YORK®
Heating and Air Conditioning

SPECIFICATION CATALOG

LX CONDO
COMMERCIAL GEOTHERMAL/
WATER SOURCE HEAT PUMPS
SINGLE CAPACITY

MODELS:
YFV018 - 041
(1.5 THRU 3.5 NOMINAL TONS)

AHRI CERTIFIED™
www.ahridirectory.org
Water Source HP
ANSI/AHRI/ASHRAE/ISO13256-1

ETL LISTED®

Due to continuous product improvement, specifications are subject to change without notice.

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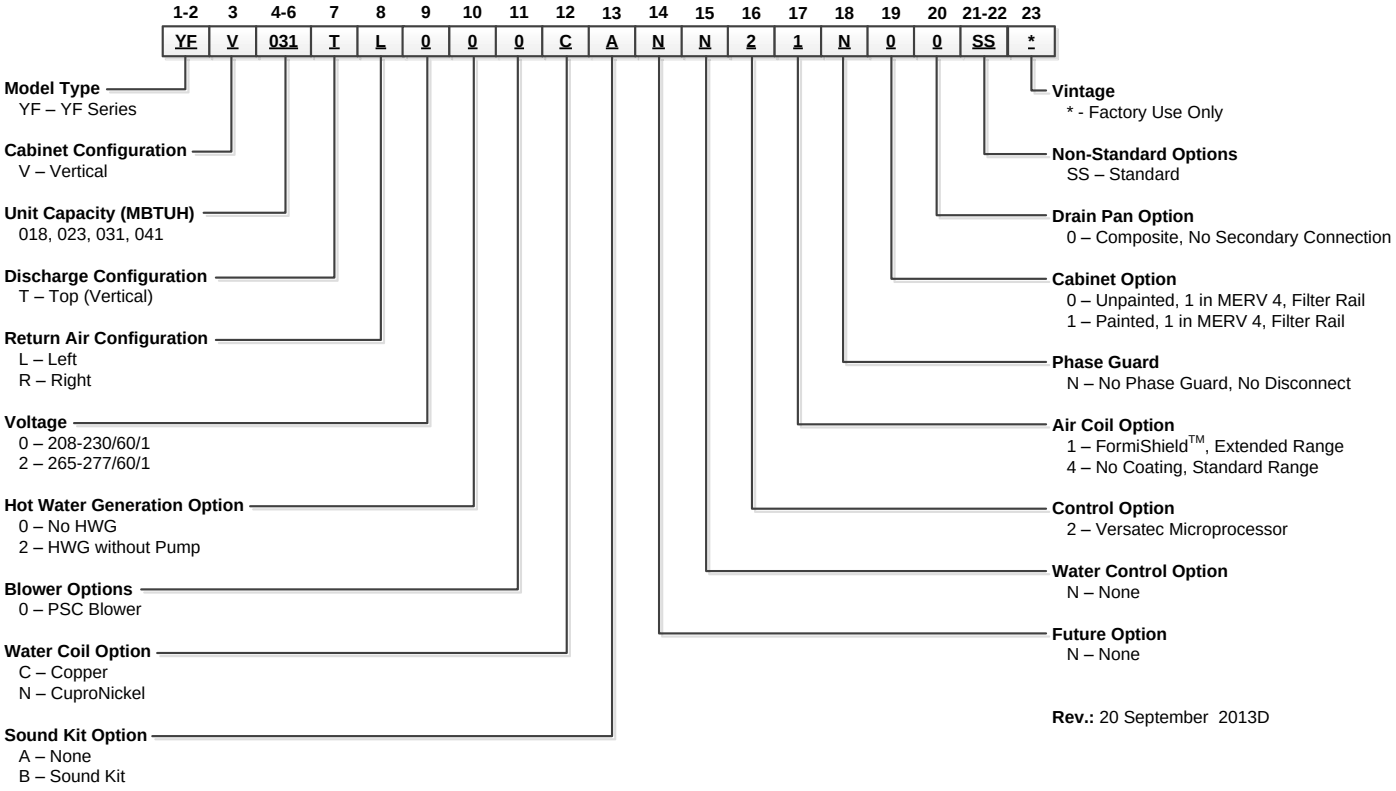
Model Nomenclature



Rev.: 20 September 2013D

All LX Condo Series product is safety listed under UL1995 thru ETL and performance listed with AHRI in accordance with standard 13256-1.

Performance Standard (AHRI/ISO/ASHRAE 13256-1)

The performance standard AHRI/ASHRAE/ISO 13256-1 became effective January 1, 2000 and replaces AHRI Standards 320, 325, and 330. This new standard has three major categories: Water Loop (comparable to ARI 320), Ground Water (ARI 325), and Ground Loop (ARI 330). Although these standards are similar there are some differences:

Unit of Measure: The Cooling COP

The cooling efficiency is measured in EER (US version measured in Btuh per Watt. The Metric version is measured in a cooling COP (Watt per Watt) similar to the traditional COP measurement.

Water Conditions Differences

Entering water temperatures have changed to reflect the centigrade temperature scale. For instance the water loop heating test is performed with 68°F (20°C) water rounded down from the old 70°F (21.1°C).

Air Conditions Differences

Entering air temperatures have also changed (rounded down) to reflect the centigrade temperature scale. For instance the cooling tests are performed with 80.6°F (27°C) dry bulb and 66.2°F (19°C) wet bulb entering air instead of the traditional 80°F (26.7°C) DB and 67°F (19.4°C) WB entering air temperatures. 80.6/66.2 data may be converted to 80/67 using the entering air correction table. This represents a significantly lower relative humidity than the old 80/67 of 50% and will result in lower latent capacities.

Pump Power Correction Calculation

Within each model, only one water flow rate is specified for all three groups and pumping Watts are calculated using the following formula. This additional power is added onto the existing power consumption.

• Pump power correction = (gpm x 0.0631) x (Press Drop x 2990) / 300

Where ‘gpm’ is waterflow in gpm and ‘Press Drop’ is the pressure drop through the unit heat exchanger at rated water flow in feet of head.

Fan Power Correction Calculation

Fan power is corrected to zero external static pressure using the following equation. The nominal airflow is rated at a specific external static pressure. This effectively reduces the power consumption of the unit and increases cooling capacity but decreases heating capacity. These Watts are significant enough in most cases to increase EER and COPs fairly dramatically over ARI 320, 325, and 330 ratings.

• Fan Power Correction = (cfm x 0.472) x (esp x 249) / 300

Where ‘cfm’ is airflow in cfm and ‘esp’ is the external static pressure at rated airflow in inches of water gauge.

ISO Capacity and Efficiency Calculations

The following equations illustrate cooling calculations:

• ISO Cooling Capacity = Cooling Capacity (Btuh) + (Fan Power Correction (Watts) x 3.412)

• ISO EER Efficiency (W/W) = ISO Cooling Capacity (Btuh) x 3.412 / [Power Input (Watts) - Fan Power Correction (Watts) + Pump Power Correction (Watt)]

The following equations illustrate heating calculations:

• ISO Heating Capacity = Heating Capacity (Btuh) - (Fan Power Correction (Watts) x 3.412)

• ISO COP Efficiency (W/W) = ISO Heating Capacity (Btuh) x 3.412 / [Power Input (Watts) - Fan Power Correction (Watts) + Pump Power Correction (Watt)]

Comparison of Test Conditions

	ARI 320	ISO/AHRI 13256-1 WLHP	ARI 325	ISO/AHRI 13256-1 GWHP	ARI 330	ISO/AHRI 13256-1 GLHP
Cooling						
Entering Air - DB/WB °F	80/67	80.6/66.2	80/67	80.6/66.2	80/67	80.6/66.2
Entering Water - °F	85	86	50/70	59	77	77
Fluid Flow Rate	*	**	**	**	**	**
Heating						
Entering Air - DB/WB °F	70	68	70	68	70	68
Entering Water - °F	70	68	50/70	50	32	32
Fluid Flow Rate	*	**	**	**	**	**

Note *: Flow rate is set by 10°F rise in standard cooling test Note **: Flow rate is specified by the manufacturer
Part load entering water conditions not shown.

Conversions: WLHP = Water Loop Heat Pump; GWHP = Ground Water Heat Pump; GLHP = Ground Loop Heat Pump

Airflow (lps) = CFM x 0.472; Water Flow (lps) = GPM x 0.0631;

ESP (Pascals) = ESP (in wg) x 249; Press Drop (Pascals) = Press Drop (ft hd) x 2990

AHRI/ISO 13256-1 Performance Ratings

PSC Motor

AHRI/ASHRAE/ISO 13256-1
English (IP) Units

Model	Flow Rate		Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
			Cooling EWT 86°F		Heating EWT 68°F		Cooling EWT 59°F		Heating EWT 50°F		Cooling EWT 77°F		Heating EWT 32°F	
	gpm	cfm	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP
018	5.0	600	17,600	14.6	21,000	4.7	20,600	23.5	17,500	4.0	18,500	17.0	13,700	3.5
023	6.0	800	22,000	13.8	27,000	4.5	26,400	21.0	22,300	3.9	24,000	15.6	17,500	3.2
031	8.0	1000	29,000	14.0	34,600	4.5	32,900	20.5	28,300	3.9	29,500	15.6	22,800	3.2
041	11.0	1300	39,000	13.0	45,000	4.0	44,500	19.0	36,000	3.5	41,000	14.9	29,000	2.9

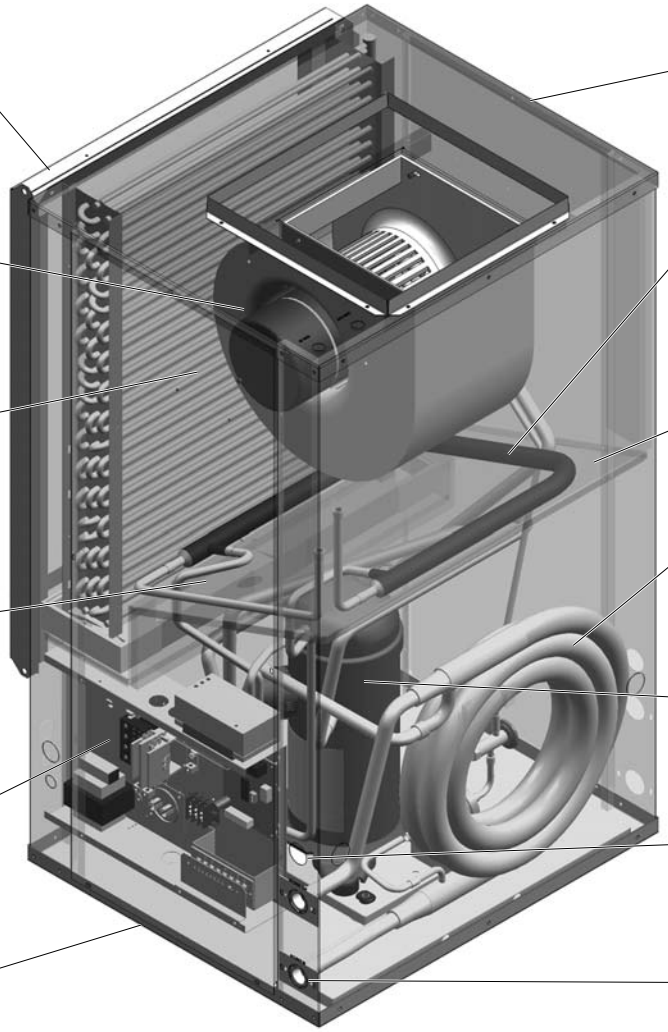
9/2/10

Cooling capacities based upon 80.6°F DB, 66.2°F WB entering air temperature
Heating capacities based upon 68°F DB, 59°F WB entering air temperature
All ratings based upon 208V operation

The LX Condo Series

Product Features: Vertical Cabinet

LX Condo Series vertical units are designed for high efficiency, maximum flexibility, and primary servicing from the front.



Standard filter rail 1 in. MERV 4 filters with "lift-out" filter rails

Removable inlet rings for easy blower removal

Oversized rifled tube/ lanced fin air coil (optional FormiShield coating).

Corrosion-resistant, composite drain pan with overflow protection

Microprocessor control Versatec - Standard

Compact width allows unit to fit between 24 in. door jamb

Optional powder coated, heavy-gauge steel cabinet

Optional factory installed hot water generation system with built-in coil (no factory installed pump)

Insulated divider panel

Optional ThermaShield coated coaxial heat exchanger

High efficiency rotary or scroll compressor

Internally trapped condensate line

Flush mounted water connections (no backup wrenches needed)

A true left and right return option is available.

The LX Condo Series cont.

Flexible Product with Several Standard Options

- Compact cabinet design, vertical with true left and right return configurations
- Vertical top discharge air configurations
- Capacities of 18,000 through 41,000 Btuh
- Hot water generation
- 3 speed PSC motors
- FormiShield coated air coils
- Copper or cupronickel heat exchangers
- Extended range insulation option
- Quiet rotary or scroll compressors in all models
- 2-dimension refrigerant piping vibration loops to isolate the compressor
- Heavy gauge cabinet
- Standard Versatec microprocessor
- Optional painted cabinet
- Polymer composite drain pan
- 1 in. MERV 4

High Efficiency

The LX Condo Series is a high efficiency water source heat pump in a compact vertical cabinet. The product features highly efficient and reliable single capacity rotary or scroll compressors mated with large blowers driven by efficient 3 speed PSC blower motors.

Quiet Operation

All LX Condo Series product incorporates several noise reduction technologies and is ARI 260 sound rated using third party sound testing. Room Noise Criteria Curves (NC Curve) may be calculated using data from the ARI 260 ratings giving the engineer total flexibility in assuring a quiet environment.

Indoor Air Quality (IAQ)

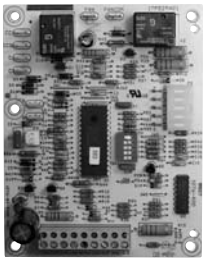
The LX Condo Series features several IAQ benefits:

- Corrosion-free composite double-sloped drain pan to eliminate standing water and prevent bacterial growth
- Foil-faced fibre insulation in all air handler compartments to allow cleanability and inhibit bacteria growth. Optional non-fibrous closed cell insulation is also available for more sensitive applications.

- Open filter rail comes standard for non-ducted return applications.
- Standard supplied filter is a pleated MERV 4, 1 in. [2.54 cm].

Flexible Control Options

The standard Versatec microprocessor control board provides complete monitoring and control with fault, status, and optional I/O LED indication for easy servicing. The Versatec features a robust microprocessor control that monitors LP, HP, Condensate, field selectable thermistor freeze detection, while providing a fault output scheme.



Versatec

Easy Maintenance and Service Advantages

- Designed for front panel access.
- Quick attach wiring harnesses are used throughout for fast servicing.
- High and low pressure refrigerant service ports.
- Removable blower inlet rings allow for ease of service without removing the blower housing.
- Internal drop out blowers

Factory Quality

- All refrigerant brazing is performed in a nitrogen environment.
- Computer controlled deep vacuum and refrigerant charging system.
- All joints are leak detected for maximum leak rate of less than 1/4 oz. per year.
- Computer bar code equipped assembly line ensures all components are correct.
- All units are computer run-tested with water to verify both function and performance.

Inside the LX Condo Series

Refrigerant

LX Condo Series products all feature zero ozone depletion and low global warming potential refrigerant R-410A.

Cabinet

All units are constructed of corrosion resistant galvanized sheet metal with optional white polyester powder coat paint rated for more than 1,000 hours of salt spray. One large lift-out access panel provides access to the compressor and air handler section to allow servicing of blower motor, blower, and drain pan. Refrigerant circuit is designed to allow primary serviceability from the front. The blower motor and blower can be completely serviced or replaced without removal of the unit. Service of the blower and blower motor is made easier via the removable orifice ring on the housing.

Flexible configurations include a true left and right return.

Filter Rack

All units come standard with an open filter rail, for use in open return applications, and a MERV 4 1 in. [2.54 cm] filter.

Electrical Box

Unit controls feature quick connect wiring harnesses for easy servicing. Separate knockouts for LV, and two for power on two sides allow easy access to the control box. Large 75VA transformer assures adequate controls power for accessories.

Water Connections

Flush mount FPT water connection fittings allow one wrench leak-free connections and do not require a backup wrench.

Drain Pan

All condensate connections are PVC glue for economical corrosion free connections. Bacteria resistant composite drain pan is sloped to promote complete drainage and will never rust or corrode. Complete drainage helps to inhibit bacterial or microbial growth. Units feature an internally trapped condensate line using clear PVC hose for easy inspection and reduced installation cost.

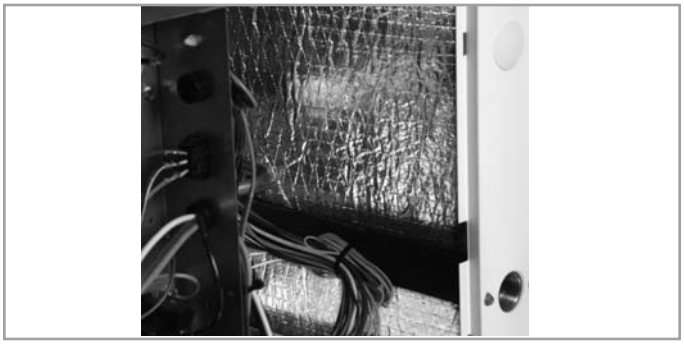
Compressors

High efficiency R-410A rotary or scroll compressors are used on every model. Rotary or scrolls provide both the highest efficiency available and great reliability. Single speed scroll models are available in commercial voltages

Inside the LX Condo Series cont.

Air Handler Insulation

Foil Faced air handler insulation provides cleanability to further enhance IAQ.



Thermostatic Expansion Valve

All LX Condo Series models utilize a balanced port bidirectional thermostatic expansion valve (TXV) for refrigerant metering. This allows precise refrigerant flow in a wide range of entering water variation (20 to 120°F [-7 to 49 °C]) found in geothermal systems. The TXV is located in the compressor compartment for easy access.

Water-to-Refrigerant Coaxial Heat Exchanger Coil

Large oversized coaxial refrigerant to water heat exchangers provide unparalleled efficiency. The coaxes are designed for low pressure drop and low flow rates. All coaxes are pressure rated to 450 psi water side and 600 psi on the refrigerant side. Optional ThermaShield coating is available on the water-to-refrigerant heat exchanger to prevent condensation in low temperature loop operation.

Service Connections and Serviceability

Two Schrader service ports are provided in every unit. The suction side and discharge side ports are for field charging and servicing access. All valves are 7/16 in. SAE connections. All water and electrical connections are made from the front of the unit. Unit is designed for front access serviceability.

4-Way Reversing Valve

LX Condo Series units feature a reliable all-brass pilot operated refrigerant reversing valve. The reversing valve operation is limited to change of mode by the control to enhance reliability.

Inside the LX Condo Series cont.

Air Coil

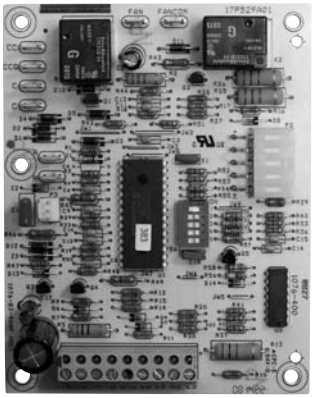
Large low velocity air coils are constructed of lanced fin and rifled tube. Each model features 3 or 4 rows for added moisture removal. An optional FormiShield™ air coil coating is available to further inhibit formicary corrosion

Blower Motor and Housing

High efficiency low rpm galvanized direct drive blower featuring 3 speed permanently split capacitor (PSC) motor. All PSC motors have speed selection terminal strip on the motor for easy speed change. Blower motors are vibration isolated to reduce noise.

Controls - Versatec Microprocessor

Standard Versatec Microprocessor



Flexible Control Options

The LXCondo Series control system is a microprocessor-based printed circuit board, (PCB), conveniently located in the unit control box for accessibility. The microprocessor control is specifically designed for water source heat pumps to integrate compressors and advanced features needed in water source heat pump applications. The microprocessor provides control of the entire unit as well as outputs for status modes, faults, and diagnostics. Low voltage thermostat terminal strips provide convenient field connections.

Startup

The unit will not operate until all the inputs and safety controls are checked for normal conditions. At first powerup, a five minute delay is employed before the compressor is energized.

Component Sequencing Delays

Components are sequenced and delayed for optimum space conditioning performance.

Short Cycle Protection

The control allows a minimum on time of 2 minutes and a minimum off time of 5 minutes for short cycle protection.

Condensate Overflow Protection

The Versatec control board incorporates an impedance sensing liquid sensor at the top of the drain pan. Upon a continuous 30-second sensing of the condensate, compressor operation is suspended (see Fault Retry), and the condensate overflow lockout LED begins flashing.

Safety Controls

The Versatec control receives separate signals for a high pressure switch for safety, a low pressure switch to prevent loss of charge damage, and a low suction temperature thermistor for freeze sensing. Upon a continuous 30-second measurement of the fault (immediate for high pressure), compressor operation is suspended, the appropriate lockout LED begins flashing. (Refer to the “Fault Retry” section below).

Testing

The Versatec control allows service personnel to shorten most timing delays for faster diagnostics.

Fault Retry

All faults are retried twice before finally locking the unit out. An output signal is made available for a fault LED at the thermostat. The “Fault Retry” feature is designed to prevent nuisance service calls.

Diagnostics

The Versatec control board allows all inputs and outputs to be displayed on the LEDs for fast and simple control board diagnosis.

Emergency Shutdown

A grounded signal to common or connecting 24 VAC to the ES terminal places the controller into the emergency shutdown mode. The compressor and blower operation are suspended while in the emergency shutdown mode.

Heating Operation

Heating (Y1)

The blower motor is started immediately after the “Y1” input is received, and the compressor is energized 10 seconds after the “Y1” input.

Cooling Operation

In all cooling operations, the reversing valve directly tracks the “O” input. Thus, anytime the “O” input is present, the reversing valve will be energized.

Cooling (Y1,O)

The blower motor is started immediately after the “Y1” input is received, and the compressor is energized 10 seconds after the “Y1” input.

Blower (G only)

The blower motor is started immediately after the “G” input is received; and it will remain on for 30 seconds at the end of each heating or cooling cycle.

Lockout Conditions

During lockout mode, the appropriate unit and thermostat lockout LEDs will illuminate. The compressor and accessory outputs are de-energized. If the thermostat calls for heating, emergency heat operation will occur. All other lockout modes can be reset at the thermostat after turning the unit off, and then on, which restores normal operation but keeps the unit lockout LED illuminated. Interruption of power to the unit will reset lockout without a waiting period and clear all lockout LEDs.

Controls - Versatec Microprocessor cont.

High Pressure

This lockout mode occurs when the normally closed safety switch is opened momentarily (set at 600 PSI).

Low Pressure

This lockout mode occurs when the normally closed low pressure switch is opened for 30 continuous seconds (set at 40 PSI).

Freeze Detection (Water Flow)

This lockout mode occurs when the freeze thermistor temperature is at or below the selected freeze detection point (well 30°F or loop 15°F) for 30 continuous seconds.

DIP Switch Settings

Prior to powering unit, ensure that all DIP switches on SW1 are set properly according to the table below.

FACTORY SETUP DIP SWITCHES (SW1)				
Dip Switch Number		**Description**	**"OFF" Position**	**"ON" Position**
SW1-	**1**	**Service Test Mode** On the control, allows field selection of "NORMAL" or "TEST" operational modes, Test mode accelerates most timing functions 16 times to allow faster troubleshooting. Test mode also allows viewing the "CURRENT" status of the fault inputs on the LED display.	Test Mode	Normal Speed Operation
SW1-	**2**	**Freeze Detection Setting** This DIP switch allows field selection of low source water thermistor fault sensing for "WELL" water (30°F) or "LOOP" (15°F) for antifreeze protected earth loops.	"LOOP" (15°F)	"WELL" (30°F)
SW1-	**3**	**Not Available**	N/A	Normal Operation
SW1-	**4**	**I/O Display Mode** This DIP switch enables Input/Output Display or Status/Current Fault on LED Board. Refer to SW2 for operation and positioning.	Input/Output Display Mode	Status/Current Fault Display Mode
SW1-	**5**	**Not Available**	N/A	Normal Operation
SW2-		**LED Display (On LED Board)** This DIP switch enables Normal Status or Input display mode in the "OFF" position and Current Fault or Output display mode in the "ON" position.	Status or Inputs Display Mode	Current Fault or Output Display Mode

Operation Logic Data Table

Mode	Inputs	Blower	Comp	RV
Htg	Y	Auto	ON	OFF
Clg	Y, O	Auto	ON	ON
Blower Only	G/Y2	ON	OFF	OFF

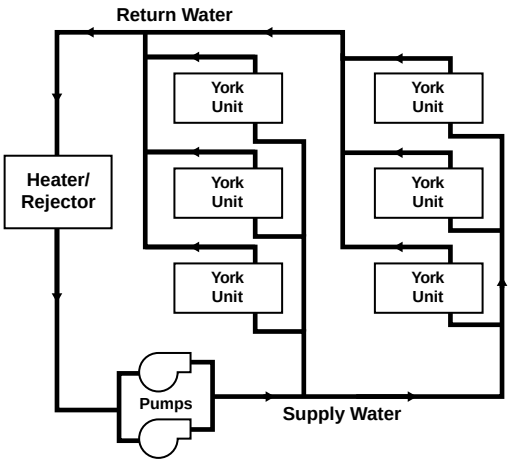
Application Notes

The Closed Loop Heat Pump Concept

The basic principle of a water source heat pump is the transfer of heat into water from the space during cooling, or the transfer of heat from water into the space during heating. Extremely high levels of energy efficiency are achieved as electricity is used only to move heat, not to produce it. Using a typical York LX Condo Series, one unit of electricity will move four to five units of heat.

When multiple water source heat pumps are combined on a common circulating loop, the ultimate in energy efficiency is created: The York units on cooling mode are adding heat to the loop which the units in heating mode can absorb, thus removing heat from the area where cooling is needed, recovering and redistributing that heat for possible utilization elsewhere in the system. In modern commercial structures, this characteristic of heat recovery from core area heat generated by lighting, office equipment, computers, solar radiation, people or other sources, is an important factor in the high efficiency and low operating costs of York closed source heat pump systems.

In the event that a building's net heating and cooling requirements create loop temperature extremes, LX Condo Series units have the extended range capacity and versatility to maintain a comfortable



environment for all building areas. Excess heat can be stored for later utilization or be added or removed in one of three ways; by ground-source heat exchanger loops: plate heat exchangers connected to other water sources, or conventional cooler/boiler configurations. Your York representative has the expertise and computer software to assist in determining optimum system type for specific applications.

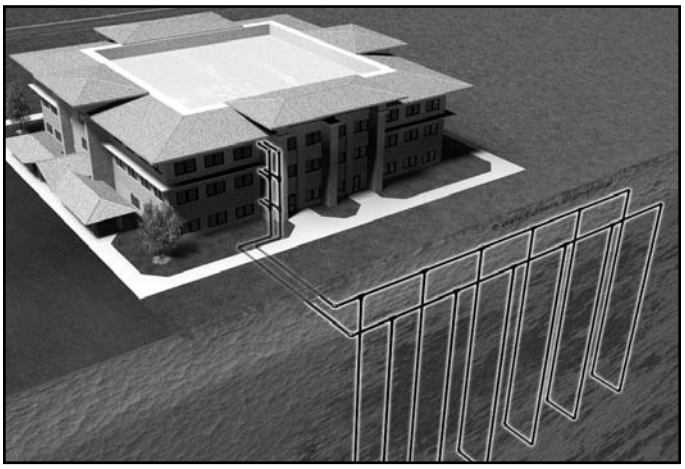
The Closed Loop Advantage

A properly applied water source heat pump system offers many advantages over other systems. First costs are low because units can be added to the loop on an “as needed basis”- perfect for speculative buildings. Installed costs are low since units are self-contained and can be located adjacent to the occupied space, requiring minimal ductwork. Maintenance can be done on individual units without system shut-down. Conditions remain comfortable since each unit operates separately, allowing cooling in one area and heating in another. Tenant spaces can be finished and added as needed. Power billing to tenants is also convenient since each unit can be individually metered: each pays for what each uses. Nighttime and/or weekend uses of certain areas are possible without heating or cooling the entire facility. A decentralized system also means if one unit should fault, the rest of the system will continue to operate normally, as well as eliminating air cross-contamination problems and expensive high pressure duct systems requiring an inefficient electric resistance reheat mode.

The York LX Approach

There are a number of proven choices in the type of LX Condo Series system which would be best for any given application. Most often considered are:

Vertical - Closed Loop/Ground Source



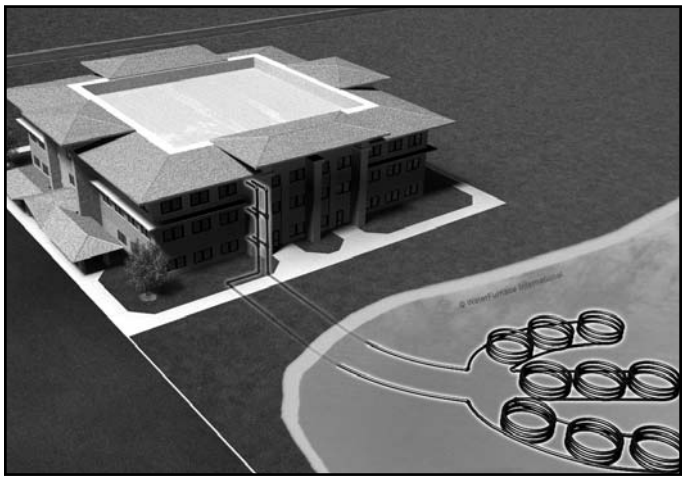
• *Closed Loop/Ground-Source Systems* utilize the stable temperatures of the earth to maintain proper water source temperatures (via vertical or horizontal closed loop heat exchangers) for LX Condo Series extended range heat pump system. Sizes range from a single unit through many hundreds of units. When net cooling requirements cause closed loop water temperatures to rise, heat is dissipated into the cooler earth through buried high strength plastic pipe “heat exchangers.” Conversely if net space heating demands cause loop heat absorption beyond that heat recovered from building core areas, the loop temperature will fall causing heat to be extracted from the earth. Due to the extended loop temperatures, AHRI/ISO 13256-1 Ground Loop Heat Pumps are required for this application. Because auxiliary equipment such as a fossil fuel boiler and cooling tower are not required to maintain the loop temperature, operating and maintenance costs are very low.

Application Notes cont.

Ground-source systems are most applicable in residential and light commercial buildings where both heating and cooling are desired, and on larger envelope dominated structures where core heat recovery will not meet overall heating loads. Both vertical and horizontally installed closed-loops can be used. The land space required for the “heat exchangers” is 100-250 sq. ft./ton on vertical (drilled) installations and 750-1500 sq. ft./ton for horizontal (trenched) installations. Closed loop heat exchangers can be located under parking areas or even under the building itself.

On large multi-unit systems, sizing the closed loop heat exchanger to meet only the net heating loads and assisting cooling loads with a closed circuit cooling tower may be the most cost effective choice.

Surface Water - Closed Loop/Ground Source



• *Closed Loop/Ground-Source Surface Water Systems* also utilize the stable temperatures of Surface Water to maintain proper water source temperatures for LX Condo Series extended range heat pump systems. These systems have all of the advantages of horizontal and vertical closed loop systems. Due to the extended loop temperatures, AHRI/ISO 13256-1 Ground Water or Ground Loop Heat Pumps are required for this application.

In cooling dominated structures, the ground-source surface water systems can be very cost effective especially where local building codes require water retention ponds for short term storage of surface run-off. Sizing requirements for the surface water is a minimum of 500 sq. ft./ton of surface area at a minimum depth of 8 feet. York should be contacted when designs for heating dominated structures are required.

Plate Heat Exchanger - Closed Loop/Ground Water

• *Closed Loop/Ground Water Plate Heat Exchanger Systems* utilize lake, ocean, well water or other water sources to maintain closed loop water temperatures in multi-unit LX Condo Series systems. A plate frame heal exchanger isolates the units from any contaminating effects of the water source, and allows periodic cleaning of the heat exchanger during off peak hours.

Operation and benefits are similar to those for ground-source systems. Due to the extended loop temperatures, AHRI/ISO 13256-1 Ground Loop Heat Pumps are required for this application. Closed loop plate heat exchanger systems are applicable in commercial, marine, or industrial structures where the many benefits of a water source heat pump system are desired, regardless of whether the load is heating or cooling dominated.

Application Notes cont.

Cooler/Boiler - Closed Loop

• *Closed Loop /Cooler-Boiler Systems* utilize a closed heat recovering loop with multiple water source heat pumps in the more conventional manner. Typically a boiler is employed to maintain closed loop temperatures above 60°F and a cooling tower to maintain loop temperatures below 90°F. These systems are applicable in medium to large buildings regardless of whether the load is heating or cooling dominated. Due to the moderate loop temperatures, AHRI/ISO 13256-1 Water Loop Heat Pumps are required for this application.

Water Quality

In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, a closed loop system is recommended. The heat exchanger coils in ground water systems may, over a period of time, lose heat exchange capabilities due to a buildup of mineral deposits inside. These can be cleaned, but only by a qualified service mechanic, as special solutions and pumping equipment are required. Hot water generator coils can likewise become scaled and possibly plugged.

In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional flushing. Failure to adhere to the guidelines in the water quality table could result in loss of warranty.

Units with cupronickel heat exchangers are recommended for open loop applications due to the increased resistance to build-up and corrosion, along with reduced wear caused by acid cleaning.

Material		Copper	90/10 Cupronickel	316 Stainless Steel
pH	**Acidity/Alkalinity**	7 - 9	7 - 9	7 - 9
Scaling	Calcium and Magnesium Carbonate	(Total Hardness) less than 350 ppm	(Total Hardness) less than 350 ppm	(Total Hardness) less than 350 ppm
Corrosion	Hydrogen Sulfide	Less than 0.5 ppm (rotten egg smell appears at 0.5 ppm)	10 - 50 ppm	Less than 1 ppm
	Sulfates	Less than 125 ppm	Less than 125 ppm	Less than 200 ppm
	Chlorine	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Chlorides	Less than 20 ppm	Less than 125 ppm	Less than 300 ppm
	Carbon Dioxide	Less than 50 ppm	10 - 50 ppm	10 - 50 ppm
	Ammonia	Less than 2 ppm	Less than 2 ppm	Less than 20 ppm
	Ammonia Chloride	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonia Nitrate	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonia Hydroxide	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonia Sulfate	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Total Dissolved Solids (TDS)	Less than 1000 ppm	1000 - 1500 ppm	1000 - 1500 ppm
	LSI Index	+0.5 to -0.5	+0.5 to -0.5	+0.5 to -0.5
Iron Fouling (Biological Growth)	Iron, FE^{2}+ (Ferrous) Bacterial Iron Potential	< 0.2 ppm	< 0.2 ppm	< 0.2 ppm
	Iron Oxide	Less than 1 ppm, above this level deposition will occur	Less than 1 ppm, above this level deposition will occur	Less than 1 ppm, above this level deposition will occur
Erosion	Suspended Solids	Less than 10 ppm and filtered for max. of 600 micron size	Less than 10 ppm and filtered for max. of 600 micron size	Less than 10 ppm and filtered for max. of 600 micron size
	Threshold Velocity (Fresh Water)	< 6 ft/sec	< 6 ft/sec	< 6 ft/sec

NOTES: Grains = ppm divided by 17
mg/L is equivalent to ppm

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Installation Notes

Typical Unit Installation

Unit Location

Locate the unit in an indoor area that allows for easy removal of the filter and access panels. Location should have enough space for service personnel to perform maintenance or repair. Provide sufficient room to make water, electrical and duct connection(s). If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Care should be taken when units are located in unconditioned spaces to prevent damage from frozen water lines and excessive heat that could damage electrical components.

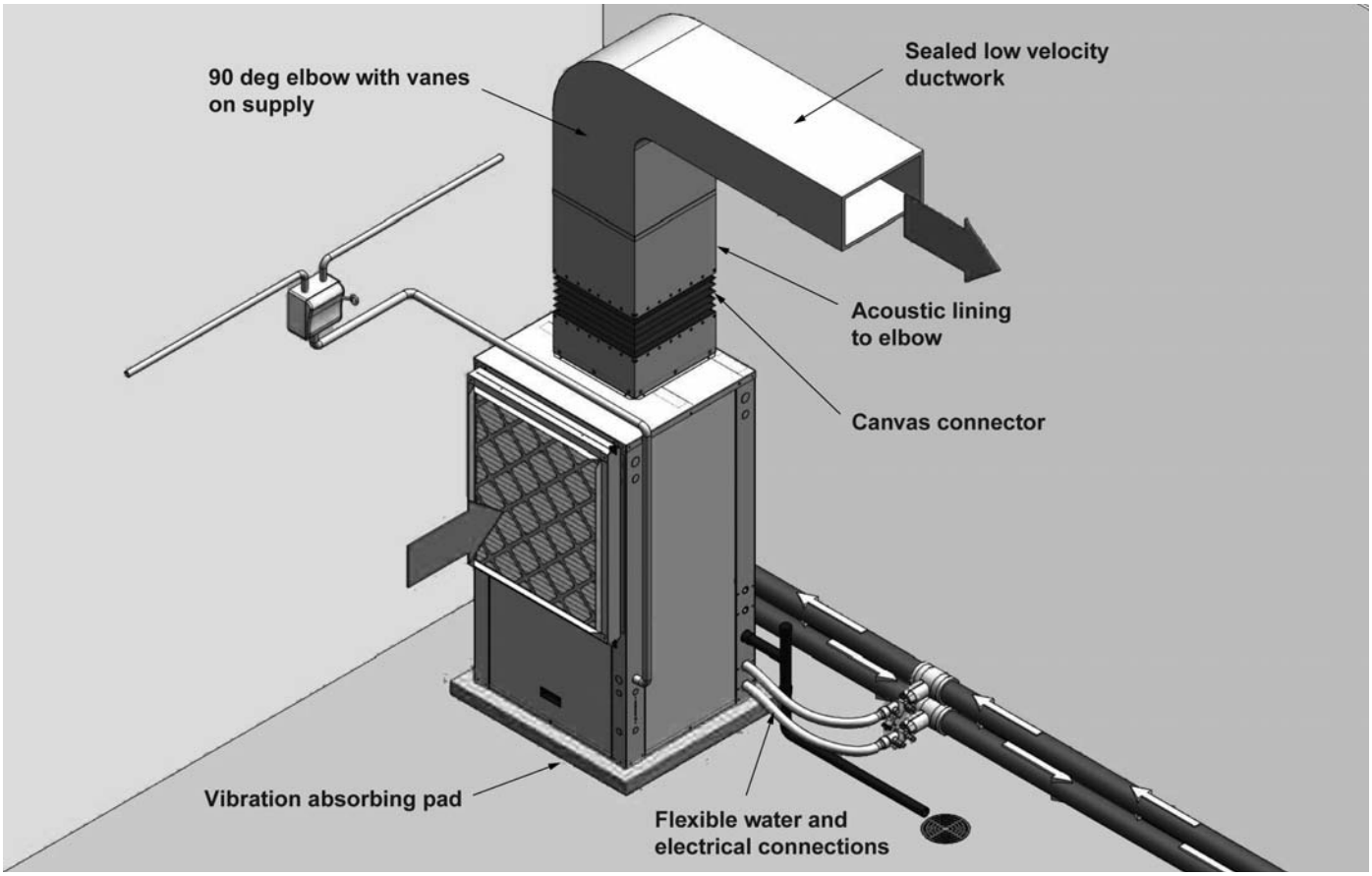
Installing Vertical Units

Prior to setting the unit in place, remove and discard the compressor hold down shipping bolt located at the front of the compressor mounting bracket. Vertical units are available in left or right air return configurations. Top flow vertical units should be mounted level on a vibration absorbing pad slightly larger than the base to provide isolation between the unit and the floor. It is not necessary to anchor the unit to the floor.

WARNING: Before performing service or maintenance operations on a system, turn off main power switches to the indoor unit. If applicable, turn off the accessory heater power switch. Electrical shock could cause personal injury.

Installing and servicing heating and air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service heating and air conditioning equipment. Untrained personnel can perform the basic maintenance functions of cleaning coils and cleaning and replacing filters.

All other operations should be performed by trained service personnel. When working on heating and air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply. Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing operations and have a fire extinguisher available.



Installation Notes cont.

Water Piping

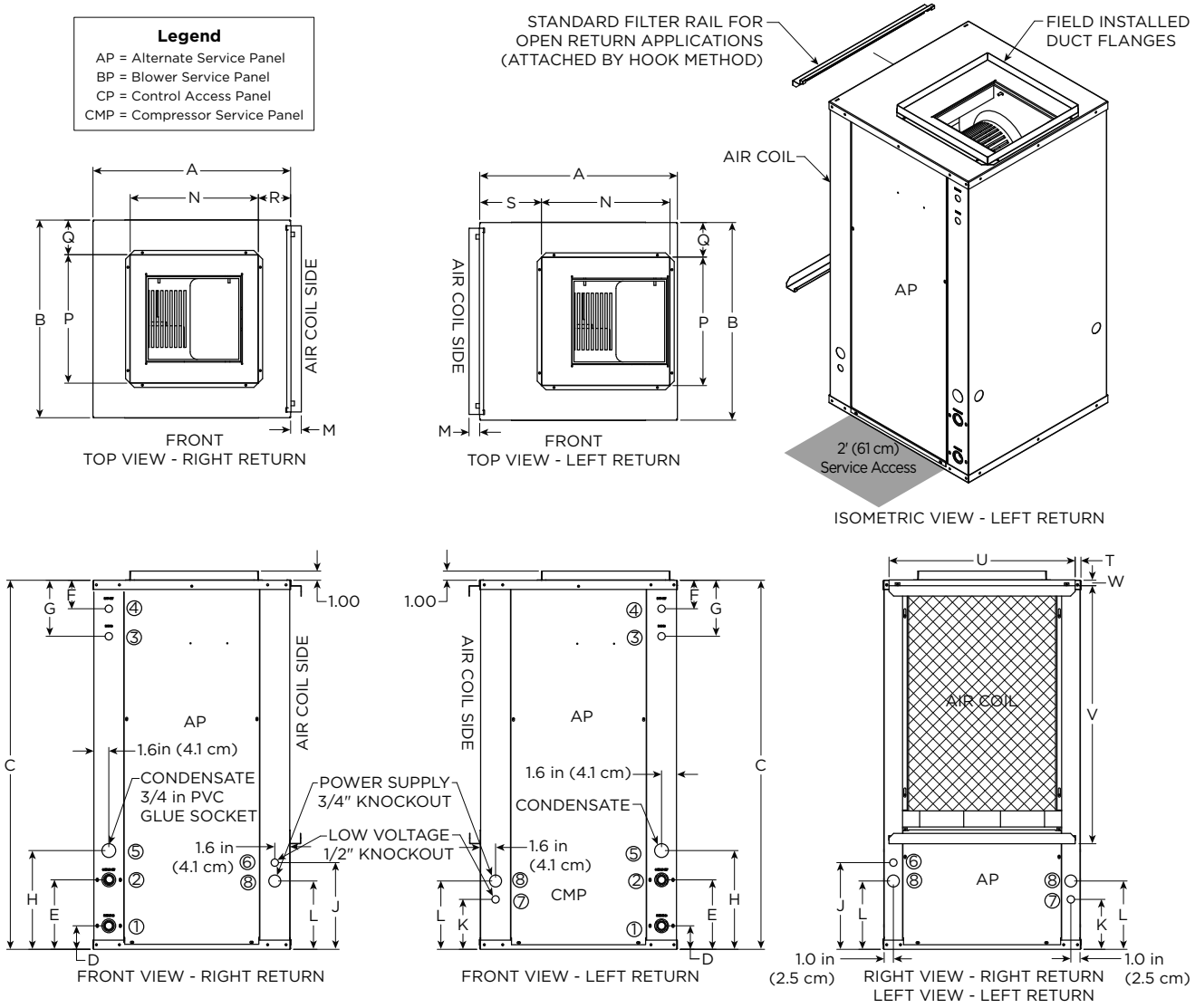
Piping is usually design as ‘reverse return’ to equalize flow paths through each unit. A short flexible pressure rated hose is used to make connection to the fixed building piping system. This hose is typically stainless steel braid and includes a swivel fitting on one end for easy removal and is flexible to help isolate the unit for quieter operation. Isolation valves for servicing, y-strainers for filtering and memory-stop flow valve or a balancing valve can be provided for consistent water flow through the unit.

All unit source water connections are fittings that accept a male pipe thread (MPT). Insert the connectors by hand, then tighten the fitting with a wrench to provide a leakproof joint. The open and closed loop piping system should include pressure/temperature ports for serviceability. The proper water flow must be provided to each unit whenever the unit operates. To assure proper flow, use pressure/temperature ports to determine the flow rate. These ports should be located at the supply and return water connections on the unit. The proper flow rate cannot be accurately set without measuring the water pressure drop through the refrigerant-to-water heat exchanger. Never use flexible hoses smaller than the inside diameter of the water connection at the unit. Limit hose length to 10 feet per connection. Check carefully for water leaks.

Condensate Drain

On vertical units, the internal condensate drain assembly consists of a drain tube which is connected to the drain pan, a 3/4 in. PVC female adapter and a flexible connecting hose. The female adapter may exit either the front or the side of the cabinet. The adapter should be glued to the field-installed PVC condensate piping. On vertical upflow units, a condensate hose is inside all cabinets as a trapping loop; therefore, an external trap is not necessary.

Dimensional Data



Vertical Models		Overall Cabinet			Water Connections							Electrical Knockouts		
					1	2	3	4	5			6	7	8
		A	B	C	D	E	F	G	H	Loop	Knock-out	J	K	L
		Width	Depth	Height**	In	Out	HWG In	HWG Out	Cond-ensate	Water FPT	HWG Provisions	1/2 in. cond	1/2 in. cond	1 in. cond
018-031	in.	21.5	21.5	36.2	2.6	7.6	3.1	6.1	10.8	3/4"	0.875	9.4	5.4	7.4
	cm.	54.6	54.6	91.9	6.6	19.3	7.9	15.5	27.4	19.1 mm	22.2 mm	23.9	13.7	18.8
041	in.	21.5	21.5	40.2	2.6	7.6	3.1	6.1	10.8	3/4"	0.875	9.4	5.4	7.4
	cm.	54.6	54.6	102.1	6.6	19.3	7.9	15.5	27.4	19.1 mm	22.2 mm	23.9	13.7	18.8

Vertical Models			Discharge Connection duct flange installed (±0.10 in)					Return Connection* using deluxe filter rack (±0.10 in)			
		M	N	P	Q	R	S	T	U	V	W
		Filter Rack Width	Supply Width	Supply Depth					Return Depth	Return Height	
018-031	in.	1.2	14.0	14.0	3.8	3.5	6.7	0.6	20.2	24.0	0.6
	cm.	3.0	35.6	35.6	9.7	8.9	17.0	1.5	51.3	61.0	1.5
041	in.	1.2	14.0	14.0	3.8	3.5	6.7	0.6	20.2	28.0	0.6
	cm.	3.0	35.6	35.6	9.7	8.9	17.0	1.5	51.3	71.1	1.5

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Condensate is 3/4 in. PVC female glue socket and is switchable from side to front.

***Dimensions for return connections are for a standard rail design with open return application only. The open filter rail, used in non-ducted returns, extends 1.2 in. [3.11 cm] from the unit.**

**Discharge flange is field installed and extends 1 in. (25.4 mm) from top of cabinet.

Physical Data

Model		Single Speed			
		018	023	031	041
Compressor (1 each)		Rotary	Scroll		
Factory Charge R-410A, oz [kg]		52 [1.47]	44 [1.25]	50 [1.42]	68 [1.93]
Blower Motor & Blower					
Blower Motor Type/Speeds	PSC	3 speeds			
Blower Motor- hp [W]	PSC	1/6 [134]	1/5 [149]	1/3 [249]	1/3 [249]
Blower Wheel Size (Dia x W), in [mm]	PSC	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]	9 x 7 [229 x 178]
Coax and Water Piping					
Water Connection Size - FPT - in [mm]		3/4 [19.1]	3/4 [19.1]	3/4 [19.1]	3/4 [19.1]
HWG Connection Size - FPT - in [mm]		1/2 [12.7]	1/2 [12.7]	1/2 [12.7]	1/2 [12.7]
Coax & Piping Water Volume - gal [l]		0.4 [1.49]	0.4 [1.49]	0.75 [2.83]	0.9 [3.41]
Vertical					
Air Coil Dimensions (H x W), in. [mm]		22 x 16 [559 x 406]	22 x 16 [559 x 406]	22 x 16 [559 x 406]	26 x 16 [660 x 406]
Air Coil Total Face Area, ft^2 [m^2]		2.4 [0.220]	2.4 [0.220]	2.4 [0.220]	2.9 [0.269]
Air Coil Tube Size, in [mm]		3/8 [9.5]	3/8 [9.5]	3/8 [9.5]	3/8 [9.5]
Air Coil Number of rows		3	3	3	3
Filter Standard - 1 in [25mm] MERV 4 Throwaway, in [mm]		24 x 20 [610 x 508]	24 x 20 [610 x 508]	24 x 20 [610 x 508]	28 x 24 [711 x 610]
Shipping Weight- lb [kg]		170 [77]	220 [100]	240 [109]	275 [125]

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PSC Motor

Model	Rated Voltage	Voltage Min/Max	Compressor			Blower Motor FLA	Total Unit FLA	Min Circ Amps	Max Fuse/ HACR
			MCC	RLA	LRA				
018	208-230/60/1	187/253	10.4	6.7	33.5	1.1	7.8	9.5	15
	265/60/1	238/292	8.7	5.6	28.0	1.0	6.6	8.0	10
023	208-230/60/1	187/253	21.0	13.5	58.3	1.2	14.7	18.1	30
	265/60/1	238/292	14.0	9.0	54.0	1.1	10.1	12.4	20
031	208-230/60/1	187/253	22.0	14.1	73.0	1.5	15.6	19.1	30
	265/60/1	238/292	17.5	11.2	60.0	1.5	12.7	15.5	25
041	208-230/60/1	187/253	31.0	20.0	115.0	3.5	23.5	28.5	45

HACR circuit breaker in USA only

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Blower Performance Data

Standard PSC Motor

Model	Blower Spd	Blower Size	Motor HP	Airflow (cfm) at External Static Pressure (in. wg)														
				0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.60	0.70	0.80	0.90	1.00
018	H	9 x 7	1/6	875	860	845	830	820	805	790	770	750	725	700	-	-	-	-	-
	M			760	750	740	730	720	710	700	680	660	640	620	-	-	-	-	-
	L			630	620	610	600	590	580	570	560	550	520	490	-	-	-	-	-
023	H	9 x 7	1/5	995	975	950	925	895	865	835	795	750	715	680	595	-	-	-	-
	M			860	840	820	805	785	755	725	690	655	620	580	-	-	-	-	-
	L			790	775	760	745	725	690	655	635	610	575	535	-	-	-	-	-
031	H	9 x 7	1/3	1160	1135	1110	1085	1055	1025	995	965	930	890	850	765	650	-	-	-
	M			1035	1015	1000	975	955	930	905	875	845	810	780	685	-	-	-	-
	L			855	845	840	830	820	800	785	760	740	710	685	610	-	-	-	-
041	**H**	9 x 7	1/2	1200	1170	1145	1115	1080	1035	995	955	915	875	835	765	640	-	-	-
	M			1110	1085	1065	1035	1010	975	940	900	860	825	795	715	585	-	-	-
	L			1040	1020	1000	975	950	920	890	860	830	795	765	683	560	-	-	-

Factory settings are in Bold

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Air flow values are with dry coil and standard filter

For wet coil performance first calculate the face velocity of the air coil (Face Velocity [fpm] = Airflow [cfm] / Face Area [sq ft]).

Then for velocities of 200 fpm reduce the static capability by 0.03 in. wg, 300 fpm by 0.08 in. wg, 400 fpm by 0.12in. wg. and 500 fpm by 0.16 in. wg.

Selection Example

To achieve optimal performance, proper selection of each heat pump is essential. A building load program should be used to determine the heating and cooling load of each zone. A computer software selection program can then be used to develop an accurate and complete heat pump schedule. Software can be obtained from your local York representative.

While a computer software program is the easiest and most accurate method to size and select equipment, however, selection can still be accomplished manually using this manual and the following selection procedure. Sizing so that the actual sensible capacity of the equipment will satisfy the sensible capacity of the zone is the recommended method for best results.

Boiler/Tower Application

Typical boiler/tower application will result in entering water temperatures of 60-90°F with 70°F for heating and 90°F for cooling. Water to refrigerant insulation option would not be required. Flow rates are 2.5 to 3 gpm per ton with 2.5 gpm per ton often representing an economical design point.

Geothermal Application

Typical geothermal application can result in a wide entering water temperature range of 30-100°F. Typically minimum heating entering water temperatures can range from 30 to 50°F depending upon loop type and geographical location. Cooling performance should be calculated using a maximum loop temperature of 100°F in most loop applications. Water flow is typically 2.5 to 3 gpm per ton with 3 gpm per ton recommended with the more extreme loop temperatures. PLEASE NOTE THAT WATER COIL INSULATION OPTION SHOULD BE SELECTED WHEN ENTERING WATER TEMPERATURES ARE EXPECTED TO BE BELOW 45-50°F.

Geothermal Selection Example

Step 1: Determine the actual heating and cooling loads at the desired dry bulb and wet bulb conditions.

Step 2: Obtain the following design parameters: Entering water temperature, water flow rate in GPM, air flow in CFM, water flow pressure drop and design wet and dry bulb temperatures. Air flow CFM should be between 300 and 450 CFM per ton. Unit water pressure drop should be kept as close as possible to each other to make water balancing easier. Go to the appropriate tables and find the proper indicated water flow and water temperature.

Step 3: Select a unit based on total and sensible cooling conditions. Select a unit which is closest to, but no larger than, the actual cooling load.

Step 4: Enter tables at the design water flow and water temperature. Read the total and sensible cooling capacities (**NOTE:** interpolation is permissible, extrapolation is not).

Step 5: Read the heating capacity. If it exceeds the design criteria it is acceptable. It is quite normal for water source heat pumps to be selected on cooling capacity only since the heating output is usually greater than the cooling capacity.

Step 6: Determine the correction factors associated with the variable factors of dry bulb and wet bulb.
Corrected Total Cooling = tabulated total cooling x wet bulb correction.
Corrected Sensible Cooling = tabulated sensible cooling x wet/dry bulb correction.

Step 7: Compare the corrected capacities to the load requirements. Normally if the capacities are within 10% of the loads, the equipment is acceptable. It is better to undersize than oversize, as undersizing improves humidity control, reduces sound levels and extends the life of the equipment.

Step 8: When complete, calculate water temperature rise and assess the selection. If the units selected are not within 10% of the load calculations, then review what effect changing the GPM, water temperature and/or air flow and air temperature would have on the corrected capacities. If the desired capacity cannot be achieved, select the next larger or smaller unit and repeat the procedure. Remember, when in doubt, undersize slightly for best performance.

Example Equipment Selection - Cooling

1. Load Determination:
Assume we have determined that the appropriate cooling load at the desired dry bulb 80°F and wet bulb 65°F conditions is as follows:
Total Cooling..... 28,500 BTUH
Sensible Cooling..... 18,600 BTUH
Entering Air Temp .....75°F Dry Bulb / 60°F Wet Bulb

2. Design Conditions:
Similarly, we have also obtained the following design parameters:
Entering Water Temp.....90°F
Water Flow (Based upon 10°F rise in temp.) 7.0 GPM
Air Flow Required..... 900 CFM @ 0.2 in. wg.

Selection Example cont.

3, 4 & 5. HP Selection:
After making our preliminary selection (YFV031 PSC), we enter the tables at design water flow and water temperature and read Total Cooling, Sens. Cooling and Heat of Rej. capacities:
Total Cooling..... 28,300 BTUH
Sensible Cooling..... 21,600 BTUH
Heat of Rejection..... 35,500 BTUH

6 & 7. Entering Air and Airflow Corrections:
Next, we determine our correction factors. (Refer to Correction Factor Tables - Air Flow and Entering Air correction tables — using 900 cfm. or 900÷1,000 nom. = 90%).
Corrected Total Cooling = 28,300 x 0.990 x 0.967 = 27,092
Corrected Sens Cooling = 21,600 x 0.956 x 0.881 = 18,192
Corrected Heat of Reject = 35,500 x 0.987 x 0.972 = 34,057

$$HR = 500 \times GPM \times (T_{in} - T_{out})$$

$$\frac{HR}{500 \times GPM} = (Tin - Tout) \text{ or } \Delta T \text{ Rise}$$

$$\frac{34{,}057}{500 \times 7} = 9.73°F \text{ Rise}$$

8. Water Temperature Rise Calculation & Assessment:
Note: 500 = parameters for water & 485 = parameters for antifreeze solutions to 30% weight.

When we compare the Corrected Total Cooling and Corrected Sensible Cooling figures with our load requirements stated in Step 1, we discover that our selection is within +10% of our sensible load requirement. Further more, we see that our Corrected Total Cooling figure is within 1,000 Btuh of the actual indicated load.

Antifreeze Corrections

Catalog performance can be corrected for antifreeze use. Please use the following table and note the example given.

Antifreeze Type	Antifreeze % by wt	Cooling Capacity	Heating Capacity	Pressure Drop
EWT - degF [DegC]		**90 [32.2]**	**30 [-1.1]**	**30 [-1.1]**
Water	0	1.000	1.000	1.000
Ethylene Glycol	10	0.991	0.973	1.075
	20	0.979	0.943	1.163
	30	0.965	0.917	1.225
	40	0.955	0.890	1.324
	50	0.943	0.865	1.419
Propylene Glycol	10	0.981	0.958	1.130
	20	0.969	0.913	1.270
	30	0.950	0.854	1.433
	40	0.937	0.813	1.614
	50	0.922	0.770	1.816
Ethanol	10	0.991	0.927	1.242
	20	0.972	0.887	1.343
	30	0.947	0.856	1.383
	40	0.930	0.815	1.523
	50	0.911	0.779	1.639
Methanol	10	0.986	0.957	1.127
	20	0.970	0.924	1.197
	30	0.951	0.895	1.235
	40	0.936	0.863	1.323
	50	0.920	0.833	1.399

***Warning**: Gray area represents antifreeze concentrations greater than 35% by weight and should be avoided due to the extreme performance penalty they represent.*

Antifreeze Correction Example

Antifreeze solution is Propylene Glycol 20% by weight. Determine the corrected heating and cooling performance at 30°F and 90°F respectively as well as pressure drop at 30°F for a LX Condo Series YFV023 PSC.

The corrected cooling capacity at 90°F would be: 23,500 MBtuh x 0.969 = 22,772 MBtuh

The corrected heating capacity at 30°F would be: 16,000 MBtuh x 0.913 = 14,608 MBtuh

The corrected pressure drop at 30°F and 6 GPM would be: 10.5 feet of head x 1.270 = 13.34 feet of head

Reference Calculations

Heating Calculations:	Cooling Calculations:
$LWT = EWT - \frac{HE}{GPM \times 500}$	$LWT = EWT + \frac{HR}{GPM \times 500}$
$LAT = EAT + \frac{HC}{CFM \times 1.08}$	$LAT(DB) = EAT(DB) - \frac{SC}{CFM \times 1.08}$
$TH = HC + HWC$	$LC = TC - SC$
	$S/T = \frac{SC}{TC}$

Legend and Notes

ABBREVIATIONS AND DEFINITIONS:

CFM = airflow, cubic feet/minute
EWT = entering water temperature, Fahrenheit
GPM = water flow in gallons/minute
WPD = water pressure drop, PSI and feet of water
EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
HC = air heating capacity, MBTUH
TC = total cooling capacity, MBTUH
SC = sensible cooling capacity, MBTUH
KW = total power unit input, kilowatts
HR = total heat of rejection, MBTUH
HE = total heat of extraction, MBTUH
HWC = hot water generator capacity, MBTUH
EER = Energy Efficient Ratio = BTU output/Watt input
COP = Coefficient of Performance = BTU output/BTU input
LWT = leaving water temperature, °F
LAT = leaving air temperature, °F
TH = total heating capacity, MBTUH
LC = latent cooling capacity, MBTUH
S/T = sensible to total cooling ratio

Notes (Refer to Performance Data tables)

- Performance ratings are based on 80°F DB / 67°F WB EAT for cooling and 70°F DB EAT for heating.
- Three flow rates are shown for each unit. The lowest flow rate shown is used for geothermal open loop/well water systems with a minimum of 50°F EWT. The middle flow rate shown is the minimum geothermal closed loop flow rate. The highest flow rate shown is optimum for geothermal closed loop systems and the suggested flow rate for boiler/tower applications.
- The hot water generator numbers are based on a flow rate of 0.4 GPM/ton of rated capacity with an EWT of 90°F.
- Entering water temperatures below 40°F assumes 15% antifreeze solution.
- For non-standard EAT conditions, apply the appropriate correction factors on (Refer to Correction Factor Tables).
- Interpolation between EWT, GPM and CFM data is permissible.

Operating Limits

Operating Limits	Cooling		Heating	
	(°F)	(°C)	(°F)	(°C)
Air Limits				
Min. Ambient Air	45	7.2	45	7.2
Rated Ambient Air	80	26.7	70	21.1
Max. Ambient Air	100	37.8	85	29.4
Min. Entering Air	50	10.0	40	4.4
Rated Entering Air db/wb	80.6/66.2	27/19	68	20.0
Max. Entering Air db/wb	110/83	43/28.3	80	26.7
Water Limits				
Min. Entering Water	30	-1.1	20	-6.7
Normal Entering Water	50-110	10-43.3	30-70	-1.1
Max. Entering Water	120	48.9	90	32.2

NOTE: Minimum/maximum limits are only for start-up conditions, and are meant for bringing the space up to occupancy temperature. Units are not designed to operate at the minimum/maximum conditions on a regular basis. The operating limits are dependant upon three primary factors: 1) water temperature, 2) return air temperature, and 3) ambient temperature. When any of the factors are at the minimum or maximum levels, the other two factors must be at the normal level for proper and reliable unit operation.

Correction Factor Tables

Cooling Capacity Corrections

Entering Air WB ºF	Total Clg Cap	Sensible Cooling Capacity Multipliers - Entering DB ºF										Power Input	Heat of Rejection
		60	65	70	75	80	80.6	85	90	95	100		
55	0.898	0.723	0.866	1.048	1.185	*	*	*	*	*	*	0.985	0.913
60	0.912		0.632	0.880	1.078	1.244	1.260	*	*	*	*	0.994	0.927
65	0.967			0.694	0.881	1.079	1.085	1.270	*	*	*	0.997	0.972
66.2	0.983			0.655	0.842	1.040	1.060	1.232	*	*	*	0.999	0.986
67	1.000			0.616	0.806	1.000	1.023	1.193	1.330	*	*	1.000	1.000
70	1.053				0.693	0.879	0.900	1.075	1.250	1.404	*	1.003	1.044
75	1.168					0.687	0.715	0.875	1.040	1.261	1.476	1.007	1.141

NOTE: * Sensible capacity equals total capacity at conditions shown.

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Heating Corrections

Ent Air DB °F	Htg Cap	Power	Heat of Ext
45	1.062	0.739	1.158
50	1.050	0.790	1.130
55	1.037	0.842	1.096
60	1.025	0.893	1.064
65	1.012	0.945	1.030
68	1.005	0.976	1.012
70	1.000	1.000	1.000
75	0.987	1.048	0.970
80	0.975	1.099	0.930

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Air Flow Corrections

Airflow		Cooling				Heating		
CFM Per Ton of Clg	% of Nominal	Total Cap	Sens Cap	Power	Heat of Rej	Htg Cap	Power	Heat of Ext
240	60	0.922	0.786	0.910	0.920	0.943	1.150	0.893
275	69	0.944	0.827	0.924	0.940	0.958	1.105	0.922
300	75	0.959	0.860	0.937	0.955	0.968	1.078	0.942
325	81	0.971	0.894	0.950	0.967	0.977	1.053	0.959
350	88	0.982	0.929	0.964	0.978	0.985	1.031	0.973
375	94	0.992	0.965	0.982	0.990	0.993	1.014	0.988
400	100	1.000	1.000	1.000	1.000	1.000	1.000	1.000
425	106	1.007	1.034	1.020	1.010	1.007	0.990	1.011
450	113	1.012	1.065	1.042	1.018	1.013	0.983	1.020
475	119	1.017	1.093	1.066	1.026	1.018	0.980	1.028
500	125	1.019	1.117	1.092	1.033	1.023	0.978	1.034
520	130	1.020	1.132	1.113	1.038	1.026	0.975	1.038

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Pressure Drop

Model	GPM	Pressure Drop (psi)				
		30°F	50°F	70°F	90°F	110°F
018	3.0	1.1	1.0	0.8	0.7	0.5
	4.0	1.9	1.8	1.6	1.5	1.3
	5.0	3.3	3.2	3.0	2.9	2.7
	6.0	4.5	4.4	4.3	4.1	4.0
023	3.0	1.1	1.0	0.9	0.8	0.6
	4.5	2.4	2.2	2.1	2.0	1.9
	6.0	4.5	4.4	4.3	4.1	4.0
	8.0	6.7	6.6	6.5	6.3	6.2
031	4.0	0.9	0.8	0.7	0.6	0.5
	6.0	1.9	1.8	1.7	1.6	1.5
	8.0	3.7	3.6	3.5	3.4	3.3
	10.0	4.8	4.7	4.6	4.5	4.4
041	5.0	1.5	1.2	0.9	0.5	0.4
	8.0	3.4	3.1	2.8	2.5	2.1
	11.0	7.9	7.5	7.2	6.9	6.6
	14.0	9.1	8.8	8.5	8.2	7.9

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Model 018 - Performance Data

Single Speed PSC (600 CFM)

EWT °F	Flow gpm	WPD		HEATING - EAT 70°F						COOLING - EAT 80/67°F						
		PSI	FT	HC kBtuh	Power kW	HE kBtuh	LAT °F	COP	HWC kBtuh	TC kBtuh	SC kBtuh	S/T Ratio	Power kW	HR kBtuh	EER	HWC kBtuh
20	3.0	1.2	2.8	Operation not recommended						Operation not recommended						
	4.0	2.0	4.6													
	5.0	3.4	7.8	13.0	1.21	8.9	88.1	3.15	1.4							
30	3.0	1.1	2.6	Operation not recommended						Operation not recommended						
	4.0	1.9	4.4	14.5	1.29	10.1	90.3	3.29	1.5	18.2	11.8	0.65	0.86	21.1	21.0	---
	5.0	3.3	7.6	14.9	1.31	10.4	91.0	3.33	1.5	18.4	12.0	0.65	0.81	21.2	22.7	---
40	3.0	1.1	2.5	Operation not recommended						Operation not recommended						
	4.0	1.8	4.3	15.7	1.34	11.1	92.2	3.43	1.6	19.1	12.4	0.65	0.92	22.2	20.8	---
	5.0	3.2	7.5	16.5	1.37	11.8	93.4	3.52	1.6	19.4	12.6	0.65	0.89	22.4	21.9	---
50	3.0	1.0	2.3	16.0	1.36	11.4	92.7	3.45	1.7	19.7	12.8	0.65	0.98	23.0	20.1	0.9
	4.0	1.8	4.1	17.0	1.40	12.2	94.2	3.57	1.7	20.0	13.0	0.65	0.97	23.3	20.6	0.9
	5.0	3.2	7.3	18.0	1.43	13.1	95.8	3.69	1.8	20.3	13.1	0.65	0.96	23.6	21.1	0.9
60	3.0	0.9	2.1	17.5	1.43	12.6	95.0	3.60	1.9	18.7	12.4	0.66	1.07	22.3	17.6	1.1
	4.0	1.7	3.9	18.5	1.45	13.5	96.5	3.73	1.9	18.9	12.6	0.67	1.06	22.5	17.9	1.1
	5.0	3.1	7.1	19.5	1.48	14.5	98.1	3.86	2.0	19.2	12.8	0.67	1.05	22.7	18.3	1.0
70	3.0	0.8	1.9	19.0	1.49	13.9	97.3	3.74	2.1	17.7	12.0	0.68	1.15	21.6	15.4	1.3
	4.0	1.6	3.7	20.0	1.51	14.8	98.9	3.88	2.1	17.9	12.3	0.69	1.14	21.7	15.7	1.3
	5.0	3.0	6.9	21.0	1.53	15.8	100.4	4.02	2.2	18.0	12.5	0.69	1.13	21.9	15.9	1.2
80	3.0	0.8	1.8	21.9	1.56	16.5	101.7	4.10	2.4	16.6	11.4	0.69	1.36	21.2	12.2	1.7
	4.0	1.5	3.6	22.6	1.58	17.2	102.8	4.17	2.4	16.8	11.7	0.70	1.30	21.2	12.9	1.6
	5.0	2.9	6.8	23.3	1.61	17.8	103.9	4.25	2.5	17.0	12.0	0.70	1.26	21.3	13.5	1.5
90	3.0	0.7	1.6	24.7	1.64	19.1	106.2	4.43	2.8	15.4	10.8	0.70	1.49	20.5	10.3	2.2
	4.0	1.5	3.4	25.1	1.66	19.5	106.8	4.44	2.8	15.7	11.1	0.71	1.43	20.5	11.0	2.0
	5.0	2.9	6.6	25.5	1.68	19.8	107.4	4.45	2.8	16.0	11.4	0.71	1.38	20.7	11.6	1.9
100	3.0	0.6	1.4							Operation not recommended						
	4.0	1.4	3.2							14.9	11.0	0.74	1.52	20.1	9.8	2.5
	5.0	2.8	6.4							15.1	11.1	0.73	1.47	20.1	10.3	2.3
110	3.0	0.5	1.2							Operation not recommended						
	4.0	1.3	3.0	Operation not recommended						13.9	10.5	0.76	1.60	19.4	8.7	3.2
	5.0	2.7	6.2							14.2	10.7	0.75	1.56	19.5	9.1	3.0
120	3.0	0.5	1.1							Operation not recommended						
	4.0	1.2	2.9							13.2	10.1	0.76	1.76	19.2	7.5	4.0
	5.0	2.6	6.1							13.5	10.2	0.76	1.71	19.3	7.9	3.6

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Model 023 - Performance Data

Single Speed PSC (700 CFM)

EWT °F	Flow gpm	WPD		HEATING - EAT 70°F					COOLING - EAT 80/67°F					
		PSI	FT	HC kBtuh	Power kW	HE kBtuh	LAT °F	COP	TC kBtuh	SC kBtuh	S/T Ratio	Power kW	HR kBtuh	EER
20	3.0	1.2	2.8	Operation not recommended					Operation not recommended					
	4.5	2.4	5.6											
	6.0	4.6	10.6	15.0	1.68	9.2	85.3	2.61						
30	3.0	1.1	2.6	Operation not recommended					Operation not recommended					
	4.5	2.4	5.5	17.9	1.74	11.9	88.7	3.01	26.3	16.7	0.63	1.11	30.1	23.8
	6.0	4.5	10.5	18.2	1.76	12.2	89.1	3.04	26.7	17.0	0.64	1.04	30.2	25.7
40	3.0	1.1	2.5	Operation not recommended					Operation not recommended					
	4.5	2.3	5.3	19.6	1.78	13.6	90.7	3.24	26.5	17.0	0.64	1.20	30.6	22.0
	6.0	4.5	10.3	20.3	1.80	14.1	91.4	3.30	26.8	17.3	0.64	1.14	30.7	23.6
50	3.0	1.0	2.3	20.8	1.79	14.7	92.1	3.41	26.4	17.3	0.66	1.37	31.1	19.3
	4.5	2.2	5.2	21.6	1.82	15.4	92.9	3.48	26.6	17.4	0.65	1.30	31.1	20.5
	6.0	4.4	10.2	22.3	1.84	16.0	93.8	3.55	26.9	17.5	0.65	1.23	31.1	21.9
60	3.0	1.0	2.2	23.0	1.83	16.7	94.6	3.68	25.7	17.0	0.66	1.52	30.9	16.9
	4.5	2.2	5.0	23.8	1.85	17.5	95.5	3.76	25.9	17.1	0.66	1.44	30.9	18.0
	6.0	4.3	10.0	24.6	1.88	18.2	96.4	3.84	26.2	17.2	0.66	1.36	30.8	19.3
70	3.0	0.9	2.0	25.2	1.87	18.8	97.1	3.94	25.0	16.7	0.67	1.67	30.7	15.0
	4.5	2.1	4.9	26.0	1.89	19.6	98.1	4.03	25.3	16.8	0.67	1.58	30.6	16.0
	6.0	4.3	9.9	26.9	1.91	20.4	99.1	4.12	25.5	16.9	0.66	1.49	30.6	17.1
80	3.0	0.8	1.9	27.9	1.88	21.5	100.2	4.35	23.8	16.1	0.68	1.81	30.0	13.1
	4.5	2.1	4.7	28.5	1.90	22.0	101.0	4.40	24.1	16.3	0.68	1.73	30.0	13.9
	6.0	4.2	9.7	29.2	1.92	22.6	101.8	4.46	24.5	16.5	0.67	1.68	30.2	14.6
90	3.0	0.8	1.7	30.6	1.88	24.1	103.4	4.76	22.7	15.6	0.69	2.01	29.6	11.3
	4.5	2.0	4.6	31.0	1.91	24.5	103.9	4.77	23.0	15.8	0.69	1.92	29.6	12.0
	6.0	4.1	9.6	31.5	1.93	24.9	104.5	4.78	23.5	16.0	0.68	1.86	29.8	12.6
100	3.0	0.7	1.6	Operation not recommended					Operation not recommended					
	4.5	1.9	4.4						21.7	15.1	0.69	2.20	29.2	9.9
	6.0	4.1	9.4						22.1	15.2	0.69	2.13	29.3	10.4
110	3.0	0.6	1.4						Operation not recommended					
	4.5	1.9	4.3						20.2	14.2	0.70	2.46	28.6	8.2
	6.0	4.0	9.3						20.6	14.4	0.70	2.39	28.8	8.6
120	3.0	0.6	1.3						Operation not recommended					
	4.5	1.8	4.1						18.4	14.2	0.77	2.85	28.2	6.5
	6.0	3.9	9.1						18.8	14.4	0.77	2.77	28.3	6.8

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Model 031 - Performance Data

Single Speed PSC (1000 CFM)

EWT °F	Flow gpm	WPD		HEATING - EAT 70°F						COOLING - EAT 80/67°F						
		PSI	FT	HC kBtuh	Power kW	HE kBtuh	LAT °F	COP	HWC kBtuh	TC kBtuh	SC kBtuh	S/T Ratio	Power kW	HR kBtuh	EER	HWC kBtuh
20	4.0	1.0	2.2	Operation not recommended						Operation not recommended						
	6.0	1.9	4.5													
	8.0	3.8	8.7	20.7	2.10	13.5	87.2	2.89	1.9							
30	4.0	0.9	2.1	Operation not recommended						Operation not recommended						
	6.0	1.9	4.4	24.6	2.10	17.4	90.8	3.43	2.1	30.4	20.8	0.68	1.24	34.6	24.6	---
	8.0	3.7	8.5	24.0	2.12	16.8	90.2	3.32	2.1	30.8	21.2	0.69	1.16	34.8	26.6	---
40	4.0	0.9	2.0	Operation not recommended						Operation not recommended						
	6.0	1.8	4.3	27.2	2.17	19.8	93.2	3.68	2.3	32.0	22.5	0.70	1.35	36.6	23.7	---
	8.0	3.7	8.4	27.6	2.19	20.1	93.5	3.69	2.4	32.5	23.1	0.71	1.28	36.8	25.4	---
50	4.0	0.8	1.9	29.0	2.21	21.5	94.9	3.85	2.5	33.1	23.5	0.71	1.54	38.4	21.5	1.4
	6.0	1.8	4.1	30.1	2.24	22.4	95.8	3.94	2.6	33.6	24.3	0.72	1.47	38.6	22.9	1.3
	8.0	3.6	8.3	31.1	2.26	23.4	96.8	4.03	2.7	34.1	25.0	0.73	1.40	38.9	24.4	1.3
60	4.0	0.8	1.8	32.3	2.28	24.5	97.9	4.15	2.9	31.9	23.1	0.72	1.70	37.7	18.8	1.6
	6.0	1.7	4.0	33.4	2.31	25.6	98.9	4.25	2.9	32.5	23.5	0.72	1.63	38.0	19.9	1.5
	8.0	3.6	8.2	34.6	2.34	26.6	100.0	4.34	3.0	33.1	24.0	0.72	1.56	38.4	21.2	1.4
70	4.0	0.7	1.6	35.6	2.35	27.6	101.0	4.44	3.2	30.7	22.6	0.74	1.86	37.0	16.5	2.0
	6.0	1.7	3.9	36.8	2.38	28.7	102.1	4.53	3.3	31.4	22.8	0.73	1.79	37.5	17.5	1.9
	8.0	3.5	8.1	38.0	2.41	29.8	103.2	4.62	3.4	32.0	22.9	0.72	1.72	37.9	18.6	1.8
80	4.0	0.7	1.5	39.3	2.46	30.9	104.4	4.68	3.6	28.8	20.8	0.72	2.07	35.9	13.9	2.5
	6.0	1.6	3.8	40.2	2.49	31.7	105.2	4.73	3.7	29.6	21.4	0.72	1.97	36.3	15.0	2.4
	8.0	3.5	8.0	41.2	2.53	32.5	106.1	4.78	3.8	30.2	22.3	0.74	1.91	36.7	15.8	2.3
90	4.0	0.6	1.4	43.0	2.57	34.2	107.8	4.89	4.1	27.0	19.0	0.70	2.27	34.7	11.9	3.3
	6.0	1.6	3.7	43.6	2.61	34.7	108.4	4.90	4.2	27.8	20.0	0.72	2.17	35.2	12.8	3.1
	8.0	3.4	7.9	44.3	2.64	35.3	109.0	4.92	4.3	28.4	21.6	0.76	2.10	35.6	13.5	3.0
100	4.0	0.6	1.3	Operation not recommended						Operation not recommended						
	6.0	1.6	3.6							26.3	20.7	0.78	2.43	34.7	10.8	3.9
	8.0	3.4	7.8							26.8	20.9	0.78	2.36	34.8	11.4	3.7
110	4.0	0.5	1.2							Operation not recommended						
	6.0	1.5	3.5							24.6	19.8	0.81	2.68	33.8	9.2	4.9
	8.0	3.3	7.6							25.1	20.1	0.80	2.61	34.0	9.6	4.5
120	4.0	0.5	1.1							Operation not recommended						
	6.0	1.5	3.3							22.5	19.1	0.85	3.03	32.8	7.4	5.7
	8.0	3.3	7.5							23.0	19.4	0.84	2.94	33.0	7.8	5.4

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Model 041 - Performance Data

Single Speed PSC (1200 CFM)

EWT °F	Flow gpm	WPD		HEATING - EAT 70°F						COOLING - EAT 80/67°F						
		PSI	FT	HC kBtuh	Power kW	HE kBtuh	LAT °F	COP	HWC kBtuh	TC kBtuh	SC kBtuh	S/T Ratio	Power kW	HR kBtuh	EER	HWC kBtuh
20	5.0	1.6	3.8	Operation not recommended						Operation not recommended						
	8.0	3.6	8.2													
	11.0	8.0	18.5	26.3	2.40	18.1	88.3	3.21	1.9							
30	5.0	1.5	3.4	Operation not recommended						Operation not recommended						
	8.0	3.4	7.8	31.9	2.86	22.1	92.6	3.27	2.1	43.3	25.6	0.59	1.81	49.5	23.9	---
	11.0	7.9	18.1	32.0	2.90	22.1	92.7	3.23	2.1	43.9	26.1	0.59	1.70	49.7	25.8	---
40	5.0	1.3	3.0	Operation not recommended						Operation not recommended						
	8.0	3.2	7.5	35.3	2.96	25.2	95.2	3.50	2.3	44.7	27.7	0.62	1.96	51.4	22.9	---
	11.0	7.7	17.8	36.2	3.00	26.0	95.9	3.54	2.4	45.3	27.9	0.62	1.85	51.6	24.5	---
50	5.0	1.2	2.7	37.5	3.00	27.3	96.9	3.66	2.5	45.7	30.0	0.66	2.20	53.2	20.8	1.4
	8.0	3.1	7.1	39.0	3.05	28.5	98.1	3.74	2.6	46.2	29.8	0.65	2.10	53.3	22.0	1.3
	11.0	7.5	17.4	40.4	3.10	29.8	99.2	3.82	2.7	46.6	29.6	0.64	2.00	53.4	23.3	1.3
60	5.0	1.0	2.3	41.6	3.10	31.0	100.1	3.93	2.9	44.3	29.1	0.66	2.45	52.7	18.1	1.6
	8.0	2.9	6.7	43.3	3.15	32.6	101.4	4.03	2.9	44.6	29.1	0.65	2.33	52.5	19.2	1.5
	11.0	7.4	17.0	45.0	3.20	34.1	102.7	4.12	3.0	44.9	29.1	0.65	2.20	52.4	20.4	1.4
70	5.0	0.9	2.0	45.7	3.20	34.8	103.3	4.19	3.2	42.9	28.1	0.66	2.70	52.1	15.9	2.0
	8.0	2.8	6.4	47.7	3.25	36.6	104.8	4.30	3.3	43.1	28.3	0.66	2.55	51.8	16.9	1.9
	11.0	7.2	16.7	49.6	3.30	38.3	106.3	4.41	3.4	43.2	28.5	0.66	2.40	51.4	18.0	1.8
80	5.0	0.7	1.6	51.5	3.31	40.2	107.7	4.56	3.6	40.1	26.5	0.66	2.92	50.1	13.7	2.5
	8.0	2.6	6.0	52.9	3.35	41.4	108.8	4.62	3.7	40.8	24.2	0.59	2.79	50.3	14.6	2.4
	11.0	7.1	16.3	54.3	3.40	42.7	109.9	4.68	3.8	41.3	26.8	0.65	2.70	50.5	15.3	2.3
90	5.0	0.5	1.2	57.2	3.41	45.6	112.2	4.92	4.1	37.3	24.9	0.67	3.25	48.4	11.5	3.3
	8.0	2.5	5.7	58.1	3.46	46.3	112.8	4.93	4.2	38.5	20.0	0.52	3.10	49.1	12.4	3.1
	11.0	6.9	16.0	59.0	3.50	47.1	113.5	4.94	4.3	39.3	25.1	0.64	3.00	49.5	13.1	3.0
100	5.0	0.4	0.9	Operation not recommended						Operation not recommended						
	8.0	2.3	5.3							36.8	24.1	0.66	3.46	48.6	10.6	3.9
	11.0	6.8	15.6							37.4	24.4	0.65	3.35	48.8	11.2	3.7
110	5.0	0.4	0.9							Operation not recommended						
	8.0	2.1	4.9							34.8	23.3	0.67	3.80	47.8	9.1	4.9
	11.0	6.6	15.2							35.5	23.6	0.66	3.70	48.1	9.6	4.5
120	5.0	0.4	0.9							Operation not recommended						
	8.0	2.0	4.6							32.4	22.3	0.69	4.22	46.8	7.7	5.7
	11.0	6.5	14.9							33.1	22.6	0.68	4.10	47.1	8.1	5.4

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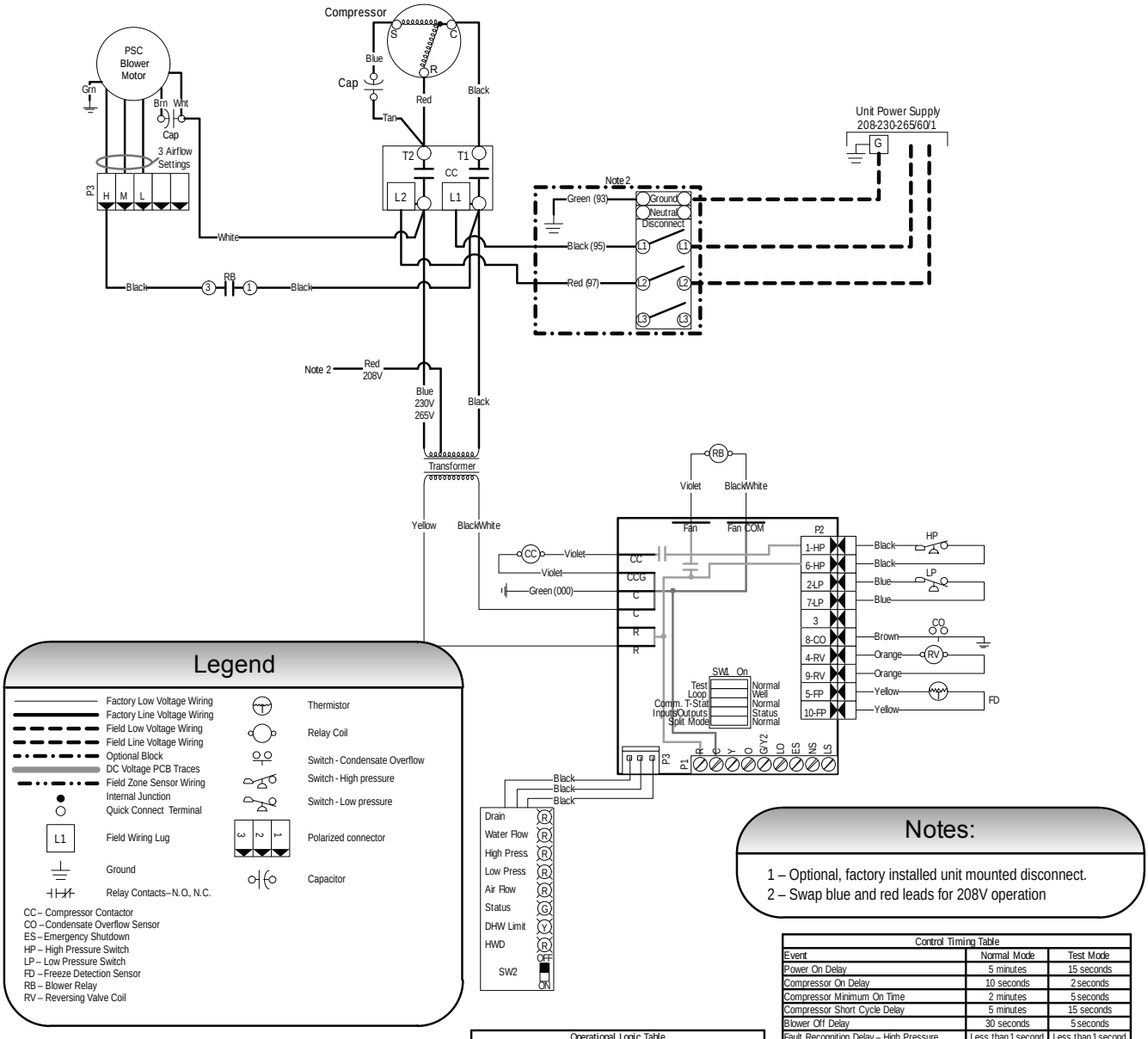
Wiring Schematic

Versatec Microprocessor 208-230/60/1 PSC



Legend

- Factory Low Voltage Wiring
- Factory Line Voltage Wiring
- Field Low Voltage Wiring
- Field Line Voltage Wiring
- Optional Block
- DC Voltage PCB Traces
- Field Zone Sensor Wiring
- Internal Junction
- Quick Connect Terminal
- L1 — Field Wiring Lug
- Ground
- Relay Contacts–N.O, N.C.
- Thermistor
- Relay Coil
- Switch - Condensate Overflow
- Switch - High pressure
- Switch - Low pressure
- Polarized connector (3, 2, 1)
- Capacitor

CC – Compressor Contactor
CO – Condensate Overflow Sensor
ES – Emergency Shutdown
HP – High Pressure Switch
LP – Low Pressure Switch
FD – Freeze Detection Sensor
RB – Blower Relay
RV – Reversing Valve Coil

Notes:

1 – Optional, factory installed unit mounted disconnect.
2 – Swap blue and red leads for 208V operation

Control Timing Table		
Event	Normal Mode	Test Mode
Power On Delay	5 minutes	15 seconds
Compressor On Delay	10 seconds	2 seconds
Compressor Minimum On Time	2 minutes	5 seconds
Compressor Short Cycle Delay	5 minutes	15 seconds
Blower Off Delay	30 seconds	5 seconds
Fault Recognition Delay – High Pressure	Less than 1 second	Less than 1 second
Start-Up Bypass–Low Pressure	2 minutes	0 seconds
Fault Recognition Delay – Low Pressure	30 seconds	30 seconds
Start-Up Bypass–Freeze Detection	2 minutes	0 seconds
Fault Recognition Delay – Freeze Detection	30 seconds	30 seconds
Fault Recognition Delay – Condensate Overflow	30 seconds	30 seconds

LED Display Mode Table			
Status Display Mode			
LED	SW1-4 On, SW2 Off		
Drain	Drain Pan Overflow Lockout		
Water Flow	Freeze Detection Lockout(Loop <= 15°F, Well <= 30°F)		
High Press.	High Pressure Lockout		
Low Press.	Low Pressure Lockout		
Air Flow	Not Used		
Status	Microprocessor Malfunction		
DHW Limit	Not Used		
DHW	SW2 Status(Off = Down Position, On=Up Position)		
Diagnostic Display Modes			
	Current Fault Display Mode	Inputs Display Mode	Outputs Display Mode
LED	SW1-4 On, SW2 On	SW1-4 Off, SW2 Off	SW1-4 Off, SW2 On
Drain	Drain Pan Overflow Lockout	Y	Compressor
Water Flow	Freeze Detection Lockout	G	Blower
High Press.	High Pressure Lockout	O	Reversing Valve
Low Press.	Low Pressure Lockout	ES	ES
Air Flow	Not Used	NS	NS
Status	Not Used	LS	LS
DHW Limit	Not Used	Not Used	Not Used
HWD	SW2 = On	SW2 = Off	SW2 = On

* Flashing Status Light Indicates the Board is Functioning Properly
A Solid "On" Indicates a Board Malfunction

Operational Logic Table				
Single-Speed				
Mode	Inputs	Blower	Comp	RV
Htg	Y	Auto	ON	OFF
Clg	Y,O	Auto	ON	ON
Blower Only	G	ON	OFF	OFF

Factory Setup DIP Switches(SW1)				
DIP Switch Number		Description	"OFF" Position	"ON" Position
SW1-	1	Service Test Mode On the control allows field selection of "NORMAL" or "TEST" operational modes. Test mode accelerates most timing functions 16 times to allow faster troubleshooting. Test mode also allows viewing the "CURRENT" status of the fault inputs on the LED display.	Test Mode	Normal Speed Operation
SW1-	2	Freeze Detection Setting This DIP switch allows field selection of low source water thermistor fault sensing for "WELL" water (30°F) or "LOOP" (15°F) for anti-freeze protected earth loops	"LOOP" (15°F)	"WELL" (30°F)
SW1-	3	Not Available	N/A	Normal Operation
SW1-	4	I/O Display Mode This DIP switch enables Input/Output Display or Status/Current Fault on LED Board. Refer to SW2 for operation and positioning	Input/Output Display Mode	Status/Current Fault Display Mode
SW1-	5	Not Available	N/A	Normal Operation
SW2		LED Display (On LED Board) This DIP switch enables Normal Status or Input display mode in the "OFF" position and Current Fault or Output display mode in the "ON" position.	Status or Inputs Display Mode	Current Fault or Output Display Mode

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Engineering Guide Specifications

General

Furnish and install York Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow. The reverse cycle heating/cooling units shall be vertical upflow air discharge. Units shall be AHRI/ISO 13256-1 certified and listed by a nationally recognized safety-testing laboratory or agency, such as ETL Testing Laboratory. Each unit shall be computer run-tested at the factory with conditioned water and operation verified to catalog data. Each unit shall be mounted on a pallet and shipped in a corrugated box or stretch-wrapped. The units shall be designed to operate with entering liquid temperature between 20°F and 120°F [-6.7°C and 48.9°C].

Casing and Cabinet

The cabinet shall be fabricated from heavy-gauge galvanized steel and finished with optional corrosion-resistant powder coating. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. The interior shall be insulated with 1/2 in. thick, multi-density, cleanable aluminum foil coated glass fiber with edges sealed or tucked under flanges to prevent the introduction of glass fibers into the discharge air. Standard cabinet panel insulation must meet NFPA 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21, and shall meet zero level bacteria growth per ASTM G22. Unit insulation must meet these stringent requirements or unit(s) will not be accepted.

One (horizontal) to two (vertical) blower and two compressor compartment access panels shall be 'lift-out' removable with supply and return ductwork in place.

A duct collar shall be provided on the supply air opening. Standard size 1 in. [2.54 cm] MERV 4 filters shall be provided with each unit. Units shall have a return air filter rack that is field convertible from 1 in. [2.54 cm] to 2 in. [5.1 cm]. The upflow vertical units shall have a removable insulated divider panel between the air handling section and the compressor section to minimize the transmission of compressor noise and to permit operational service testing without air bypass. Vertical units shall be supplied with left or right horizontal air inlet and top vertical air discharge.

The compressor shall be mounted using selected durometer grommets to provide vibration free compressor mounting.

Refrigerant Circuit

All units shall utilize the non-ozone depleting and low global warming potential refrigerant R-410A. All units shall contain a sealed refrigerant circuit including a hermetic motor-compressor, bidirectional thermostatic expansion valve, finned tube air-to-refrigerant heat exchanger, reversing valve, coaxial tube water-to-refrigerant heat exchanger, optional hot water generator coil, and service ports.

Compressors shall be high-efficiency single speed rotary or scroll type designed for heat pump duty and mounted on vibration isolators. Compressor motors shall be single-phase PSC with overload protection.

The air coil shall be sized for low-face velocity and constructed of lanced aluminum fins bonded to rifled copper tubes in a staggered pattern not less than three rows deep for enhanced performance.

Option: FormiShield electro-coated air coil for maximum protection against formicary corrosion.

The coaxial water-to-refrigerant heat exchanger shall be designed for low water pressure drop and constructed of a convoluted copper (cupronickel option) inner tube and a steel outer tube. Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 600 PSIG (4135 kPa) refrigerant working pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 600 PSIG (4135 kPa) working refrigerant pressure and 450 PSIG (3101 kPa) working water pressure. The thermostatic expansion valve shall provide proper superheat over the entire liquid temperature range with minimal "hunting." The valve shall operate bidirectionally without the use of check valves.

Option: Cupronickel refrigerant to water heat exchanger shall be of copper-nickel inner water tube and steel refrigerant outer tube design, rated to withstand 600 PSIG (4135 kPa) working refrigerant pressure and 450 PSIG (3101 kPa) working water pressure. Water lines shall also be of cupronickel construction.

Option: Hot water generator - Internal double wall vented hot water generator coil refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 600 PSIG (4135 kPa) working refrigerant pressure and 450 PSIG (3101 kPa) working water pressure.

Option: ThermaShield coated water-to-refrigerant heat exchanger, *water lines and refrigerant suction lines* shall be insulated to prevent condensation at low liquid temperatures below 50°F.

Engineering Guide Specifications cont.

Blower motor and Assembly

The blower shall be a direct drive centrifugal type with a dynamically balanced wheel. The housing and wheel shall be designed for quiet low outlet velocity operation. The blower housing shall be removable from the unit without disconnecting the supply air ductwork for servicing of the blower motor. The blower motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermostatic overload protection.

Option: PSC blower motor shall be a three-speed PSC type.

Electrical

A control box shall be located within the unit compressor compartment and shall contain a 75VA transformer, 24 volt activated, 2 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Electromechanical operation WILL NOT be accepted. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 volt and provide heating or cooling as required by the remote thermostat/sensor.

A Versatec microprocessor-based controller that interfaces with a multi-stage electronic thermostat to monitor and control unit operation shall be provided. The control shall provide operational sequencing, blower speed control, high and low pressure switch monitoring, freeze detection, condensate overflow sensing, lockout mode control, LED status and fault indicators, fault memory, field selectable options and accessory output. The control shall provide fault retry three times before locking out to limit nuisance trips.

A detachable terminal block with screw terminals will be provided for field control wiring. All units shall have knockouts for entrance of low and line voltage wiring. The blower motor and control box shall be harness plug wired for easy removal.

Piping

Supply and return water connections shall be FPT copper fittings fixed to the corner post, which eliminate the need for backup pipe wrenches.

With vertical units, the condensate connection shall be a 3/4 in. [19.1 mm] PVC socket with internally-trapped hose that can be routed to front or side corner post locations.

Accessories

Thermostat (field-installed)

A multi-stage auto-changeover electronic digital thermostat shall be provided. The thermostat shall offer two heating stages and one cooling stage with precise temperature control. An OFF-HEAT-AUTO-COOL-EMERG system switch, OFF-AUTO blower switch, and indicating LEDs shall be provided. The thermostat shall display in °F or °C.

Hose Kits – Ball Valves (field-installed)

A flexible steel braid hose featuring Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid and fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1). Ball valve at one end; swivel connector with adapter at the other end (swivel to adapter connection via fiber or EPDM gasket). Swivel connection provides union between heat pump and piping system. The hoses feature brass fittings, stainless steel ferrules. A full port ball valve shall be provided with integral P/T (pressure/temperature) port on supply hose. Specifications:

- Temperature range of 35°F [2°C] to 180°F [82°C].
- Max. working pressure of 400 psi [2757 kPa] for 1/2 in. and 3/4 in. hose kits; max. working pressure of 350 psi [kPa] for 1 in. and 1-1/4 in. hose kits.

Hose Kits – Automatic Balancing and Ball Valves (field-installed)

A flexible steel braid hose featuring Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid and fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1). Ball valve at one end; swivel connector with adapter at the other end (swivel to adapter connection via fiber or EPDM gasket). Swivel connection provides union between heat pump and piping system. The hoses feature brass fittings, stainless steel ferrules. A full port ball valve shall be provided with integral P/T (pressure/temperature) port on supply hose and automatic balancing valve with integral P/T ports and full port ball valve on return hose.

Specifications:

- Temperature range of 35°F [2°C] to 180°F [82°C]
- Max. working pressure of 400 psi [2757 kPa] for 1/2 in. and 3/4 in. hose kits; max. working pressure of 350 psi [2413 kPa] for 1 in. and 1-1/4 in. hose kits
- Minimum burst pressure of four times working pressure

Engineering Guide Specifications cont.

Hose Kits – Automatic Balancing and Ball Valves with 'Y' strainer (field-installed)

A flexible steel braid hose featuring Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid and fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1). Ball valve at one end; swivel connector with adapter at the other end (swivel to adapter connection via fiber or EPDM gasket). Swivel connection provides union between heat pump and piping system. The hoses feature brass fittings, stainless steel ferrules. A "y" strainer is provided on one end for fluid straining and integral "blowdown" valve. A full port ball valve shall be provided with integral P/T (pressure/temperature) port on supply hose and automatic balancing valve with integral P/T ports and full port ball valve on return hose.

Specifications:

- Temperature range of 35°F [2°C] to 180°F [82°C]
- Max. working pressure of 400 psi [2756 kPa] for 1/2 in. and 3/4 in. hose kits; max. working pressure of 350 psi [2413 kPa] for 1 in. and 1-1/4 in. hose kits
- Minimum burst pressure of four times working pressure

Notes

Revision Guide

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