with 24-volt electronic and electro-mechanical thermostats.



## Field Installed Accessories

MODEL	VOLTAGE	DESCRIPTION	WHERE USED
Non-Electrical			
1BD0408	All	Burglar Bars, Downflow	All Cabinets
1CG0419	All	Coil Guard	(Electric / Electric Models), 50" Tall Standard Cabinets
1CG0420	All	Coil Guard	(Gas / Electric Models), 50" Tall Standard Cabinets
1HG0411	All	Hail Guard Kit	All Tall (50") Standard Cabinets
1HG0425	All	Hail Guard Kit	Diamond Pattern "W" Style Cabinet: ZZ15
1HG0432	All	Hail Guard Kit	Provent Style 50" Std Tall Cabinets
1FE0412	All	Flue Exhaust Extension Kit	All Cabinets
1FF0414	All	2" only Metal Filter Frame Kit	All Tall 50" Cabinets
1FL0402	All	Permanent 2" only Filter Kit Includes (4) Four Filters)	All Tall 50" Cabinets
1GP0405	All	Gas Piping Kit	All Cabinets
1HA0442	All	High Altitude Kit for Natural Gas	All 15T Cabinets
1HA0443	All	High Altitude Kit for Propane	All 15T Cabinets
1NP0442	All	Propane Conversion Kit	All 15T Cabinets
1RC0470	All	Roof Curb, 8" Height	All Cabinets
1RC0471	All	Roof Curb, 14" Height	All Cabinets
1RC0472	All	Roof Curb, Transition (7.5 T thru 12.5T Sunline to Sun™ Pro 15T)	All Cabinets
Electric Heat			
2TP04531825	230	18kW Electric Heat	All 50" Cabinet 15 Ton Models
2TP04531846	460		
2TP04532425	230	24kW Electric Heat	All 50" Cabinet 15 Ton Models
2TP04532446	460		
2TP04533625	230	36kW Electric Heat	All 50" Cabinet 15 Ton Models
2TP04533646	460		
2TP04525425	230	54kW Electric Heat	All 50" 15 Ton Models
2TP04525446	460		
Fresh Air			
1FA0413	All	Manual Outside Air Damper 0-35%, Downflow	All Cabinets
1FA0414	All	Manual Outside Air Damper 0-100%, Downflow	All Cabinets
1EH0408	All	Barometric Relief Kit for Power Exhaust, Horizontal Application	All Cabinets
2EC0401	All	Single Enthalpy Control	All Cabinets
2EC0402	All	Dual Enthalpy Control (Includes 2 Sensors)	All Cabinets
2EE04717424	All	Economizer for Downflow, End Return Horizontal, or ERV Applications. Includes FA Hood, Exhaust Hood w/Baro Relief	All 50" Cabinets
2EE04706924	All	Horizontal Economizer without Barometric Relief	All Cabinets
2MD04703824	All	Motorized Damper, Downflow without Barometric Relief	All Cabinets
2MD04703924	All	Motorized Damper, Horizontal without Barometric Relief	All Cabinets
2PE04704706	230	Power Exhaust 230V Downflow or Horizontal	All Cabinets
2PE04704746	460	Power Exhaust 460V Downflow or Horizontal	All Cabinets
Controls			
2AP0401	All	Air Proving Switch	All Units
2AQ04700524	All	CO² Space Accessory	All Units
2AQ04700624	All	CO² Unit Accessory	All Units
2DF0402	All	Dirty Air Switch	All Units
2SD04700824	All	Smoke Detector for Supply	All Gen 5 units and greater with 2" & 4" Filters
2SD04700924	All	Smoke Detector for Return	All Gen 5 units and greater with 2" & 4" Filters
2SD04701024	All	Smoke Detector for Supply and Return	All Gen 5 units and greater with 2" & 4" Filters
S1-YK-MAP1810-0P	All	MAP (Mobile Access Portal) Gateway- For use with Smart Equipment™ Control.	All Units
S1-MP-PRTKIT-0P	All	MAP (Mobile Access Portal) Gateway Kit- Replacement MAP gateway protective case, lanyard and communication cable. Use only to replace worn or damaged components.	All Units
Electrical			
2LA04702424	All	Low Ambient Kit	All 15T cabinets

## Guide Specifications

### GENERAL

YORK® Sun™ Pro units are convertible single packages with a common footprint cabinet and common roof curb models. The 15 ton units have two compressors with independent R-410A refrigeration circuits to provide 2 stages of cooling. The units were designed for light commercial applications and can be easily installed on a roof curb, slab, or frame. All Sun™ Pro units are self-contained and assembled on rigid full perimeter base rails allowing for 3-way forklift access and overhead rigging. Every unit is completely charged with R-410A, wired, piped, and tested at the factory to provide a quick and easy field installation. All units are convertible between side and down airflow. Independent economizer designs are used on side and down discharge applications, as well as all tonnage sizes. Sun™ Pro units are available in the following configurations: cooling only, cooling with electric heat, cooling with gas heat. Electric heaters are available as factory-installed options or field-installed accessories.

### DESCRIPTION

Units shall be factory assembled, single package, (Elec/Elec, Gas/Elec), designed for outdoor installation. They shall have built in field convertible duct connections for down discharge supply/return or horizontal discharge supply/return and be available with factory installed options or field installed accessories. The units shall be factory wired, piped and charged with R-410A refrigerant and factory tested prior to shipment. All unit wiring shall be both numbered and color coded. The cooling performance shall be rated in accordance with DOE and AHRI test procedures.

### UNIT CABINET

Unit cabinet shall be constructed of galvanized steel with exterior surfaces coated with a non-chalking, powder paint finish, certified at a 750-hour salt spray test per ASTM-B117 standards. Indoor blower sections shall be insulated with up to 1" thick insulation coated on the airside. Either aluminum foil faced or elastometric rubber insulation shall be used in the unit's compartments and be fastened to prevent insulation from entering the air stream. Cabinet doors shall be hinged with toolless access for easy servicing and maintenance. Full perimeter base rails shall be provided to assure reliable transit of equipment, overhead rigging, fork truck access and proper sealing on roof curb applications. Disposable 2" filters shall be furnished as standard and be accessible through hinged access door. Fan performance measuring ports shall be provided on the outside of the cabinet to allow accurate air measurements of evaporator fan performance without removing panels or creating bypass of the coils. Condensate pan shall be slide out design, constructed of a non corrosive material, internally sloped and conforming to ASHRAE 62-B9 standards. Condensate connection shall be a minimum of ¾" I.D. female and be rigid mount connection.

### INDOOR (EVAPORATOR) FAN ASSEMBLY

Fan shall be a belt drive assembly and include an adjustable pitch motor pulley. Job site selected brake horsepower shall not exceed the motors nameplate horsepower rating plus the service factor. Units shall be designed to operate within the service factor. Fan wheel shall be double inlet type with forward curve blades, dynamically balanced to operate smoothly throughout the entire range of operation. Airflow design shall be constant volume. Bearings shall be sealed and permanently lubricated for longer life and no maintenance. Entire blower assembly and motor shall be slide out design.

### OUTDOOR (CONDENSER) FAN ASSEMBLY

The outdoor fans shall be of the direct drive type, discharge air vertically, have aluminum blades riveted to corrosion resistant steel spider brackets and shall be dynamically balanced for smooth operation. The outdoor fan motors shall have permanently lubricated bearings internally protected against overload conditions and staged independently. A cleaning window shall be provided on two sides of the units for coil cleaning.

### REFRIGERANT COMPONENTS

#### Compressors:

- a. Shall be fully hermetic type, direct drive, internally protected with internal high-pressure relief and over temperature protection. The hermetic motor shall be suction gas cooled and have a voltage range of + or – 10% of the unit nameplate voltage.
- b. Shall have internal spring isolation and sound muffling to minimize vibration and noise, and be externally isolated on a dedicated, independent mounting.

#### Coils:

- a. Evaporator coils shall have aluminum plate fins mechanically bonded to seamless internally enhanced copper tubes with all joints brazed. Special Phenolic coating shall be available as a factory option.
- b. Evaporator coils shall be of the direct expansion, draw-thru design.
- c. Condenser coils shall have Micro-Channel aluminum tube, aluminum fins.
- d. Condenser coils shall be of the draw-thru design.

Refrigerant Circuit and Refrigerant Safety Components shall include:

- a. Independent fixed-orifice or thermally operated expansion devices.
- b. Solid core filter drier/strainer to eliminate any moisture or foreign matter.
- c. Accessible service gage connections on both suction and discharge lines to charge, evacuate, and measure refrigerant pressure during any necessary servicing or troubleshooting, without losing charge.

- d. The 15 ton unit shall have two independent refrigerant circuits, equally split in 50% capacity increments.

#### Unit Controls:

- a. Unit shall be complete with self-contained low-voltage control circuit protected by a resettable circuit breaker on the 24-volt transformer side.
- b. Unit shall incorporate a lockout circuit which provides reset capability at the space thermostat or base unit, should any of the following standard safety devices trip and shut off compressor.
  1. Loss-of-charge/Low-pressure switch.
  2. High-pressure switch.
  3. Freeze condition sensor on evaporator coil. If any of these safety devices trip, the LCD screen will display the alarm message.
- c. Unit shall incorporate "AUTO RESET" compressor over temperature, over current protection.
- d. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up.
- e. Unit control board shall have on-board diagnostics and fault message display.
- f. Standard controls shall include anti-short cycle and low voltage protection, and permit cooling operation down to a selectable value as low as 0 °F.
- g. Control board shall monitor each refrigerant safety switch independently.

#### **GAS HEATING SECTION (IF EQUIPPED)**

Heat exchanger and exhaust system shall be constructed of aluminized steel, and be designed with induced draft combustion with post purge logic, energy saving direct spark ignition, and redundant main gas valve. The heat exchanger shall be of the tubular type, constructed of T1-40 aluminized steel for corrosion resistance and allowing minimum mixed air entering temperature of 40 °F. Burners shall be of the in-shot type, constructed of aluminum-coated steel. All gas piping shall enter the unit cabinet at a single location, through either the side or bottom, without any field modifications. An integrated control board shall provide timed control of evaporator fan functioning and burner ignition. Heating section shall be provided with the following minimum protection:

- a. Primary and auxiliary high-temperature limit switches.
- b. Induced draft pressure sensor.
- c. Flame roll out switch (manual reset).
- d. Flame proving controls.
- e. All two stage gas units shall have two independent stages of capacity as shown on Page 5.

#### **ELECTRIC HEATING SECTION (IF EQUIPPED)**

An electric heating section, with nickel chromium elements, shall be provided in a range of 3 thru 54KW. The heating section shall have a primary limit control(s) (automatic reset) to

prevent the heating element system from operating at an excessive temperature. The Heating Section assembly shall slide out of the unit for easy maintenance and service. Units with Electric Heating Sections shall be wired for a single point power supply with branch circuit fusing (where required).

#### **UNIT OPERATING CHARACTERISTICS**

Unit shall be capable of starting and running at 125 °F outdoor temperature, exceeding maximum load criteria of AHRI Standard 340/360. The compressor, with standard controls, shall be capable of operation down to 0 °F outdoor temperature. Unit shall be provided with fan time delay to prevent cold air delivery before heat exchanger warms up. (Gas heat only)

**ELECTRICAL REQUIREMENTS** - All unit power wiring shall enter unit cabinet at a single factory provided location and be capable of side or bottom entry to minimize roof penetrations and avoid unit field modifications. Separate side and bottom openings shall be provided for the control wiring.

**STANDARD LIMITED WARRANTIES** - Compressor – 5 Years, Heat Exchanger – 10 Years, Elect. Heat Elem. – 5 Years, Parts – 1 Year

**OPTIONAL OUTDOOR AIR** (Shall be made available by either/or):

- **DRY BULB AUTOMATIC ECONOMIZER** - Outdoor and return air dampers that are interlocked and positioned by a fully-modulating, spring-return damper actuator. The maximum leakage rate for the outdoor air intake dampers shall be designed to meet ASHRAE 90.1, AMCA 511 Class 1A damper, and the International Energy Conservation Code (IECC) certification requirements by achieving leakage rates of 3 CFM/sq. ft. at 1" of static pressure. Changeover from compressor to economizer operation shall be provided by an integral electronic enthalpy control that feeds input into the basic module. The outdoor intake opening shall be covered with a rain hood that matches the exterior of the unit. Water eliminator/filters shall be provided. Simultaneous economizer/compressor operation is also possible. Dampers shall fully close on power loss. Available with barometric relief and power exhaust.
- **MOTORIZED OUTDOOR AIR DAMPERS** - Outdoor and return air dampers that are interlocked and positioned by a 2- position, spring-return damper actuator. A unit-mounted potentiometer shall be provided to adjust the outdoor and return air damper assembly to take in the design CFM of outdoor air to meet the ventilation requirements of the conditioned space during normal operation. Whenever the indoor fan motor is energized, the dampers open up to one of two pre-selected positions - regardless of the outdoor air enthalpy. Dampers return to the fully closed position when the indoor fan motor is de-energized. Dampers shall fully close on power loss.

#### **ADDITIONAL FACTORY INSTALLED OPTIONS**

- **ALTERNATE INDOOR BLOWER MOTOR** – For applications with high restrictions, units are available with

optional indoor blower motors that provide higher static output and/or higher airflow.

- **CONVENIENCE OUTLET (POWERED/NON-POWERED)**– Unit can be provided with an optional 120VAC GFCI outlet with cover on the corner of the unit housing the compressors.
- **ELECTRIC HEAT** - Electric Heaters range from 3kW to 54kW and are available in all the voltage options of the base unit.
- **PHASE MONITOR** - Designed to prevent damage in out-of-phase condition.
- **COIL GUARD** - Designed to prevent condenser coil damage.
- **BAS CONTROLS HARDWARE** - Include supply air sensor, return air sensor, dirty filter indicator and air proving switch.
- **DIRTY FILTER SWITCH** – This kit includes a differential pressure switch that energizes the fault light on the unit thermostat, indicating that there is an abnormally high-pressure drop across the filters.
- **BREAKER** – An HACR breaker can be factory installed on gas heat units or cooling units with electric heat.
- **DISCONNECT SWITCH** - A disconnect can be factory installed on a cooling only units sized for the largest electric heat available.

- **STAINLESS STEEL HEAT EXCHANGER** – For applications in a corrosive environment, this option provides a full stainless steel heat exchanger assembly.
- **SMOKE DETECTOR** – A smoke detector can be factory mounted and wired in the supply and/or return air compartments.

#### OTHER PRE-ENGINEERED ACCESSORIES AVAILABLE

- **ROOF CURB** - 14" and 8" high, full perimeter knockdown curb, with hinged design for quick assembly.
- **BAROMETRIC RELIEF DAMPER** – (Unit mounted – Downflow, Duct Mounted – Horizontal) – Contains a rain hood, air inlet screen, exhaust damper and mounting hardware. Used to relieve internal air pressure through the unit during economizer operation.
- **PROPANE CONVERSION KIT** – Contains new orifices and gas valve springs to convert from natural to L.P. gas.
- **ECONOMIZER** (Downflow and Horizontal flow)
- **POWER EXHAUST** – (Unit mount – Downflow, Duct mount – Horizontal flow)
- **DUAL ENTHALPY KIT** - Provides a second input to economizer to monitor return air.

## Physical Data

### ZZ15 Physical Data

Component		Models	
		ZZ15	
Nominal Tonnage		15	
AHRI COOLING PERFORMANCE	Gross Capacity @ AHRI A Point (BTU)	187072	
	AHRI net Capacity (Btu)	179614	
	EER <sup>1</sup>	11.5	
	Nominal CFM	4500	
	System Power (KW)	16.34	
	Refrigerant type	R-410A	
	Refrigerant charge (lb-oz)		
	System 1	8-12	
	System 2	7-14	
AHRI HEATING PERFORMANCE	Heating Option	N18	N24
	Heating model	180	240
	1st. Stage Heat input (K Btu)	144	192
	AFUE %	-	-
	Steady State Efficiency (%)	80	80
	No. burners	6	8
	No. stages <sup>2</sup>	2	2
	Temperature Rise Range ( °F)	10-40	25-55
	Gas Limit Setting ( °F)	195	160
	Gas piping connection (in.)	3/4	3/4
Dimensions (inches)	Length	119-1/2	
	Width	59	
	Height	50-3/4	
OPERATING WT. (lbs.)		1360	
COMPRESSORS <sup>3</sup>	Type	Scroll	
	Quantity	2	
	Unit Capacity Step (%)	50/100	
CONDENSER COIL DATA	Face area (Sq. Ft.)	47.5	
	Rows	1	
	Fins per inch	23	
	Tube diameter (in./MM)	.71/18	
	Circuit Type	2-pass Microchannel	
EVAPORATOR COIL DATA	Face area (Sq. Ft.)	13.2	
	Rows	4	
	Fins per inch	15	
	Tube diameter	0.375	
	Circuit Type	Intertwined	
	Refrigerant control	TXV	



**ZZ15 Physical Data (Continued)**

Component		Models	
		<b>ZZ15</b>	
<b>Nominal Tonnage</b>		15	
<b>CONDENSER FAN DATA</b>	Quantity of fans	4	
	fan diameter (Inch)	24	
	Type	Prop	
	Drive type	Direct	
	Quantity of motors	4	
	Motor HP each	1/3	
	No. speeds	1	
	RPM	850	
	Nominal total CFM	14000	
<b>EVAPORATOR FAN DATA</b>	Quantity	1	
	Fan size (inch)	15 x 15	
	Type	Centrifugal	
	Motor Sheave	1VM50	1VP56
	Blower Sheave	AK74	BK77
	Belt	A54	BX55
	Motor HP each	3	5
	RPM	1725	1725
	Frame size	56	184T
<b>FILTERS</b>	Quantity-Size	4 - (24 x 20 x 2) <sup>4,5</sup>	
		4 - (24 x 20 x 4) <sup>6</sup>	

1. Cooling Only Unit or Cooling Unit with Electric Heat
2. 1<sup>st</sup> Stage 60% of Full Capacity.
3. ZZ unit has crankcase heaters standard.
4. 2 In. Throwaway, Standard, MERV (Minimum Efficiency Reporting Value) 3.
5. 2 In. Pleated, Optional, MERV 8.
6. 4 In. Pleated, Optional, MERV 13.

**ZZ15 Unit Limitations**

Size (Tons)	Model	Unit Voltage	Unit Limitations		
			Applied Voltage		Outdoor DB Temp
			Min	Max	Max (°F)
15	ZZ	208/230-3-60	187	252	125
(15)		460-3-60	432	504	125

## Capacity Performance

### ZZ15 Cooling Capacities

#### ZZ15 (15 Ton)

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
CFM	WB (°F)	Total Capacity <sup>1</sup> (MBh)	Total Input (kW) <sup>2</sup>	Sensible Capacity (MBh)						Total Capacity <sup>1</sup> (MBh)	Total Input (kW) <sup>2</sup>	Sensible Capacity (MBh)					
				Return Dry Bulb (°F)								Return Dry Bulb (°F)					
				90	85	80	75	70	65			90	85	80	75	70	65
		75°F								85°F							
4500	77	241.8	12.2	127.7	112.5	97.2	-	-	-	228.6	13.6	122.6	107.0	91.4	-	-	-
	72	223.9	11.9	147.3	131.0	114.8	98.5	-	-	212.8	13.3	142.6	126.1	109.6	93.0	-	-
	67	206.1	11.6	166.8	149.6	132.4	115.2	82.7	-	197.0	12.9	162.6	145.2	127.7	110.2	78.9	-
	62	192.2	11.3	176.4	175.8	156.2	136.5	108.2	97.2	183.5	12.6	168.6	167.7	148.0	128.3	102.6	88.9
	57	178.3	10.9	178.3	178.3	178.3	157.8	133.7	99.8	170.0	12.2	170.0	170.0	167.5	146.4	126.3	91.2
5250	77	246.3	12.4	133.9	117.7	101.6	-	-	-	234.5	13.8	133.1	116.4	99.4	-	-	-
	72	229.8	12.0	156.4	139.0	121.6	104.2	-	-	218.6	13.4	150.9	134.7	116.8	99.0	-	-
	67	213.4	11.6	178.9	160.3	141.7	123.0	83.9	-	202.7	13.0	168.7	152.9	134.2	115.2	78.9	-
	62	201.1	11.4	186.8	186.3	165.0	143.7	114.9	101.1	189.0	12.7	173.7	171.9	150.3	130.8	109.1	85.7
	57	188.8	11.2	188.8	188.8	187.5	164.3	145.9	103.6	175.3	12.5	175.3	174.9	166.1	146.4	131.5	88.7
6000	77	250.8	12.6	140.1	123.0	106.0	-	-	-	240.4	13.9	143.6	125.8	107.4	-	-	-
	72	235.7	12.2	165.5	147.0	128.5	109.9	-	-	224.4	13.5	159.2	143.3	124.1	104.9	-	-
	67	220.7	11.7	191.0	170.9	150.9	130.9	85.1	-	208.3	13.0	174.8	160.7	140.8	120.2	78.8	-
	62	210.0	11.6	197.2	196.8	173.8	150.9	121.5	104.9	194.5	12.9	178.7	176.1	152.7	133.3	115.7	82.6
	57	199.3	11.4	199.3	199.3	196.8	170.8	158.0	107.4	180.7	12.7	180.6	179.7	164.6	146.5	136.7	86.3
		95°F								105°F							
4500	77	215.5	15.0	117.5	101.6	85.7	-	-	-	203.4	16.9	112.8	96.7	80.6	-	-	-
	72	201.7	14.6	138.0	121.2	104.3	87.5	-	-	189.1	16.6	132.7	115.8	99.0	82.2	-	-
	67	187.9	14.3	158.5	140.8	123.0	105.2	75.1	-	174.8	16.3	152.5	135.0	117.4	99.9	68.4	-
	62	174.8	13.9	160.8	159.6	139.8	120.1	96.9	80.5	165.5	15.8	155.3	154.2	135.4	116.7	91.3	79.1
	57	161.7	13.6	161.7	161.7	156.7	134.9	118.8	82.7	156.2	15.4	156.2	156.2	152.9	133.4	114.2	81.1
5250	77	222.7	15.1	132.4	115.1	97.2	-	-	-	209.9	17.0	125.3	111.3	91.3	-	-	-
	72	207.3	14.7	145.5	130.3	112.0	93.7	-	-	194.4	16.6	137.9	124.9	106.1	87.4	-	-
	67	191.9	14.3	158.6	145.6	126.8	107.3	73.9	-	178.9	16.3	150.6	138.5	121.0	101.7	67.5	-
	62	176.9	14.0	160.5	157.5	135.7	117.9	103.4	70.4	165.9	16.0	152.8	150.5	130.7	112.7	92.4	65.9
	57	161.9	13.8	161.9	161.0	144.6	128.6	117.1	73.9	154.8	15.7	154.3	153.8	140.2	123.8	106.4	69.2
6000	77	230.0	15.3	147.2	128.6	108.8	-	-	-	216.4	17.1	137.8	125.9	102.1	-	-	-
	72	213.0	14.8	152.9	139.5	119.7	99.8	-	-	199.7	16.7	143.2	134.0	113.3	92.6	-	-
	67	196.0	14.3	158.6	150.4	130.6	109.4	72.6	-	183.0	16.3	148.6	142.1	124.5	103.4	66.6	-
	62	179.0	14.2	160.2	155.3	131.5	115.8	109.8	60.2	166.2	16.1	150.4	146.8	126.1	108.8	93.4	52.7
	57	162.0	14.0	162.0	160.2	132.5	122.2	115.4	65.1	153.3	15.9	152.3	151.4	127.6	114.1	98.5	57.4
		115°F								125°F							
4500	77	191.4	18.8	108.1	91.8	75.5	-	-	-	179.3	20.7	103.3	86.8	70.3	-	-	-
	72	176.6	18.6	127.3	110.5	93.7	76.9	-	-	164.0	20.5	121.9	105.1	88.3	71.6	-	-
	67	161.8	18.3	146.5	129.2	111.9	94.6	61.7	-	148.7	20.4	140.5	123.4	106.3	89.2	54.9	-
	62	156.2	17.8	149.7	148.8	131.0	113.2	85.7	77.7	147.0	19.7	144.2	143.4	126.6	109.8	80.1	76.2
	57	150.7	17.2	150.7	150.7	149.0	131.9	109.7	79.6	145.2	19.0	145.2	145.2	145.2	130.4	105.2	78.0
5250	77	197.1	18.8	118.8	107.4	85.4	-	-	-	184.3	20.7	112.0	103.5	79.5	-	-	-
	72	181.5	18.6	130.4	119.5	100.3	81.1	-	-	168.5	20.5	122.9	114.0	94.4	74.8	-	-
	67	165.8	18.3	142.6	131.5	115.1	96.0	61.2	-	152.8	20.3	134.6	124.5	109.3	90.3	54.8	-
	62	154.8	17.9	145.2	143.5	125.8	107.5	81.4	61.4	143.8	19.9	137.5	136.6	120.9	102.3	70.3	56.9
	57	147.6	17.5	146.7	146.7	135.9	119.0	95.7	64.6	140.5	19.4	139.1	139.5	131.5	114.2	85.0	59.9
6000	77	202.8	18.9	129.5	122.9	95.4	-	-	-	189.3	20.6	120.6	120.1	88.7	-	-	-
	72	186.4	18.6	133.5	128.4	106.9	85.4	-	-	173.0	20.5	123.8	122.9	100.5	78.1	-	-
	67	169.9	18.3	138.6	133.8	118.4	97.4	60.7	-	156.8	20.3	128.6	125.5	112.3	91.4	54.7	-
	62	153.4	18.1	140.6	138.2	120.6	101.7	77.0	45.1	140.6	20.0	130.8	129.7	115.1	94.7	60.6	37.6
	57	144.5	17.8	142.7	142.7	122.8	106.0	81.7	49.6	135.8	19.7	133.0	133.9	117.9	98.0	64.8	41.8

1. These capacities are gross ratings. For net capacity, deduct air blower motor, MBh = 3.415 x kW. Refer to the appropriate Blower Performance Table for the kW of the supply air blower motor.
2. These ratings include the condenser fan motors (total 1 kW) and the compressor motors but not the supply air blower motor.

**Drive Selection**

1. Determine side or bottom supply duct Application.
2. Determine desired airflow.
3. Calculate or measure the amount of external static pressure.
  - Add or deduct any additional static resistance from "Additional Static Resistance Table".
4. Using the operating point determined from steps 1, 2 & 3, locate this point on the appropriate supply air blower performance table. (Linear interpolation may be necessary.)
5. Noting the RPM and BHP from step 4, locate the appropriate motor and, or drive on the RPM selection table.
6. Review the BHP compared to the motor options available. Select the appropriate motor and, or drive.
7. Review the RPM range for the motor options available. Select the appropriate drive if multiple drives are available for the chosen motor.
8. Determine turns open to obtain the desired operation point.

**Example**

1. 2600 CFM
2. 1.6 iwg
3. Using the supply air blower performance table below, the following data point was located: 1268 RPM & 1.95 BHP.
4. Using the RPM selection table below, Size X and Model Y is found.
5. 1.95 BHP exceeds the maximum continuous BHP rating of the 1.5 HP motor. The 2 HP motor is required.
6. 1268 RPM is within the range of the 2 HP drives.
7. Using the 2 HP motor and drive, .5 turns open will achieve 1268 RPM.

**Airflow Performance****Example Supply Air Blower Performance**

Air Flow (CFM)	Available External Static Pressure - IWG																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
			1.5 HP & Field Supplied Drive						Standard 1.5 HP & Drive						Alternate 2 HP & Drive					
2200	804	0.50	866	0.71	925	0.90	982	1.06	1038	1.21	1092	1.35	1147	1.48	1203	1.61	1259	1.73	1317	1.87
2400	835	0.66	897	0.87	956	1.06	1013	1.22	1069	1.37	1124	1.51	1178	1.64	1234	1.77	1290	1.90	1348	2.03
2600	869	0.84	931	1.05	990	1.24	1047	1.40	1103	1.55	1158	1.69	1212	1.82	1268	1.95	1324	2.07	1382	2.21
2800	906	1.03	968	1.25	1027	1.43	1084	1.60	1139	1.75	1194	1.89	1249	2.02	1304	2.14	1361	2.27	-	-

**Example RPM Selection**

Size (Tons)	Model	Airflow Option	HP	Max BHP	Motor Sheave	Blower Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Fully Closed
X	Y	Std.	1.5	1.73	1VM50	AK74	N/A	897	945	991	1035	1079	1126
		H. Static	2	2.30	1VM50	AK64	N/A	1039	1094	1150	1207	1256	1308

**Example Additional Static Resistance**

Size (Tons)	Model	CFM	Cooling Only	Economizer	4" Pleated Filter	Electric Heat kW					
						3	6	9	15	20	24
X	Y	900	0.05	-0.05	0.01	0.00	0.00	0.00	0.01	0.01	0.01
		1000	0.05	-0.03	0.02	0.00	0.00	0.00	0.02	0.02	0.02
		1100	0.04	-0.02	0.03	0.01	0.01	0.01	0.02	0.02	0.02
		1200	0.04	0.00	0.04	0.01	0.01	0.01	0.02	0.02	0.02
		1300	0.03	0.01	0.05	0.01	0.01	0.01	0.03	0.03	0.03

### Altitude and Temperature Correction for CFM, Static Pressure and Power.

The information below should be used to assist in application of product when being applied at altitudes at or exceeding 1000 feet above sea level.

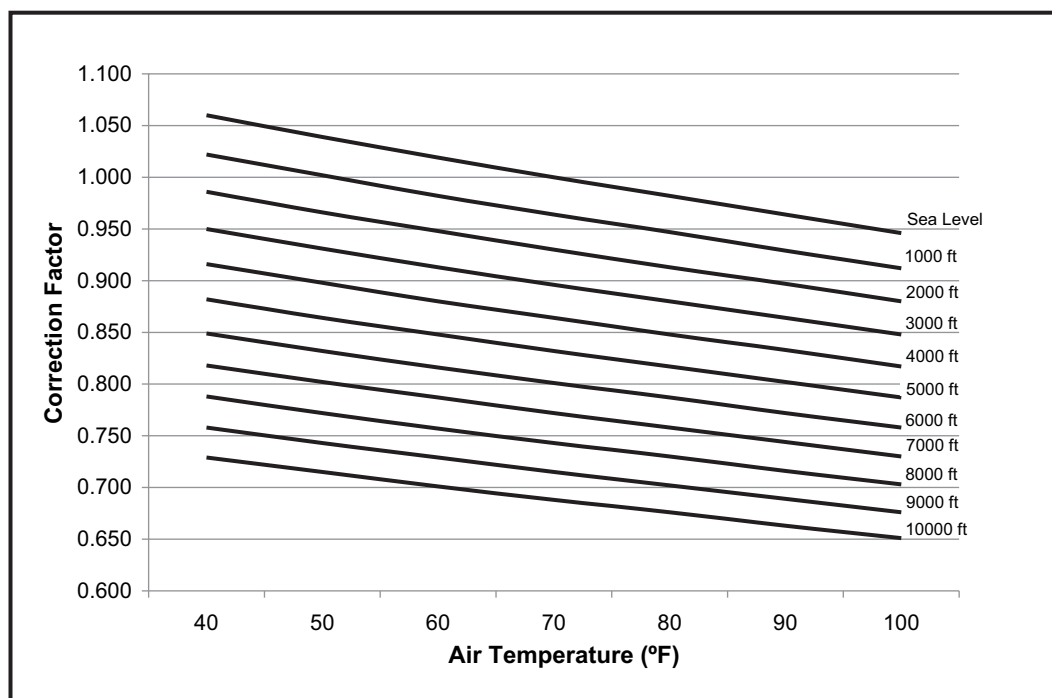
The air flow rates listed in the standard blower performance tables are based on standard air at sea level. As the altitude or temperature increases, the density of air decreases. In order to

use the indoor blower tables for high altitude applications, certain corrections are necessary.

A centrifugal fan is a "constant volume" device. This means that, if the rpm remains constant, the CFM delivered is the same regardless of the density of the air. However, since the air at high altitude is less dense, less static pressure will be generated and less power will be required than a similar application at sea level. Air density correction factors are shown in Table **Altitude/Temperature Correction Factors** and following Figure.

### Altitude/Temperature Correction Factors

Air Temp.	Altitude (Ft.)										
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
40	1.060	1.022	0.986	0.950	0.916	0.882	0.849	0.818	0.788	0.758	0.729
50	1.039	1.002	0.966	0.931	0.898	0.864	0.832	0.802	0.772	0.743	0.715
60	1.019	0.982	0.948	0.913	0.880	0.848	0.816	0.787	0.757	0.729	0.701
70	1.000	0.964	0.930	0.896	0.864	0.832	0.801	0.772	0.743	0.715	0.688
80	0.982	0.947	0.913	0.880	0.848	0.817	0.787	0.758	0.730	0.702	0.676
90	0.964	0.929	0.897	0.864	0.833	0.802	0.772	0.744	0.716	0.689	0.663
100	0.946	0.912	0.880	0.848	0.817	0.787	0.758	0.730	0.703	0.676	0.651



The examples below will assist in determining the airflow performance of the product at altitude.

**Example 1:** What are the corrected CFM, static pressure, and BHP at an elevation of 5,000 ft. if the blower performance data is 6,000 CFM, 1.5 IWC and 4.0 BHP?

**Solution:** At an elevation of 5,000 ft. the indoor blower will still deliver 6,000 CFM if the rpm is unchanged. However, **Airflow Performance Table** must be used to determine the static pressure and BHP. Since no temperature data is given, we will assume an air temperature of 70°F. **Altitude/Temperature Correction Factors Table** shows the correction factor to be 0.832.

$$\begin{aligned}\text{Corrected static pressure} &= 1.5 \times 0.832 = 1.248 \text{ IWC} \\ \text{Corrected BHP} &= 4.0 \times 0.832 = 3.328\end{aligned}$$

**Example 2:** A system, located at 5,000 feet of elevation, is to deliver 6,000 CFM at a static pressure of 1.5". Use the unit blower tables to select the blower speed and the BHP requirement.

**Solution:** As in the example above, no temperature information is given so 70°F is assumed.

The 1.5" static pressure given is at an elevation of 5,000 ft. The first step is to convert this static pressure to equivalent sea level conditions.

Sea level static pressure =  $1.5 / .832 = 1.80$ "  
Enter the blower table at 6000 CFM and static pressure of 1.8". The rpm listed will be the same rpm needed at 5,000 ft.

Suppose that the corresponding BHP listed in the table is 3.2. This value must be corrected for elevation.

$$\text{BHP at 5,000 ft.} = 3.2 \times .832 = 2.66$$

## Indoor Blower Specifications

Size (Tons)	Model	Airflow Option	Motor					Motor Sheave			Blower Sheave			Belt
			HP	RPM	Eff.	SF	Frame	Datum Dia. (in.)	Bore (in.)	Model	Datum Dia. (in.)	Bore (in.)	Model	
15 (15)	ZZ	Std.	3	1725	0.8	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
		H. Static	5	1725	0.87	1.15	184T	4.3 - 5.3	1-1/8	1VP56	6.7	1	BK77	BX55

## Power Exhaust Specifications

Model	Voltage	Motor			Unit (Per Circuit)			Fuse Size	CFM @ 0.1 ESP
		HP	RPM <sup>1</sup>	QTY	LRA	FLA	MCA		
2PE04704706	208/230-1-60	3/4	1075	1	24.9	5	6.3	10	4800
2PE04704746	460-1-60	3/4	1075	1	N/A	2.2	2.8	5	4800

1. Motors are multi-tapped and factory wired for high speed.

## RPM Selection

Size (Tons)	Model	Airflow Option	HP	Max BHP	Motor Sheave	Blower Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Fully Closed
15 (15)	ZZ	Std.	3	3.45	1VM50	AK74	N/A	887	936	986	1035	1084	1134
		H. Static	5	5.75	1VP56	BK77	1052	1095	1136	1175	1216	1272	N/A

## Additional Static Resistance - ZZ15

Size (Tons)	Model	CFM	Cooling Only <sup>1</sup>	Economizer <sup>2 3</sup>	4" Filter <sup>2</sup>	Electric Heat kW <sup>2</sup>				
						09	18	24	36	54
15 (15)	ZZ	3700	0.20	0.49	0.27	0.17	0.18	0.21	0.22	0.26
		3900	0.23	0.54	0.29	0.19	0.20	0.23	0.24	0.28
		4100	0.25	0.58	0.32	0.21	0.22	0.25	0.26	0.31
		4300	0.28	0.65	0.35	0.23	0.24	0.28	0.29	0.34
		4500	0.30	0.69	0.38	0.25	0.26	0.30	0.31	0.37
		4700	0.33	0.74	0.41	0.28	0.29	0.33	0.34	0.40
		4900	0.36	0.78	0.44	0.30	0.31	0.35	0.37	0.43
		5100	0.39	0.82	0.47	0.33	0.34	0.38	0.40	0.46
		5300	0.42	0.86	0.51	0.35	0.37	0.41	0.43	0.49
		5500	0.45	0.89	0.56	0.38	0.40	0.44	0.46	0.53
		5700	0.48	0.93	0.58	0.41	0.43	0.47	0.49	0.56
		5900	0.52	0.96	0.62	0.44	0.46	0.50	0.53	0.59
		6100	0.56	0.98	0.67	0.47	0.49	0.53	0.56	0.62
		6300	0.60	1.01	0.71	0.50	0.53	0.56	0.59	0.65

1. Add these values to the available static resistance in the respective Blower Performance Tables.
2. Deduct these values from the available external static pressure shown in the respective Blower Performance Tables.
3. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

## Gas Heat Minimum Supply Air

Size (Tons)	Model	Heat Size	Supply Air (CFM)	
			Heating	
			Min	Max
15 (15)	ZZ	N18	3750	6250
		N24	3750	6250

## Electric Heat Minimum Supply Air

6-1/2 thru 12-1/5 Tons

Size (Tons)	Model	Voltage	Minimum Supply Air (CFM)				
			Heater kW				
			9	18	24	36	54
15 (15)	ZZ	208/230-3-60	-	3750	3750	3750	4000
		460-3-60	-	3750	3750	3750	3750



## Airflow Performance

### ZZ15 Side Duct Application

#### ZZ15 (15 Ton) Side Duct

Air Flow (CFM)	Available External Static Pressure - IWG <sup>1</sup>															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3200	713	0.88	764	1.09	814	1.28	861	1.47	907	1.65	952	1.83	995	2.00	1037	2.17
3400	728	1.02	779	1.23	829	1.43	877	1.61	923	1.79	967	1.97	1010	2.14	1053	2.31
3600	745	1.18	796	1.39	846	1.59	893	1.77	939	1.95	984	2.13	1027	2.30	1069	2.47
3800	763	1.36	815	1.57	864	1.76	912	1.95	958	2.13	1002	2.31	1046	2.48	1088	2.65
4000	783	1.55	835	1.76	884	1.96	932	2.15	978	2.33	1022	2.50	1066	2.67	1108	2.84
4200	805	1.77	856	1.98	906	2.17	953	2.36	999	2.54	1044	2.72	1087	2.89	1129	3.06
4400	828	2.00	879	2.21	929	2.41	976	2.59	1022	2.77	1067	2.95	1110	3.12	1152	3.29
4600	852	2.25	904	2.46	953	2.66	1001	2.85	1047	3.03	1092	3.20	1135	3.37	1177	3.54
4800	879	2.52	930	2.73	980	2.93	1027	3.12	1073	3.30	1118	3.47	1161	3.65	1203	3.82
5000	906	2.81	958	3.02	1007	3.22	1055	3.41	1101	3.59	1146	3.76	1189	3.94	1231	4.11
5200	936	3.12	987	3.33	1037	3.53	1084	3.72	1130	3.90	1175	4.07	1218	4.24	1260	4.42
5400	966	3.45	1018	3.66	1067	3.86	1115	4.05	1161	4.23	1206	4.40	1249	4.57	1291	4.74
5600	999	3.80	1050	4.01	1100	4.20	1147	4.39	1193	4.57	1238	4.75	1281	4.92	1323	5.09
5800	1032	4.16	1084	4.37	1133	4.57	1181	4.75	1227	4.93	1271	5.11	1315	5.28	1357	5.45
6000	1067	4.54	1119	4.75	1168	4.95	1216	5.13	1262	5.31	1306	5.49	1350	5.66	-	-
6200	1103	4.94	1155	5.15	1204	5.34	1252	5.53	1298	5.71	-	-	-	-	-	-

	Field Supplied Drive
	Standard 3 HP & Drive
	Hi Static 5 HP & Drive
	5 HP & Field Supplied Drive

1. Blower performance includes gas heat exchangers and 2" filters. See STATIC RESISTANCE table for additional applications.
2. See RPM SELECTION table to determine desired motor sheave setting and to determine the maximum continuous BHP.
3. KW = BHP x 0.932.

### ZZ15 Bottom Duct Application

#### ZZ15 (15 Ton) Bottom Duct

Air Flow (CFM)	Available External Static Pressure - IWG <sup>1</sup>															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3200	797	1.32	851	1.46	903	1.60	953	1.74	1001	1.86	1048	1.99	1093	2.11	1138	2.23
3400	828	1.52	882	1.67	934	1.81	983	1.94	1032	2.07	1078	2.19	1124	2.32	1168	2.44
3600	861	1.75	915	1.90	967	2.04	1017	2.17	1065	2.30	1112	2.42	1157	2.54	1201	2.67
3800	897	2.00	951	2.15	1002	2.29	1052	2.42	1101	2.55	1147	2.67	1193	2.80	1237	2.92
4000	935	2.27	989	2.42	1041	2.56	1091	2.69	1139	2.82	1186	2.95	1231	3.07	1275	3.19
4200	976	2.57	1030	2.72	1082	2.86	1132	2.99	1180	3.12	1227	3.24	1272	3.36	1316	3.48
4400	1019	2.88	1073	3.03	1125	3.17	1175	3.30	1223	3.43	1270	3.55	1315	3.67	1360	3.80
4600	1065	3.22	1119	3.36	1171	3.50	1221	3.64	1269	3.76	1316	3.89	1361	4.01	1405	4.13
4800	1113	3.57	1167	3.72	1219	3.86	1269	3.99	1317	4.12	1364	4.24	1409	4.36	1453	4.48
5000	1163	3.94	1217	4.09	1269	4.23	1319	4.36	1367	4.49	1414	4.62	1459	4.74	1504	4.86
5200	1216	4.34	1270	4.48	1321	4.62	1371	4.76	1420	4.88	1466	5.01	1512	5.13	1556	5.25
5400	1270	4.75	1324	4.89	1376	5.03	1426	5.17	1474	5.29	1521	5.42	1566	5.54	1611	5.66
5600	1327	5.17	1381	5.32	1433	5.46	1483	5.59	1531	5.72	-	-	-	-	-	-
5800	1385	5.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	Field Supplied Drive
	Standard 3 HP & Drive
	Hi Static 5 HP & Drive
	5 HP & Field Supplied Drive

1. Blower performance includes gas heat exchangers and 2" filters. See STATIC RESISTANCE table for additional applications.
2. See RPM SELECTION table to determine desired motor sheave setting and to determine the maximum continuous BHP.
3. KW = BHP x 0.932.

Sound Performance

Outdoor Sound Power Levels ZZ15

Size (Tons)	Model	Sound Rating <sup>1</sup> dB (A)	Octave Band Centerline Frequency (Hz)							
			63	125	250	500	1000	2000	4000	8000
15 (15)	ZZ	81	85.0	86.0	82.5	79.5	75.0	70.0	65.0	59.0

1. Rated in accordance with AHRI 270 standard.

## Electrical Data

### ZZ15 Standard Motor - Without Powered Convenience Outlet

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Exh Motor	Pwr Conv Outlet	Electric Heat Option				MCA <sup>1</sup> (Amps)	MCA <sup>1</sup> w/Pwr Exh (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size w/ Pwr Exh (Amps)
		RLA	LRA	MCC					Model	kW	Stages	Amps				
15 (15)	208	25.0	164	39	2.1	9.6	5.5		None	-	-	-	74.3	79.8	90	90
									E18	13.5	2	37.55	74.3	79.8	90	90
									E24	18	2	50	74.3	79.8	90	90
									E36	25.5	2	70.8	98.1	103.6	110	110
									E54	40.6	2	112.7	150.5	156.0	175	175
	230	25.0	164	39	2.1	9.6	5.5		None	-	-	-	74.3	79.8	90	90
									E18	18	2	43.3	74.3	79.8	90	90
									E24	24	2	57.7	81.7	87.2	90	90
									E36	34	2	81.8	111.9	117.4	125	125
									E54	54	2	129.9	172.0	177.5	190	190
	460	12.2	100	19	1.26	4.7	2.2		None	-	-	-	37.1	39.3	45	50
									E18	18	2	21.7	37.1	39.3	45	50
									E24	24	2	28.9	40.8	43.0	45	50
									E36	34	2	40.9	55.8	58.0	60	60
									E54	54	2	65	86.0	88.2	90	90

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

### ZZ15 Hi Static Motor - Without Powered Convenience Outlet

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Exh Motor	Pwr Conv Outlet	Electric Heat Option				MCA <sup>1</sup> (Amps)	MCA <sup>1</sup> w/Pwr Exh (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size w/ Pwr Exh (Amps)
		RLA	LRA	MCC					Model	kW	Stages	Amps				
15 (15)	208	25.0	164	39	2.1	14	5.5		None	-	-	-	78.7	84.2	90	90
									E18	13.5	2	37.55	78.7	84.2	90	90
									E24	18	2	50	78.7	84.2	90	90
									E36	25.5	2	70.8	102.5	108.0	110	110
									E54	40.6	2	112.7	154.9	160.4	175	175
	230	25.0	164	39	2.1	14	5.5		None	-	-	-	78.7	84.2	90	90
									E18	18	2	43.3	78.7	84.2	90	90
									E24	24	2	57.7	86.1	91.6	90	100
									E36	34	2	81.8	116.3	121.8	125	125
									E54	54	2	129.9	176.4	181.9	190	190
	460	12.2	100	19	1.26	6.6	2.2		None	-	-	-	39.0	41.2	45	50
									E18	18	2	21.7	39.0	41.2	45	50
									E24	24	2	28.9	42.7	44.9	45	50
									E36	34	2	40.9	57.7	59.9	60	60
									E54	54	2	65	87.9	90.1	90	90

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

**ZZ15 Standard Motor - With Powered Convenience Outlet**

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Exh Motor	Pwr Conv Outlet	Electric Heat Option				MCA <sup>1</sup> (Amps)	MCA <sup>1</sup> w/Pwr Exh (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size w/ Pwr Exh (Amps)
		RLA	LRA	MCC					Model	kW	Stages	Amps				
15 (15)	208	25.0	164	39	2.1	9.6	5.5	20	None	-	-	-	94.3	99.8	100	100
									E18	13.5	2	37.55	94.3	99.8	100	100
									E24	18	2	50	94.3	99.8	100	100
									E36	25.5	2	70.8	118.1	123.6	125	125
									E54	40.6	2	112.7	170.5	176.0	175	175
	230	25.0	164	39	2.1	9.6	5.5	20	None	-	-	-	94.3	99.8	100	100
									E18	18	2	43.3	94.3	99.8	100	100
									E24	24	2	57.7	101.7	107.2	110	110
									E36	34	2	81.8	131.9	137.4	150	150
									E54	54	2	129.9	192.0	197.5	200	200
	460	12.2	100	19	1.26	4.7	2.2	20	None	-	-	-	57.1	59.3	60	60
									E18	18	2	21.7	57.1	59.3	60	60
									E24	24	2	28.9	60.8	63.0	65	70
									E36	34	2	40.9	75.8	78.0	90	90
									E54	54	2	65	106.0	108.2	110	110

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

**ZZ15 Hi Static Motor - With Powered Convenience Outlet**

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Exh Motor	Pwr Conv Outlet	Electric Heat Option				MCA <sup>1</sup> (Amps)	MCA <sup>1</sup> w/Pwr Exh (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size w/ Pwr Exh (Amps)
		RLA	LRA	MCC					Model	kW	Stages	Amps				
15 (15)	208	25.0	164	39	2.1	14	5.5	20	None	-	-	-	98.7	104.2	100	110
									E18	13.5	2	37.55	98.7	104.2	100	110
									E24	18	2	50	98.7	104.2	100	110
									E36	25.5	2	70.8	122.5	128.0	125	130
									E54	40.6	2	112.7	174.9	180.4	175	190
	230	25.0	164	39	2.1	14	5.5	20	None	-	-	-	98.7	104.2	100	110
									E18	18	2	43.3	98.7	104.2	100	110
									E24	24	2	57.7	106.1	111.6	110	125
									E36	34	2	81.8	136.3	141.8	150	150
									E54	54	2	129.9	196.4	201.9	200	210
	460	12.2	100	19	1.26	6.6	2.2	20	None	-	-	-	59.0	61.2	60	75
									E18	18	2	21.7	59.0	61.2	60	75
									E24	24	2	28.9	62.7	64.9	75	75
									E36	34	2	40.9	77.7	79.9	90	90
									E54	54	2	65	107.9	110.1	110	125

1. Minimum Circuit Ampacity.
2. Dual Element, Time Delay Type.
3. HACR type per NEC.

**Electric Heat Multipliers**

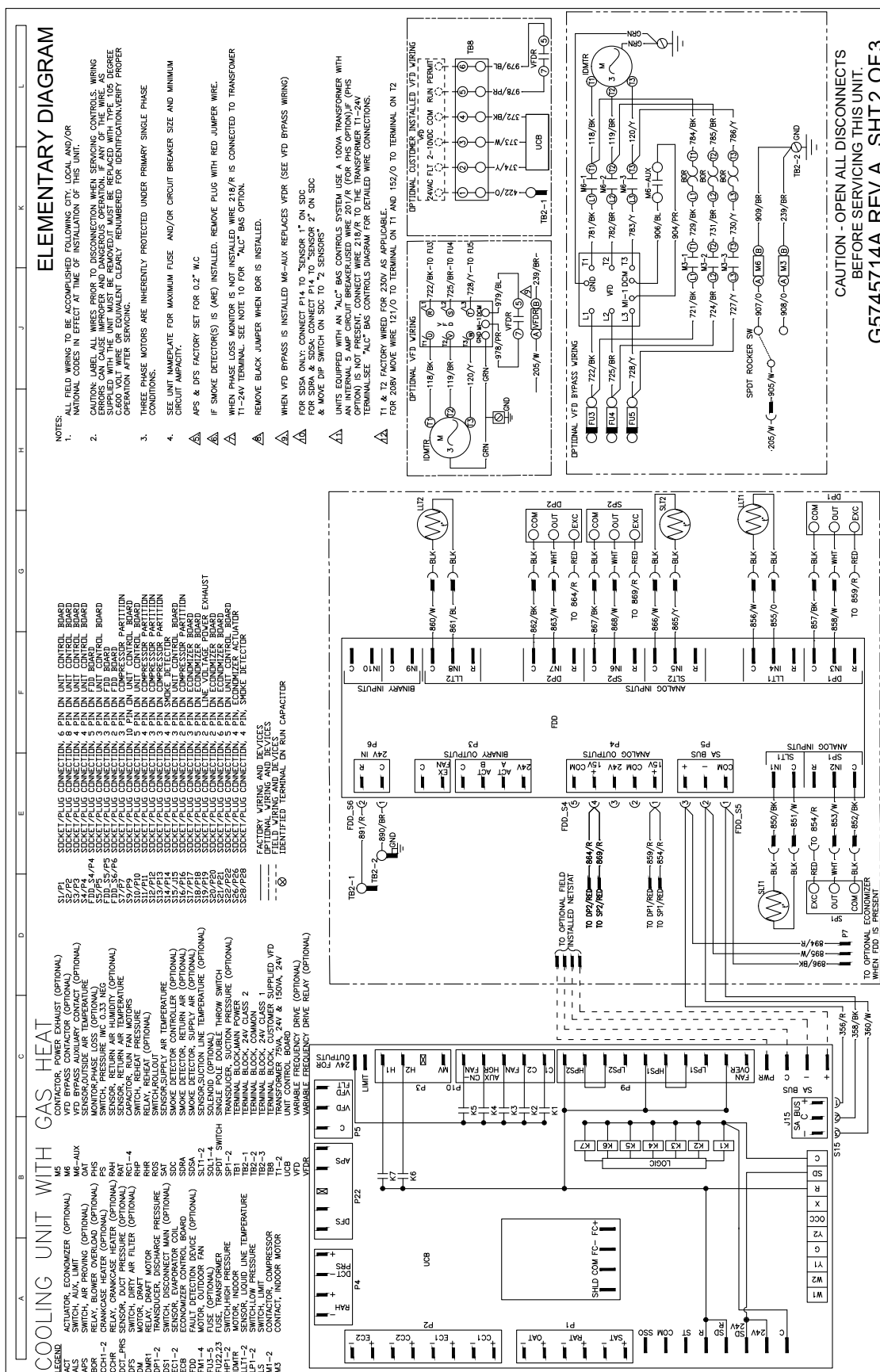
Voltage		kW Capacity Multipliers <sup>1</sup>
Nominal	Applied	
240	208	0.75
	230	0.92
480	460	0.92

1. Electric heaters are rated at nominal voltage. Use this table to determine the electric heat capacity for heaters applied at lower voltages.

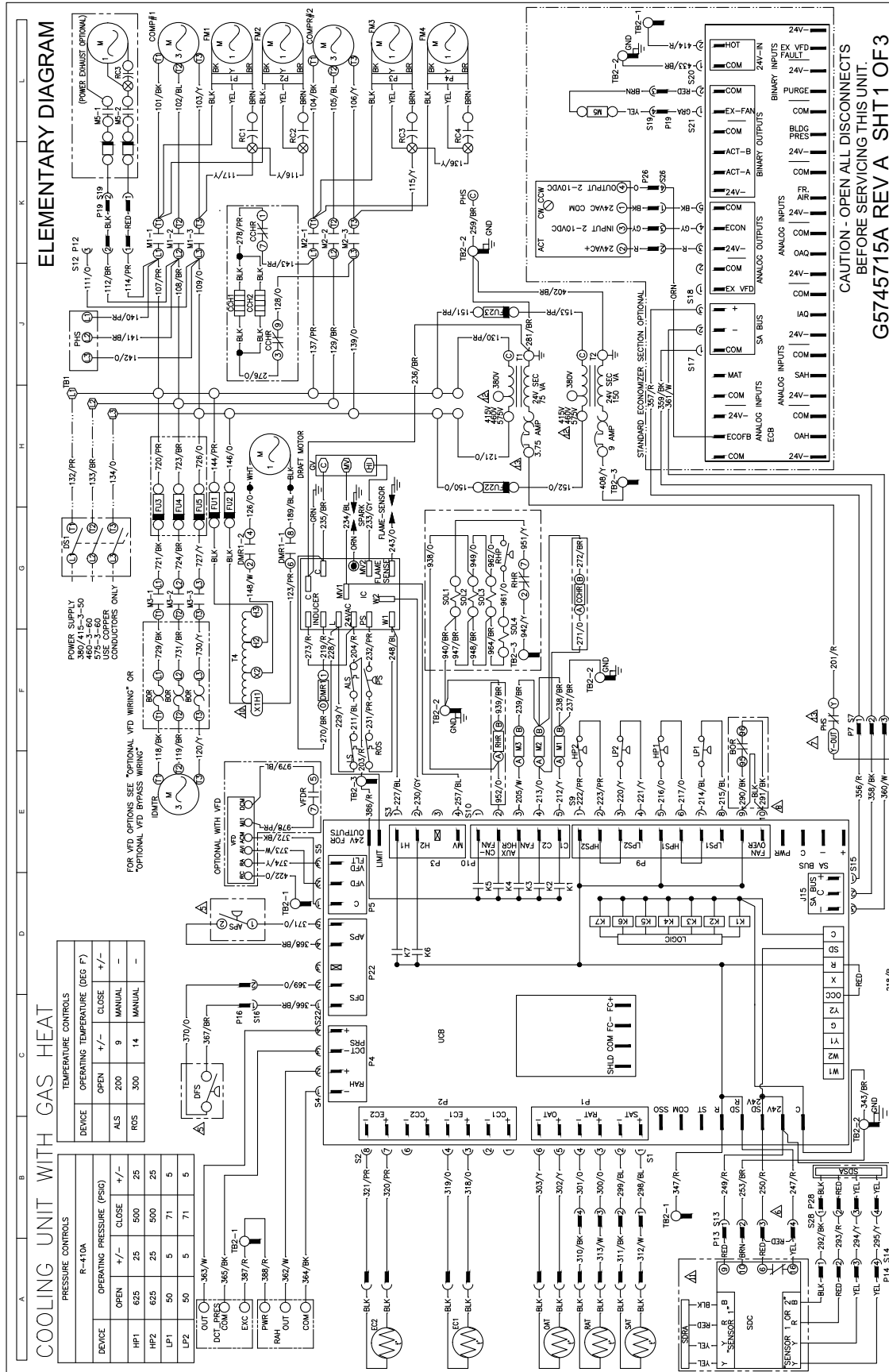




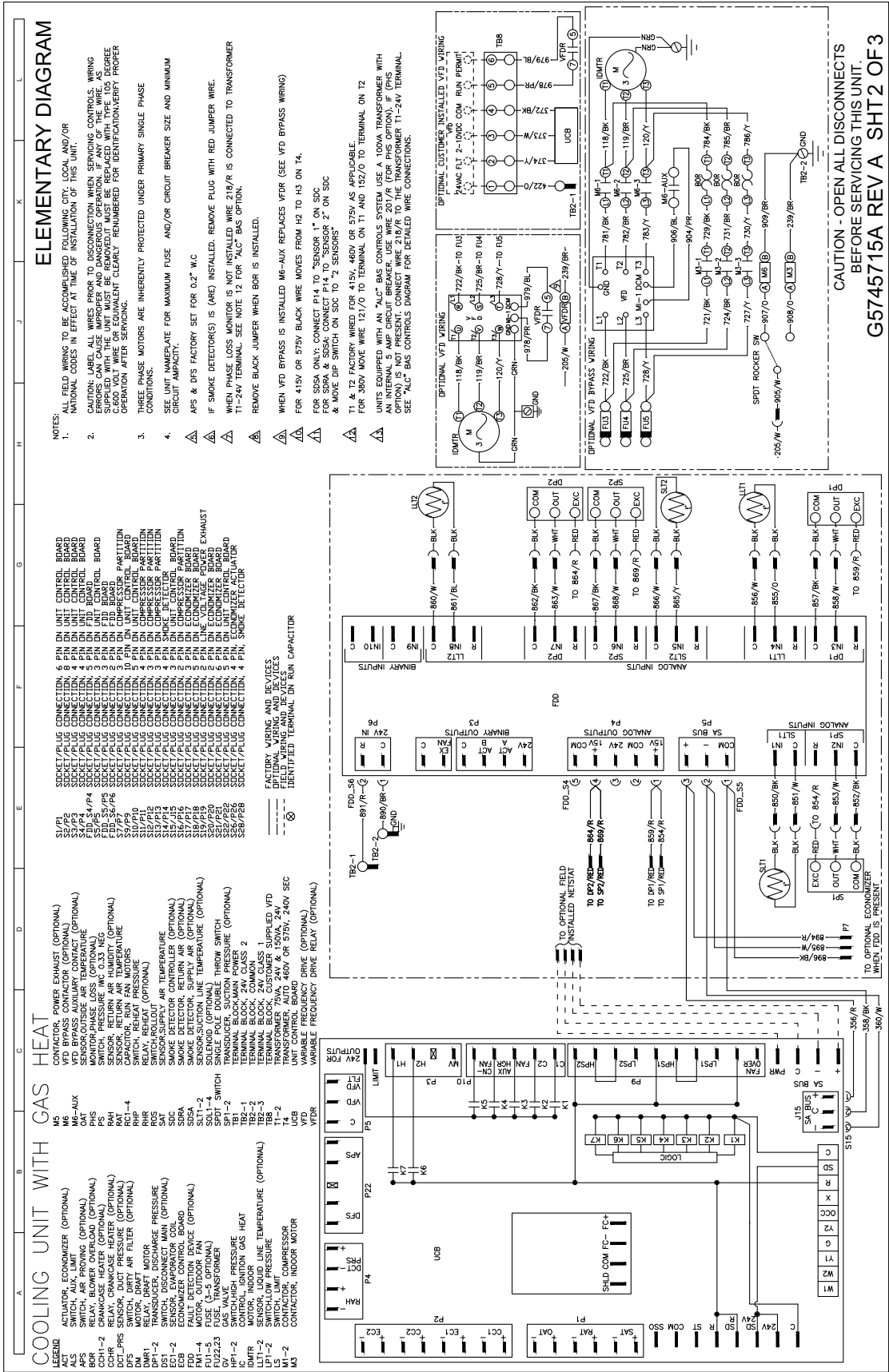
### Typical ZZ15 Cooling Unit with Gas Heat 208/230 Volt Unit (Options)



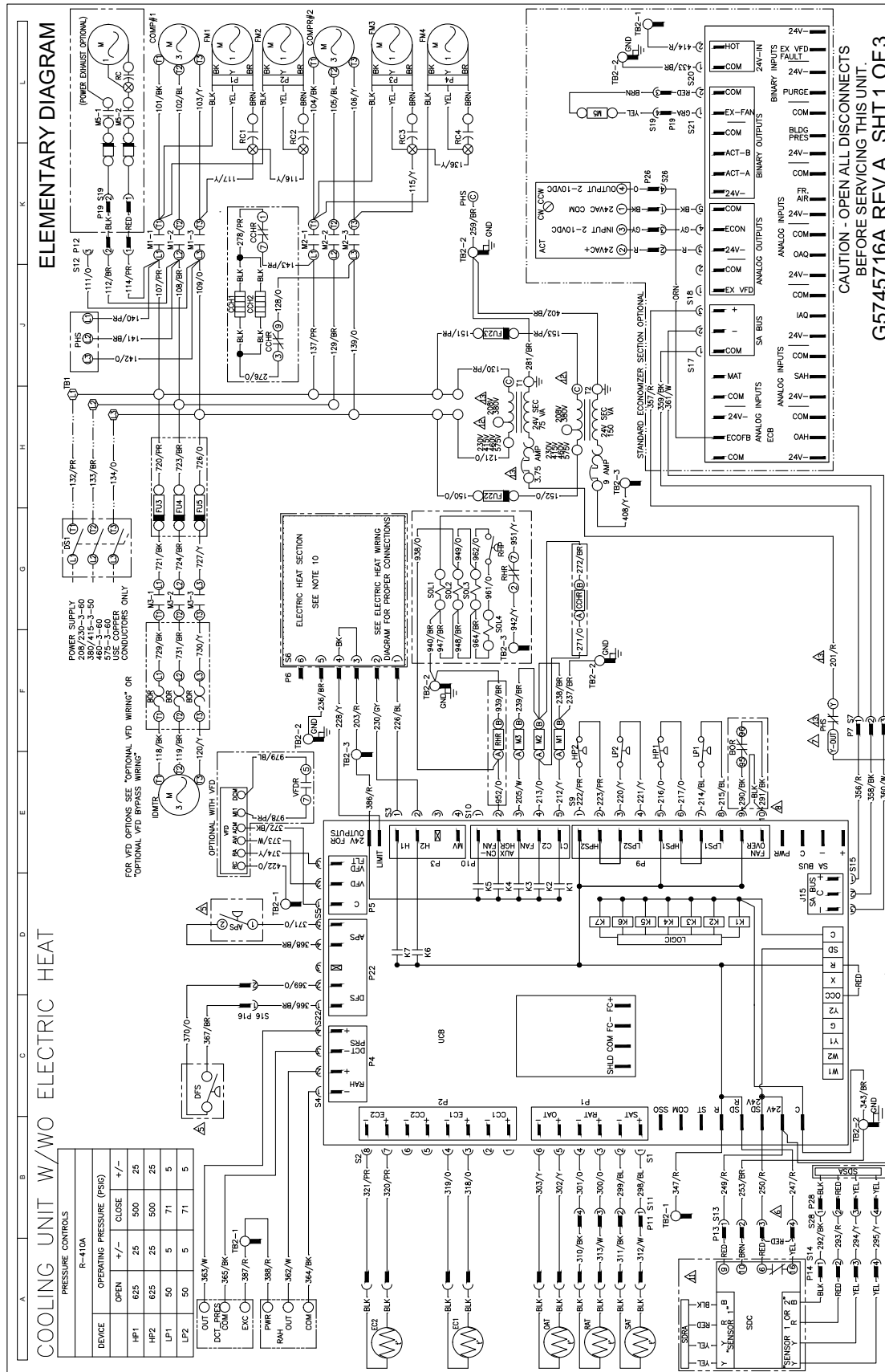
## Typical ZZ15 Cooling Unit with Gas Heat 460 Volt Wiring Diagram



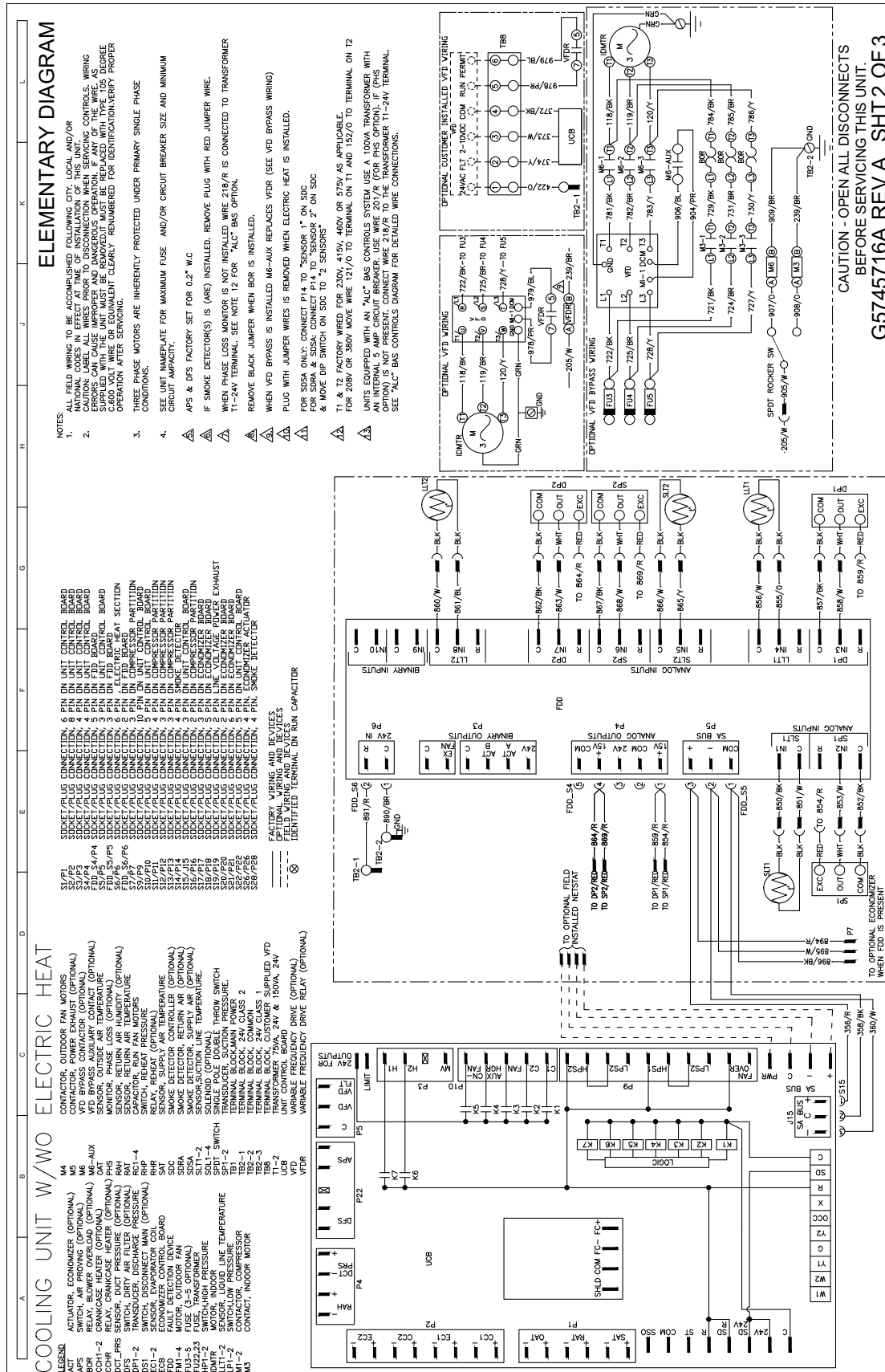
Typical ZZ15 Cooling Unit with Gas Heat 460 Volt Unit (Options)



### Typical ZZ15 Cooling Unit with/without Electric Heat Wiring Diagram



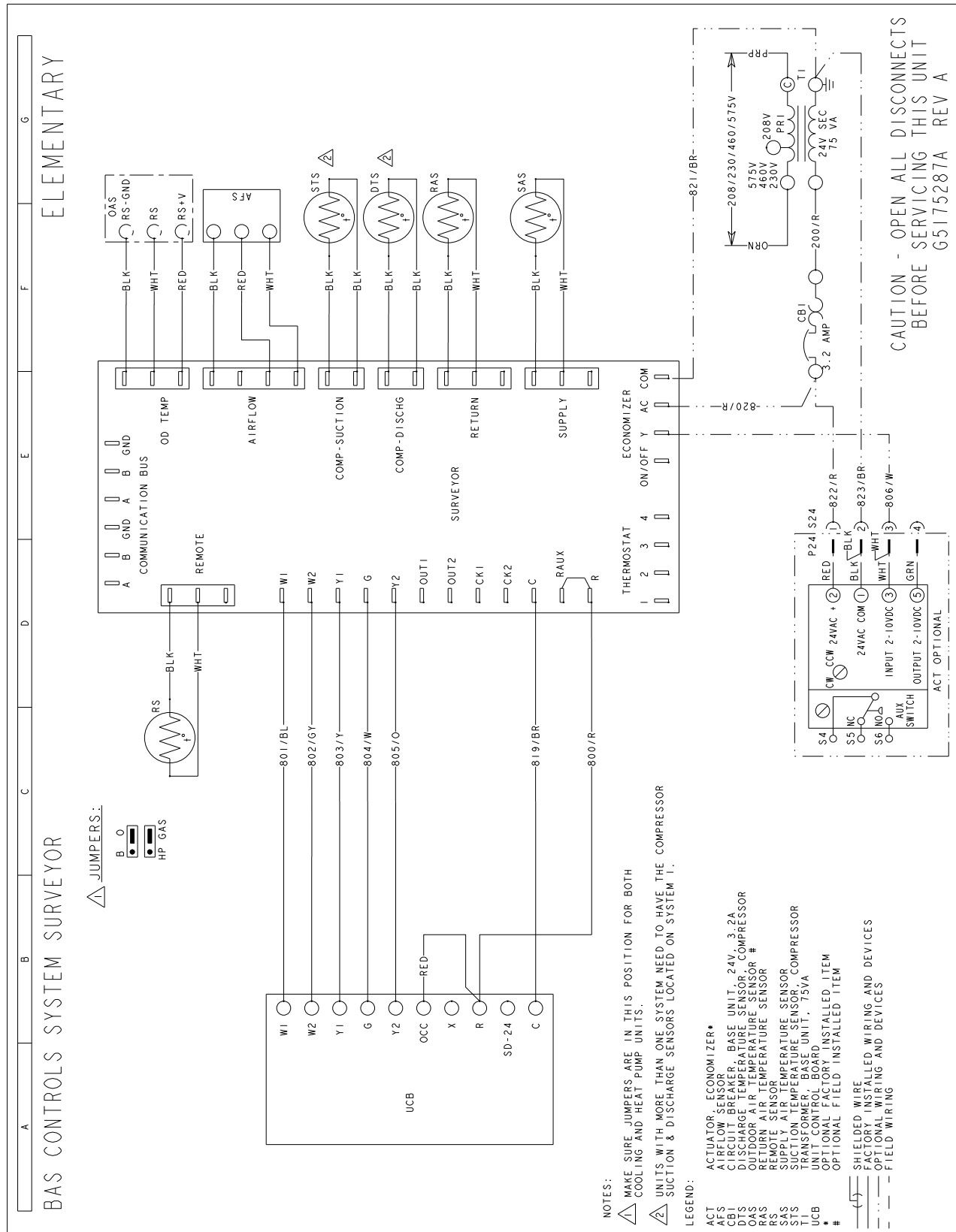
## Typical ZZ15 Cooling Unit with/without Electric Heat Unit (Options)



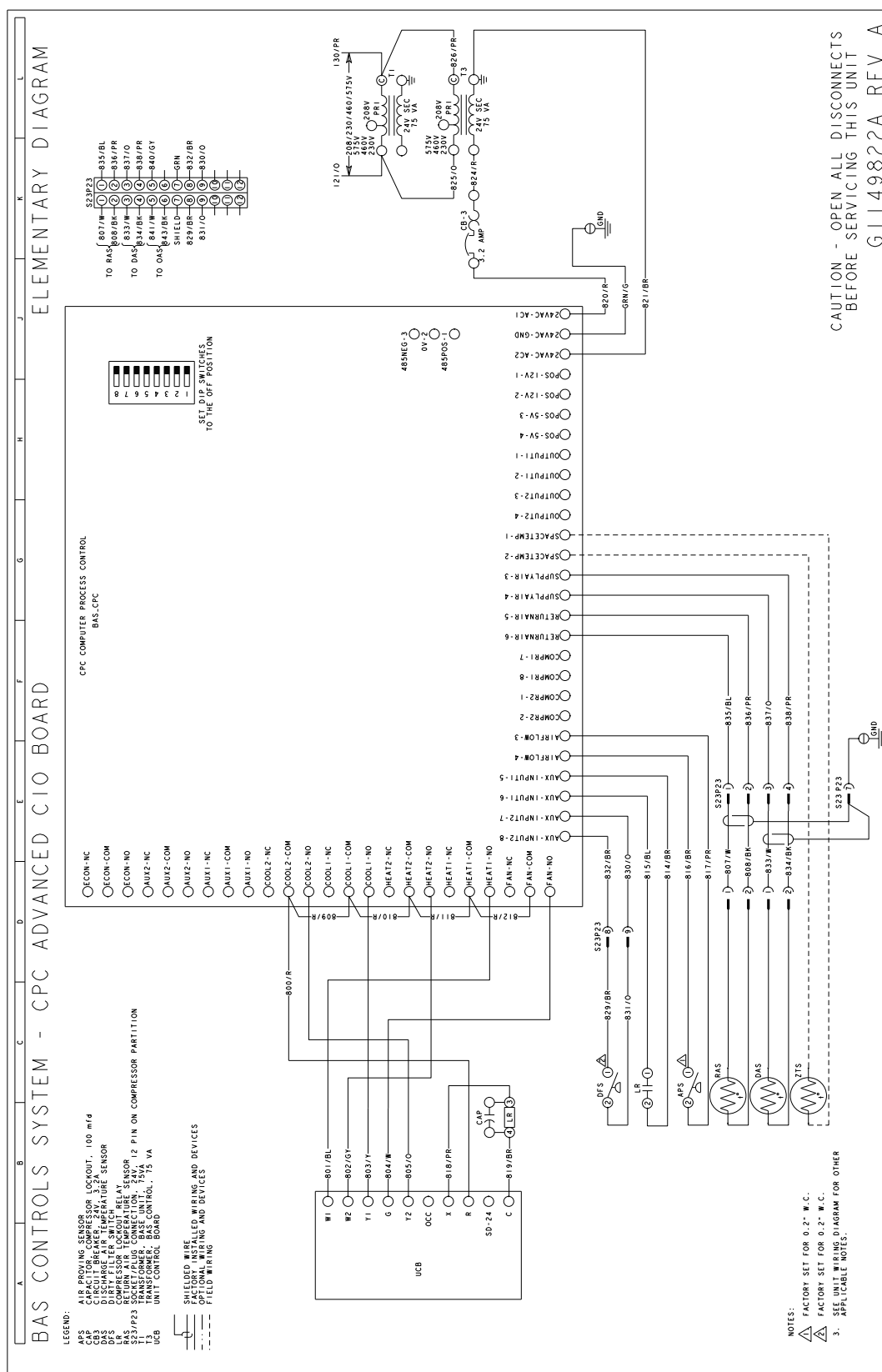


## BAS Controls Typical Wiring Diagrams

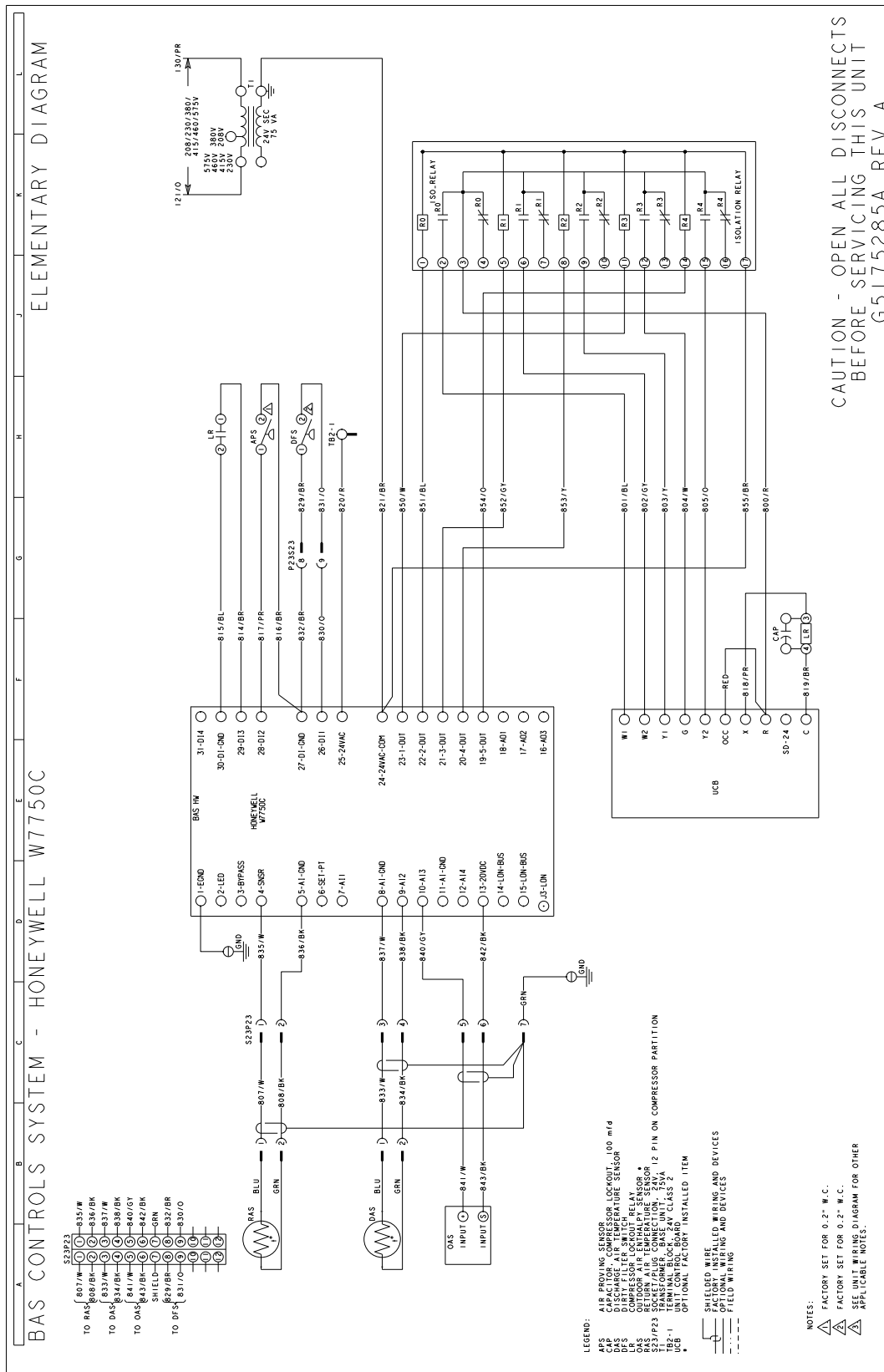
## Typical SURVEYOR BAS Control Wiring Diagram



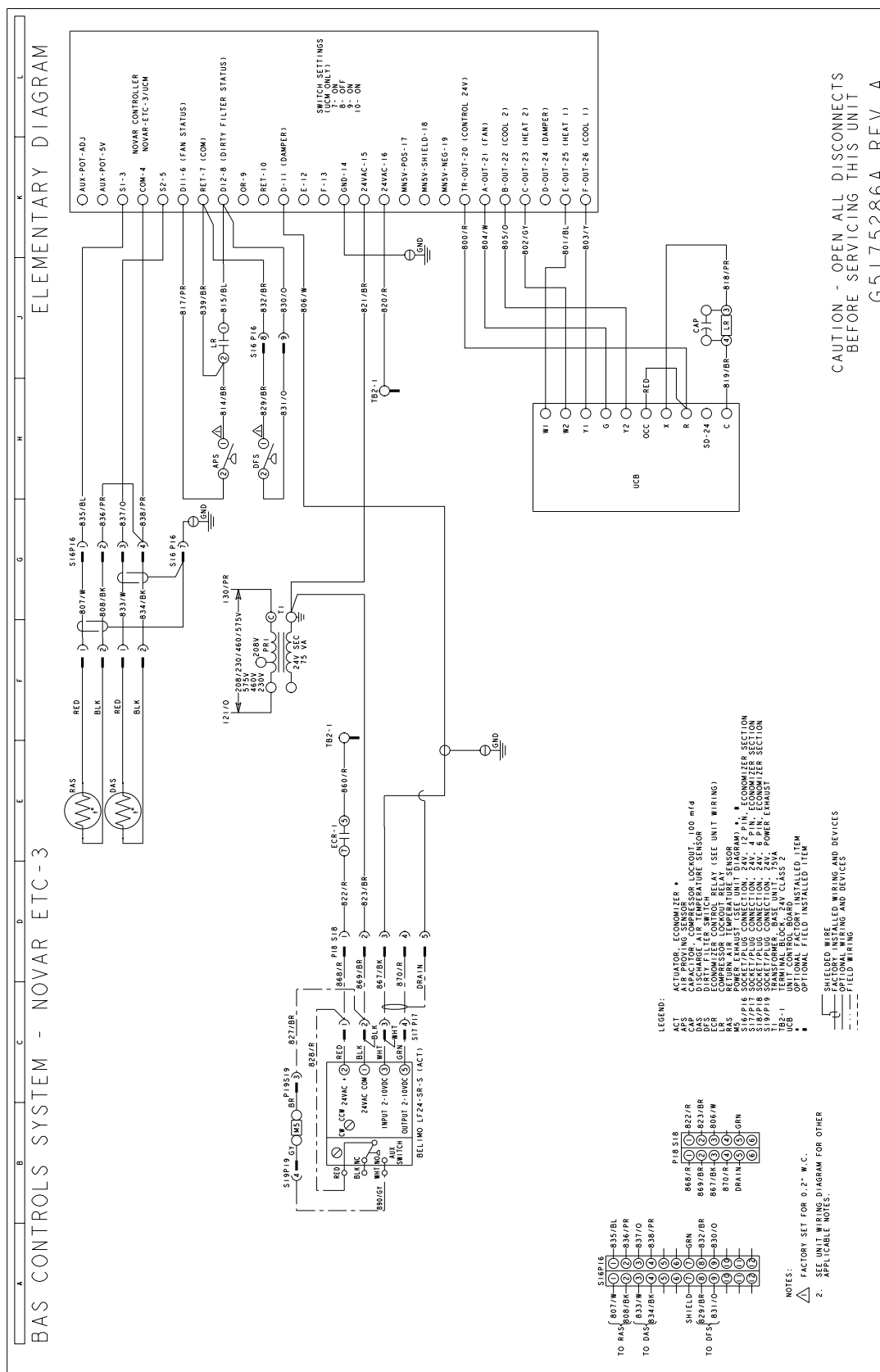
## Johnson Controls Ducted Systems



## Typical HONEYWELL BAS Control Wiring Diagram



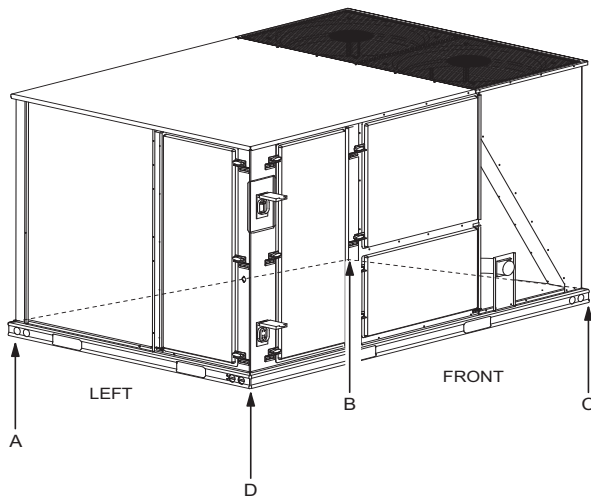
## Typical NOVAR BAS Control Wiring Diagram



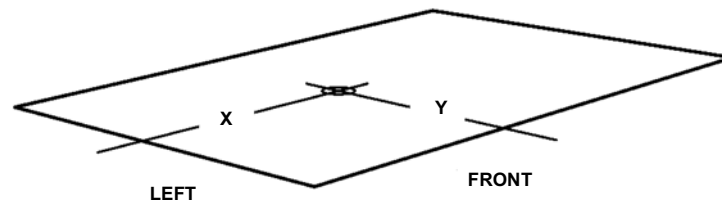
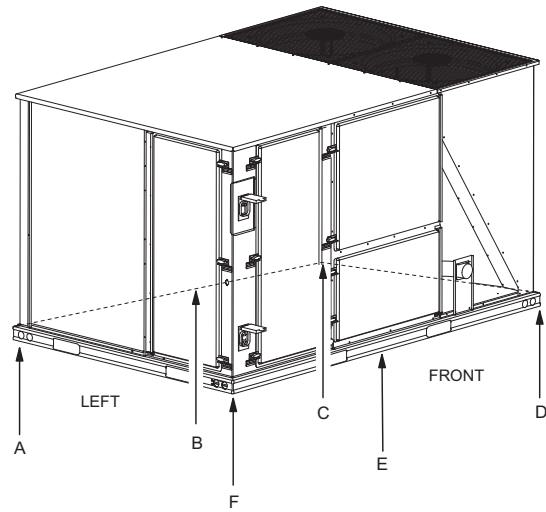
## Weights and Dimensions

### ZZ Unit Weights

#### Unit 4 Point Load Weight



#### Unit 6 Point Load Weight



Size (Tons)	Model	Weight (lbs.)		Center of Gravity		4 Point Load Location (lbs.)				6 Point Load Location (lbs.)					
		Shipping	Operating	X	Y	A	B	C	D	A	B	C	D	E	F
15 (15)	ZZ	1365	1360	41.3	34.5	427	369	262	303	292	264	240	170	187	207

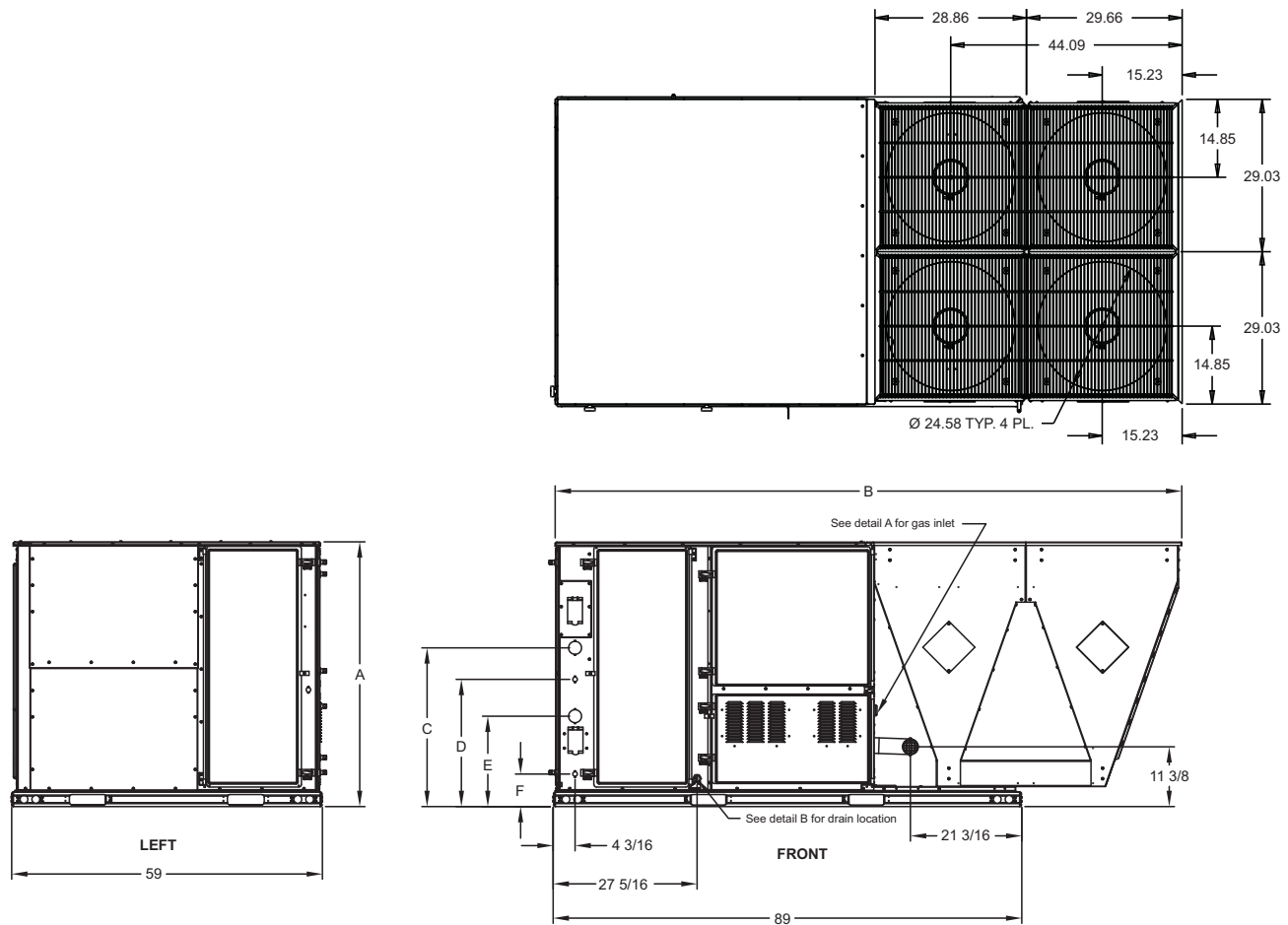
### ZZ15 Unit Accessory Weights

Unit Accessory	Weight (lbs.)	
	Shipping	Operating
Economizer	90	85
Power Exhaust	40	35
Electric Heat <sup>1</sup>	49	49
Gas Heat <sup>2</sup>	110	110

1. Weight given is for the maximum heater size available (54KW).
2. Weight given is for the maximum number of tube heat exchangers available (8 tube).

ZZ15 Unit Dimensions

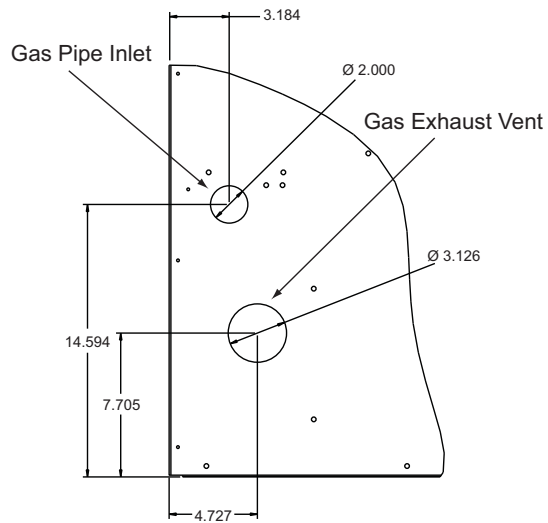
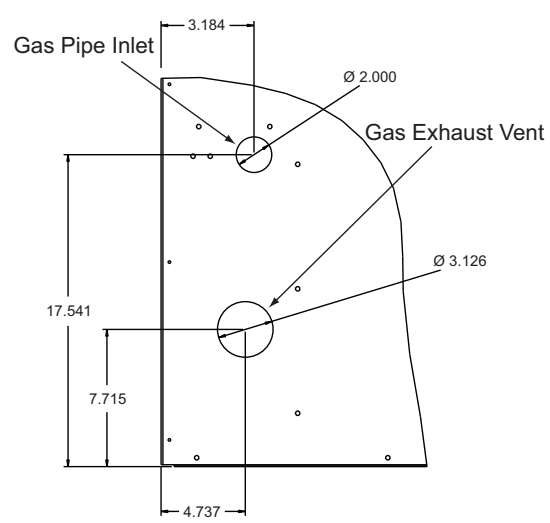
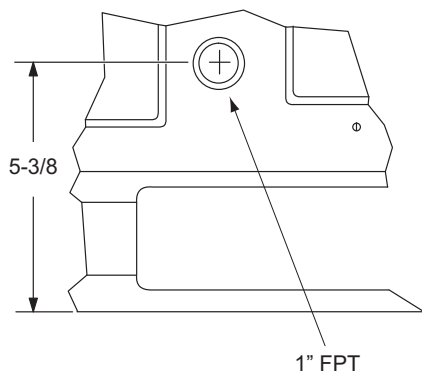
ZZ15



ZZ15 Unit Physical Dimensions

Unit Model Number	Dimension (in.)					
	A	B	C	D	E	F
ZZ15	50 3/4	119 1/2	30 3/16	24 3/16	17 3/16	6 3/16

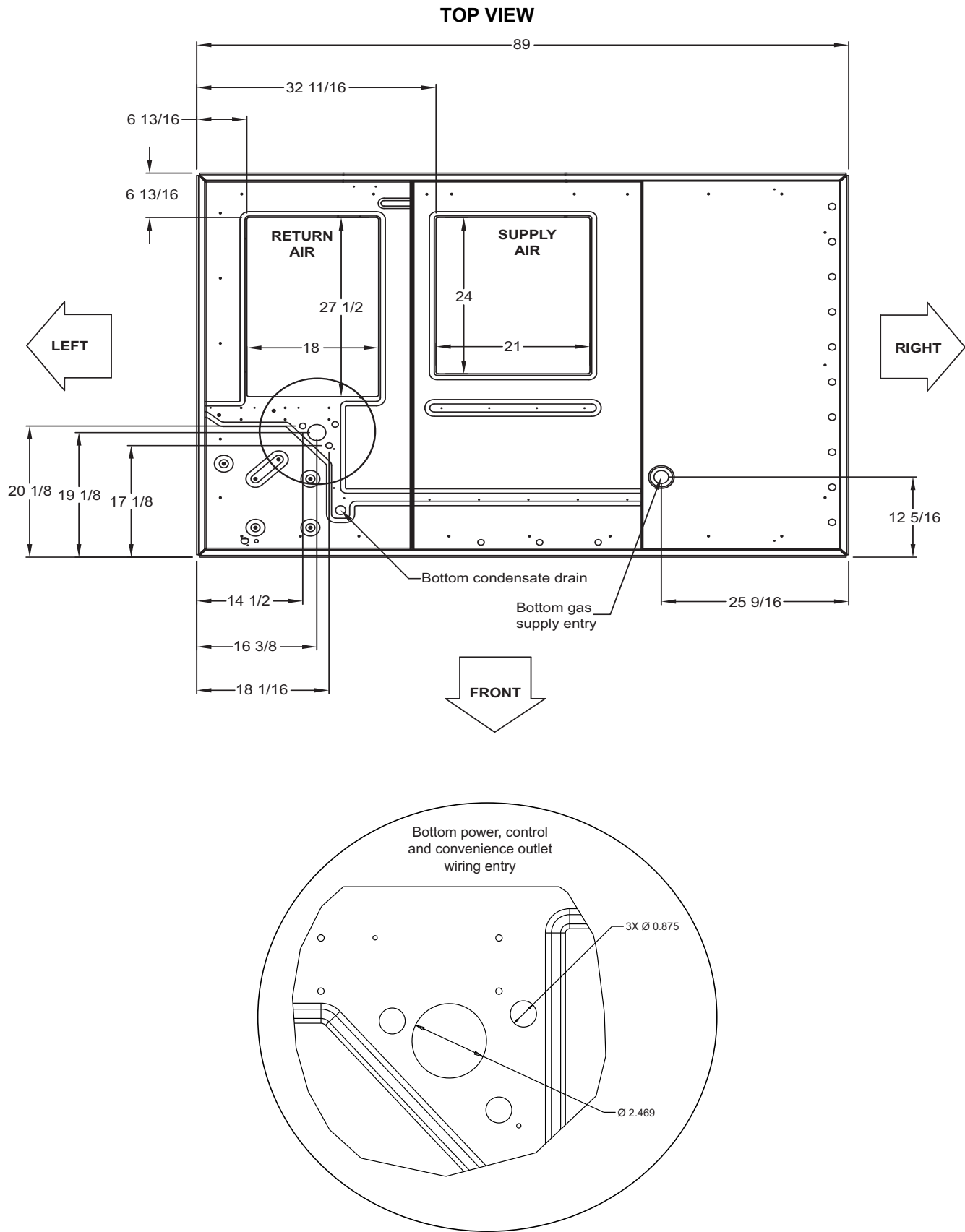


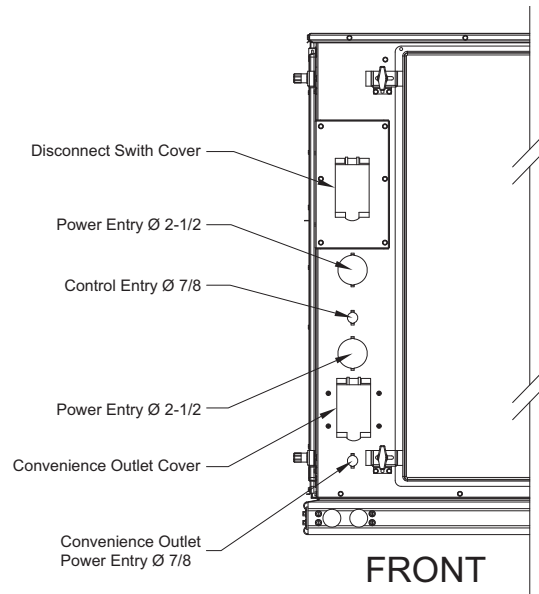
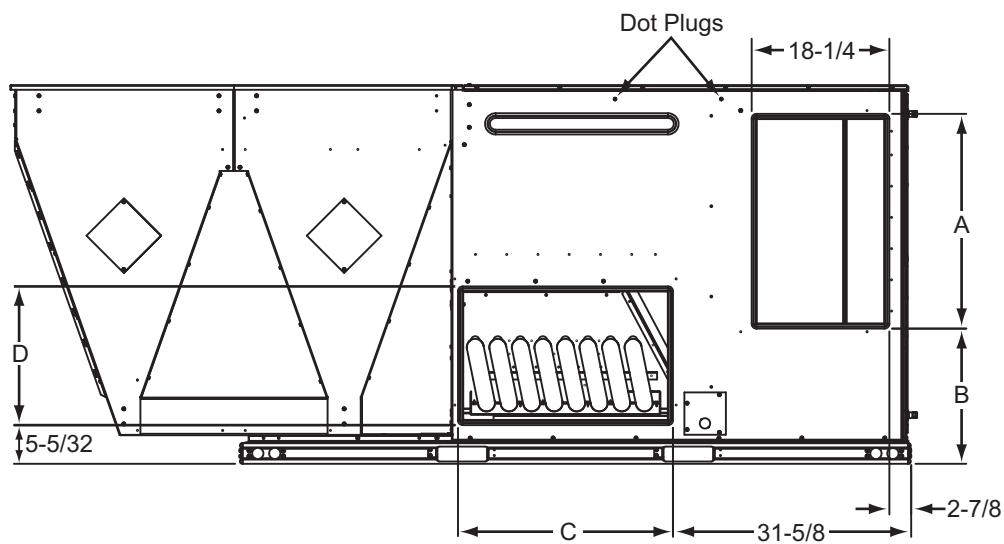
**Detail A****42" CABINET****50 3/4" CABINET****Detail B****ZZ15 Unit Clearances**

Direction	Distance (in.)	Direction	Distance (in.)
Top <sup>1</sup>	72	Right	12
Front	36	Left	36
Rear	36	Bottom <sup>2</sup>	0

1. Units must be installed outdoors. Over hanging structure or shrubs should not obscure condenser air discharge outlet.
2. Units may be installed on combustible floors made from wood or class A, B or C roof covering materials.

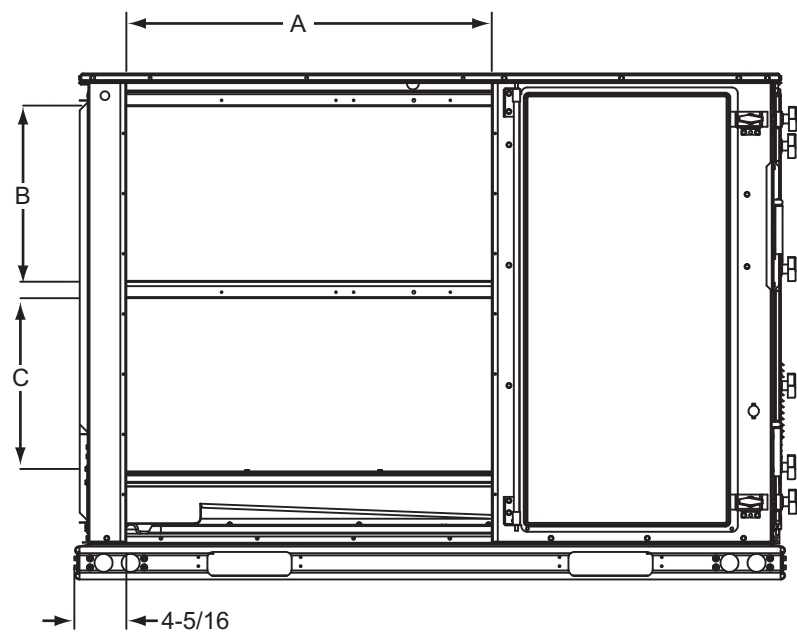
ZZ15 Unit Bottom Duct Openings



**ZZ15 Unit Electrical Entry****ZZ15 Unit Side Duct Openings****ZZ15 Side Duct Dimensions**

Unit Model Number	Dimension (in.)			
	A	B	C	D
ZZ15	28 1/4	18 1/16	28 1/4	18 1/4

ZZ15 Unit Left/End Duct Opening

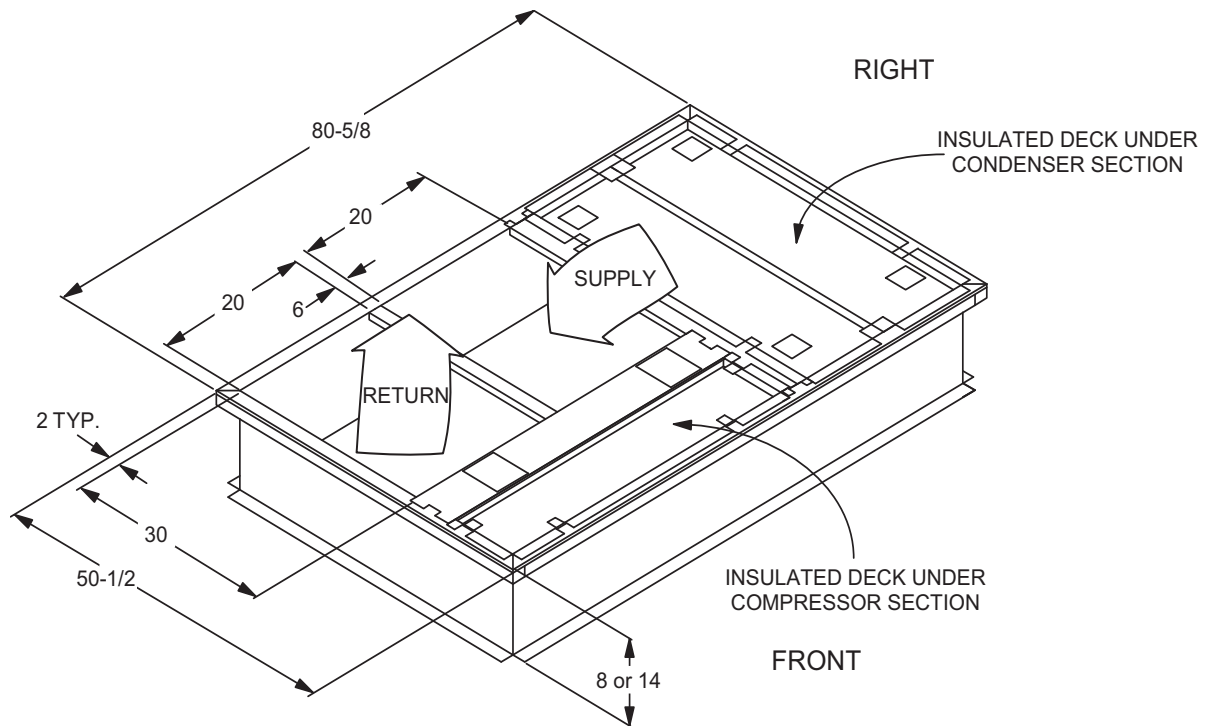


ZZ15 Left/End Duct Dimensions

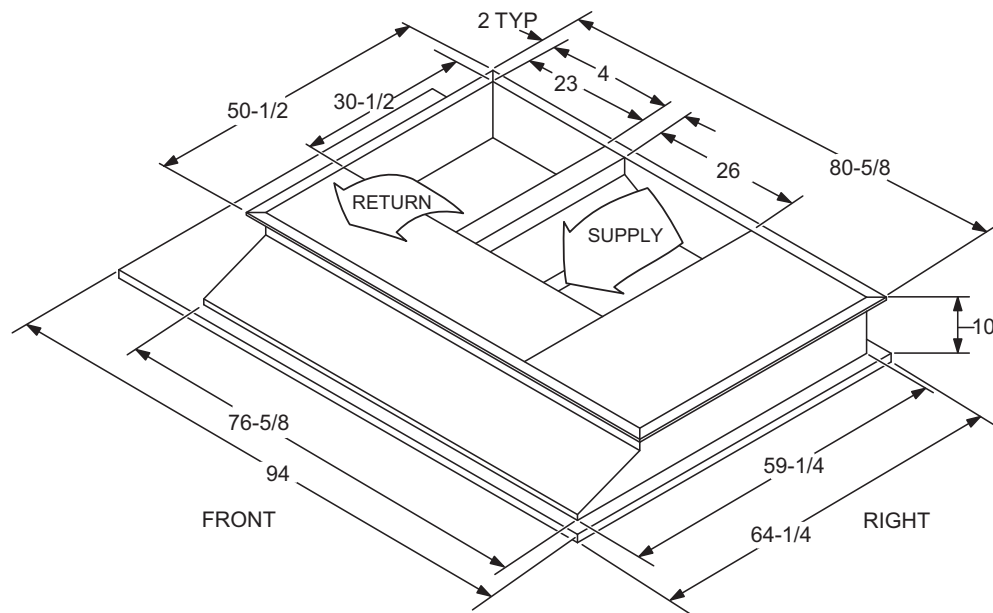
Unit Model Number	Dimension (in.)		
	A	B	C
ZZ15	30.358	22.580	22.330

## ZZ15 Unit Accessory Dimensions

### ZZ15 Roof Curb



### ZZ15 Transition Roof Curb



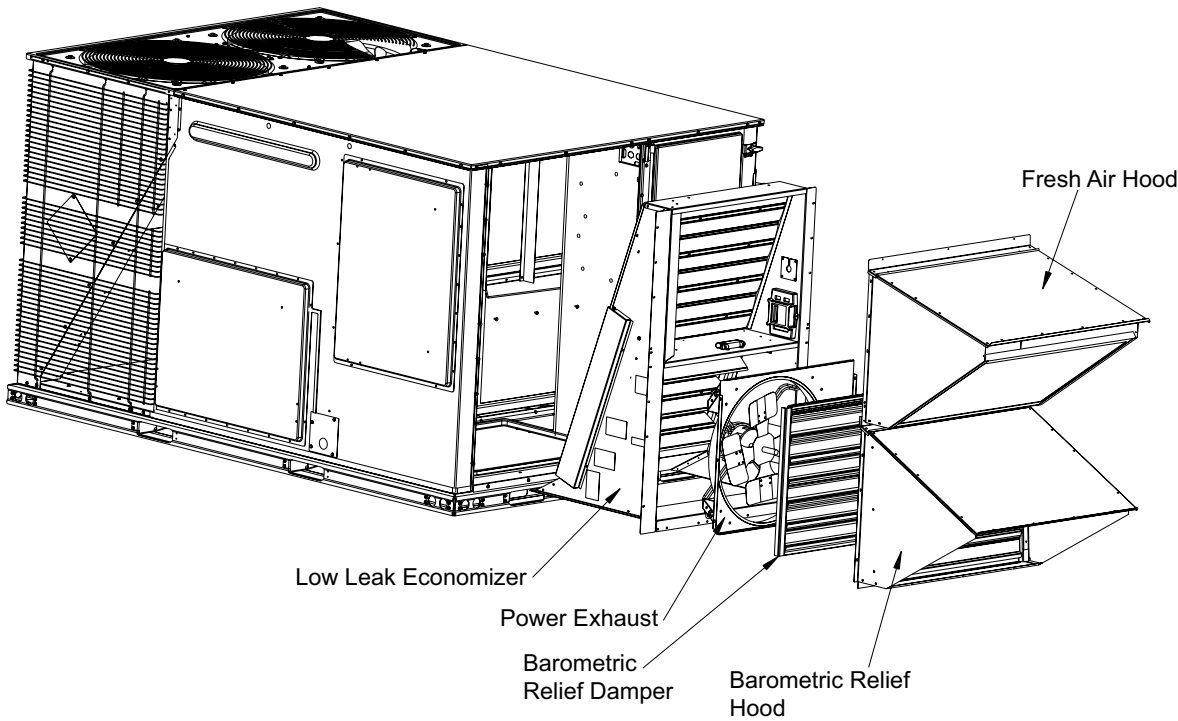
Economizer Options

Economizer Usage

Application	Cabinet Height	Description	Model
Side Return	All	Horizontal economizer without barometric relief	2EE04706924 <sup>1</sup>
Downflow, End Return	42"	Economizer, 42" tall cabinet	2EE04717424 <sup>2</sup>
Horizontal or ERV	50"	Economizer, 50" tall cabinet	2EE04717624 <sup>2</sup>

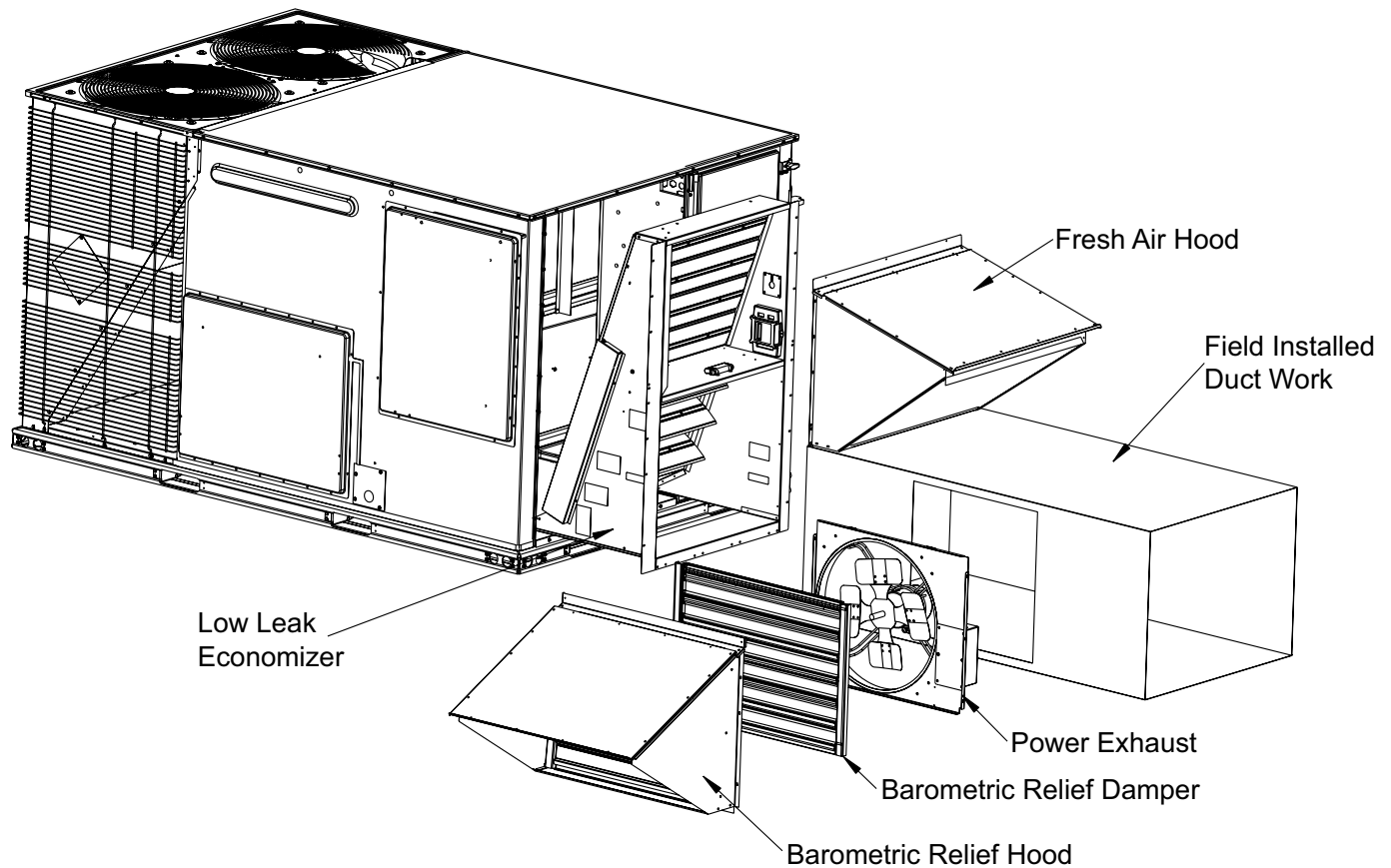
- 1. Barometric relief must be ordered separately and installed in duct work.
- 2. Includes fresh air hood, exhaust hood and barometric relief.

Economizer Downflow W/Power Exhaust

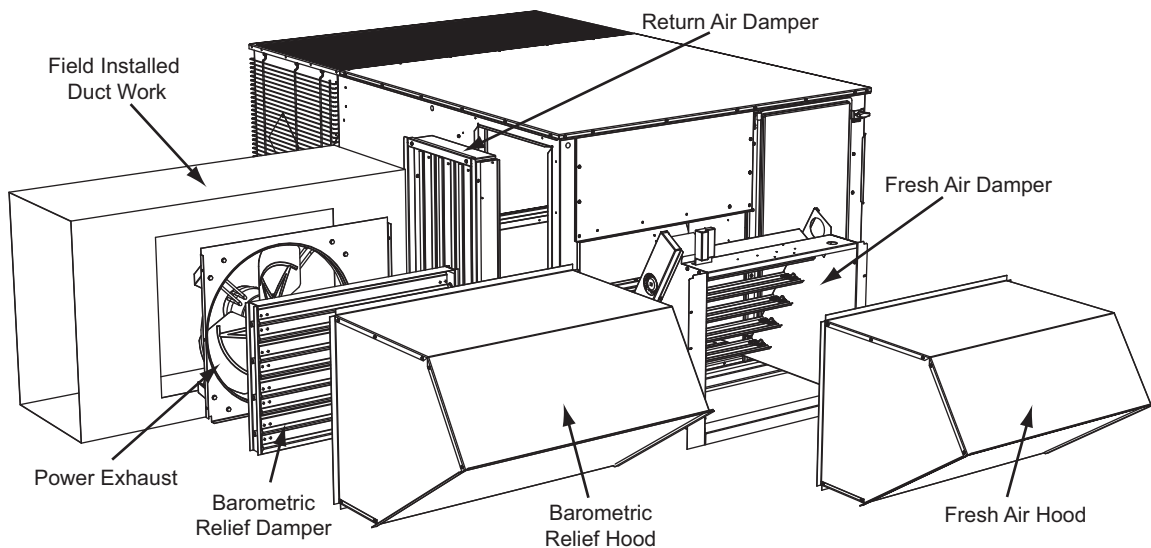




## Economizer End Return W/Power Exhaust



## Field Installed Horizontal Economizer W/Power Exhaust



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Supersedes: Nothing

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