TECHNICAL GUIDE

R-410A
ZF SERIES
7-1/2 THRU 12-1/2 TON
50 Hz (Export)

ZF 7-1/2 AND 10 TON

Description

ASHRAE 90.1 COMPLIANT

YORK® Sun™ Pro units are convertible single packages with a common footprint cabinet and common roof curb for all 7-1/2 through 12-1/2 ton models. All units have two compressors with independent 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, 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, and cooling with gas heat. Electric heaters are available as factory-installed options or field-installed accessories.

All units provide constant supply air volume.

ZF 12-1/2 TON

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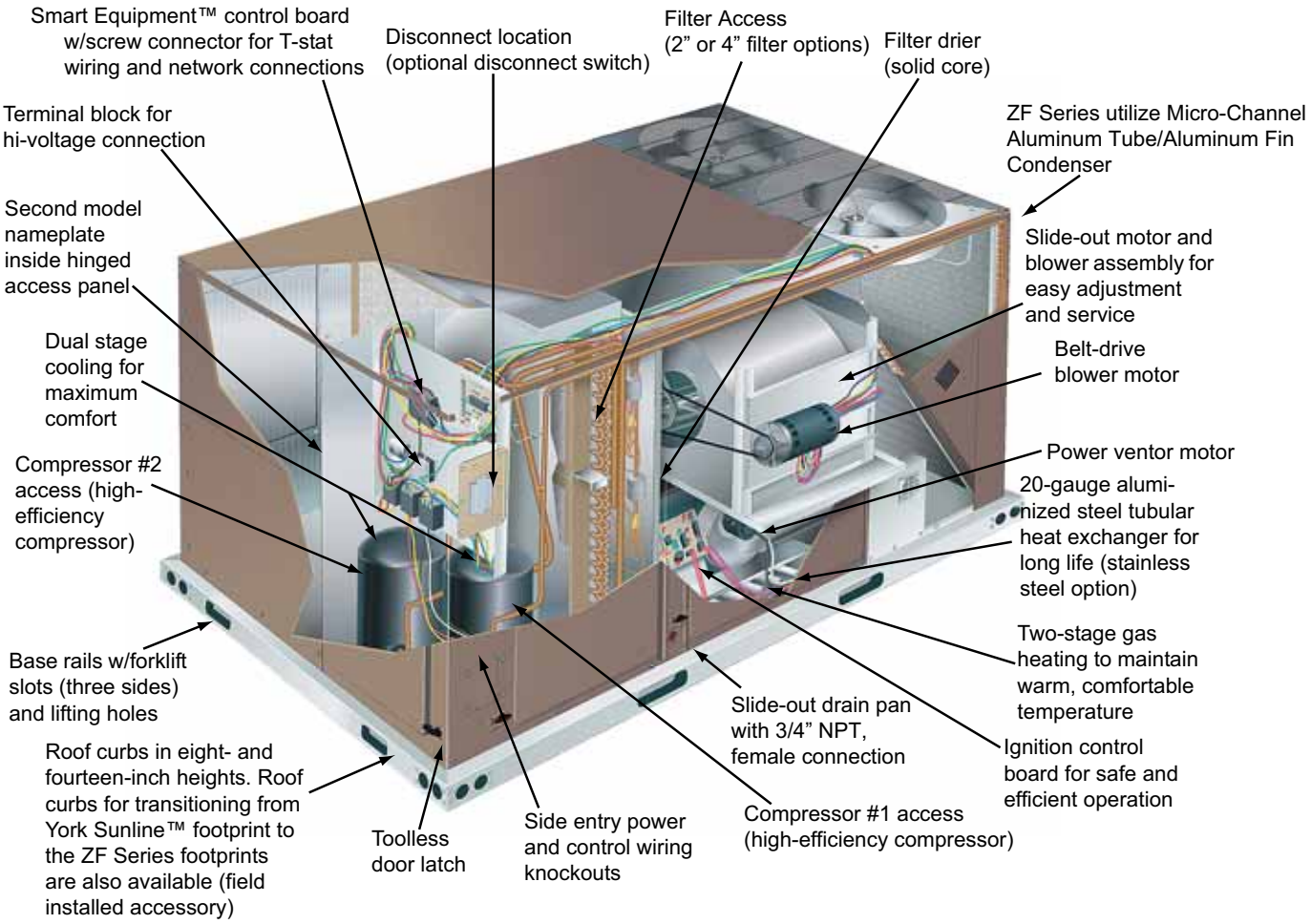
Component Location

Cooling With Gas Heat



Nomenclature

7.5-12.5 Ton York® 50 Hz. Model Number Nomenclature

Z	F	090	C	00	A	7	A	1	A	A	A	1	A	1

Product Category
Z = A/C, Single Pkg., R-410A

Product Identifier
F = Pkg AC Std Eff

Nominal Cooling Capacity
090 = 7.5 Ton
120 = 10.0 Ton
150 = 12.5 Ton

Heat Type
C = Cooling Only
E = Electric Heat

Two Stage Natural Gas Heat Options
N = 2 Stage Gas Aluminized Steel
S = 2 Stage Gas Stainless Steel

Heat Capacity
00 = Cooling Only

Gas MBH Input (Unit Size Allowed)
12 = 120 MBH Input (090)
18 = 180 MBH Input (090,120,150)
24 = 240 MBH Input (120,150)

Electric Heat (Unit Size Allowed)
18 = 18 KW (120,150)
36 = 36 KW (120,150)
24 = 24 KW (120, 150)
54 = 54 KW (120,150)

Blower Option
B = Standard Static
D = High Static

Voltage
7 = 380/415-3-50

Outdoor Air Option
A = No Economizer
B = Economizer w/Barometric RLF
D = Economizer w/Power EXH
H = Motorized Damper

Service Options
1 = No Service Options
2 = DSC (Disconnect Switch)

Sensors
A = No Sensors
B = PHM (Phase Monitor)
C = DFS (Dirty Filter Switch)
D = SSD (Supply Air Smoke DET)
E = RSD (Return Air Smoke DET)
F = PHM,DFS
G = PHM,SSD
H = PHM,RSD
J = DFS,SSD
K = DFS,RSD
L = SSD,RSD
M = PHM,DFS,SSD
N = PHM,DFS,RSD
P = PHM,SSD,RSD
Q = DFS,SSD,RSD
R = PHM,DFS,SSD,RSD

Controls Option
A = Stand Alone Smart Equipment™
C = BACnet MSTP,Mdbs,N2 COM Card
F = Fault Detection Diagnostics

Refrigeration
A = Standard Refrigeration
B = ECC (E-Coat Cond Coil)
C = EEC (E-Coat Evap Coil)
F = ECC,EEC

Additional Options
1 = STD Throwaway Filter
2 = 2" Pleated Filters (Merv 8)
3 = 4" Pleated Filters (Merv 13)
4 = Coil Guard (CG), STD Filter
5 = 2" Pleated Filter,CG
6 = 4" Pleated Filter,CG

Cabinet Options
A = Std Cabinet
E = SSD (SST Drain Pan)

Product Generation
1 = First Generation

Features and Benefits

Standard Features

- **High Efficiency** – High efficiency units reach as high as 11.2 EER. Gas/electric units have electronic spark ignition and power vented combustion with steady state efficiencies of 80%. These efficiencies exceed all legislated minimum levels and provide low operating costs.
- **Service Friendly** – The Sun™ Pro incorporates a number of enhancements which improve 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 the same standard filter size. This standardization removes any confusion on which filter sizes are needed for 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** – ZF condensers utilize Micro-Channel “all aluminum” condensers which provide improved heat transfer capabilities and reduced charge volumes.
- **Environmentally Aware** – For improved Indoor Air Quality, a combination of foil faced and elastometric rubber insulation is used exclusively throughout the units.
- **Balanced Heating** – The Sun™ Pro offers “Ultimate Heating Comfort” with a balance between 1st and 2nd stage gas heating. The first stage of a gas heat Sun™ Pro unit provides 60% of the heating capacity. Balanced heating allows the unit to better maintain desired temperatures.
- **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 reference applications bulletin AE-011-07 or call the applications department for Ducted Systems Products @ 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 Ducted Systems 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 will 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 Sun™ Pro 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 1000 hour salt spray test.
- **Flexible Placement** – All models and configurations share the same cabinet/footprint and thus the same roof curb. You have the flexibility to set one curb and choose the correct tonnage size and heating option after the internal loads have been determined.

  To further simplify planning and installation, Sun™ Pro ZF cabinets are designed to fit your roof. With the optional roof curb, the unit ductwork is designed to fit around 24” on-center joists or between 48” on-center joists.

  The drain pan can be rotated to drain to either the front or the rear of the unit. Additionally, the drain pan can be fitted to drain through the roof curb. As it is sometimes difficult to have a level installation, the drain pan features a generous slope to ensure proper drainage.
- **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 forklift access from 3 sides, and rigging holes are available 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. A clearly identified location is provided to mount a field supplied electrical disconnect switch. 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 indoor fan motors are belt-drive type providing maximum flexibility to handle most airflow requirements. For high static applications, factory installed alternate indoor fan motors are available. With the optional indoor fan motor, all units can supply nominal airflow at a minimum of 1.5” ESP.
- **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 and stainless steel tubular heat exchangers carry a 10-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 enthalpy sensor enables economizer operation if the outdoor enthalpy is less than the setpoint 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 90.1-2010, 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. Factory installed option or field installed accessory.
- **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 (10 & 12.5 Ton Only)** - The electric heaters range from 18KW to 54kW and are available in all the voltage options of the base units. All heaters are dual staged. 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.
- **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. 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 range 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).
- **Novar® BAS Control -** The Novar® building automation system controller is factory installed. Incudes 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, 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, dirty filter indicator switch, and air proving switch.

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 90.1-2010, 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 slab economizers.
- **Power Exhaust** - This accessory installs in the unit with a down flow economizer. Power exhaust plugs into the connector in the unit bulkhead. **You must purchase 1EH0408 barometric relief when applying to a horizontal flow application.**
- **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_2 Sensor** - Senses CO_2 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.
- **-60°F Gas Heat Kit** - For installations which require gas heat units to perform in low ambient temperatures, a gas section heating kit is available. This kit provides electric heat in the gas heat controls section to ensure the gas valve and controls will continue to function properly at extremely low temperatures.
- **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 (10 & 12.5 Ton Only)** - The electric heaters range from 18 kW to 54kW.

  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.
- **Low Limit / Compressor Lockout Kit**
  - **Compressor Lockout (CLO):** To prevent mechanical (compressorized) operation of the unit during cold outdoor conditions where there is a risk of returning liquid refrigerant back to the compressors.
  - **Low Limit Control (LLC):** To prevent the supply air from dropping below a specified setpoint by utilizing the units first stage heating means when there is a demand for cooling during cold outside conditions.
- **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. All units (with or without an economizer) operate with two-stage heat/two-stage cool or two-stage cooling only thermostats, depending upon unit configuration.

Accessories

Field Installed Accessories - Non-Electrical

MODEL	VOLTAGE	DESCRIPTION	WHERE USED
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
1CG0427	All	Coil Guard	(Electric / Electric Models), 42” Tall Cabinets
1CG0428	All	Coil Guard	(Gas / Electric Models), 42" Tall Cabinets
1HG0411	All	Hail Guard Kit	All Tall (50") Standard Cabinets, (Excludes 12.5T "V" cabinets)
1HG0415	All	Hail Guard Kit	All Short (42") Standard Cabinets
1FE0411	All	Flue Exhaust Extension Kit	All Cabinets
1FF0414	All	2" only Metal Filter Frame Kit	All Tall 50" Cabinets
1FF0415	All	2" only Metal Filter Frame Kit	All Tall 42" Cabinets
1FL0402	All	Permanent 2" only Filter Kit Includes (4) Four Filters)	All Tall 50" Cabinets
1FL0423	All	Permanent 2" only Filter Kit (Includes (4) four Filters)	All Tall 42" Cabinets
1GP0405	All	Gas Piping Kit	All Cabinets
1HA0442	All	High Altitude Kit for Natural Gas	All 7 1/2 - 12T Cabinets
1HA0443	All	High Altitude Kit for Propane	All 7 1/2 - 12T Cabinets
1NP0442	All	Propane Conversion Kit	All 6 - 12T 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 3- 12T)	All Cabinets
1WC0412	All	Wooden Crate for extra protection during shipping and handling	Standard Cabinets Only (not applicable to units 119" in length)

Field Installed Accessories - Electric Heat

MODEL	VOLTAGE	DESCRIPTION	WHERE USED
2TP04521850	380/415-3-50	18kW Electric Heat	All 50" Cabinet 10 Ton Models
2TP04522450	380/415-3-50	24kW Electric Heat	All 50" Cabinet 10 and 12.5 Ton Models
2TP04523650	380/415-3-50	36kW Electric Heat	All 50" Cabinet 10 and 12.5 Ton Models
2TP04525450	380/415-3-50	54kW Electric Heat	All 50" Cabinet 10 and 12.5 Ton Models

*__Note:__ No factory or field installed electric heater available for 42” Cabinet ZF090

Accessories (Continued)

Field Installed Accessories - Fresh Air

MODEL	VOLTAGE	DESCRIPTION	WHERE USED
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
2EE04707624	All	Economizer for Downflow, End Return Horizontal, or ERV Applications. Includes FA Hood, Exhaust Hood w/ Baro Relief	All 50" Cabinets
2EE04707424	All	Economizer for Downflow, End Return Horizontal, or ERV Applications. Includes FA Hood, Exhaust Hood w/ Baro Relief	All 42" 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
2PE04704758*	575	Power Exhaust 575V Downflow or Horizontal	All Cabinets

*** Must be installed in return Duct on Horizontal Applications and a 1EH0408 is required. Approved for operation on 50Hz**

Field Installed Accessories - Controls

MODEL	VOLTAGE	DESCRIPTION	WHERE USED
2AP0401	All	Air Proving Switch	All Units
2AQ04700324	All	CO2 Space Accessory	All Units
2AQ04700424	All	CO2 Unit Accessory	All Units
2DF0402	All	Dirty Air Switch	All Units
2SH0401	All	Wall Mounted humidity sensor-For use with MagnaDry Reheat or space humidity input to Smart Equipment™ board.	All Cabinets
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 (Multiple Access Portal) Gateway Kit- Replacement MAP gateway protective case, lanyard and communication cable. Use only to replace worn or damaged components.	All Units

Field Installed Accessories - Electrical

MODEL	VOLTAGE	DESCRIPTION	WHERE USED
2BC04700106	230	Gas heat kit, -60ºF	All Units
2BC04700151	460	Gas heat kit, -60ºF	All Units
2BC04700154	575	Gas heat kit, -60ºF	All Units
2LA04704632	All	Low Ambient Kit	All 3 - 10T units (excludes 12.5T "V" cabinets)

Guide Specifications

GENERAL

Units shall be manufactured by York International Ducted Systems Products in an ISO 9001 certified facility. YORK® Sun™ Pro units are convertible single packages with a common footprint cabinet and common roof curb for all 7-1/2 through 12-1/2 ton models. All 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, heat pump, and heat pump with electric 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 and MEW-2010.

UNIT CABINET

Unit cabinet shall be constructed of galvanized steel with exterior surfaces coated with a non-chalking, powder paint finish, certified at 1000 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 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 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:

c. Loss-of-charge/Low-pressure switch.

- High-pressure switch.
- Freeze-protection thermostat, evaporator coil. If any of the above safety devices trip, an LED (light-emitting diode) indicator shall flash a diagnostic code that indicates which safety switch has tripped.

d. Unit shall incorporate "AUTO RESET" compressor over temperature, over current protection.

e. Unit shall operate with conventional thermostat designs and have a low voltage terminal strip for easy hook-up.

f. Unit control board shall have on-board diagnostics and fault code display.

g. Standard controls shall include anti-short cycle and low voltage protection, and permit cooling operation down to 0 ºF.

h. Control board shall monitor each refrigerant safety switch independently.

i. Control board shall retain last 5 fault codes in non-volatile memory, which will not be lost in the event of a power loss.

GAS HEATING SECTION (IF EQUIPPED)

Heat exchanger and exhaust system shall be constructed of aluminized steel and shall 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 ºF. 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 units shall have two independent stages of capacity (60% 1st stage, 100% 2nd stage).

ELECTRIC HEATING SECTION (IF EQUIPPED)

An electric heating section, with nickel chromium elements, shall be provided in a range of 18 thru 54 KW, offering two states of capacity all sizes. 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 ºF outdoor temperature, exceeding maximum load criteria of AHRI Standard 340/360. The compressor, with standard controls, shall be capable of operation down to 0 ºF 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

FACTORY INSTALLED 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 90.1-2010, 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.
- **MOTORIZED OUTDOOR AIR DAMPERS** – Outdoor and return air dampers that are interlocked and positioned by a 2-position, spring-return damper actuator. The maximum leakage rate for the outdoor air intake dampers shall not exceed 2% when dampers are fully closed and operating against a pressure differential of 0.5 IWG. 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.
- **ELECTRIC HEAT (10 & 12.5 Ton Only)** - Electric Heaters range from 18 kW to 54 kW 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** - 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.
- **60ºF GAS HEAT KIT** – Provides an electric heat kit for the gas compartment for use in extreme low ambient conditions.
- **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

ZF090-150 Physical Data

Component	Models					
	ZF090		ZF120		ZF150	
Nominal Tonnage	**7.5**		**10**		**12.5**	
Gross Capacity @ AHRI A point (Mbh)	88200		115300		151500	
EER	11.2		11.2		11.0	
Nominal CFM	3000		4000		5000	
System power (KW)	7.21		10.05		12.7	
Refrigerant type	R-410A		R-410A		R-410A	
Refrigerant charge (lb-oz)						
System 1	4-12		7-12		8-3	
System 2	4-12		7-8		8-10	
AHRI HEATING PERFORMANCE						
Heating model	N12	N18	N18	N24	N18	N24
Heat input (K Btu)	120	180	180	240	180	240
Heat output (K Btu)	96	144	144	192	144	192
AFUE %	-	-	-	-	-	-
Steady state efficiency (%)	80	80	80	80	80	80
No. burners	4	6	6	8	6	8
No. stages	2[1]	2[1]	2[1]	2[1]	2[1]	2[1]
Temperature Rise Range (ºF)	15-45	30-60	20-50	35-65	10-40	25-55
Gas Limit Setting (ºF)	165	165	195	160	195	160
Gas piping connection (in.)	3/4	3/4	3/4	3/4	3/4	3/4
DIMENSIONS (inches)						
Length	89		89		119-1/2	
Width	59		59		59	
Height	42		50-3/4		50-3/4	
OPERATING WT. (lbs.)	880		1060		1253	
COMPRESSORS						
Type	Scroll		Scroll		Scroll	
Quantity	2		2		2	
Unit Capacity Steps (%)	50 / 100		50 / 100		50 / 100	
CONDENSER COIL DATA						
Face area (Sq. Ft.)	18.5		29.0		29.0	
Rows	1		1		1	
Fins per inch	23		23		23	
Tube diameter (in.)/mm	.71/18		1/25		1/25	
Circuitry Type	2-pass Microchannel		2-pass Microchannel		2-pass Microchannel	
EVAPORATOR COIL DATA						
Face area (Sq. Ft.)	10.6		13.2		13.2	
Rows	3		4		4	
Fins per inch	15		15		15	
Tube diameter	0.375		0.375		0.375	
Circuitry Type	Intertwined		Intertwined		Intertwined	
Refrigerant control	TXV		TXV		TXV	

ZF090-150 Physical Data (Continued)

Component	Models				
	ZF090		ZF120		ZF150
Nominal Tonnage	**7.5**		**10**		**12.5**
CONDENSER FAN DATA					
Quantity of Fans	2		2		4
Fan diameter (Inch)	24		24		24
Type	Prop		Prop		Prop
Drive type	Direct		Direct		Direct
Quantity of motors	2		2		4
Motor HP each @ 50 Hz.	3/4		3/4		3/4
No. speeds	1		1		1
RPM @ 50 Hz.	940[2]		940[2]		940[2]
Nominal total CFM	7600		9500		13900
BELT DRIVE EVAP FAN DATA					
Quantity	1		1		1
Fan Size (Inch)	12 x 12		15 x 15		15 x 15
Type	Centrifugal		Centrifugal		Centrifugal
Motor Sheave	1VM50	1VM50	1VM50	1VP56	1VP56
Blower Sheave	AK59	AK54	AK74	AK66	BK72
Belt	A49	A47	A54	A56	BX56
Motor HP each @ 50 Hz.	2	2	2	4	4
RPM @ 50 Hz.	1425[3]	1425[3]	1425[3]	1455[3]	1455[3]
Frame size	56	56	56	184T	184T
FILTERS					
Quantity - Size	4 - (24 x 16 x 2)[4, 5]		4 - (24 x 20 x 2)[4,5]		4 - (24 x 20 x 2)[4, 5]
	4 - (24 x 16 x 4)[6]		4 - (24 x 20 x 4)[6]		4 - (24 x 20 x 4)[6]

1. 1ST Stage 60% of 2nd Stage
2. 1110 RPM 60 Hz.
3. 1725 RPM 60 Hz.
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

ZF078-150 Unit Limitations

Size (Tons/KW)	Model	Unit Voltage	Unit Limitations		
			Applied Voltage		Outdoor DB Temp
			Min	Max	Max (°F/°C)
090 (7.5/26)	ZF	380/415-3-50	342	457	125/52
120 (10/35)	ZF	380/415-3-50	342	457	125/52
150 (12.5/44)	ZF	380/415-3-50	342	457	125/52

Capacity Performance

ZF090-150 Cooling Capacities

ZF090 (7.5 Ton) Imperial

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
		Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh)						Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh)					
CFM	WB (°F)			Return Dry Bulb (°F)								Return Dry Bulb (°F)					
				90	85	80	75	70	65			90	85	80	75	70	65
		85°F								**95°F**							
	77	105.2	6.36	45.4	36.2	33.7	-	-	-	102.4	7.01	45.6	36.3	27.0	-	-	-
	72	98.1	6.35	58.7	49.6	45.4	31.2	-	-	94.4	6.99	59.0	49.7	40.4	31.0	-	-
2250	67	90.9	6.33	72.1	62.9	57.1	44.5	35.4	-	86.4	6.98	72.4	63.1	53.7	44.4	35.1	-
	62	82.9	6.33	79.2	76.7	71.5	58.3	49.1	39.9	79.2	6.97	79.2	76.8	67.5	58.1	48.8	39.5
	57	82.6	5.78	78.7	78.7	76.4	63.0	53.9	44.7	78.7	6.96	78.7	78.7	72.2	62.9	53.6	44.2
	77	108.4	6.86	48.1	38.7	35.9	-	-	-	104.1	7.19	57.7	43.5	29.3	-	-	-
	72	101.0	6.85	63.7	53.8	48.3	34.0	-	-	95.9	7.17	63.9	53.9	43.9	33.9	-	-
2625	67	93.6	6.84	79.4	68.9	60.7	48.0	37.5	-	87.8	7.16	70.1	64.3	58.4	52.6	46.8	-
	62	85.4	6.83	80.5	79.2	76.0	62.6	51.8	41.0	80.5	7.15	80.5	79.3	73.4	62.6	51.8	40.9
	57	85.0	6.25	80.0	80.0	81.2	67.4	56.3	45.1	80.0	7.15	80.0	80.0	78.6	67.3	56.0	44.7
	77	111.5	7.42	50.8	41.2	38.0	-	-	-	105.8	7.42	69.8	50.8	31.7	-	-	-
	72	103.9	7.40	68.7	58.1	51.1	36.8	-	-	97.5	7.41	68.8	58.1	47.4	36.7	-	-
3000	67	96.3	7.39	86.7	74.9	64.3	51.4	39.6	-	89.3	7.39	67.8	65.5	63.1	60.8	58.5	-
	62	87.9	7.38	81.8	81.8	80.4	66.9	54.4	42.0	81.8	7.38	81.8	81.8	79.3	67.0	54.7	42.4
	57	87.5	6.77	81.3	81.3	86.0	71.8	58.7	45.6	81.3	7.38	81.3	81.3	84.9	71.7	58.4	45.2
	77	112.9	7.43	58.7	44.9	40.3	-	-	-	107.3	7.74	68.1	49.6	33.4	-	-	-
	72	105.2	7.41	74.0	62.0	54.3	38.0	-	-	98.9	7.73	73.9	62.0	50.0	38.0	-	-
3325	67	97.5	7.40	89.2	79.1	68.3	54.0	41.4	-	90.5	7.71	79.8	74.3	66.6	58.8	51.0	-
	62	88.9	7.39	83.0	83.0	85.2	68.8	55.9	43.1	83.0	7.70	83.0	83.0	81.7	68.9	56.2	43.4
	57	88.6	6.81	82.5	82.5	87.8	71.0	57.8	44.6	82.5	7.70	82.5	82.5	84.3	71.0	57.8	44.6
	77	114.2	7.43	66.7	48.5	42.7	-	-	-	108.8	8.06	66.3	48.4	35.1	-	-	-
	72	106.4	7.42	79.2	65.9	57.5	39.2	-	-	100.3	8.05	79.1	65.8	52.6	39.3	-	-
3650	67	98.7	7.41	91.8	83.3	72.3	56.6	43.3	-	91.8	8.03	91.8	83.2	70.0	56.7	43.5	-
	62	90.0	7.40	84.1	84.1	90.0	70.8	57.4	44.1	84.1	8.02	84.1	84.1	84.1	70.9	57.6	44.4
	57	89.6	6.85	83.6	83.6	89.6	70.3	56.9	43.6	83.6	8.02	83.6	83.6	83.6	70.4	57.1	43.9
		105°F								**115°F**							
	77	96.0	7.80	42.6	33.4	24.1	-	-	-	89.6	8.60	39.6	30.4	21.3	-	-	-
	72	88.3	7.79	55.9	46.6	37.3	28.1	-	-	82.2	8.59	52.7	43.5	34.3	25.1	-	-
2250	67	80.6	7.78	69.1	59.8	50.6	41.3	32.0	-	74.8	8.57	65.8	56.6	47.4	38.2	29.0	-
	62	73.9	7.77	73.9	72.8	63.5	54.2	45.0	35.7	68.7	8.58	68.7	68.7	59.5	50.3	41.1	32.0
	57	73.6	7.77	73.6	73.6	67.4	58.2	48.9	39.6	68.4	8.58	68.4	68.4	62.6	53.4	44.2	35.0
	77	97.4	7.98	50.6	38.1	26.4	-	-	-	90.8	8.78	43.5	32.7	23.4	-	-	-
	72	89.6	7.97	60.7	50.7	40.8	30.9	-	-	83.3	8.77	57.4	47.6	37.8	28.0	-	-
2625	67	81.8	7.96	70.7	63.4	55.3	47.2	39.1	-	75.8	8.75	71.3	62.5	52.2	41.8	31.5	-
	62	75.0	7.95	75.0	74.5	69.5	58.7	47.9	37.1	69.6	8.76	69.6	69.6	65.5	54.8	44.0	33.2
	57	74.7	7.95	74.7	74.7	73.7	62.6	51.4	40.2	69.3	8.76	69.3	69.3	68.9	57.9	46.8	35.7
	77	98.9	8.21	58.6	42.8	28.6	-	-	-	92.0	9.01	47.4	34.9	25.5	-	-	-
	72	90.9	8.20	65.4	54.9	44.3	33.8	-	-	84.4	9.00	62.1	51.7	41.2	30.8	-	-
3000	67	83.0	8.19	72.3	66.9	60.0	53.1	46.2	-	76.7	8.98	76.7	68.4	56.9	45.4	34.0	-
	62	76.2	8.18	76.2	76.2	75.4	63.1	50.7	38.4	70.5	8.99	70.5	70.5	71.6	59.2	46.8	34.4
	57	75.8	8.18	75.8	75.8	80.1	67.0	53.9	40.8	70.2	8.99	70.2	70.2	75.3	62.3	49.3	36.4
	77	100.3	8.53	61.9	43.8	30.1	-	-	-	93.3	9.33	55.7	38.0	26.8	-	-	-
	72	92.2	8.52	70.4	58.5	46.6	34.8	-	-	85.6	9.31	66.8	55.0	43.3	31.5	-	-
3325	67	84.2	8.51	78.8	73.2	63.2	53.1	43.1	-	77.9	9.30	77.9	72.0	59.7	47.4	35.1	-
	62	77.3	8.50	77.3	77.3	76.9	64.1	51.4	38.6	71.6	9.30	71.6	71.6	72.1	59.3	46.6	33.8
	57	76.9	8.50	76.9	76.9	79.0	65.9	52.7	39.6	71.3	9.30	71.3	71.3	73.8	60.7	47.7	34.7
	77	101.7	8.85	65.2	44.8	31.6	-	-	-	94.7	9.65	64.1	41.2	28.1	-	-	-
	72	93.6	8.84	75.3	62.1	48.9	35.7	-	-	86.9	9.63	71.6	58.4	45.3	32.2	-	-
3650	67	85.4	8.83	85.4	79.5	66.3	53.1	39.9	-	79.0	9.62	79.0	75.7	62.6	49.4	36.3	-
	62	78.4	8.82	78.4	78.4	78.4	65.2	52.0	38.8	72.6	9.62	72.6	72.6	72.6	59.5	46.4	33.2
	57	78.0	8.82	78.0	78.0	78.0	64.8	51.6	38.4	72.3	9.62	72.3	72.3	72.3	59.2	46.1	32.9

ZF090 (7.5 Ton) Imperial (Continued)

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
		Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh) Return Dry Bulb (°F)						Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh) Return Dry Bulb (°F)					
CFM	WB (°F)			90	85	80	75	70	65			90	85	80	75	70	65
		118.4°F								**125°F**							
2250	77	88.3	8.85	33.5	26.8	20.2	-	-	-	85.8	9.48	21.5	19.8	18.1	-	-	-
	72	80.4	8.84	46.7	40.1	33.4	26.8	-	-	76.9	9.47	35.1	33.4	31.6	29.9	-	-
	67	72.5	8.84	59.9	53.3	46.6	40.0	33.3	-	68.0	9.45	48.6	46.9	45.2	43.5	41.7	-
	62	68.0	8.83	64.0	63.4	56.8	50.1	43.5	36.8	66.8	9.45	54.8	53.1	51.4	49.7	47.9	46.2
	57	67.8	8.83	64.2	63.6	59.2	52.5	45.9	39.2	66.6	9.45	55.9	54.2	52.5	50.8	49.1	47.4
2625	77	89.2	9.04	36.7	29.1	22.5	-	-	-	86.1	9.66	23.3	22.1	20.8	-	-	-
	72	81.5	9.03	50.8	43.8	36.8	29.8	-	-	78.0	9.64	38.0	36.4	34.8	33.3	-	-
	67	73.7	9.02	64.9	58.5	51.0	43.6	36.1	-	69.8	9.63	52.6	50.8	48.9	47.0	45.1	-
	62	68.9	9.02	66.6	65.9	62.5	54.7	46.9	39.0	67.7	9.63	60.6	58.6	56.6	54.5	52.5	50.4
	57	68.7	9.01	66.8	66.1	65.1	57.2	49.2	41.2	67.5	9.63	61.8	59.8	57.8	55.8	53.8	51.7
3000	77	90.1	9.28	39.8	31.3	24.8	-	-	-	86.4	9.88	25.1	24.3	23.5	-	-	-
	72	82.5	9.26	54.9	47.5	40.1	32.8	-	-	79.0	9.87	40.9	39.5	38.0	36.6	-	-
	67	75.0	9.26	69.9	63.7	55.5	47.2	38.9	-	71.6	9.86	56.7	54.6	52.6	50.5	48.5	-
	62	69.8	9.25	69.2	68.3	68.2	59.2	50.2	41.3	68.5	9.86	66.5	64.1	61.7	59.4	57.0	54.6
	57	69.6	9.24	69.4	68.6	71.1	61.8	52.4	43.1	68.4	9.86	67.8	65.4	63.1	60.8	58.4	56.1
3325	77	91.7	9.60	45.7	33.5	25.5	-	-	-	88.6	10.20	26.2	24.7	23.1	-	-	-
	72	83.7	9.59	58.9	50.5	42.1	33.7	-	-	80.1	10.19	43.6	41.8	39.9	38.0	-	-
	67	75.8	9.58	72.2	67.6	58.7	49.9	41.0	-	71.7	10.18	61.1	58.9	56.7	54.5	52.4	-
	62	70.9	9.57	70.5	70.1	69.6	60.4	51.2	42.0	69.6	10.17	68.5	67.1	64.8	62.4	60.1	57.8
	57	70.6	9.56	70.5	70.1	71.2	61.8	52.4	43.0	69.4	10.17	69.1	67.9	66.2	63.9	61.6	59.3
3650	77	93.3	9.92	51.6	35.7	26.2	-	-	-	90.7	10.51	27.3	25.0	22.7	-	-	-
	72	85.0	9.91	63.0	53.6	44.1	34.7	-	-	81.3	10.51	46.4	44.1	41.8	39.5	-	-
	67	76.6	9.90	74.4	71.4	62.0	52.5	43.1	-	71.9	10.50	65.5	63.2	60.8	58.5	56.2	-
	62	71.9	9.89	71.9	71.8	71.0	61.5	52.1	42.6	70.6	10.49	70.6	70.2	67.8	65.5	63.2	60.9
	57	71.7	9.88	71.7	71.7	71.3	61.8	52.4	42.9	70.4	10.49	70.4	70.4	69.3	67.0	64.7	62.4

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. Capacity rating are based on 80 F (26.6 C) Entering Air Dry Bulb Temperature.
3. These ratings include the condenser fan motors, the compressor motors and supply air blower motor (External Static Pressure 0.25 IWG/ 62.3 Pa).

ZF090 (26 kW) Metric

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
				Sensible Capacity (kW)								Sensible Capacity (kW)					
m^3/s	WB (°C)	Total Capacity[1,2] (kW)	Total Input (kW)[3]	Return Dry Bulb (°C)						Total Capacity[1,2] (kW)	Total Input (kW)[3]	Return Dry Bulb (°C)					
				32	29	27	24	21	18			32	29	27	24	21	18
		29°C								35°C							
	25	30.8	6.36	13.3	10.6	9.9	-	-	-	30.0	7.01	13.4	10.6	7.9	-	-	-
	22	28.7	6.35	17.2	14.5	13.3	9.1	-	-	27.7	6.99	17.3	14.6	11.8	9.1	-	-
1.06	19	26.6	6.33	21.1	18.4	16.7	13.1	10.4	-	25.3	6.98	21.2	18.5	15.8	13.0	10.3	-
	17	24.3	6.33	23.2	22.5	20.9	17.1	14.4	11.7	23.2	6.97	23.2	22.5	19.8	17.0	14.3	11.6
	14	24.2	5.78	23.1	23.1	22.4	18.5	15.8	13.1	23.1	6.96	23.1	23.1	21.2	18.4	15.7	13.0
	25	31.8	6.86	14.1	11.3	10.5	-	-	-	30.5	7.19	16.9	12.8	8.6	-	-	-
	22	29.6	6.85	18.7	15.8	14.1	10.0	-	-	28.1	7.17	18.7	15.8	12.9	9.9	-	-
1.24	19	27.4	6.84	23.3	20.2	17.8	14.1	11.0	-	25.7	7.16	20.5	18.8	17.1	15.4	13.7	-
	17	25.0	6.83	23.6	23.2	22.3	18.3	15.2	12.0	23.6	7.15	23.6	23.2	21.5	18.3	15.2	12.0
	14	24.9	6.25	23.5	23.5	23.8	19.8	16.5	13.2	23.5	7.14	23.5	23.5	23.0	19.7	16.4	13.1
	25	32.7	7.42	14.9	12.1	11.1	-	-	-	31.0	7.42	20.5	14.9	9.3	-	-	-
	22	30.5	7.40	20.1	17.0	15.0	10.8	-	-	28.6	7.40	20.2	17.0	13.9	10.8	-	-
1.42	19	28.2	7.39	25.4	22.0	18.8	15.1	11.6	-	26.2	7.39	19.9	19.2	18.5	17.8	17.1	-
	17	25.8	7.38	24.0	24.0	23.6	19.6	16.0	12.3	24.0	7.38	24.0	24.0	23.2	19.6	16.0	12.4
	14	25.6	6.77	23.8	23.8	25.2	21.0	17.2	13.4	23.8	7.38	23.8	23.8	24.9	21.0	17.1	13.3
	25	33.1	7.43	17.2	13.1	11.8	-	-	-	31.4	7.74	20.0	14.5	9.8	-	-	-
	22	30.8	7.41	21.7	18.2	15.9	11.1	-	-	29.0	7.73	21.7	18.2	14.6	11.1	-	-
1.57	19	28.6	7.40	26.2	23.2	20.0	15.8	12.1	-	26.5	7.71	23.4	21.8	19.5	17.2	14.9	-
	17	26.1	7.39	24.3	24.3	25.0	20.2	16.4	12.6	24.3	7.70	24.3	24.3	23.9	20.2	16.5	12.7
	14	26.0	6.81	24.2	24.2	25.7	20.8	16.9	13.1	24.2	7.70	24.2	24.2	24.7	20.8	16.9	13.1
	25	33.5	7.43	19.6	14.2	12.5	-	-	-	31.9	8.06	19.4	14.2	10.3	-	-	-
	22	31.2	7.42	23.2	19.3	16.8	11.5	-	-	29.4	8.05	23.2	19.3	15.4	11.5	-	-
1.72	19	28.9	7.41	26.9	24.4	21.2	16.6	12.7	-	26.9	8.03	26.9	24.4	20.5	16.6	12.7	-
	17	26.4	7.40	24.7	24.7	26.4	20.7	16.8	12.9	24.7	8.02	24.7	24.7	24.7	20.8	16.9	13.0
	14	26.3	6.85	24.5	24.5	26.3	20.6	16.7	12.8	24.5	8.02	24.5	24.5	24.5	20.6	16.7	12.9
		41°C								46°C							
	25	28.1	7.78	12.5	9.8	7.1	-	-	-	26.3	8.56	11.6	8.9	6.2	-	-	-
	22	25.9	7.78	16.4	13.7	10.9	8.2	-	-	24.1	8.57	15.4	12.8	10.1	7.4	-	-
1.06	19	23.6	7.78	20.2	17.5	14.8	12.1	9.4	-	21.9	8.57	19.3	16.6	13.9	11.2	8.5	-
	17	21.7	7.77	21.7	21.3	18.6	15.9	13.2	10.5	20.1	8.58	20.1	20.1	17.4	14.8	12.1	9.4
	14	21.6	7.77	21.6	21.6	19.8	17.0	14.3	11.6	20.0	8.58	20.0	20.0	18.4	15.7	13.0	10.3
	25	28.6	7.96	14.8	11.2	7.7	-	-	-	26.6	8.74	12.8	9.6	6.9	-	-	-
	22	26.3	7.96	17.8	14.9	12.0	9.1	-	-	24.4	8.75	16.8	13.9	11.1	8.2	-	-
1.24	19	24.0	7.96	20.7	18.6	16.2	13.8	11.5	-	22.2	8.75	20.9	18.3	15.3	12.3	9.2	-
	17	22.0	7.95	22.0	21.8	20.4	17.2	14.0	10.9	20.4	8.76	20.4	20.4	19.2	16.0	12.9	9.7
	14	21.9	7.95	21.9	21.9	21.6	18.3	15.1	11.8	20.3	8.76	20.3	20.3	20.2	17.0	13.7	10.5
	25	29.0	8.19	17.2	12.6	8.4	-	-	-	27.0	8.97	13.9	10.2	7.5	-	-	-
	22	26.6	8.19	19.2	16.1	13.0	9.9	-	-	24.7	8.98	18.2	15.1	12.1	9.0	-	-
1.42	19	24.3	8.19	21.2	19.6	17.6	15.6	13.5	-	22.5	8.98	22.5	20.1	16.7	13.3	10.0	-
	17	22.3	8.18	22.3	22.3	22.1	18.5	14.9	11.3	20.7	8.99	20.7	20.7	21.0	17.3	13.7	10.1
	14	22.2	8.18	22.2	22.2	23.5	19.6	15.8	12.0	20.6	8.99	20.6	20.6	22.1	18.3	14.5	10.7
	25	29.4	8.51	18.1	12.8	8.8	-	-	-	27.4	9.29	16.3	11.2	7.9	-	-	-
	22	27.0	8.51	20.6	17.1	13.7	10.2	-	-	25.1	9.29	19.6	16.1	12.7	9.2	-	-
1.57	19	24.7	8.51	23.1	21.5	18.5	15.6	12.6	-	22.8	9.30	22.8	21.1	17.5	13.9	10.3	-
	17	22.6	8.50	22.6	22.6	22.5	18.8	15.1	11.3	21.0	9.30	21.0	21.0	21.1	17.4	13.6	9.9
	14	22.5	8.50	22.5	22.5	23.2	19.3	15.5	11.6	20.9	9.30	20.9	20.9	21.6	17.8	14.0	10.2
	25	29.8	8.83	19.1	13.1	9.3	-	-	-	27.8	9.61	18.8	12.1	8.2	-	-	-
	22	27.4	8.83	22.1	18.2	14.3	10.5	-	-	25.5	9.61	21.0	17.1	13.3	9.4	-	-
1.72	19	25.0	8.83	25.0	23.3	19.4	15.6	11.7	-	23.2	9.62	23.2	22.2	18.3	14.5	10.6	-
	17	23.0	8.82	23.0	23.0	23.0	19.1	15.2	11.4	21.3	9.62	21.3	21.3	21.3	17.4	13.6	9.7
	14	22.9	8.82	22.9	22.9	22.9	19.0	15.1	11.3	21.2	9.62	21.2	21.2	21.2	17.3	13.5	9.7

ZF090 (26 kW) Metric (Continued)

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
		Total Capacity[1,2] (kW)	Total Input (kW)[3]	Sensible Capacity (kW) Return Dry Bulb (°C)						Total Capacity[1,2] (kW)	Total Input (kW)[3]	Sensible Capacity (kW) Return Dry Bulb (°C)					
m^3/s	WB (°C)			32	29	27	24	21	18			32	29	27	24	21	18
		48°C								52°C							
1.06	25	25.9	8.85	9.8	7.9	5.9	-	-	-	25.2	9.48	6.3	5.8	5.3	-	-	-
	22	23.6	8.84	13.7	11.7	9.8	7.8	-	-	22.5	9.47	10.3	9.8	9.3	8.8	-	-
	19	21.2	8.84	17.6	15.6	13.7	11.7	9.8	-	19.9	9.45	14.2	13.7	13.2	12.7	12.2	-
	17	19.9	8.83	18.7	18.6	16.6	14.7	12.7	10.8	19.6	9.45	16.1	15.6	15.1	14.6	14.0	13.5
	14	19.9	8.83	18.8	18.6	17.3	15.4	13.4	11.5	19.5	9.45	16.4	15.9	15.4	14.9	14.4	13.9
1.24	25	26.1	9.04	10.7	8.5	6.6	-	-	-	25.2	9.66	6.8	6.5	6.1	-	-	-
	22	23.9	9.03	14.9	12.8	10.8	8.7	-	-	22.8	9.64	11.1	10.7	10.2	9.7	-	-
	19	21.6	9.02	19.0	17.1	15.0	12.8	10.6	-	20.5	9.63	15.4	14.9	14.3	13.8	13.2	-
	17	20.2	9.02	19.5	19.3	18.3	16.0	13.7	11.4	19.8	9.63	17.8	17.2	16.6	16.0	15.4	14.8
	14	20.1	9.01	19.6	19.4	19.1	16.8	14.4	12.1	19.8	9.63	18.1	17.5	16.9	16.3	15.8	15.2
1.42	25	26.4	9.28	11.7	9.2	7.3	-	-	-	25.3	9.88	7.4	7.1	6.9	-	-	-
	22	24.2	9.26	16.1	13.9	11.8	9.6	-	-	23.1	9.87	12.0	11.6	11.1	10.7	-	-
	19	22.0	9.26	20.5	18.7	16.3	13.8	11.4	-	21.0	9.86	16.6	16.0	15.4	14.8	14.2	-
	17	20.5	9.25	20.3	20.0	20.0	17.4	14.7	12.1	20.1	9.86	19.5	18.8	18.1	17.4	16.7	16.0
	14	20.4	9.24	20.3	20.1	20.8	18.1	15.4	12.6	20.0	9.86	19.9	19.2	18.5	17.8	17.1	16.4
1.57	25	26.9	9.60	13.4	9.8	7.5	-	-	-	26.0	10.20	7.7	7.2	6.8	-	-	-
	22	24.5	9.59	17.3	14.8	12.3	9.9	-	-	23.5	10.19	12.8	12.2	11.7	11.1	-	-
	19	22.2	9.58	21.2	19.8	17.2	14.6	12.0	-	21.0	10.18	17.9	17.3	16.6	16.0	15.3	-
	17	20.8	9.57	20.7	20.5	20.4	17.7	15.0	12.3	20.4	10.17	20.1	19.7	19.0	18.3	17.6	16.9
	14	20.7	9.56	20.7	20.6	20.9	18.1	15.4	12.6	20.3	10.17	20.2	19.9	19.4	18.7	18.0	17.4
1.72	25	27.4	9.92	15.1	10.5	7.7	-	-	-	26.6	10.51	8.0	7.3	6.7	-	-	-
	22	24.9	9.91	18.5	15.7	12.9	10.2	-	-	23.8	10.51	13.6	12.9	12.2	11.6	-	-
	19	22.5	9.90	21.8	20.9	18.2	15.4	12.6	-	21.1	10.50	19.2	18.5	17.8	17.2	16.5	-
	17	21.1	9.89	21.1	21.0	20.8	18.0	15.3	12.5	20.7	10.49	20.7	20.6	19.9	19.2	18.5	17.8
	14	21.0	9.88	21.0	21.0	20.9	18.1	15.4	12.6	20.6	10.49	20.6	20.6	20.3	19.6	19.0	18.3

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. Capacity rating are based on 80 F (26.6 C) Entering Air Dry Bulb Temperature.
3. These ratings include the condenser fan motors, the compressor motors and supply air blower motor (External Static Pressure 0.25 IWG/ 62.3 Pa).

ZF120 (10 Ton) Imperial

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
		Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh) Return Dry Bulb (°F)						Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh) Return Dry Bulb (°F)					
CFM	WB (°F)			90	85	80	75	70	65			90	85	80	75	70	65
		85°F								**95°F**							
	77	120.6	8.40	68.1	55.8	43.5	-	-	-	120.7	9.61	67.5	55.2	42.9	-	-	-
	72	115.1	8.47	83.7	71.4	59.1	46.8	-	-	112.0	9.59	81.3	69.0	56.7	44.4	-	-
3000	67	109.6	8.54	99.2	86.9	74.7	62.4	50.1	-	103.2	9.57	95.1	82.8	70.5	58.2	45.9	-
	62	103.7	8.56	103.7	89.8	77.5	65.2	52.9	40.7	96.8	9.56	96.8	87.4	75.1	62.8	50.5	38.2
	57	95.5	8.56	95.5	95.5	92.3	80.0	67.7	55.5	90.4	9.54	90.4	90.4	86.3	74.0	61.7	49.4
	77	128.2	8.64	70.2	59.1	46.9	-	-	-	128.2	9.88	70.6	58.5	46.4	-	-	-
	72	122.4	8.71	90.3	77.0	63.7	50.4	-	-	118.9	9.86	87.7	74.6	61.4	48.2	-	-
3500	67	116.6	8.78	110.4	94.9	80.5	66.2	51.8	-	109.6	9.83	104.9	90.6	76.3	62.0	47.7	-
	62	110.3	8.80	110.3	99.7	83.6	69.2	54.9	40.6	102.8	9.82	102.8	95.7	81.3	67.0	52.6	38.3
	57	101.6	8.80	101.6	101.6	99.6	84.7	69.9	55.1	96.0	9.80	96.0	96.0	93.5	78.7	63.9	49.2
	77	135.9	8.97	72.2	62.4	50.3	-	-	-	135.7	10.24	73.7	61.8	50.0	-	-	-
	72	129.7	9.04	96.9	82.6	68.3	54.1	-	-	125.8	10.22	94.2	80.1	66.1	52.0	-	-
4000	67	123.5	9.11	121.5	102.8	86.4	69.9	53.5	-	116.0	10.20	114.7	98.4	82.1	65.9	49.6	-
	62	116.8	9.14	116.8	109.6	89.6	73.2	56.9	40.5	108.8	10.18	108.8	103.9	87.5	71.1	54.7	38.4
	57	107.6	9.14	107.6	107.6	106.8	89.5	72.1	54.7	101.6	10.17	101.6	101.6	100.6	83.4	66.2	48.9
	77	134.8	9.53	92.3	68.8	54.6	-	-	-	135.5	10.80	94.5	70.2	54.8	-	-	-
	72	128.7	9.60	107.0	90.6	74.2	57.8	-	-	125.7	10.78	104.8	88.6	72.4	56.2	-	-
4550	67	122.7	9.67	121.7	112.3	93.8	76.3	58.8	-	115.8	10.76	115.2	107.0	90.0	72.7	55.4	-
	62	116.1	9.69	116.1	112.4	99.3	81.9	64.4	47.0	108.6	10.74	108.6	106.2	95.9	78.5	61.1	43.8
	57	106.9	9.69	106.9	106.9	106.5	88.5	70.6	52.6	101.4	10.73	101.4	101.4	101.0	83.1	65.3	47.5
	77	133.8	9.98	112.4	75.3	58.8	-	-	-	135.3	11.26	115.3	78.5	59.6	-	-	-
	72	127.8	10.05	117.1	98.6	80.0	61.5	-	-	125.5	11.24	115.5	97.1	78.7	60.3	-	-
5100	67	121.8	10.12	121.8	121.8	101.2	82.7	64.1	-	115.7	11.22	115.7	115.7	97.9	79.5	61.1	-
	62	115.3	10.15	115.3	115.3	109.1	90.5	72.0	53.4	108.5	11.20	108.5	108.5	104.3	85.9	67.5	49.2
	57	106.2	10.14	106.2	106.2	106.2	87.6	69.1	50.5	101.3	11.19	101.3	101.3	101.3	82.9	64.5	46.1
		105°F								**115°F**							
	77	120.9	10.83	66.9	54.6	42.2	-	-	-	121.0	12.04	66.3	53.9	41.6	-	-	-
	72	108.8	10.72	78.9	66.6	54.3	41.9	-	-	105.7	11.84	76.6	64.2	51.8	39.5	-	-
3000	67	96.8	10.60	91.0	78.6	66.3	54.0	41.6	-	90.4	11.64	86.8	74.5	62.1	49.8	37.4	-
	62	89.8	10.55	89.8	85.0	72.7	60.3	48.0	35.7	82.9	11.54	82.9	82.6	70.2	57.9	45.5	33.2
	57	85.2	10.52	85.2	85.2	80.4	68.0	55.7	43.4	80.0	11.50	80.0	80.0	74.4	62.0	49.7	37.3
	77	128.2	11.12	71.0	57.9	46.0	-	-	-	128.1	12.36	71.5	57.3	45.5	-	-	-
	72	115.4	11.01	85.2	72.1	59.0	45.9	-	-	111.9	12.16	82.7	69.7	56.7	43.7	-	-
3500	67	102.6	10.89	99.4	86.3	72.1	57.9	43.7	-	95.7	11.95	93.9	82.1	67.9	53.8	39.6	-
	62	95.3	10.84	95.3	91.6	79.1	64.7	50.3	35.9	87.8	11.85	87.8	87.6	76.8	62.4	48.0	33.6
	57	90.3	10.81	90.3	90.3	87.4	72.7	58.0	43.2	84.7	11.81	84.7	84.7	81.3	66.6	52.0	37.3
	77	135.5	11.51	75.2	61.3	49.7	-	-	-	135.3	12.78	76.7	60.7	49.4	-	-	-
	72	122.0	11.40	91.5	77.7	63.8	49.9	-	-	118.1	12.57	88.8	75.2	61.5	47.9	-	-
4000	67	108.5	11.28	107.8	94.0	77.9	61.8	45.7	-	101.0	12.37	101.0	89.7	73.7	57.8	41.8	-
	62	100.7	11.22	100.7	98.3	85.5	69.0	52.6	36.2	92.7	12.27	92.7	92.7	83.4	66.9	50.5	34.1
	57	95.5	11.20	95.5	95.5	94.5	77.3	60.2	43.1	89.4	12.23	89.4	89.4	88.3	71.3	54.3	37.3
	77	136.2	12.08	96.7	71.6	55.0	-	-	-	136.8	13.35	98.9	72.9	55.2	-	-	-
	72	122.6	11.96	102.7	86.7	70.6	54.6	-	-	119.5	13.15	100.6	84.7	68.8	53.0	-	-
4550	67	109.0	11.85	108.7	101.8	86.2	69.1	51.9	-	102.2	12.94	102.2	96.5	82.5	65.5	48.5	-
	62	101.2	11.79	101.2	100.0	92.5	75.2	57.9	40.6	93.7	12.84	93.7	93.7	89.1	71.8	54.6	37.4
	57	95.9	11.76	95.9	95.9	95.4	77.7	60.1	42.4	90.5	12.80	90.5	90.5	89.9	72.4	54.8	37.3
	77	136.8	12.54	118.3	81.8	60.3	-	-	-	138.4	13.82	121.2	85.1	61.1	-	-	-
	72	123.2	12.43	113.9	95.7	77.4	59.2	-	-	120.9	13.62	112.3	94.2	76.2	58.1	-	-
5100	67	109.5	12.32	109.5	109.5	94.6	76.3	58.1	-	103.3	13.41	103.3	103.3	91.2	73.2	55.1	-
	62	101.6	12.26	101.6	101.6	99.5	81.3	63.1	44.9	94.8	13.31	94.8	94.8	94.8	76.7	58.7	40.6
	57	96.4	12.23	96.4	96.4	96.4	78.2	59.9	41.7	91.5	13.27	91.5	91.5	91.5	73.4	55.4	37.3

ZF120 (10 Ton) Imperial (Continued)

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
		Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh) Return Dry Bulb (°F)						Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh) Return Dry Bulb (°F)					
CFM	WB (°F)			90	85	80	75	70	65			90	85	80	75	70	65
		118.4°F								**125°F**							
3000	77	118.0	12.34	67.4	53.5	41.1	-	-	-	112.2	12.91	69.7	52.6	40.2	-	-	-
	72	102.1	12.21	75.7	63.3	50.9	38.6	-	-	95.2	12.94	73.9	61.5	49.1	36.7	-	-
	67	86.2	12.09	83.9	73.1	60.7	48.4	36.0	-	78.1	12.96	78.1	70.4	58.1	45.7	33.3	-
	62	80.0	11.98	80.0	79.8	69.0	56.6	44.3	31.9	74.5	12.84	74.5	74.5	66.6	54.2	41.8	29.4
	57	77.7	11.96	77.7	77.7	71.8	59.5	47.1	34.7	73.2	12.84	73.2	73.2	66.9	54.5	42.1	29.7
3500	77	124.8	12.67	73.2	57.3	45.4	-	-	-	118.3	13.28	76.7	57.4	45.3	-	-	-
	72	108.1	12.53	81.8	68.7	55.7	42.6	-	-	100.8	13.26	80.0	66.8	53.7	40.6	-	-
	67	91.4	12.39	90.3	80.1	66.0	51.8	37.7	-	83.2	13.23	83.2	76.3	62.2	48.0	33.9	-
	62	84.7	12.30	84.7	84.6	75.4	60.9	46.4	31.9	78.8	13.16	78.8	78.8	72.8	58.0	43.3	28.5
	57	82.3	12.27	82.3	82.3	78.5	63.8	49.1	34.4	77.5	13.16	77.5	77.5	73.1	58.3	43.5	28.7
4000	77	131.6	13.11	79.0	61.2	49.7	-	-	-	124.5	13.76	83.7	62.2	50.4	-	-	-
	72	114.1	12.95	87.9	74.2	60.4	46.7	-	-	106.4	13.68	86.0	72.2	58.3	44.5	-	-
	67	96.7	12.79	96.7	87.1	71.2	55.3	39.4	-	88.3	13.61	88.3	82.1	66.3	50.4	34.6	-
	62	89.5	12.71	89.5	89.5	81.9	65.2	48.6	31.9	83.2	13.58	83.2	83.2	79.0	61.9	44.8	27.6
	57	86.9	12.69	86.9	86.9	85.2	68.2	51.1	34.1	81.8	13.58	81.8	81.8	79.4	62.2	45.0	27.8
4550	77	132.7	13.69	100.8	74.0	55.0	-	-	-	124.8	14.34	104.4	76.2	54.5	-	-	-
	72	115.5	13.52	99.5	83.7	67.6	51.6	-	-	107.6	14.26	97.4	81.8	65.3	48.8	-	-
	67	98.2	13.36	98.2	93.4	80.3	63.1	45.9	-	90.4	14.17	90.4	87.3	76.0	58.5	41.0	-
	62	90.5	13.29	90.5	90.5	86.7	69.2	51.6	34.1	84.2	14.16	84.2	84.2	82.1	63.9	45.8	27.6
	57	87.8	13.26	87.8	87.8	87.0	69.3	51.5	33.8	82.8	14.15	82.8	82.8	81.5	63.4	45.2	27.0
5100	77	133.9	14.16	122.6	86.8	60.2	-	-	-	125.2	14.82	125.2	90.2	58.6	-	-	-
	72	116.8	14.00	111.1	93.2	74.8	56.4	-	-	108.8	14.73	108.8	91.4	72.2	53.0	-	-
	67	99.6	13.83	99.6	99.6	89.4	70.9	52.5	-	92.5	14.64	92.5	92.5	85.7	66.6	47.4	-
	62	91.5	13.76	91.5	91.5	91.5	73.1	54.6	36.2	85.1	14.64	85.1	85.1	85.1	66.0	46.8	27.6
	57	88.8	13.74	88.8	88.8	88.8	70.4	52.0	33.5	83.7	14.63	83.7	83.7	83.7	64.5	45.4	26.2

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. Capacity rating are based on 80 F (26.6 C) Entering Air Dry Bulb Temperature.
3. These ratings include the condenser fan motors, the compressor motors and supply air blower motor (External Static Pressure 0.30 IWG/ 74.7 Pa).

ZF120 (35 kW) Metric

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
				Sensible Capacity (kW)								Sensible Capacity (kW)					
m^3/s	WB (°C)	Total Capacity[1,2] (kW)	Total Input (kW)[3]	Return Dry Bulb (°C)						Total Capacity[1] (kW)	Total Input (kW)[2]	Return Dry Bulb (°C)					
				32	29	27	24	21	18			32	29	27	24	21	18
		29°C								35°C							
	25	35.3	8.40	20.0	16.4	12.8	-	-	-	35.4	9.61	19.8	16.2	12.6	-	-	-
	22	33.7	8.47	24.5	20.9	17.3	13.7	-	-	32.8	9.59	23.8	20.2	16.6	13.0	-	-
1.42	19	32.1	8.54	29.1	25.5	21.9	18.3	14.7	-	30.2	9.57	27.9	24.3	20.7	17.0	13.4	-
	17	30.4	8.56	30.4	26.3	22.7	19.1	15.5	11.9	28.4	9.56	28.4	25.6	22.0	18.4	14.8	11.2
	14	28.0	8.56	28.0	28.0	27.1	23.5	19.9	16.3	26.5	9.54	26.5	26.5	25.3	21.7	18.1	14.5
	25	37.6	8.64	20.6	17.3	13.8	-	-	-	37.6	9.88	20.7	17.2	13.6	-	-	-
	22	35.9	8.71	26.5	22.6	18.7	14.8	-	-	34.8	9.86	25.7	21.9	18.0	14.1	-	-
1.65	19	34.2	8.78	32.3	27.8	23.6	19.4	15.2	-	32.1	9.83	30.7	26.6	22.4	18.2	14.0	-
	17	32.3	8.80	32.3	29.2	24.5	20.3	16.1	11.9	30.1	9.82	30.1	28.0	23.8	19.6	15.4	11.2
	14	29.8	8.80	29.8	29.8	29.2	24.8	20.5	16.2	28.1	9.80	28.1	28.1	27.4	23.1	18.7	14.4
	25	39.8	8.97	21.2	18.3	14.7	-	-	-	39.8	10.24	21.6	18.1	14.7	-	-	-
	22	38.0	9.04	28.4	24.2	20.0	15.8	-	-	36.9	10.22	27.6	23.5	19.4	15.2	-	-
1.89	19	36.2	9.11	35.6	30.1	25.3	20.5	15.7	-	34.0	10.20	33.6	28.8	24.1	19.3	14.5	-
	17	34.2	9.14	34.2	32.1	26.3	21.5	16.7	11.9	31.9	10.18	31.9	30.5	25.7	20.8	16.0	11.2
	14	31.5	9.14	31.5	31.5	31.3	26.2	21.1	16.0	29.8	10.17	29.8	29.8	29.5	24.4	19.4	14.3
	25	39.5	9.53	27.0	20.2	16.0	-	-	-	39.7	10.80	27.7	20.6	16.1	-	-	-
	22	37.7	9.60	31.4	26.5	21.7	16.9	-	-	36.8	10.78	30.7	26.0	21.2	16.5	-	-
2.15	19	36.0	9.67	35.7	32.9	27.5	22.4	17.2	-	33.9	10.76	33.8	31.4	26.4	21.3	16.2	-
	17	34.0	9.69	34.0	33.0	29.1	24.0	18.9	13.8	31.8	10.74	31.8	31.1	28.1	23.0	17.9	12.8
	14	31.3	9.69	31.3	31.3	31.2	26.0	20.7	15.4	29.7	10.73	29.7	29.7	29.6	24.4	19.1	13.9
	25	39.2	9.98	32.9	22.1	17.2	-	-	-	39.7	11.26	33.8	23.0	17.5	-	-	-
	22	37.5	10.05	34.3	28.9	23.5	18.0	-	-	36.8	11.24	33.8	28.5	23.1	17.7	-	-
2.41	19	35.7	10.12	35.7	35.7	29.7	24.2	18.8	-	33.9	11.22	33.9	33.9	28.7	23.3	17.9	-
	17	33.8	10.15	33.8	33.8	32.0	26.5	21.1	15.7	31.8	11.20	31.8	31.8	30.6	25.2	19.8	14.4
	14	31.1	10.14	31.1	31.1	31.1	25.7	20.2	14.8	29.7	11.19	29.7	29.7	29.7	24.3	18.9	13.5
		41°C								46°C							
	25	35.4	10.83	19.6	16.0	12.4	-	-	-	35.5	12.04	19.4	15.8	12.2	-	-	-
	22	31.9	10.72	23.1	19.5	15.9	12.3	-	-	31.0	11.84	22.4	18.8	15.2	11.6	-	-
1.42	19	28.4	10.60	26.7	23.0	19.4	15.8	12.2	-	26.5	11.64	25.4	21.8	18.2	14.6	11.0	-
	17	26.3	10.55	26.3	24.9	21.3	17.7	14.1	10.5	24.3	11.54	24.3	24.2	20.6	17.0	13.3	9.7
	14	25.0	10.52	25.0	25.0	23.6	19.9	16.3	12.7	23.4	11.50	23.4	23.4	21.8	18.2	14.6	10.9
	25	37.6	11.12	20.8	17.0	13.5	-	-	-	37.6	12.36	21.0	16.8	13.3	-	-	-
	22	33.8	11.01	25.0	21.1	17.3	13.5	-	-	32.8	12.16	24.2	20.4	16.6	12.8	-	-
1.65	19	30.1	10.89	29.1	25.3	21.1	17.0	12.8	-	28.0	11.95	27.5	24.1	19.9	15.8	11.6	-
	17	27.9	10.84	27.9	26.9	23.2	19.0	14.7	10.5	25.7	11.85	25.7	25.7	22.5	18.3	14.1	9.9
	14	26.5	10.81	26.5	26.5	25.6	21.3	17.0	12.7	24.8	11.81	24.8	24.8	23.8	19.5	15.2	10.9
	25	39.7	11.51	22.0	18.0	14.6	-	-	-	39.6	12.78	22.5	17.8	14.5	-	-	-
	22	35.8	11.40	26.8	22.8	18.7	14.6	-	-	34.6	12.57	26.0	22.0	18.0	14.0	-	-
1.89	19	31.8	11.28	31.6	27.6	22.8	18.1	13.4	-	29.6	12.37	29.6	26.3	21.6	16.9	12.3	-
	17	29.5	11.22	29.5	28.8	25.0	20.2	15.4	10.6	27.2	12.27	27.2	27.2	24.4	19.6	14.8	10.0
	14	28.0	11.20	28.0	28.0	27.7	22.7	17.6	12.6	26.2	12.23	26.2	26.2	25.9	20.9	15.9	10.9
	25	39.9	12.08	28.3	21.0	16.1	-	-	-	40.1	13.35	29.0	21.4	16.2	-	-	-
	22	35.9	11.96	30.1	25.4	20.7	16.0	-	-	35.0	13.15	29.5	24.8	20.2	15.5	-	-
2.15	19	31.9	11.85	31.9	29.8	25.3	20.2	15.2	-	29.9	12.94	29.9	28.3	24.2	19.2	14.2	-
	17	29.7	11.79	29.7	29.3	27.1	22.0	17.0	11.9	27.5	12.84	27.5	27.5	26.1	21.1	16.0	11.0
	14	28.1	11.76	28.1	28.1	28.0	22.8	17.6	12.4	26.5	12.80	26.5	26.5	26.3	21.2	16.1	10.9
	25	40.1	12.54	34.7	24.0	17.7	-	-	-	40.6	13.82	35.5	24.9	17.9	-	-	-
	22	36.1	12.43	33.4	28.0	22.7	17.4	-	-	35.4	13.62	32.9	27.6	22.3	17.0	-	-
2.41	19	32.1	12.32	32.1	32.1	27.7	22.4	17.0	-	30.3	13.41	30.3	30.3	26.7	21.4	16.2	-
	17	29.8	12.26	29.8	29.8	29.2	23.8	18.5	13.2	27.8	13.31	27.8	27.8	27.8	22.5	17.2	11.9
	14	28.2	12.23	28.2	28.2	28.2	22.9	17.6	12.2	26.8	13.27	26.8	26.8	26.8	21.5	16.2	10.9

ZF120 (35 kW) Metric (Continued)

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
		Total Capacity[1,2] (kW)	Total Input (kW)[3]	Sensible Capacity (kW) Return Dry Bulb (°C)						Total Capacity[1] (kW)	Total Input (kW)[2]	Sensible Capacity (kW) Return Dry Bulb (°C)					
m^3/s	WB (°C)			32	29	27	24	21	18			32	29	27	24	21	18
		48°C								52°C							
1.42	25	34.6	12.34	19.8	15.7	12.1	-	-	-	32.9	12.91	20.4	15.4	11.8	-	-	-
	22	29.9	12.21	22.2	18.5	14.9	11.3	-	-	27.9	12.94	21.7	18.0	14.4	10.8	-	-
	19	25.3	12.09	24.6	21.4	17.8	14.2	10.5	-	22.9	12.96	22.9	20.6	17.0	13.4	9.8	-
	17	23.5	11.98	23.5	23.4	20.2	16.6	13.0	9.3	21.8	12.84	21.8	21.8	19.5	15.9	12.3	8.6
	14	22.8	11.96	22.8	22.8	21.0	17.4	13.8	10.2	21.5	12.84	21.5	21.5	19.6	16.0	12.3	8.7
1.65	25	36.6	12.67	21.5	16.8	13.3	-	-	-	34.7	13.28	22.5	16.8	13.3	-	-	-
	22	31.7	12.53	24.0	20.1	16.3	12.5	-	-	29.5	13.26	23.4	19.6	15.7	11.9	-	-
	19	26.8	12.39	26.5	23.5	19.3	15.2	11.0	-	24.4	13.23	24.4	22.4	18.2	14.1	9.9	-
	17	24.8	12.30	24.8	24.8	22.1	17.9	13.6	9.3	23.1	13.16	23.1	23.1	21.3	17.0	12.7	8.4
	14	24.1	12.27	24.1	24.1	23.0	18.7	14.4	10.1	22.7	13.16	22.7	22.7	21.4	17.1	12.8	8.4
1.89	25	38.6	13.11	23.2	17.9	14.6	-	-	-	36.5	13.76	24.5	18.2	14.8	-	-	-
	22	33.5	12.95	25.8	21.7	17.7	13.7	-	-	31.2	13.68	25.2	21.1	17.1	13.0	-	-
	19	28.3	12.79	28.3	25.5	20.9	16.2	11.5	-	25.9	13.61	25.9	24.1	19.4	14.8	10.1	-
	17	26.2	12.71	26.2	26.2	24.0	19.1	14.2	9.4	24.4	13.58	24.4	24.4	23.2	18.1	13.1	8.1
	14	25.5	12.69	25.5	25.5	25.0	20.0	15.0	10.0	24.0	13.58	24.0	24.0	23.3	18.2	13.2	8.1
2.15	25	38.9	13.69	29.5	21.7	16.1	-	-	-	36.6	14.34	30.6	22.3	16.0	-	-	-
	22	33.8	13.52	29.2	24.5	19.8	15.1	-	-	31.5	14.26	28.5	24.0	19.1	14.3	-	-
	19	28.8	13.36	28.8	27.4	23.5	18.5	13.5	-	26.5	14.17	26.5	25.6	22.3	17.1	12.0	-
	17	26.5	13.29	26.5	26.5	25.4	20.3	15.1	10.0	24.7	14.16	24.7	24.7	24.1	18.7	13.4	8.1
	14	25.7	13.26	25.7	25.7	25.5	20.3	15.1	9.9	24.3	14.15	24.3	24.3	23.9	18.6	13.2	7.9
2.41	25	39.2	14.16	35.9	25.5	17.7	-	-	-	36.7	14.82	36.7	26.4	17.2	-	-	-
	22	34.2	14.00	32.6	27.3	21.9	16.5	-	-	31.9	14.73	31.9	26.8	21.2	15.5	-	-
	19	29.2	13.83	29.2	29.2	26.2	20.8	15.4	-	27.1	14.64	27.1	27.1	25.1	19.5	13.9	-
	17	26.8	13.76	26.8	26.8	26.8	21.4	16.0	10.6	25.0	14.64	25.0	25.0	25.0	19.3	13.7	8.1
	14	26.0	13.74	26.0	26.0	26.0	20.6	15.2	9.8	24.5	14.63	24.5	24.5	24.5	18.9	13.3	7.7

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. Capacity rating are based on 80 F (26.6 C) Entering Air Dry Bulb Temperature.
3. These ratings include the condenser fan motors, the compressor motors and supply air blower motor (External Static Pressure 0.30 IWG/ 74.7 Pa).

ZF150 (12.5 Ton) Imperial

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
				Sensible Capacity (MBh)								Sensible Capacity (MBh)					
CFM	WB (°F)	Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Return Dry Bulb (°F)						Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Return Dry Bulb (°F)					
				90	85	80	75	70	65			90	85	80	75	70	65
		85°F								**95°F**							
	77	185.6	11.34	82.4	66.9	51.4	-	-	-	170.6	12.56	79.4	64.1	48.9	-	-	-
	72	168.8	11.18	104.3	88.8	73.3	57.8	-	-	155.7	12.43	100.6	85.3	70.1	54.8	-	-
3750	67	151.9	11.02	126.3	110.8	95.2	79.7	64.2	-	140.7	12.29	121.8	106.5	91.3	76.0	60.7	-
	62	146.1	10.96	145.6	122.7	106.4	90.9	75.4	59.8	134.2	12.23	133.9	118.6	103.4	88.1	72.9	57.6
	57	141.4	10.92	141.4	133.8	116.3	100.8	85.3	69.8	131.0	12.20	131.0	125.9	110.6	95.4	80.1	64.9
	77	190.5	11.63	85.8	71.6	55.5	-	-	-	175.4	12.85	83.8	68.3	52.7	-	-	-
	72	173.2	11.47	112.8	96.0	79.2	62.4	-	-	160.0	12.71	108.4	92.0	75.6	59.2	-	-
4375	67	155.9	11.31	139.8	120.4	102.9	85.4	67.8	-	144.7	12.57	133.0	115.8	98.5	81.2	63.9	-
	62	149.9	11.25	149.7	136.9	115.0	96.9	78.9	60.9	138.0	12.51	137.8	129.3	111.5	93.8	76.0	58.3
	57	145.1	11.21	145.1	141.3	125.7	107.3	88.9	70.4	134.6	12.48	134.6	132.1	119.4	101.3	83.2	65.0
	77	195.4	11.89	89.2	76.3	59.6	-	-	-	180.2	13.12	88.3	72.4	56.6	-	-	-
	72	177.6	11.73	121.3	103.2	85.1	67.0	-	-	164.4	12.98	116.3	98.7	81.1	63.5	-	-
5000	67	159.9	11.57	153.4	130.1	110.6	91.0	71.5	-	148.6	12.84	144.3	125.0	105.7	86.4	67.1	-
	62	153.8	11.51	153.8	151.0	123.5	103.0	82.5	61.9	141.7	12.78	141.7	139.9	119.7	99.5	79.2	59.0
	57	148.8	11.47	148.8	148.8	135.1	113.8	92.4	71.1	138.3	12.75	138.3	138.3	128.1	107.1	86.2	65.2
	77	200.8	12.68	93.4	80.3	60.9	-	-	-	184.3	13.90	95.8	77.0	58.2	-	-	-
	72	182.6	12.52	127.2	107.0	86.9	66.7	-	-	168.2	13.76	122.8	103.2	83.5	63.8	-	-
5575	67	164.3	12.36	161.0	133.8	112.9	92.0	71.1	-	152.0	13.62	149.8	129.3	108.7	88.2	67.7	-
	62	158.0	12.30	158.0	156.7	126.7	105.3	83.9	62.5	145.0	13.55	145.0	144.1	123.2	102.2	81.2	60.2
	57	152.9	12.26	152.9	152.9	139.2	117.4	95.6	73.8	141.5	13.53	141.5	141.5	131.8	110.5	89.1	67.7
	77	206.2	13.46	97.6	84.3	62.1	-	-	-	188.5	14.67	103.4	81.6	59.9	-	-	-
	72	187.5	13.30	133.1	110.9	88.6	66.4	-	-	172.0	14.53	129.4	107.6	85.8	64.1	-	-
6150	67	168.8	13.14	168.6	137.4	115.1	92.9	70.6	-	155.5	14.39	155.3	133.6	111.8	90.0	68.3	-
	62	162.3	13.08	162.3	162.3	129.8	107.5	85.3	63.1	148.3	14.32	148.3	148.3	126.6	104.9	83.1	61.3
	57	157.0	13.04	157.0	157.0	143.3	121.1	98.8	76.6	144.7	14.30	144.7	144.7	135.6	113.8	92.0	70.3
		105°F								**115°F**							
	77	155.6	13.79	76.4	61.4	46.4	-	-	-	140.6	15.02	73.4	58.6	43.9	-	-	-
	72	142.6	13.67	96.8	81.8	66.8	51.8	-	-	129.5	14.92	93.1	78.4	63.6	48.9	-	-
3750	67	129.5	13.56	117.3	102.3	87.3	72.3	57.3	-	118.3	14.83	112.8	98.1	83.3	68.6	53.8	-
	62	122.3	13.49	122.2	114.6	100.4	85.4	70.4	55.4	110.5	14.76	110.5	110.5	97.4	82.6	67.9	53.1
	57	120.6	13.48	120.6	118.0	104.9	89.9	74.9	59.9	110.2	14.76	110.2	110.2	99.2	84.5	69.8	55.0
	77	160.3	14.08	81.9	65.0	50.0	-	-	-	145.2	15.30	79.9	61.7	47.2	-	-	-
	72	146.9	13.96	104.0	88.0	72.0	56.0	-	-	133.7	15.20	99.6	84.0	68.4	52.8	-	-
4375	67	133.4	13.84	126.2	111.1	94.0	77.0	60.0	-	122.2	15.11	119.4	106.4	89.6	72.8	56.1	-
	62	126.0	13.78	125.9	121.7	108.1	90.6	73.2	55.7	114.1	15.04	114.1	114.1	104.7	87.5	70.3	53.2
	57	124.2	13.76	124.2	122.9	113.0	95.2	77.4	59.6	113.8	15.04	113.8	113.8	106.7	89.2	71.7	54.2
	77	165.0	14.34	87.3	68.6	53.5	-	-	-	149.8	15.56	86.4	64.7	50.5	-	-	-
	72	151.1	14.22	111.2	94.2	77.1	60.1	-	-	137.9	15.47	106.2	89.7	73.2	56.7	-	-
5000	67	137.3	14.10	135.1	119.8	100.8	81.7	62.7	-	126.0	15.37	126.0	114.7	95.9	77.1	58.3	-
	62	129.7	14.04	129.7	128.8	115.8	95.9	76.0	56.1	117.7	15.30	117.7	117.7	112.0	92.4	72.8	53.2
	57	127.8	14.03	127.8	127.8	121.1	100.5	79.9	59.3	117.3	15.30	117.3	117.3	114.2	93.9	73.7	53.5
	77	167.9	15.11	98.2	73.7	55.6	-	-	-	151.5	16.32	100.6	70.5	52.9	-	-	-
	72	153.8	14.99	118.4	99.3	80.1	60.9	-	-	139.5	16.23	114.1	95.4	76.7	58.1	-	-
5575	67	139.8	14.87	138.6	124.8	104.6	84.5	64.3	-	127.5	16.13	127.5	120.3	100.5	80.7	60.9	-
	62	132.0	14.81	132.0	131.6	119.7	99.1	78.5	57.9	119.0	16.06	119.0	119.0	116.2	96.0	75.8	55.6
	57	130.1	14.80	130.1	130.1	124.5	103.5	82.6	61.6	118.7	16.06	118.7	118.7	117.1	96.6	76.0	55.5
	77	170.9	15.87	109.2	78.9	57.6	-	-	-	153.2	17.07	114.9	76.2	55.4	-	-	-
	72	156.5	15.75	125.6	104.4	83.1	61.8	-	-	141.1	16.98	121.9	101.1	80.3	59.5	-	-
6150	67	142.2	15.63	142.1	129.8	108.5	87.2	65.9	-	128.9	16.88	128.9	126.0	105.2	84.4	63.6	-
	62	134.3	15.57	134.3	134.3	123.5	102.2	80.9	59.6	120.4	16.81	120.4	120.4	120.4	99.5	78.7	57.9
	57	132.4	15.56	132.4	132.4	127.8	106.5	85.2	63.9	120.0	16.82	120.0	120.0	120.0	99.2	78.4	57.6

ZF150 (12.5 Ton) Imperial (Continued)

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
		Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh) Return Dry Bulb (°F)						Total Capacity[1,2] (MBh)	Total Input (kW)[3]	Sensible Capacity (MBh) Return Dry Bulb (°F)					
CFM	WB (°F)			90	85	80	75	70	65			90	85	80	75	70	65
		118.4°F								**125°F**							
3750	77	136.5	15.57	71.2	56.3	41.4	-	-	-	128.4	16.65	67.0	51.9	36.7	-	-	-
	72	125.7	15.43	91.0	76.1	61.3	46.4	-	-	118.5	16.41	87.0	71.9	56.7	41.5	-	-
	67	115.0	15.28	110.9	96.0	81.1	66.2	51.3	-	108.5	16.17	107.1	91.9	76.7	61.5	46.4	-
	62	104.8	15.16	104.8	104.8	96.2	81.3	66.4	51.5	93.9	15.95	93.9	93.9	93.9	78.7	63.5	48.3
	57	104.5	15.16	104.5	104.5	97.3	82.4	67.5	52.6	93.6	15.95	93.6	93.6	93.6	78.4	63.2	48.1
4375	77	140.9	15.85	78.2	59.1	44.5	-	-	-	132.6	16.91	75.0	54.3	39.4	-	-	-
	72	129.8	15.71	97.4	81.6	65.9	50.1	-	-	122.3	16.70	93.1	77.1	61.0	44.9	-	-
	67	118.7	15.58	116.7	104.2	87.2	70.2	53.2	-	112.0	16.48	111.3	99.9	82.5	65.1	47.8	-
	62	108.2	15.45	108.2	108.2	104.1	86.7	69.2	51.8	96.9	16.23	96.9	96.9	103.1	85.1	67.0	49.0
	57	107.9	15.45	107.9	107.9	105.8	88.1	70.5	52.8	96.6	16.23	96.6	96.6	104.1	86.1	68.1	50.0
5000	77	145.4	16.10	85.2	62.0	47.7	-	-	-	136.9	17.15	83.0	56.6	42.2	-	-	-
	72	133.9	15.97	103.8	87.2	70.5	53.8	-	-	126.2	16.96	99.2	82.2	65.2	48.2	-	-
	67	122.4	15.85	122.4	112.3	93.3	74.2	55.2	-	115.5	16.77	115.5	107.8	88.3	68.7	49.2	-
	62	111.7	15.71	111.7	111.7	112.1	92.1	72.0	52.0	100.0	16.50	100.0	100.0	112.3	91.4	70.5	49.7
	57	111.3	15.71	111.3	111.3	114.3	93.9	73.4	53.0	99.7	16.49	99.7	99.7	114.6	93.7	72.9	52.0
5575	77	146.6	16.85	99.5	68.2	50.4	-	-	-	137.2	17.88	97.2	63.7	45.4	-	-	-
	72	135.5	16.74	111.9	92.9	73.9	54.9	-	-	127.6	17.72	107.6	88.0	68.4	48.8	-	-
	67	124.3	16.62	124.3	117.6	97.4	77.3	57.1	-	118.1	17.57	118.1	112.3	91.4	70.5	49.6	-
	62	112.9	16.47	112.9	112.9	113.2	92.5	71.8	51.2	101.1	17.26	101.1	101.1	107.3	85.7	64.2	42.6
	57	112.6	16.47	112.6	112.6	114.1	93.2	72.4	51.5	100.8	17.26	100.8	100.8	108.3	86.7	65.2	43.6
6150	77	147.9	17.59	113.7	74.4	53.1	-	-	-	137.5	18.60	111.4	70.8	48.6	-	-	-
	72	137.0	17.49	119.9	98.6	77.3	56.0	-	-	129.1	18.48	116.0	93.8	71.6	49.3	-	-
	67	126.1	17.38	126.1	122.9	101.6	80.3	59.0	-	120.7	18.35	120.7	116.8	94.6	72.3	50.1	-
	62	114.2	17.22	114.2	114.2	114.2	92.9	71.6	50.3	102.3	18.01	102.3	102.3	102.3	80.0	57.8	35.6
	57	113.9	17.22	113.9	113.9	113.9	92.6	71.3	50.0	102.0	18.01	102.0	102.0	102.0	79.7	57.5	35.2

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. Capacity rating are based on 80 F (26.6 C) Entering Air Dry Bulb Temperature.
3. These ratings include the condenser fan motors, the compressor motors and supply air blower motor (External Static Pressure 0.35 IWG/ 87.1 Pa).

ZF150 (44 kW) Metric

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
				Sensible Capacity (kW)								Sensible Capacity (kW)					
m^3/s	WB (°C)	Total Capacity[1,2] (kW)	Total Input (kW)[3]	Return Dry Bulb (°C)						Total Capacity[1,2] (kW)	Total Input (kW)[3]	Return Dry Bulb (°C)					
				32	29	27	24	21	18			32	29	27	24	21	18
		29°C								35°C							
	25	54.4	11.34	24.1	19.6	15.1	-	-	-	50.0	12.56	23.3	18.8	14.3	-	-	-
	22	49.5	11.18	30.6	26.0	21.5	16.9	-	-	45.6	12.43	29.5	25.0	20.5	16.1	-	-
1.77	19	44.5	11.02	37.0	32.5	27.9	23.4	18.8	-	41.2	12.29	35.7	31.2	26.7	22.3	17.8	-
	17	42.8	10.96	42.7	36.0	31.2	26.6	22.1	17.5	39.3	12.23	39.2	34.8	30.3	25.8	21.4	16.9
	14	41.4	10.92	41.4	39.2	34.1	29.6	25.0	20.5	38.4	12.20	38.4	36.9	32.4	28.0	23.5	19.0
	25	55.8	11.63	25.2	21.0	16.3	-	-	-	51.4	12.85	24.6	20.0	15.5	-	-	-
	22	50.8	11.47	33.1	28.1	23.2	18.3	-	-	46.9	12.71	31.8	27.0	22.2	17.3	-	-
2.06	19	45.7	11.31	41.0	35.3	30.2	25.0	19.9	-	42.4	12.57	39.0	33.9	28.9	23.8	18.7	-
	17	43.9	11.25	43.9	40.1	33.7	28.4	23.1	17.8	40.4	12.51	40.4	37.9	32.7	27.5	22.3	17.1
	14	42.5	11.21	42.5	41.4	36.8	31.4	26.0	20.6	39.5	12.48	39.5	38.7	35.0	29.7	24.4	19.1
	25	57.3	11.89	26.2	22.4	17.5	-	-	-	52.8	13.12	25.9	21.2	16.6	-	-	-
	22	52.1	11.73	35.6	30.2	24.9	19.6	-	-	48.2	12.98	34.1	28.9	23.8	18.6	-	-
2.36	19	46.9	11.57	45.0	38.1	32.4	26.7	20.9	-	43.6	12.84	42.3	36.6	31.0	25.3	19.7	-
	17	45.1	11.51	45.1	44.3	36.2	30.2	24.2	18.1	41.5	12.78	41.5	41.0	35.1	29.2	23.2	17.3
	14	43.6	11.47	43.6	43.6	39.6	33.3	27.1	20.8	40.5	12.75	40.5	40.5	37.5	31.4	25.3	19.1
	25	58.8	12.68	27.4	23.5	17.8	-	-	-	54.0	13.90	28.1	22.6	17.1	-	-	-
	22	53.5	12.52	37.3	31.4	25.5	19.5	-	-	49.3	13.76	36.0	30.2	24.5	18.7	-	-
2.63	19	48.2	12.36	47.2	39.2	33.1	27.0	20.8	-	44.6	13.62	43.9	37.9	31.9	25.9	19.8	-
	17	46.3	12.30	46.3	45.9	37.1	30.9	24.6	18.3	42.5	13.55	42.5	42.2	36.1	29.9	23.8	17.6
	14	44.8	12.26	44.8	44.8	40.8	34.4	28.0	21.6	41.5	13.53	41.5	41.5	38.6	32.4	26.1	19.9
	25	60.4	13.46	28.6	24.7	18.2	-	-	-	55.2	14.67	30.3	23.9	17.5	-	-	-
	22	54.9	13.30	39.0	32.5	26.0	19.5	-	-	50.4	14.53	37.9	31.5	25.2	18.8	-	-
2.90	19	49.5	13.14	49.4	40.3	33.7	27.2	20.7	-	45.6	14.39	45.5	39.2	32.8	26.4	20.0	-
	17	47.6	13.08	47.6	47.6	38.0	31.5	25.0	18.5	43.5	14.32	43.5	43.5	37.1	30.7	24.4	18.0
	14	46.0	13.04	46.0	46.0	42.0	35.5	29.0	22.4	42.4	14.30	42.4	42.4	39.7	33.3	27.0	20.6
		41°C								46°C							
	25	45.6	11.34	22.4	18.0	13.6	-	-	-	41.2	15.02	21.5	17.2	12.9	-	-	-
	22	41.8	11.18	28.4	24.0	19.6	15.2	-	-	37.9	14.92	27.3	23.0	18.6	14.3	-	-
1.77	19	38.0	11.02	34.4	30.0	25.6	21.2	16.8	-	34.7	14.83	33.1	28.7	24.4	20.1	15.8	-
	17	35.9	10.96	35.8	33.6	29.4	25.0	20.6	16.2	32.4	14.76	32.4	32.4	28.5	24.2	19.9	15.6
	14	35.3	10.92	35.3	34.6	30.8	26.4	22.0	17.6	32.3	14.76	32.3	32.3	29.1	24.8	20.4	16.1
	25	47.0	11.63	24.0	19.0	14.6	-	-	-	42.6	15.30	23.4	18.1	13.8	-	-	-
	22	43.0	11.47	30.5	25.8	21.1	16.4	-	-	39.2	15.20	29.2	24.6	20.0	15.5	-	-
2.06	19	39.1	11.31	37.0	32.5	27.6	22.6	17.6	-	35.8	15.11	35.0	31.2	26.3	21.3	16.4	-
	17	36.9	11.25	36.9	35.7	31.7	26.6	21.5	16.3	33.4	15.04	33.4	33.4	30.7	25.6	20.6	15.6
	14	36.4	11.21	36.4	36.0	33.1	27.9	22.7	17.5	33.3	15.04	33.3	33.3	31.3	26.1	21.0	15.9
	25	48.4	11.89	25.6	20.1	15.7	-	-	-	43.9	15.56	25.3	19.0	14.8	-	-	-
	22	44.3	11.73	32.6	27.6	22.6	17.6	-	-	40.4	15.47	31.1	26.3	21.4	16.6	-	-
2.36	19	40.2	11.57	39.6	35.1	29.5	24.0	18.4	-	36.9	15.37	36.9	33.6	28.1	22.6	17.1	-
	17	38.0	11.51	38.0	37.7	34.0	28.1	22.3	16.4	34.5	15.30	34.5	34.5	32.8	27.1	21.3	15.6
	14	37.5	11.47	37.5	37.5	35.5	29.5	23.4	17.4	34.4	15.30	34.4	34.4	33.5	27.5	21.6	15.7
	25	49.2	12.68	28.8	21.6	16.3	-	-	-	44.4	16.32	29.5	20.6	15.5	-	-	-
	22	45.1	12.52	34.7	29.1	23.5	17.9	-	-	40.9	16.23	33.4	28.0	22.5	17.0	-	-
2.63	19	41.0	12.36	40.6	36.6	30.7	24.8	18.8	-	37.4	16.13	37.4	35.3	29.5	23.7	17.9	-
	17	38.7	12.30	38.7	38.6	35.1	29.0	23.0	17.0	34.9	16.06	34.9	34.9	34.0	28.1	22.2	16.3
	14	38.1	12.26	38.1	38.1	36.5	30.3	24.2	18.1	34.8	16.06	34.8	34.8	34.3	28.3	22.3	16.3
	25	50.1	13.46	32.0	23.1	16.9	-	-	-	44.9	17.07	33.7	22.3	16.2	-	-	-
	22	45.9	13.30	36.8	30.6	24.3	18.1	-	-	41.3	16.98	35.7	29.6	23.5	17.4	-	-
2.90	19	41.7	13.14	41.7	38.0	31.8	25.6	19.3	-	37.8	16.88	37.8	36.9	30.8	24.7	18.6	-
	17	39.4	13.08	39.4	39.4	36.2	30.0	23.7	17.5	35.3	16.81	35.3	35.3	35.3	29.2	23.1	17.0
	14	38.8	13.04	38.8	38.8	37.5	31.2	25.0	18.7	35.2	16.82	35.2	35.2	35.2	29.1	23.0	16.9

ZF150 (44 kW) Metric (Continued)

Air on Evaporator Coil		Temperature of Air on Condenser Coil															
		Total Capacity[1,2] (kW)	Total Input (kW)[3]	Sensible Capacity (kW) Return Dry Bulb (°C)						Total Capacity[1,2] (kW)	Total Input (kW)[3]	Sensible Capacity (kW) Return Dry Bulb (°C)					
m^3/s	WB (°C)			32	29	27	24	21	18			32	29	27	24	21	18
		48°C								52°C							
1.77	25	40.0	15.57	20.9	16.5	12.1	-	-	-	37.6	16.65	19.6	15.2	10.8	-	-	-
	22	36.8	15.43	26.7	22.3	18.0	13.6	-	-	34.7	16.41	25.5	21.1	16.6	12.2	-	-
	19	33.7	15.28	32.5	28.1	23.8	19.4	15.0	-	31.8	16.17	31.4	26.9	22.5	18.0	13.6	-
	17	30.7	15.16	30.7	30.7	28.2	23.8	19.5	15.1	27.5	15.95	27.5	27.5	27.5	23.1	18.6	14.2
	14	30.6	15.16	30.6	30.6	28.5	24.2	19.8	15.4	27.4	15.95	27.4	27.4	27.4	23.0	18.5	14.1
2.06	25	41.3	15.85	22.9	17.3	13.1	-	-	-	38.9	16.91	22.0	15.9	11.6	-	-	-
	22	38.0	15.71	28.6	23.9	19.3	14.7	-	-	35.9	16.70	27.3	22.6	17.9	13.2	-	-
	19	34.8	15.58	34.2	30.5	25.6	20.6	15.6	-	32.8	16.48	32.6	29.3	24.2	19.1	14.0	-
	17	31.7	15.45	31.7	31.7	30.5	25.4	20.3	15.2	28.4	16.23	28.4	28.4	30.2	24.9	19.6	14.4
	14	31.6	15.45	31.6	31.6	31.0	25.8	20.7	15.5	28.3	16.23	28.3	28.3	30.5	25.2	19.9	14.7
2.36	25	42.6	16.10	25.0	18.2	14.0	-	-	-	40.1	17.15	24.3	16.6	12.4	-	-	-
	22	39.2	15.97	30.4	25.5	20.7	15.8	-	-	37.0	16.96	29.1	24.1	19.1	14.1	-	-
	19	35.9	15.85	35.9	32.9	27.3	21.8	16.2	-	33.9	16.77	33.9	31.6	25.9	20.1	14.4	-
	17	32.7	15.71	32.7	32.7	32.9	27.0	21.1	15.2	29.3	16.50	29.3	29.3	32.9	26.8	20.7	14.6
	14	32.6	15.71	32.6	32.6	33.5	27.5	21.5	15.5	29.2	16.49	29.2	29.2	33.6	27.5	21.4	15.2
2.63	25	43.0	16.85	29.2	20.0	14.8	-	-	-	40.2	17.88	28.5	18.7	13.3	-	-	-
	22	39.7	16.74	32.8	27.2	21.7	16.1	-	-	37.4	17.72	31.5	25.8	20.0	14.3	-	-
	19	36.4	16.62	36.4	34.5	28.6	22.6	16.7	-	34.6	17.57	34.6	32.9	26.8	20.7	14.5	-
	17	33.1	16.47	33.1	33.1	33.2	27.1	21.1	15.0	29.6	17.26	29.6	29.6	31.4	25.1	18.8	12.5
	14	33.0	16.47	33.0	33.0	33.4	27.3	21.2	15.1	29.5	17.26	29.5	29.5	31.7	25.4	19.1	12.8
2.90	25	43.3	17.59	33.3	21.8	15.6	-	-	-	40.3	18.60	32.6	20.7	14.2	-	-	-
	22	40.1	17.49	35.1	28.9	22.7	16.4	-	-	37.8	18.48	34.0	27.5	21.0	14.5	-	-
	19	37.0	17.38	37.0	36.0	29.8	23.5	17.3	-	35.4	18.35	35.4	34.2	27.7	21.2	14.7	-
	17	33.5	17.22	33.5	33.5	33.5	27.2	21.0	14.7	30.0	18.01	30.0	30.0	30.0	23.5	16.9	10.4
	14	33.4	17.22	33.4	33.4	33.4	27.1	20.9	14.7	29.9	18.01	29.9	29.9	29.9	23.4	16.8	10.3

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. Capacity rating are based on 80 F (26.6 C) Entering Air Dry Bulb Temperature.
3. These ratings include the condenser fan motors, the compressor motors and supply air blower motor (External Static Pressure 0.35 IWG/ 87.1 Pa).

Airflow Performance

ZF090-150 Side Duct Application

ZF090 (7.5 Ton) Standard Motor Side Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	–	–	–	–	–	–	–	–	–	–	–	–	3193	1490	1.60	2981	1310	1.41
0.4	3690	2230	2.39	3468	1950	2.09	3294	1750	1.88	3105	1550	1.66	2922	1370	1.47	2694	1210	1.30
0.6	3478	2110	2.26	3239	1830	1.96	3044	1640	1.76	2850	1440	1.54	2651	1270	1.36	2423	1120	1.20
0.8	3243	1980	2.12	3001	1720	1.85	2790	1520	1.63	2576	1330	1.43	2370	1170	1.26	2105	1020	1.09
1.0	3006	1830	1.96	2758	1580	1.70	2544	1400	1.50	2303	1230	1.32	2017	1050	1.13	1624	880	0.94
1.2	2758	1720	1.85	2533	1510	1.62	2230	1290	1.38	1891	1080	1.16	–	–	–	–	–	–
1.4	2447	1570	1.68	2182	1350	1.45	1769	1110	1.19	–	–	–	–	–	–	–	–	–
1.6	2085	1410	1.51	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ZF090 (26 kW) Standard Motor Side Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In	Out	m^3/s	In	Out	m^3/s	In	Out	m^3/s	In	Out	m^3/s	In	Out	m^3/s	In	Out
50	–	–	–	–	–	–	–	–	–	–	–	–	1.51	1.49	1.19	1.36	1.31	1.05
100	1.74	2.23	1.78	1.64	1.95	1.55	1.55	1.75	1.40	1.46	1.55	1.24	1.38	1.37	1.10	1.27	1.21	0.97
149	1.64	2.11	1.68	1.53	1.83	1.46	1.44	1.64	1.39	1.34	1.44	1.15	1.25	1.27	1.01	1.14	1.12	0.89
199	1.53	1.98	1.58	1.42	1.72	1.38	1.32	1.52	1.38	1.22	1.33	1.07	1.12	1.17	0.94	0.99	1.02	0.81
249	1.42	1.83	1.46	1.30	1.58	1.27	1.20	1.40	1.28	1.09	1.23	0.98	0.95	1.05	0.84	0.77	0.88	0.70
299	1.30	1.72	1.38	1.20	1.51	1.21	1.05	1.29	1.17	0.89	1.08	0.91	–	–	–	–	–	–
349	1.15	1.57	1.25	1.03	1.35	1.08	0.83	1.11	1.01	–	–	–	–	–	–	–	–	–
399	0.98	1.41	1.26	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ZF090 (7.5) Ton Optional Motor Side Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.25	–	–	–	–	–	–	–	–	–	–	–	–	3650	1800	1.95	3290	1560	1.68
0.5	–	–	–	–	–	–	–	–	–	–	–	–	3250	1650	1.78	2930	1430	1.53
0.8	–	–	–	–	–	–	–	–	–	–	–	–	2783	1500	1.61	2507	1300	1.39
1	3555	2440	2.62	3285	2120	2.27	3047	1860	2.00	2778	1590	1.71	2507	1390	1.49	2209	1180	1.27
1.2	3320	2310	2.48	3034	1990	2.13	2799	1730	1.86	2510	1480	1.59	2213	1260	1.35	1846	1050	1.13
1.4	3101	2160	2.32	2796	1860	2.00	2466	1590	1.71	2188	1330	1.43	1721	1090	1.17	–	–	–
1.6	2864	2040	2.19	2489	1710	1.83	2145	1450	1.56	–	–	–	–	–	–	–	–	–
1.8	2524	1860	2.00	2182	1550	1.66	–	–	–	–	–	–	–	–	–	–	–	–
2	2189	1680	1.80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ZF090 (26 kW) Optional Motor Side Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
62	–	–	–	–	–	–	–	–	–	–	–	–	1.72	1.8	1.46	1.55	1.56	1.25
125	–	–	–	–	–	–	–	–	–	–	–	–	1.53	1.65	1.33	1.38	1.43	1.14
199	–	–	–	–	–	–	–	–	–	–	–	–	1.31	1.5	1.20	1.18	1.3	1.04
249	1.68	2.44	1.95	1.55	2.12	1.70	1.44	1.86	1.49	1.31	1.59	1.27	1.18	1.39	1.11	1.04	1.18	0.94
299	1.52	2.31	1.85	1.43	1.99	1.59	1.32	1.73	1.38	1.18	1.48	1.18	1.04	1.26	1.01	0.87	1.05	0.84
349	1.46	2.16	1.73	1.31	1.86	1.49	1.16	1.59	1.27	1.03	1.33	1.06	0.81	1.09	0.87	–	–	–
399	1.35	2.04	1.63	1.17	1.71	1.36	1.01	1.45	1.16	–	–	–	–	–	–	–	–	–
448	1.19	1.86	1.49	1.03	1.55	1.24	–	–	–	–	–	–	–	–	–	–	–	–
498	1.03	1.68	1.34	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ZF120 (10 Ton) Standard Motor Side Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.35	4820	2675	2.87	4582	2362	2.53	4319	2080	2.23	4086	1842	1.98	3863	1648	1.77	3590	1430	1.53
0.6	4522	2496	2.68	4307	2215	2.38	4025	1941	2.08	3713	1678	1.80	3464	1499	1.61	3149	1291	1.38
0.8	4223	2332	2.50	3973	2062	2.21	3656	1783	1.91	3363	1550	1.66	3026	1350	1.45	-	-	-
1.0	3913	2174	2.33	3679	1923	2.06	3262	1619	1.74	2721	1330	1.43	-	-	-	-	-	-
1.2	3521	1978	2.12	3104	1693	1.82	-	-	-	-	-	-	-	-	-	-	-	-
1.4	2790	1660	1.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF120 (35 kW) Standard Motor Side Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
87	2.27	2.68	2.14	2.16	2.36	1.89	2.04	2.08	1.66	1.93	1.84	1.47	1.82	1.65	1.32	1.69	1.43	1.14
149	2.13	2.50	2.00	2.03	2.22	1.77	1.90	1.94	1.55	1.75	1.68	1.34	1.63	1.50	1.20	1.49	1.29	1.03
199	1.99	2.33	1.87	1.88	2.06	1.65	1.73	1.78	1.43	1.59	1.55	1.24	1.43	1.35	1.08	-	-	-
249	1.85	2.17	1.74	1.74	1.92	1.54	1.54	1.62	1.30	1.28	1.33	1.06	-	-	-	-	-	-
299	1.66	1.98	1.58	1.46	1.69	1.35	-	-	-	-	-	-	-	-	-	-	-	-
349	1.32	1.66	1.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF120 (10 Ton) Optional Motor Side Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5100	2495	2.68
0.6	-	-	-	-	-	-	-	-	-	-	-	-	5091	2745	2.94	4646	2314	2.48
0.8	-	-	-	-	-	-	-	-	-	5078	2937	3.15	4839	2584	2.77	4347	2153	2.31
1.0	-	-	-	-	-	-	5075	3117	3.34	4767	2730	2.93	4487	2377	2.55	3946	1942	2.08
1.2	-	-	-	5068	3308	3.55	4742	2881	3.09	4427	2513	2.69	4108	2159	2.32	3501	1723	1.85
1.4	5079	3595	3.86	4787	3105	3.33	4452	2713	2.91	4012	2259	2.42	3665	1926	2.07	-	-	-
1.6	4739	3316	3.56	4482	2892	3.10	4098	2474	2.65	3543	2006	2.15	3057	1642	1.76	-	-	-
1.8	4461	3111	3.34	4070	2621	2.81	3552	2160	2.32	-	-	-	-	-	-	-	-	-
2.0	3997	2782	2.98	3400	2219	2.38	-	-	-	-	-	-	-	-	-	-	-	-
2.2	3496	2480	2.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF120 (35 kW) Optional Motor Side Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4	2.50	2.00
149	-	-	-	-	-	-	-	-	-	-	-	-	2.40	2.75	2.20	2.19	2.31	1.85
199	-	-	-	-	-	-	-	-	-	2.40	2.94	2.35	2.28	2.58	2.07	2.05	2.15	1.72
249	-	-	-	-	-	-	2.40	3.12	2.49	2.25	2.73	2.18	2.12	2.38	1.90	1.86	1.94	1.55
299	-	-	-	2.39	3.31	2.65	2.24	2.88	2.30	2.09	2.51	2.01	1.94	2.16	1.73	1.65	1.72	1.38
349	2.40	3.60	2.88	2.26	3.11	2.48	2.10	2.71	2.17	1.89	2.26	1.81	1.73	1.93	1.54	-	-	-
399	2.24	3.32	2.65	2.12	2.89	2.31	1.93	2.47	1.98	1.67	2.01	1.60	1.44	1.64	1.31	-	-	-
448	2.11	3.11	2.49	1.92	2.62	2.10	1.68	2.16	1.73	-	-	-	-	-	-	-	-	-
498	1.89	2.78	2.23	1.60	2.22	1.78	-	-	-	-	-	-	-	-	-	-	-	-
548	1.65	2.48	1.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF150 (12.5 Ton) Side Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.35	-	-	-	6150	4171	4.47	5915	3774	4.05	5610	3309	3.55	5396	2948	3.16	4960	2495	2.68
0.6	-	-	-	5850	3932	4.22	5648	3565	3.82	5363	3136	3.36	5091	2745	2.94	4646	2314	2.48
0.8	5870	4273	4.58	5567	3715	3.98	5406	3380	3.62	5078	2937	3.15	4839	2584	2.77	4347	2153	2.31
1.0	5652	4087	4.38	5327	3518	3.77	5075	3117	3.34	4767	2730	2.93	4487	2377	2.55	3946	1942	2.08
1.2	5350	3820	4.10	5068	3308	3.55	4742	2881	3.09	4427	2513	2.69	4108	2159	2.32	-	-	-
1.4	5079	3595	3.86	4787	3105	3.33	4452	2713	2.91	4012	2259	2.42	3665	1926	2.07	-	-	-
1.6	4739	3316	3.56	4482	2892	3.10	4098	2474	2.65	-	-	-	-	-	-	-	-	-
1.8	4461	3111	3.34	4070	2621	2.81	-	-	-	-	-	-	-	-	-	-	-	-
2.0	3997	2782	2.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF150 (44 kW) Side Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
87	-	-	-	2.90	4.17	3.34	2.79	3.77	3.02	2.65	3.31	2.65	2.55	2.95	2.36	2.34	2.50	2.00
149	-	-	-	2.76	3.93	3.15	2.67	3.57	2.85	2.53	3.14	2.51	2.40	2.75	2.20	2.19	2.31	1.85
199	2.77	4.27	3.42	2.63	3.72	2.97	2.55	3.38	2.70	2.40	2.94	2.35	2.28	2.58	2.07	2.05	2.15	1.72
249	2.67	4.09	3.27	2.51	3.52	2.81	2.40	3.12	2.49	2.25	2.73	2.18	2.12	2.38	1.90	1.86	1.94	1.55
299	2.52	3.82	3.06	2.39	3.31	2.65	2.24	2.88	2.30	2.09	2.51	2.01	1.94	2.16	1.73	-	-	-
349	2.40	3.60	2.88	2.26	3.11	2.48	2.10	2.71	2.17	1.89	2.26	1.81	1.73	1.93	1.54	-	-	-
399	2.24	3.32	2.65	2.12	2.89	2.31	1.93	2.47	1.98	-	-	-	-	-	-	-	-	-
448	2.11	3.11	2.49	1.92	2.62	2.10	-	-		-	-	-	-	-	-	-	-	-
498	1.89	2.78	2.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF090-150 Bottom Duct Application

ZF090 (7.5 Ton) Standard Motor Bottom Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	3478	2110	2.26	3239	1830	1.96	3044	1640	1.76	2850	1440	1.54	2651	1270	1.36	2423	1120	1.20
0.4	3243	1980	2.12	3001	1720	1.85	2790	1520	1.63	2576	1330	1.43	2370	1170	1.26	2105	1020	1.09
0.6	3006	1830	1.96	2758	1580	1.70	2544	1400	1.50	2303	1230	1.32	2017	1050	1.13	1624	880	0.94
0.8	2758	1720	1.85	2533	1510	1.62	2230	1290	1.38	1891	1080	1.16	–	–	–	–	–	–
1.0	2447	1570	1.68	2182	1350	1.45	1769	1110	1.19	–	–	–	–	–	–	–	–	–
1.2	2085	1410	1.51	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ZF090 (26 kW) Standard Motor Bottom Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
50	1.64	2.11	1.68	1.53	1.83	1.46	1.44	1.64	1.39	1.34	1.44	1.15	1.25	1.27	1.01	1.14	1.12	0.89
100	1.53	1.98	1.58	1.42	1.72	1.38	1.32	1.52	1.38	1.22	1.33	1.07	1.12	1.17	0.94	0.99	1.02	0.81
149	1.42	1.83	1.46	1.30	1.58	1.27	1.20	1.40	1.28	1.09	1.23	0.98	0.95	1.05	0.84	0.77	0.88	0.70
199	1.30	1.72	1.38	1.20	1.51	1.21	1.05	1.29	1.17	0.89	1.08	0.91	–	–	–	–	–	–
249	1.15	1.57	1.25	1.03	1.35	1.08	0.83	1.11	1.01	–	–	–	–	–	–	–	–	–
299	0.98	1.41	1.26	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ZF090 (7.5 Ton) Optional Motor Bottom Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.4	–	–	–	–	–	–	–	–	–	–	–	–	2783	1500	1.61	2507	1300	1.39
0.6	–	–	–	3285	2120	2.27	3047	1860	2.00	2778	1590	1.71	2507	1390	1.49	2209	1180	1.27
0.8	–	–	–	3034	1990	2.13	2799	1730	1.86	2510	1480	1.59	2213	1260	1.35	1846	1050	1.13
1.0	3101	2160	2.32	2796	1860	2.00	2466	1590	1.71	2188	1330	1.43	1721	1090	1.17	–	–	–
1.2	2864	2040	2.19	2489	1710	1.83	2145	1450	1.56	–	–	–	–	–	–	–	–	–
1.4	2524	1860	2.00	2182	1550	1.66	–	–	–	–	–	–	–	–	–	–	–	–
1.6	2189	1680	1.80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ZF090 (26 kW) Optional Motor Bottom Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
100	–	–	–	–	–	–	–	–	–	–	–	–	1.31	1.5	1.20	1.18	1.3	1.04
149	1.67	2.44	1.95	1.55	2.12	1.70	1.44	1.86	1.49	1.31	1.59	1.27	1.18	1.39	1.11	1.04	1.18	0.94
199	1.57	2.31	1.85	1.43	1.99	1.59	1.32	1.73	1.38	1.18	1.48	1.18	1.04	1.26	1.01	0.87	1.05	0.84
249	1.46	2.16	1.73	1.31	1.86	1.49	1.16	1.59	1.27	1.03	1.33	1.06	0.81	1.09	0.87	–	–	–
299	1.35	2.04	1.63	1.17	1.71	1.36	1.01	1.45	1.16	–	–	–	–	–	–	–	–	–
349	1.19	1.86	1.49	1.03	1.55	1.24	–	–	–	–	–	–	–	–	–	–	–	–
399	1.03	1.68	1.34	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

ZF120 (10 Ton) Standard Motor Bottom Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	4543	2511	2.69	4362	2250	2.41	4139	1996	2.14	3911	1766	1.89	3719	1594	1.71	3518	1407	1.51
0.4	4311	2381	2.55	4115	2127	2.28	3862	1871	2.01	3611	1644	1.76	3386	1471	1.58	3153	1293	1.39
0.6	4032	2232	2.39	3804	1982	2.13	3508	1720	1.84	3246	1506	1.61	2971	1332	1.43	-	-	-
0.8	3706	2068	2.22	3428	1818	1.95	3078	1548	1.66	-	-	-	-	-	-	-	-	-
1.0	3333	1892	2.03	2989	1644	1.76	-	-	-	-	-	-	-	-	-	-	-	-
1.2	2914	1711	1.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF120 (35 kW) Standard Motor Bottom Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
50	2.14	2.51	2.01	2.06	2.25	1.80	1.95	2.00	1.60	1.85	1.77	1.41	1.75	1.59	1.27	1.66	1.41	1.13
100	2.03	2.38	1.91	1.94	2.13	1.70	1.82	1.87	1.50	1.70	1.64	1.31	1.60	1.47	1.18	1.49	1.29	1.03
149	1.90	2.23	1.79	1.80	1.98	1.59	1.66	1.72	1.38	1.53	1.51	1.20	1.40	1.33	1.07	-	-	-
199	1.75	2.07	1.65	1.62	1.82	1.45	1.45	1.55	1.24	-	-	-	-	-	-	-	-	-
249	1.57	1.89	1.51	1.41	1.64	1.32	-	-	-	-	-	-	-	-	-	-	-	-
299	1.38	1.71	1.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

ZF120 (10 Ton) Optional Motor Bottom Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.2	-	-	-	-	-	-	-	-	-	-	-	-	4966	2666	2.86	4605	2290	2.46
0.4	-	-	-	-	-	-	-	-	-	4919	2473	2.65	4721	2515	2.70	4344	2145	2.30
0.6	-	-	-	-	-	-	4929	3022	3.24	4665	2324	2.49	4450	2353	2.52	4048	1991	2.13
0.8	-	-	-	4908	3197	3.43	4668	2841	3.05	4391	2171	2.33	4151	2183	2.34	3717	1829	1.96
1.0	4915	3456	3.71	4651	3013	3.23	4388	2656	2.85	4096	2015	2.16	3825	2008	2.15	3352	1664	1.78
1.2	4653	3253	3.49	4377	2823	3.03	4089	2467	2.65	3779	1858	1.99	3471	1830	1.96	2951	1499	1.61
1.4	4372	3046	3.27	4087	2631	2.82	3771	2277	2.44	3442	1703	1.83	3090	1652	1.77	-	-	-
1.6	4070	2837	3.04	3780	2437	2.61	3434	2089	2.24	3084	1552	1.66	-	-	-	-	-	-
1.8	3748	2629	2.82	3455	2243	2.41	3078	1904	2.04	-	-	-	-	-	-	-	-	-
2.0	3406	2425	2.60	3114	2051	2.20	-	-	-	-	-	-	-	-	-	-	-	-
2.2	3044	2228	2.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF120 (35 kW) Optional Motor Bottom Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
50	-	-	-	-	-	-	-	-	-	-	-	-	2.34	2.67	2.13	2.17	2.29	1.83
100	-	-	-	-	-	-	-	-	-	2.32	2.47	1.98	2.23	2.51	2.01	2.05	2.15	1.72
149	-	-	-	-	-	-	2.33	3.02	2.42	2.20	2.32	1.86	2.10	2.35	1.88	1.91	1.99	1.59
199	-	-	-	2.32	3.20	2.56	2.20	2.84	2.27	2.07	2.17	1.74	1.96	2.18	1.75	1.75	1.83	1.46
249	2.32	3.46	2.76	2.20	3.01	2.41	2.07	2.66	2.12	1.93	2.01	1.61	1.81	2.01	1.61	1.58	1.66	1.33
299	2.20	3.25	2.60	2.07	2.82	2.26	1.93	2.47	1.97	1.78	1.86	1.49	1.64	1.83	1.46	1.39	1.50	1.20
349	2.06	3.05	2.44	1.93	2.63	2.10	1.78	2.28	1.82	1.62	1.70	1.36	1.46	1.65	1.32	-	-	-
399	1.92	2.84	2.27	1.78	2.44	1.95	1.62	2.09	1.67	1.46	1.55	1.24	-	-	-	-	-	-
448	1.77	2.63	2.10	1.63	2.24	1.79	1.45	1.90	1.52	-	-	-	-	-	-	-	-	-
498	1.61	2.43	1.94	1.47	2.05	1.64	-	-	-	-	-	-	-	-	-	-	-	-
548	1.44	2.23	1.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF150 (12.5 Ton) Bottom Duct Imperial

ESP (iwg)	Turns Open																	
	0			1			2			3			4			5		
	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP	CFM	Watts	BHP
0.35	5576	4015	4.32	5370	3547	3.80	5171	3197	3.43	5007	2884	3.09	4721	2515	2.70	4344	2145	2.30
0.6	5376	3839	4.12	5147	3376	3.62	4929	3022	3.24	4735	2704	2.90	4450	2353	2.52	4048	1991	2.13
0.8	5155	3652	3.92	4908	3197	3.43	4668	2841	3.05	4411	2501	2.68	4151	2183	2.34	3717	1829	1.96
1.0	4915	3456	3.71	4651	3013	3.23	4388	2656	2.85	4035	2281	2.45	3825	2008	2.15	-	-	-
1.2	4653	3253	3.49	4377	2823	3.03	4089	2467	2.65	3608	2051	2.20	-	-	-	-	-	-
1.4	4372	3046	3.27	4087	3621	2.82	3771	2277	2.44	-	-	-	-	-	-	-	-	-
1.6	4070	2837	3.04	3780	2437	2.61	-	-	-	-	-	-	-	-	-	-	-	-
1.8	3748	2629	2.82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ZF150 (44 kW) Bottom Duct Metric

ESP (Pa)	Turns Open																	
	0			1			2			3			4			5		
	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)	m^3/s	In (kW)	Out (kW)
87	2.63	4.01	3.21	2.53	3.55	2.84	2.44	3.20	2.56	2.36	2.88	2.31	2.23	2.51	2.01	2.05	2.15	1.72
149	2.54	3.84	3.07	2.43	3.38	2.70	2.33	3.02	2.42	2.23	2.70	2.16	2.10	2.35	1.88	1.91	1.99	1.59
199	2.43	3.65	2.92	2.32	3.20	2.56	2.20	2.84	2.27	2.08	2.50	2.00	1.96	2.18	1.75	1.75	1.83	1.46
249	2.32	3.46	2.76	2.20	3.01	2.41	2.07	2.66	2.12	1.90	2.28	1.83	1.81	2.01	1.61	-	-	-
299	2.20	3.25	2.60	2.07	2.82	2.26	1.93	2.47	1.97	1.70	2.05	1.64	-	-	-	-	-	-
349	2.06	3.05	2.44	1.93	2.63	2.10	1.78	2.28	1.82	-	-	-	-	-	-	-	-	-
399	1.92	2.84	2.27	1.78	2.44	1.95	-	-	-	-	-	-	-	-	-	-	-	-
448	1.77	2.63	2.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES FOR TABLES ON PAGES 30 THROUGH 37:

- "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.
- Blower performance includes dry coil and 2" (51mm) throw-away filters.
- Blower performance for gas heat includes the maximum number of heat tubes available for each tonnage.
- ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

Rated Airflow Imperial

Model	CFM	ESP (iwg)
ZF090	3650	0.2
ZF120	5000	0.3
ZF150	6250	0.3

Additional Static Resistance ZF120/150 Cabinet (IMPERIAL)

CFM	Cooling Only[1]	Economizer[2 3]	Electric Heat KW[2]			
			18	24	36	54
1900	0.06	0.02	0.06	0.07	0.08	0.10
2100	0.07	0.02	0.07	0.08	0.09	0.11
2300	0.08	0.02	0.08	0.09	0.10	0.13
2500	0.09	0.02	0.09	0.10	0.11	0.14
2700	0.11	0.03	0.10	0.12	0.13	0.16
2900	0.12	0.03	0.11	0.13	0.14	0.18
3100	0.14	0.03	0.13	0.15	0.16	0.20
3300	0.16	0.03	0.14	0.17	0.18	0.22
3500	0.18	0.04	0.16	0.19	0.20	0.24
3700	0.20	0.04	0.18	0.21	0.22	0.26
3900	0.23	0.04	0.20	0.23	0.24	0.28
4100	0.25	0.04	0.22	0.25	0.26	0.31
4300	0.28	0.05	0.24	0.28	0.29	0.34
4500	0.30	0.05	0.26	0.30	0.31	0.37
4700	0.33	0.05	0.29	0.33	0.34	0.40
4900	0.36	0.05	0.31	0.35	0.37	0.43
5100	0.39	0.06	0.34	0.38	0.40	0.46
5300	0.42	0.06	0.37	0.41	0.43	0.49
5500	0.45	0.06	0.40	0.44	0.46	0.53
5700	0.48	0.06	0.43	0.47	0.49	0.56
5900	0.52	0.07	0.46	0.50	0.53	0.59
6100	0.56	0.07	0.49	0.53	0.56	0.62
6300	0.60	0.07	0.53	0.56	0.59	0.65

1. Add these resistance values to the available static resistance in the respective Blower Performance Tables.
2. Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.
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 system is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

Additional Static Resistance ZF090 Cabinet (Imperial)

CFM	Cooling Only[1]	Economizer[2 3]
1900	-0.004	0.07
2100	0.01	0.09
2300	0.01	0.11
2500	0.02	0.13
2700	0.03	0.16
2900	0.04	0.18
3100	0.05	0.20
3300	0.06	0.22
3500	0.07	0.24
3700	0.08	0.27
3900	0.09	0.29
4100	0.09	0.31
4300	0.10	0.33

1. Add these resistance values to the available static resistance in the respective Blower Performance Tables.
2. Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.
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 system is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

Additional Static Resistance ZF120/150 Cabinet (Metric)

M^3S	Cooling Only[1]	Economizer[2 3]	Electric Heat kW[2]			
			18	24	36	54
0.89	14.9	5.0	14.9	17.4	19.9	24.8
0.99	17.4	5.0	17.4	19.9	22.4	27.3
1.08	19.9	5.0	19.9	22.4	24.8	32.3
1.18	22.4	5.0	22.4	24.8	27.3	34.8
1.27	27.3	7.5	24.8	29.8	32.3	39.7
1.36	29.8	7.5	27.3	32.3	34.8	44.7
1.46	34.8	7.5	32.3	37.3	39.7	49.7
1.55	39.7	7.5	34.8	42.2	44.7	54.6
1.65	44.7	9.9	39.7	47.2	49.7	59.6
1.74	49.7	9.9	44.7	52.2	49.7	64.6
1.83	57.1	9.9	49.7	57.1	59.6	69.5
1.93	62.1	9.9	54.6	62.1	64.6	77.0
1.02	69.5	12.4	59.6	69.5	72.0	84.4
2.12	74.5	12.4	64.6	74.5	77.0	91.9
2.21	82.0	12.4	72.0	82.0	84.4	99.3
2.30	89.4	12.4	77.0	86.9	91.9	106.8
2.40	96.9	14.9	84.4	94.4	99.3	114.2
2.49	104.3	14.9	91.9	101.8	106.8	121.7
2.59	111.8	14.9	99.3	109.3	114.2	131.6
2.68	119.2	14.9	106.8	116.7	121.7	139.1
2.77	129.1	17.4	114.2	124.2	131.6	146.5
2.87	139.1	17.4	121.7	131.6	139.1	154.0
2.96	149.0	17.4	131.6	139.1	146.5	161.4

1. Add these resistance values to the available static resistance in the respective Blower Performance Tables.
2. Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.
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 system is less than 62.1 Pa, the unit will deliver less M3S during full economizer operation.

Additional Static Resistance ZF090 Cabinet (Metric)

M^3S	Cooling Only[1]	Economizer[2 3]
0.9	-0.99	17.40
0.99	2.50	22.40
1.09	2.50	27.40
1.18	4.98	32.40
1.27	7.50	39.90
1.37	10.00	44.83
1.46	12.50	49.81
1.56	14.90	54.80
1.65	17.40	59.80
1.75	19.90	67.20
1.84	22.40	72.20
1.93	22.40	77.20
2.03	24.90	82.20

1. Add these resistance values to the available static resistance in the respective Blower Performance Tables.
2. Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.
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 system is less than 62.1 Pa, the unit will deliver less M3S during full economizer operation.

Gas Heat Minimum Supply Air Imperial

Size (Ton)	Model	Heat Size	Supply Air (CFM)			
			Cooling		Heating	
			Min	Max	Min	Max
090 (7.5)	ZF	N12	2250	3750	2250	3750
		N18	2250	3750	2250	3750
120 (10)	ZF	N18	3000	5000	3000	5000
		N24	3000	5000	3000	5000
150 (12.5)	ZF	N18	3750	6250	3750	6250
		N24	3750	6250	3750	6250

Gas Heat Minimum Supply Air Metric

Size (KW)	Model	Heat Size	Supply Air (M^3S)			
			Cooling		Heating	
			Min	Max	Min	Max
090 (26)	ZF	N12	1.06	1.76	1.06	1.76
		N18	1.06	1.76	1.06	1.76
120 (35)	ZF	N18	1.42	2.36	1.42	2.36
		N24	1.42	2.36	1.42	2.36
150 (44)	ZF	N18	1.76	2.95	1.76	2.95
		N24	1.76	2.95	1.76	2.95

Electric Heat Minimum Supply Air Imperial

Size (Tons)	Model	Voltage	Minimum Supply Air (CFM)			
			Heater kW			
			18	24	36	54
120 (10)	ZF	380/415-3-50	3000	3000	3000	3500
150 (12.5)	ZF	380/415-3-50	3750	3750	3750	3750

Electric Heat Minimum Supply Air Metric

Size (KW)	Model	Voltage	Minimum Supply Air (C^3S)			
			Heater kW			
			18	24	36	54
120 (35)	ZF	380/415-3-50	1.42	1.42	1.42	1.42
150 (44)	ZF	380/415-3-50	1.76	1.76	1.76	1.76

Indoor Blower Specifications

Size (Tons)	Model	Motor					Motor Sheave			Blower Sheave			Belt
		HP	RPM[1]	Eff.	SF	Frame	Datum Dia. (In.)	Bore (In.)	Model	Datum Dia. (In.)	Bore (In.)	Model	
90 (7.5)	ZF	2	1425	0.8	1.15	56	3.4 - 4.4	7/8	1VM50	5.5	1	AK59	A49
		2	1425	0.8	1.15	56	3.4 - 4.4	7/8	1VM50	5	1	AK54	A47
120 (10)	ZF	2	1425	0.8	1.15	56	3.4 - 4.4	7/8	1VM50	7	1	AK74	A54
		4	1455	0.87	1.15	184T	4.0 - 5.0	1-1/8	1VP56	6.2	1	AK66	A56
150 (12.5)	ZF	4	1455	0.87	1.15	184T	4.3 - 5.3	1-1/8	1VP56	6.6	1	BK72	BX56

1. 1725 RPM at 60 Hz.

Power Exhaust Specifications

Model	Voltage	Motor			Motor			Fuse Size	CFM @ 0.1 ESP
		HP	RPM[1]	QTY	LRA	FLA	MCA		
2PE04703246	460-1-60	3/4	1075	1	3.4	2.2	2.8	5	3800

1. Motors are multi-tapped and factory wired for high speed, suitable for 50 HZ power supply

Sound Performance

Indoor Sound Power Levels

Size (Tons)	Model	CFM	ESP (IWG)	Blower		Sound Power, dB (10^{-12}) Watts								
						Sound Rating[1] dB (A)	Octave Band Centerline Frequency (Hz)							
				RPM	BHP		63	125	250	500	1000	2000	4000	8000
090 (7.5)	ZF	3000	0.6	854	1.47	77	74	76	76	74	72	68	68	63
120 (10)	ZF	4000	0.6	959	2.29	83	80	82	82	80	78	74	74	69
150 (12.5)	ZF	5000	0.6	1132	3.74	87	84	86	86	84	82	78	78	73

1. These values have been accessed using a model of sound propagation from a point source into the hemispheric/free field. The dBA values provided are to be used for reference only. Calculation of dBA values cover matters of system design and the fan manufacture has no way of knowing the details of each system. This constitutes an exception to any specification or guarantee requiring a dBA value of sound data in any other form than sound power level ratings.

Electrical Data

ZF090-120 Standard Motor

Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Exh Motor	Electric Heat Option				MCA[1] (Amps)	MCA[1] w/ Pwr Exh (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)	Max Fuse[2]/ Breaker[3] Size w/ Pwr Exh (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	KW	Stages	Amps				
ZF090	380	6.2	52.0	9.7	1.6	4.3	2.2	None	-	-	-	21.5	23.7	25	25
	415	6.2	52.0	9.7	1.6	4.3	2.2	None	-	-	-	21.5	23.7	25	25
ZF120	380	8.0	67.1	12.5	1.6	4.3	2.2	None	-	-	-	25.5	27.7	30	35
								2TP04521850	11.3	2	17.2	26.8	29.6	30	35
								2TP04522450	15.0	2	22.8	33.9	36.6	35	40
								2TP04523650	21.3	2	32.4	45.8	48.6	50	50
								2TP04525450	33.8	2	51.4	69.6	72.3	70	80
	415	8.0	67.1	12.5	1.6	4.3	2.2	None	-	-	-	25.5	27.7	30	35
								2TP04521850	13.5	2	18.8	28.9	31.6	30	35
								2TP04522450	17.9	2	24.9	36.5	39.3	40	40
								2TP04523650	25.4	2	35.3	49.5	52.3	50	60
								2TP04525450	40.4	2	56.2	75.6	78.4	80	80

1. Minimum Circuit Ampacity.
2. Maximum Over current Protection per Standard UL 1995.
3. Fuse or HACR circuit breaker size installed at factory or field installed.

ZF090-150 Hi Static Motor

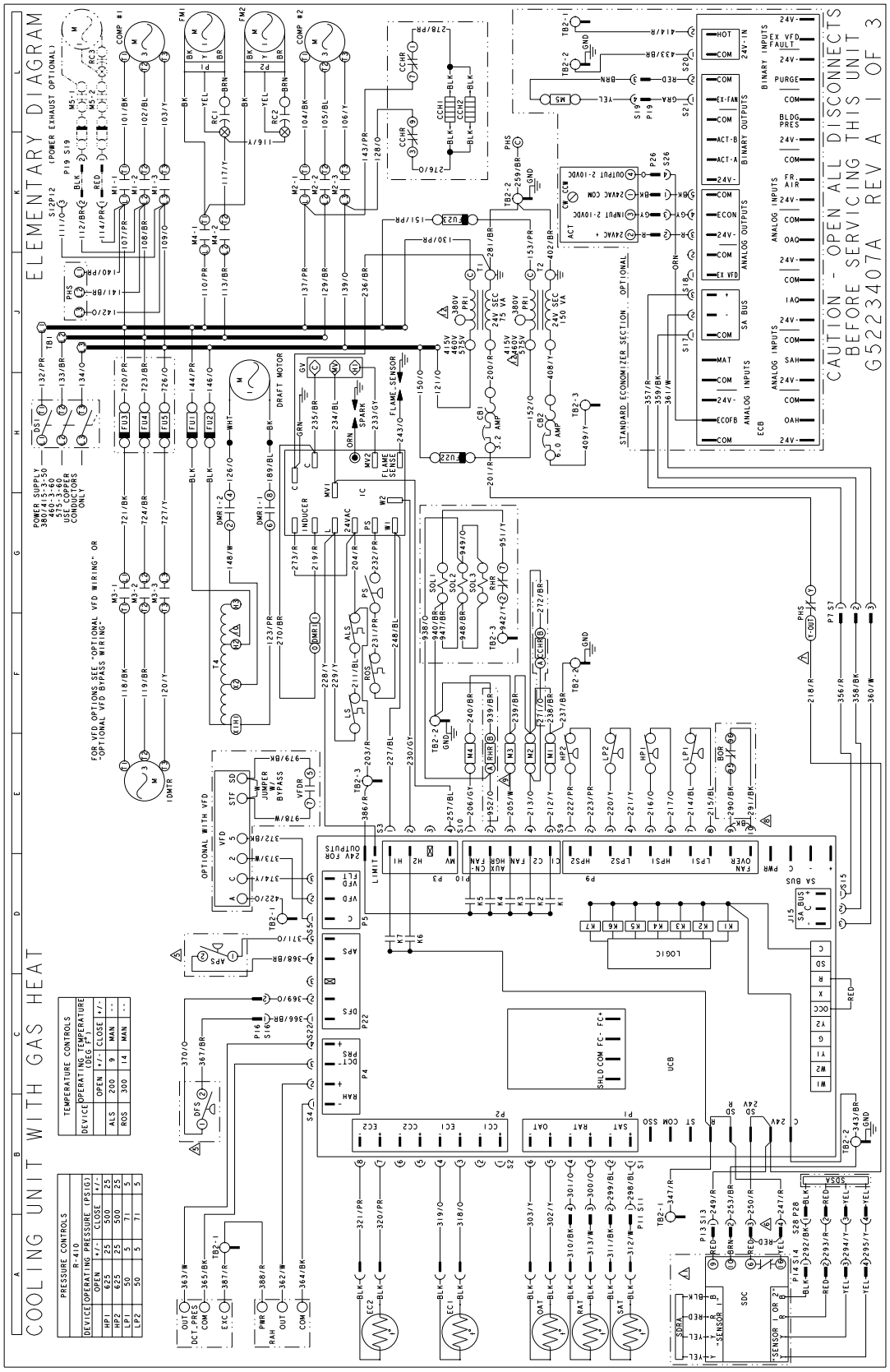
Size (Tons)	Volt	Compressors (each)			OD Fan Motors (each)	Supply Blower Motor	Pwr Exh Motor	Electric Heat Option				MCA[1] (Amps)	MCA[1] w/ Pwr Exh (Amps)	Max Fuse[2]/ Breaker[3] Size (Amps)	Max Fuse[2]/ Breaker[3] Size w/ Pwr Exh (Amps)
		RLA	LRA	MCC	FLA	FLA	FLA	Model	KW	Stages	Amps				
ZF090	380	6.2	52.0	9.7	1.6	4.3	2.2	None	-	-	-	21.5	23.7	25	25
	415	6.2	52.0	9.7	1.6	4.3	2.2	None	-	-	-	21.5	23.7	25	25
ZF120	380	8.0	67.1	12.5	1.6	6.4	2.2	None	-	-	-	27.6	29.8	35	35
								2TP04521850	11.3	2	17.2	29.5	32.2	35	35
								2TP04522450	15.0	2	22.8	36.5	39.2	40	40
								2TP04523650	21.3	2	32.4	48.5	51.2	50	60
								2TP04525450	33.8	2	51.4	72.2	74.9	80	80
	415	8.0	67.1	12.5	1.6	6.4	2.2	None	-	-	-	27.6	29.8	35	35
								2TP04521850	13.5	2	18.8	31.5	34.2	35	35
								2TP04522450	17.9	2	24.9	39.1	41.9	40	45
								2TP04523650	25.4	2	35.3	52.2	54.9	60	60
								2TP04525450	40.4	2	56.2	78.3	81.0	80	90
ZF150	380	11.2	75.0	17.5	1.6	6.4	2.2	None	-	-	-	38.0	40.2	45	50
								2TP04521850	11.3	2	17.2	38.0	40.2	45	50
								2TP04522450	15.0	2	22.8	38.0	40.2	45	50
								2TP04523650	21.3	2	32.4	48.5	51.2	50	60
								2TP04525450	33.8	2	51.4	72.2	74.9	80	80
	415	11.2	75.0	17.5	1.6	6.4	2.2	None	-	-	-	38.0	40.2	45	50
								2TP04521850	13.5	2	18.8	38.0	40.2	45	50
								2TP04522450	17.9	2	24.9	39.1	41.9	45	50
								2TP04523650	25.4	2	35.3	52.2	54.9	60	60
								2TP04525450	40.4	2	56.2	78.3	81.0	80	90

1. Minimum Circuit Ampacity.
2. Maximum Over current Protection per Standard UL 1995.
3. Fuse or HACR circuit breaker size installed at factory or field installed.

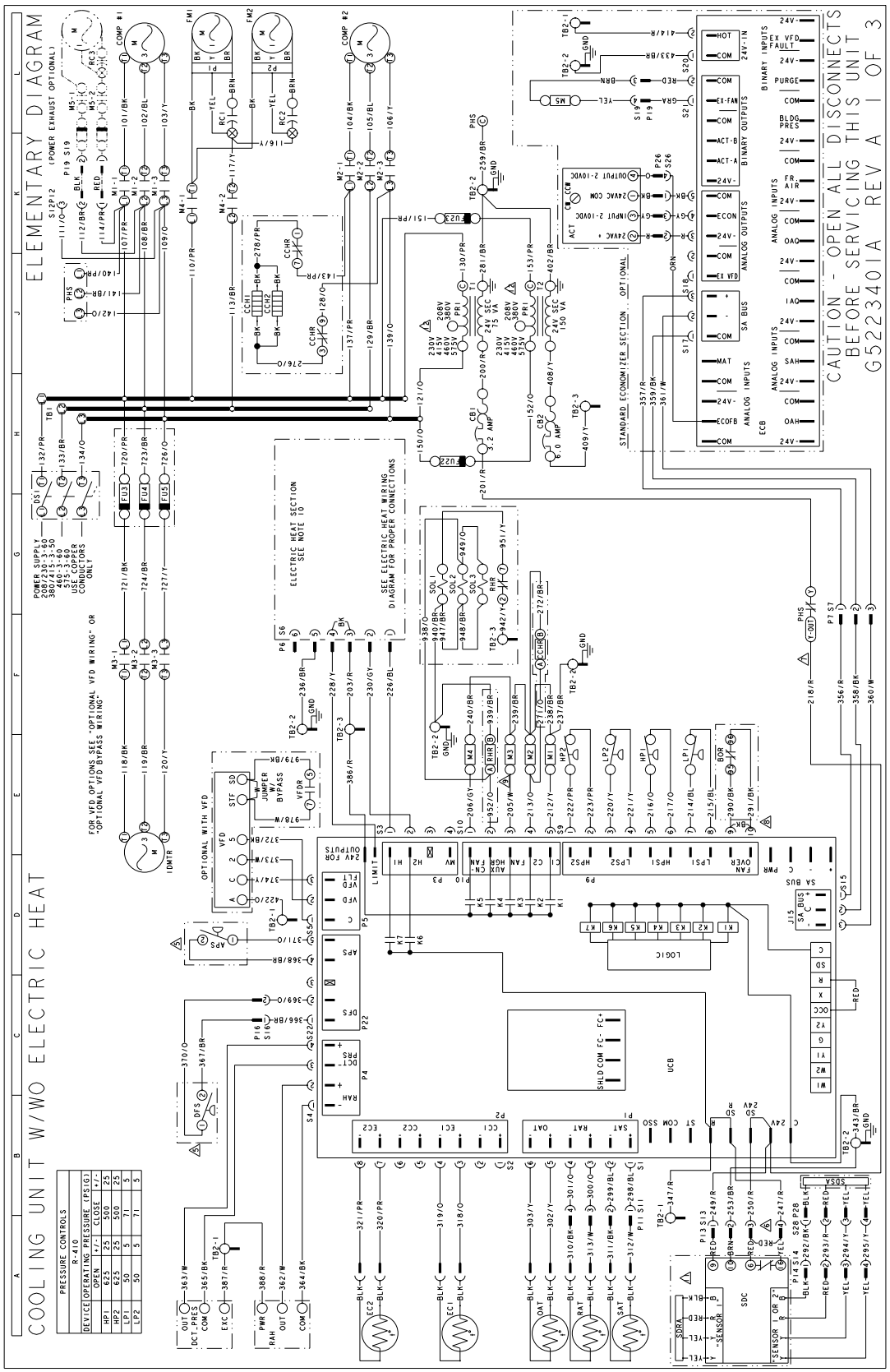
Typical Wiring Diagrams

ZF090-150 Typical Wiring Diagrams

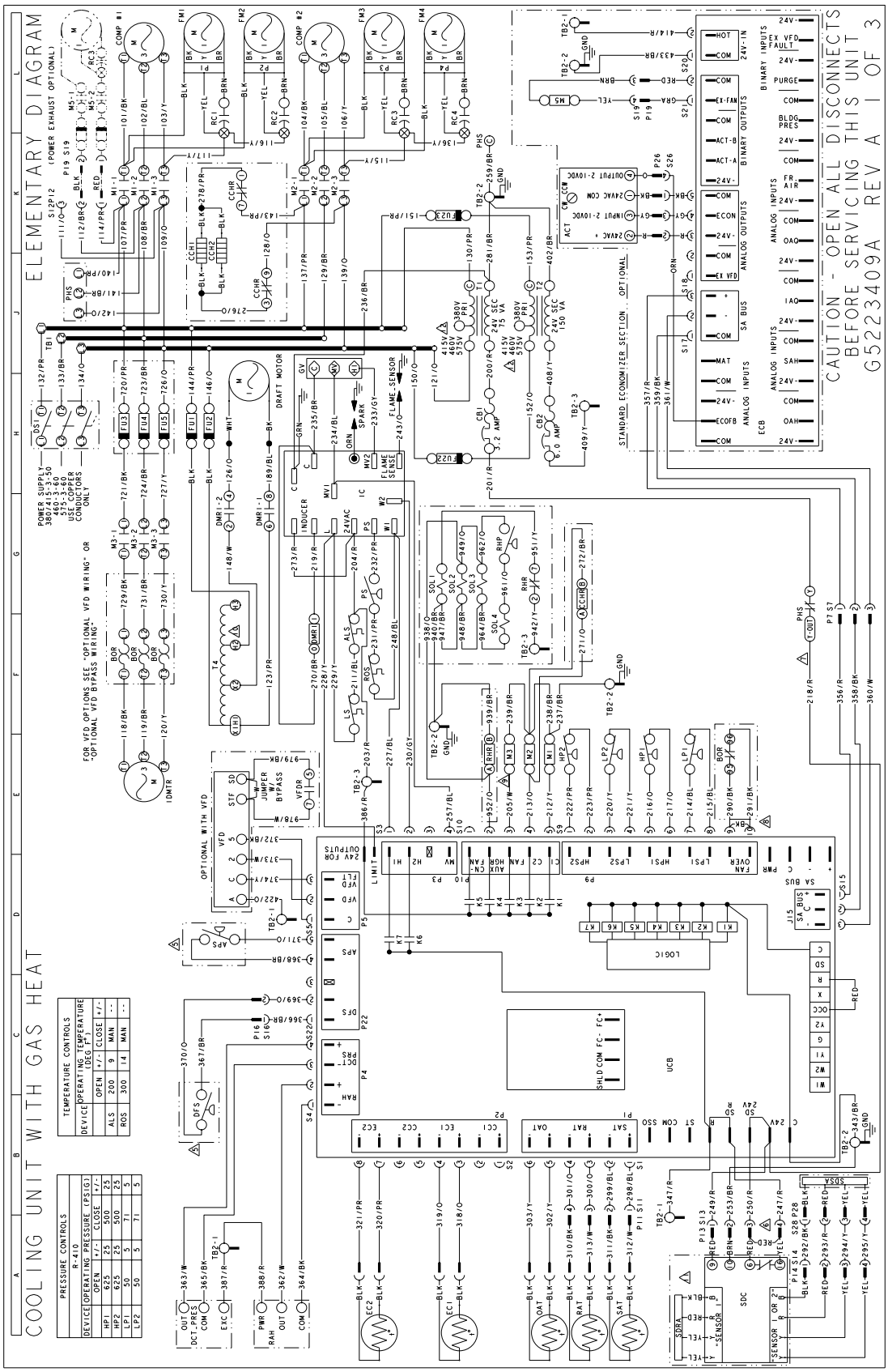
Typical ZF090-120 Cooling Unit with Gas Heat Volt Wiring Diagram



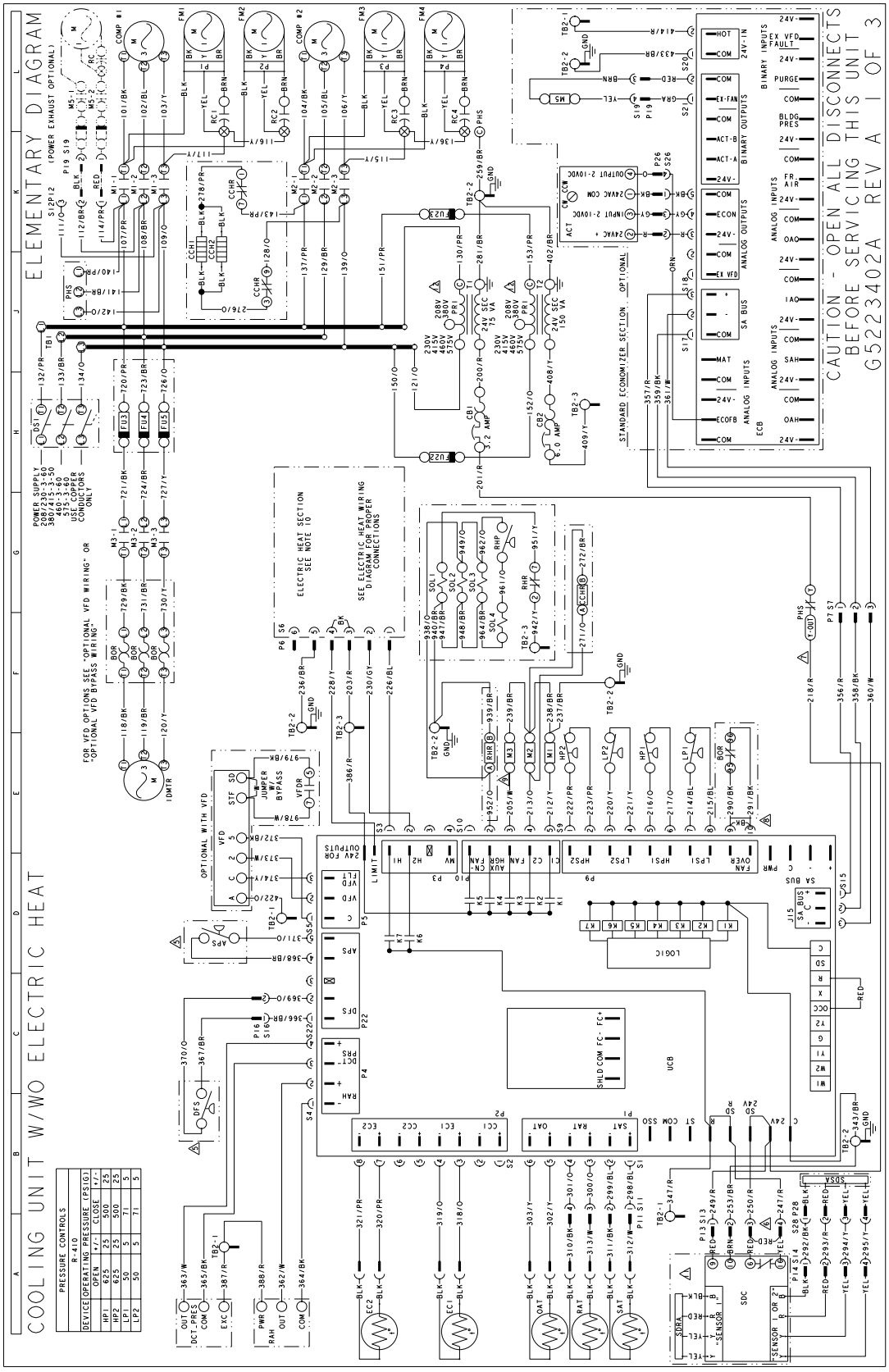
Typical ZF090-120 Cooling Unit with/without Electric Heat Wiring Diagram



Typical ZF150 Cooling Unit with Gas Heat Volt Wiring Diagram



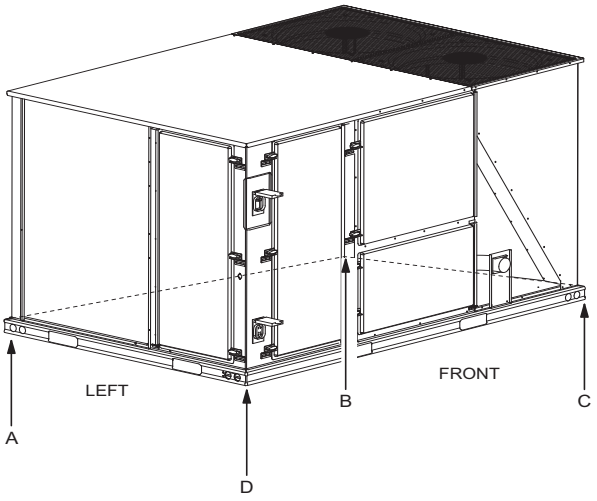
Typical ZF150 Cooling Unit with Gas Heat 380/415 Volt 50 Hz. Wiring Diagram



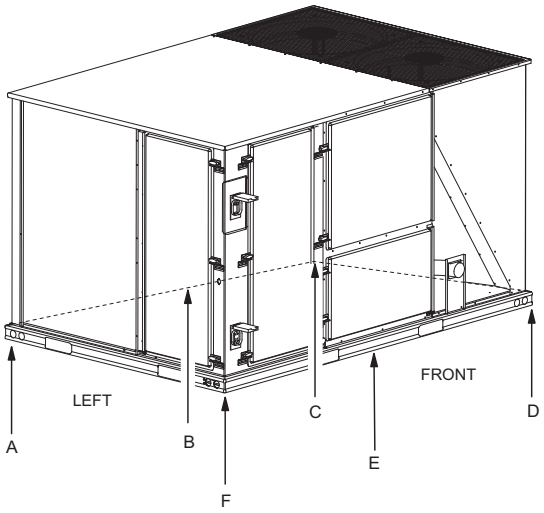
Weights and Dimensions

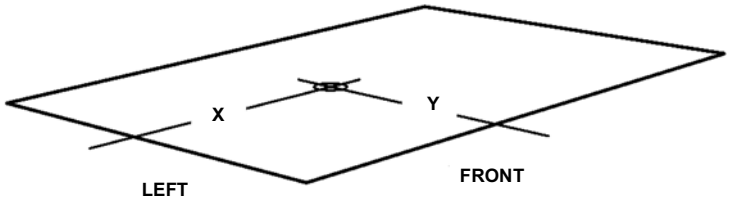
ZF090-150 Unit Weights

Unit 4 Point Load Weight



Unit 6 Point Load Weight





Imperial

Size (Tons)	Model	Weight (lbs.)		Center of Gravity (in.)		4 Point Load Location (lbs.)				6 Point Load Location (lbs.)					
		Shipping	Operating	X	Y	A	B	C	D	A	B	C	D	E	F
090 (7.5)	ZF	885	860	38	24	205	153	223	299	144	117	97	142	171	210
120 (10)	ZF	1065	1060	38	24	247	184	268	360	173	141	117	171	206	253
150 (12.5)	ZF	1258	1253	47	25	251	280	381	341	164	176	190	259	240	223

Metric

Size (KW)	Model	Weight (kg.)		Center of Gravity (mm)		4 Point Load Location (kg.)				6 Point Load Location (kg.)					
		Shipping	Operating	X	Y	A	B	C	D	A	B	C	D	E	F
090 (22)	ZF	401	390	965.2	609.7	93	69.4	101.2	135.6	65.3	53.1	44	64.4	77.6	95.3
120 (35)	ZF	483	480	965.2	609.7	112	83.5	121.6	163.3	78.5	64	53.1	77.6	93.4	114.8
150 (44)	ZF	571	568	1193.8	635	113.9	127	172.8	154.7	74.4	79.8	86.2	117.5	108.9	101.2

ZF090-150 Unit Accessory Weights Imperial

Unit Accessory	Weight (lbs.)	
	Shipping	Operating
Economizer	90	85
Power Exhaust	40	35
Electric Heat[1]	49	49
Gas Heat[2]	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).

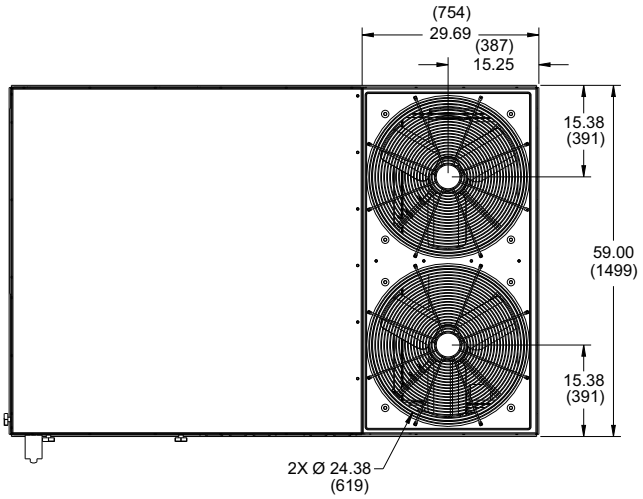
ZF090-150 Unit Accessory Weights Metric

Unit Accessory	Weight (kg.)	
	Shipping	Operating
Economizer	40.8	38.6
Power Exhaust	18.1	15.9
Electric Heat[1]	22.2	22.2
Gas Heat[2]	49.9	49.9

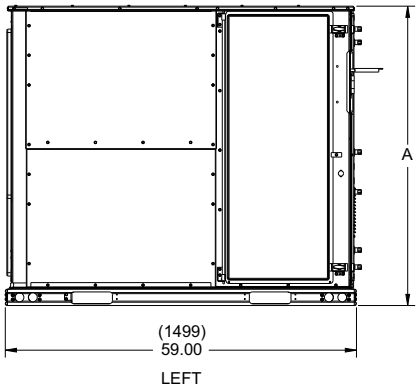
1. Weight given is for the maximum heater size available (54KW).
2. Weight given is for the maximum number of tube heat exchangers available (8 tube).

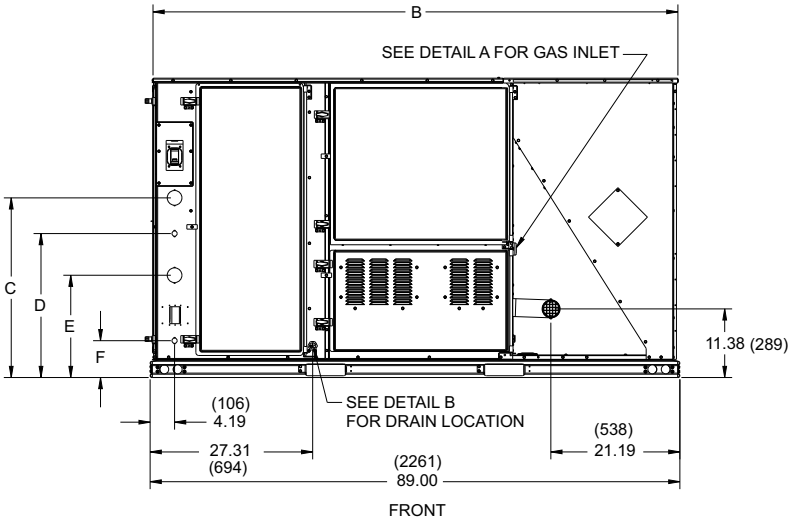
ZF090-150 Unit Dimensions

ZF090 - 120

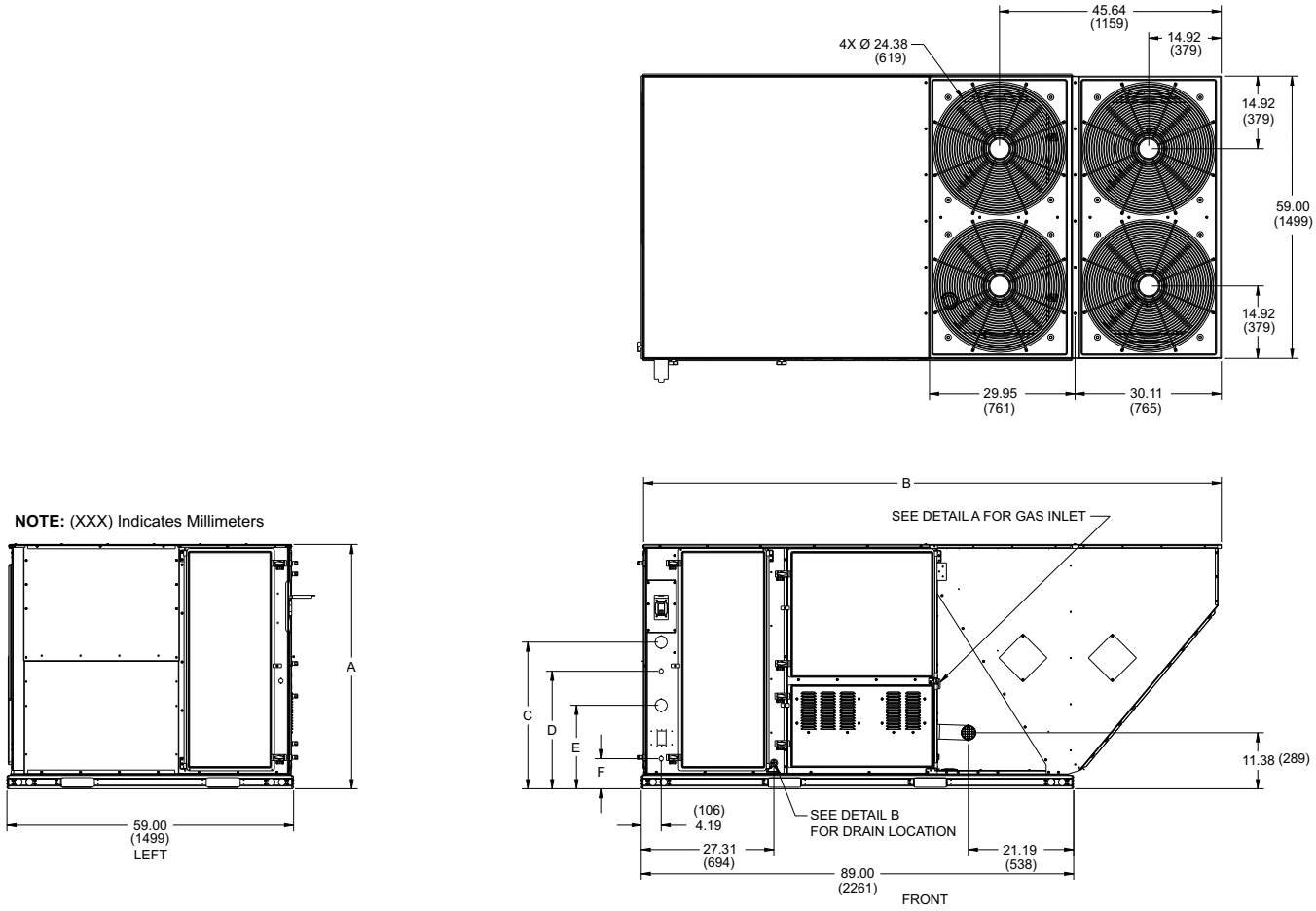


NOTE: (XXX) Indicates Millimeters





ZF150



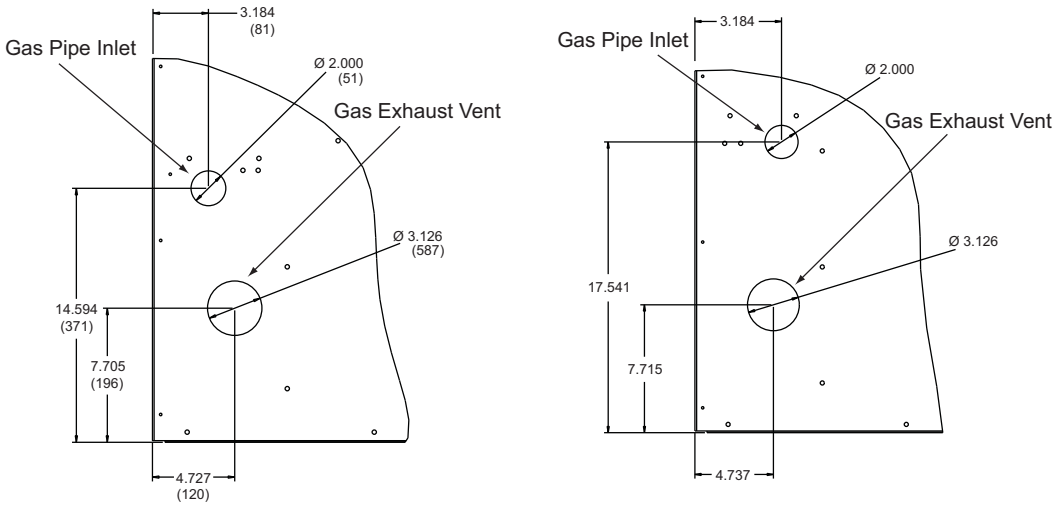
ZF090-150 Unit Physical Dimensions Imperial

Unit Model Number	Dimension (in.)					
	A	B	C	D	E	F
090	42	89	22 1/8	18 3/16	15 3/16	6 3/16
120	50 3/4	89	30 3/16	24 3/16	17 3/16	6 3/16
150	50 3/4	119 1/2	30 3/16	24 3/16	17 3/16	6 3/16

ZF090-150 Unit Physical Dimensions Metric

Unit Model Number	Dimension (mm)					
	A	B	C	D	E	F
090	1067	2261	562	462	386	157
120	1289	2261	767	614	437	157
150	1289	3035	767	614	437	157

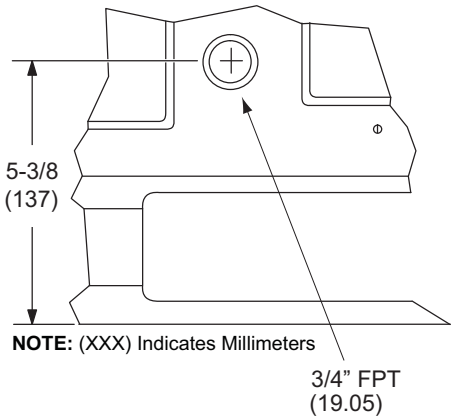
Detail A



42”/1067mm CABINET **50 3/4”/1289mm CABINET**

NOTE: (XXX) Indicates Millimeters

Detail B



NOTE: (XXX) Indicates Millimeters

ZF090-150 Unit Clearances Imperial

Direction	Distance (in.)	Direction	Distance (in.)
Top[1]	72	Right	12
Front	36	Left	36
Rear	36	Bottom[2]	0

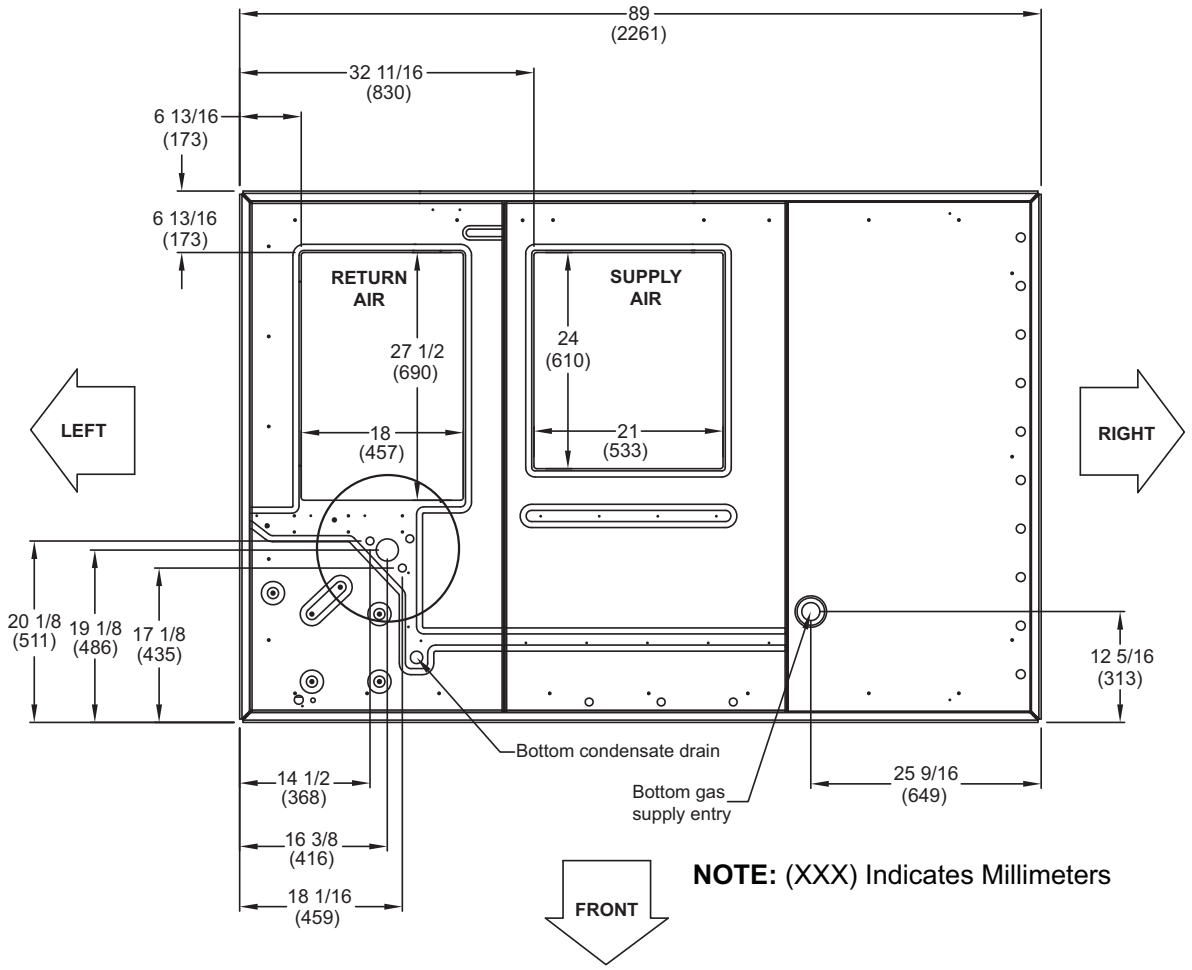
1. Units must be installed outdoors. Over hanging structure or shrubs should not obscure condenser air discharge outlet.
2. Units may be installed on combustible floors made from wood or class A, B or C roof covering materials.

ZF090-150 Unit Clearances Metric

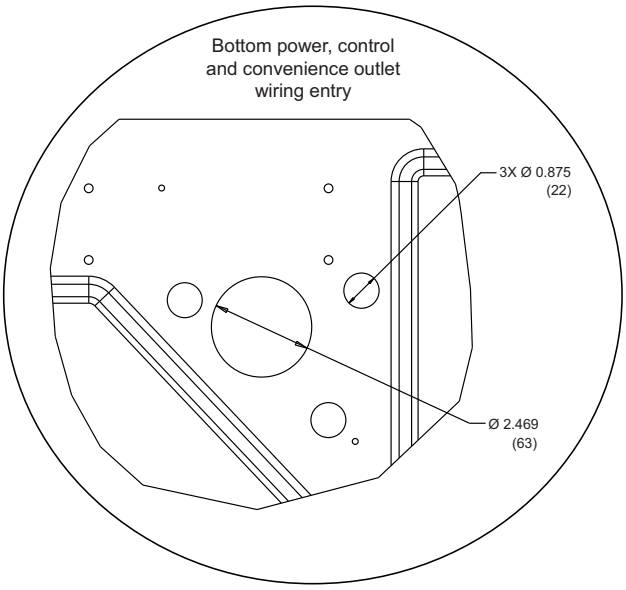
Direction	Distance (mm)	Direction	Distance (mm)
Top[1]	1829	Right	305
Front	914	Left	914
Rear	914	Bottom[2]	0

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.

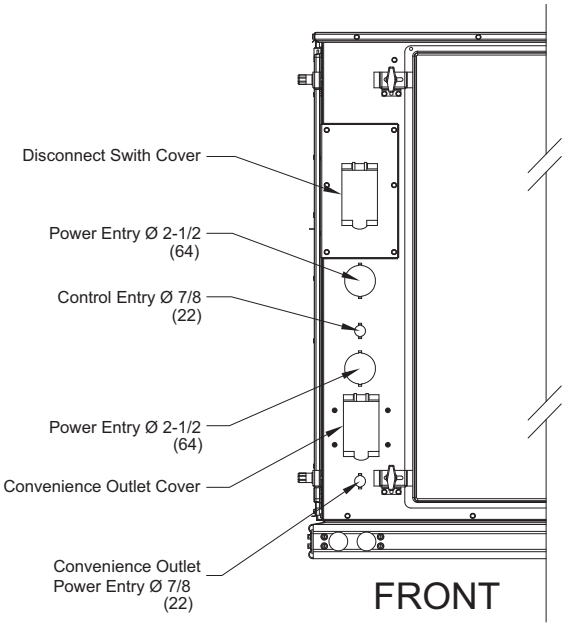
ZF090-150 Unit Bottom Duct Opening



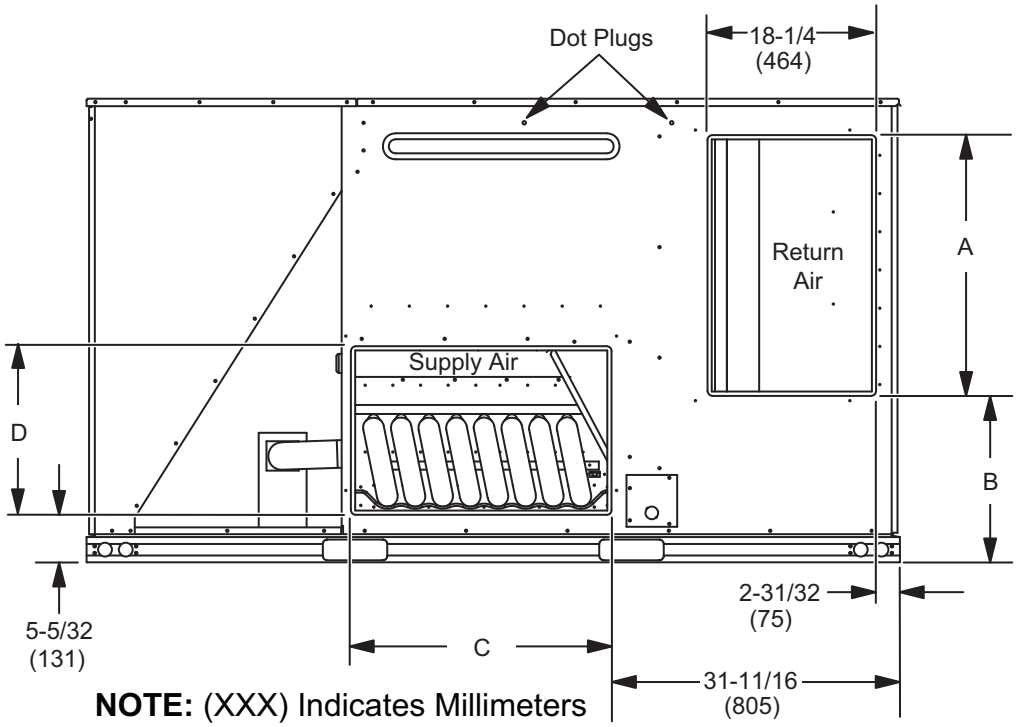
TOP VIEW



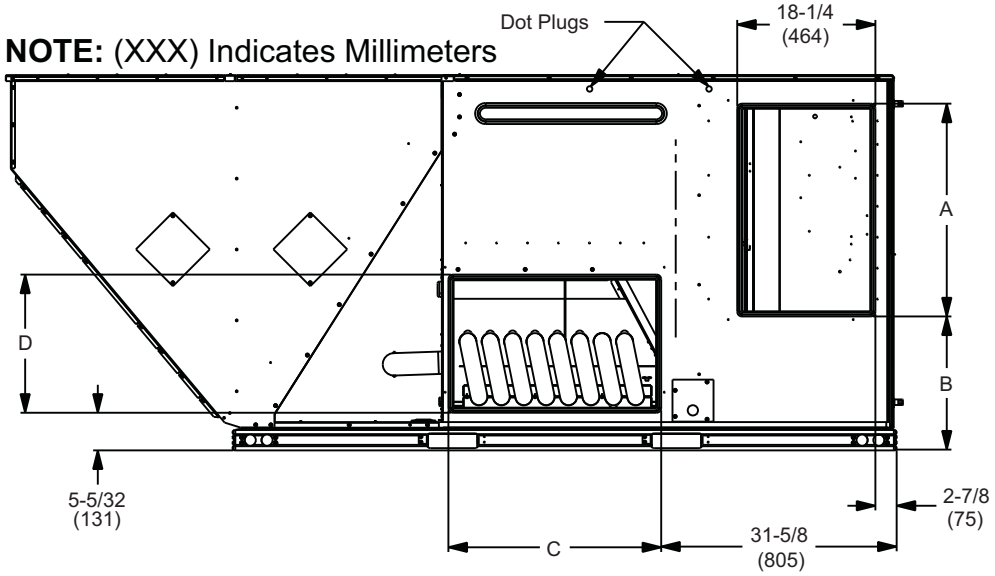
ZF090-150 Unit Electrical Entry



ZF090-120 Unit Side Duct Openings



ZF150 Unit Side Duct Openings



ZF Side Duct Dimensions Imperial

Unit Model Number	Dimension (in.)			
	A	B	C	D
090	27 3/4	12 1/16	27 1/2	16
120	28 1/4	18 1/16	28 1/4	18 1/4
150	28 1/4	18 1/16	28 1/4	18 1/4

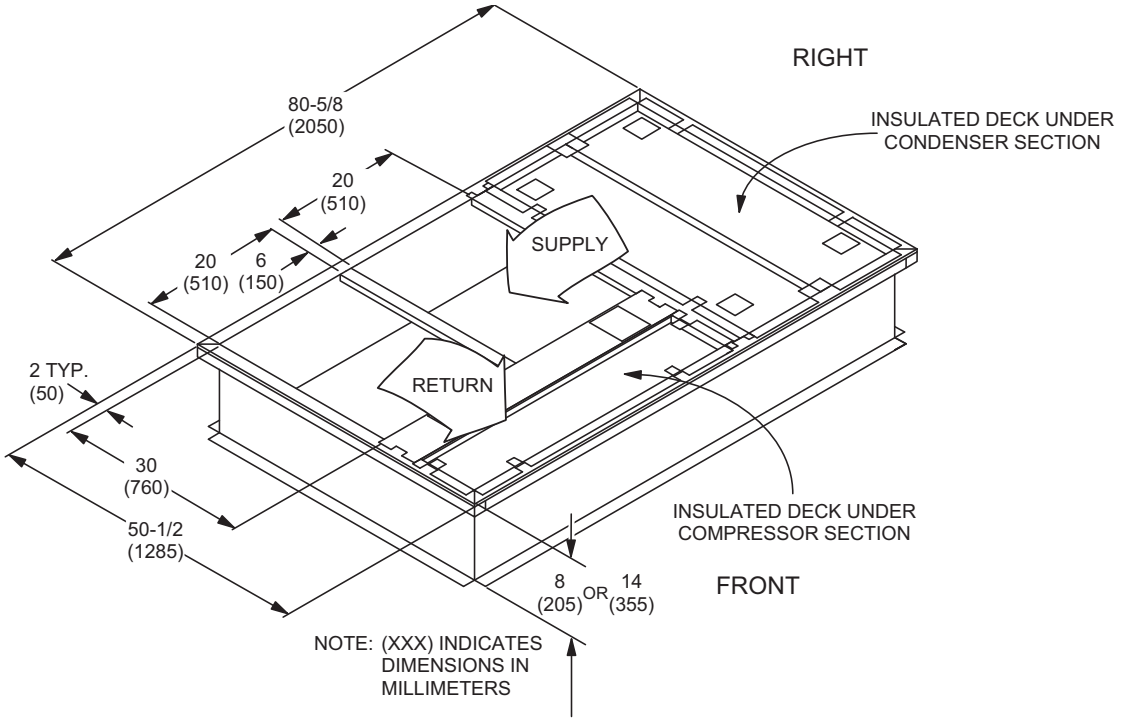
ZF Side Duct Dimensions Metric

Unit Model Number	Dimension (mm)			
	A	B	C	D
090	705	306	698	406
120	718	459	718	464
150	718	459	718	464

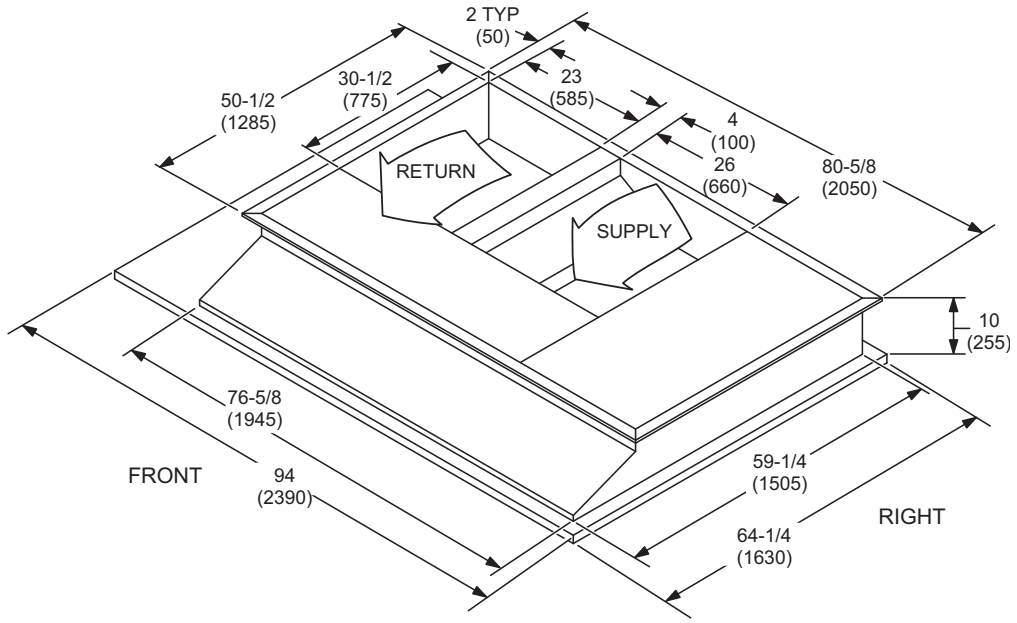
ZF090-150 Unit Left Duct Opening

ZF090-150 Unit Accessory Dimensions

ZF090-150 Roof Curb



ZF090-150 Transition Roof Curb



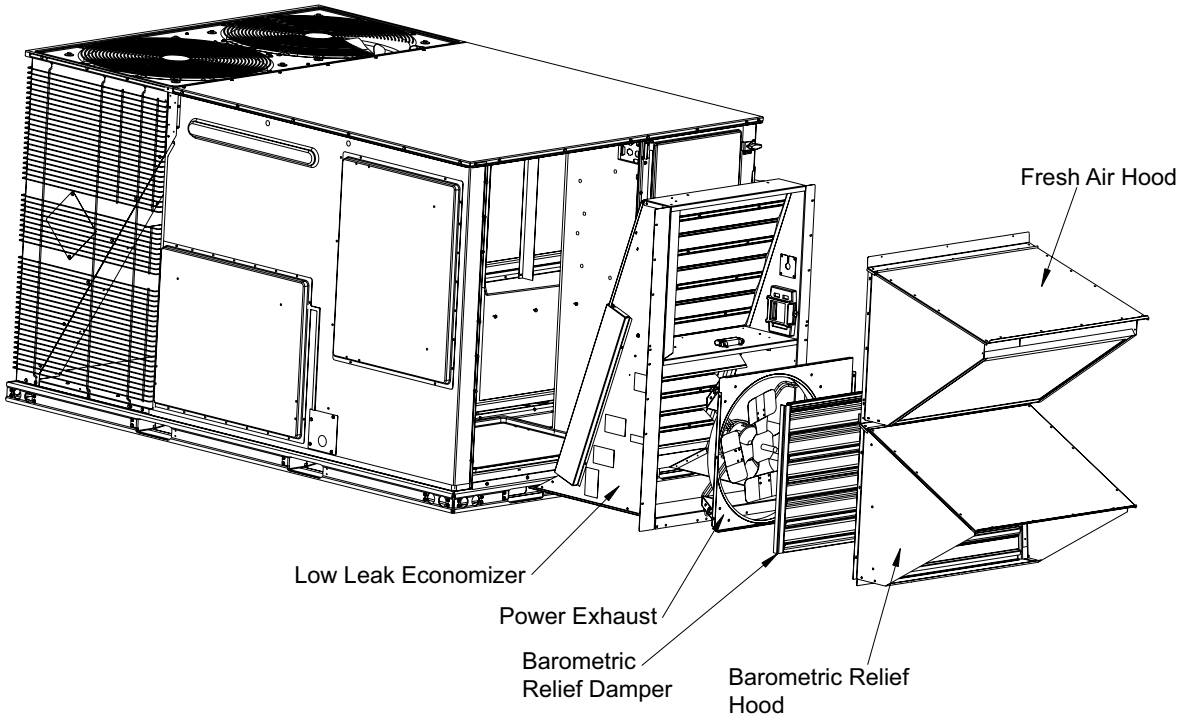
Economizer Options

Economizer Usage

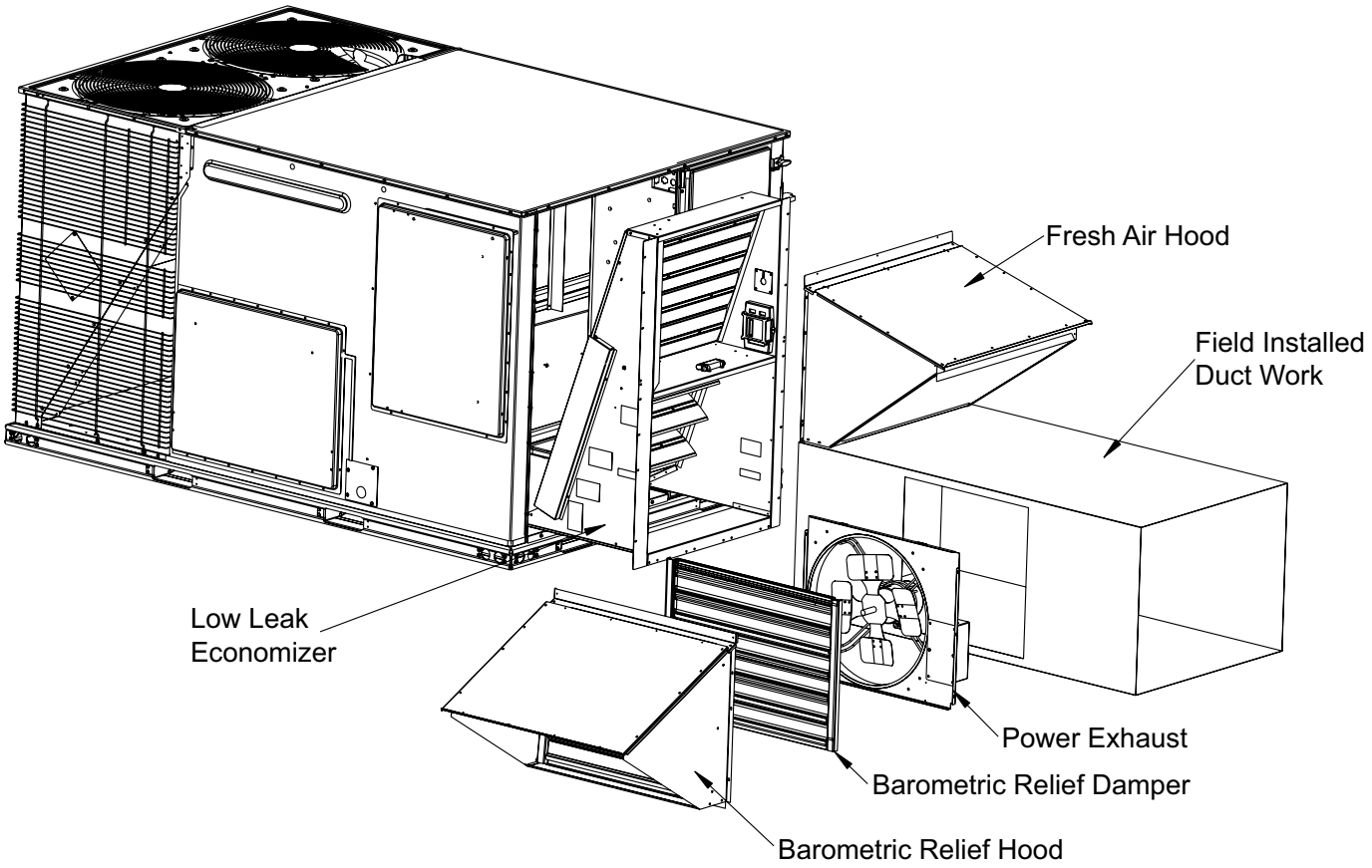
Application	Cabinet Height	Description	Model
Side Return	All	Horizontal economizer without barometric relief	2EE04706924[1]
Downflow, End Return Horizontal or ERV	42"	Economizer, 42” tall cabinet	2EE04707424[2]
	50"	Economizer, 50” tall cabinet	2EE04707624[2]

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

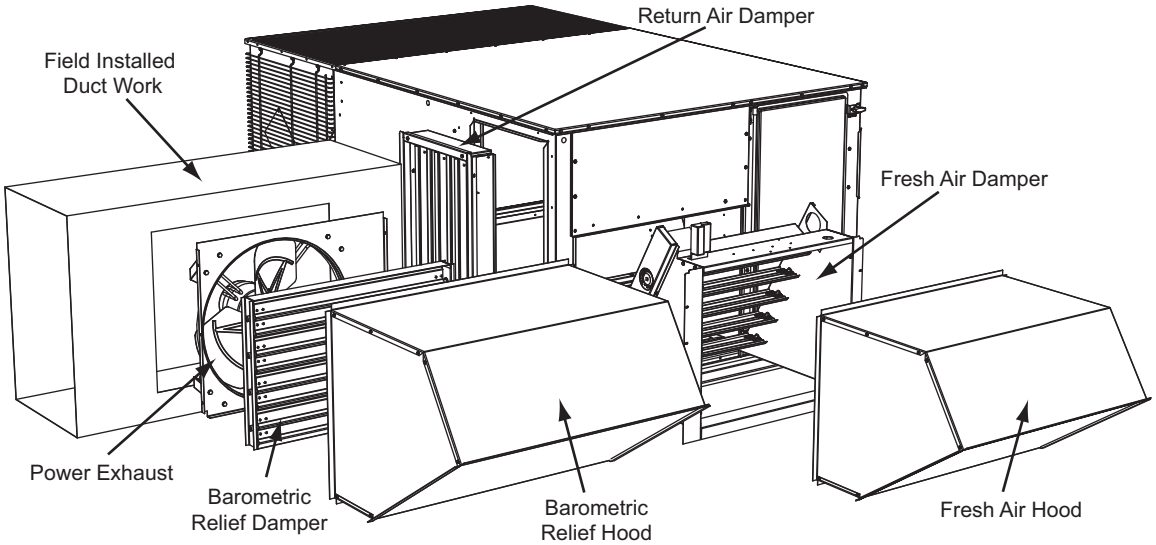
Economizer Downflow W/Power Exhaust



Economizer End Return W/Power Exhaust



Field Installed Horizontal Economizer W/Power Exhaust



5167827-XTG-D-0120
Supersedes: 5167827-XTG-C-0416

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