



Geothermal/Water Source Heat Pump

R-410A Refrigerant
0.75-6 Ton



[Design Features](#)

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GEO**SMART**
ENERGY

INSTALLATION, OPERATION & MAINTENANCE MANUAL

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NOTES: Phase guard only available on 208-230/60/3, 460/60/3, and 575/60/3
GeoStart only available on 208-230/60/1
ECM, Hot Gas Reheat/Bypass, and 2-Way Valve only available on FX10

General Installation Information

Safety Considerations



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.

Moving and Storage

Move units in the normal “up” orientation. Horizontal units may be moved and stored per the information on the packaging. Do not stack more than three units in total height. Vertical units may be stored one upon another to a maximum height of two units. Do not attempt to move units while stacked. When the equipment is received, all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. Examine units for shipping damage, removing the units from the packaging if necessary. Units in question should also be internally inspected. If any damage is noted, the carrier should make the proper notation on the delivery receipt, acknowledging the damage.

Unit Location

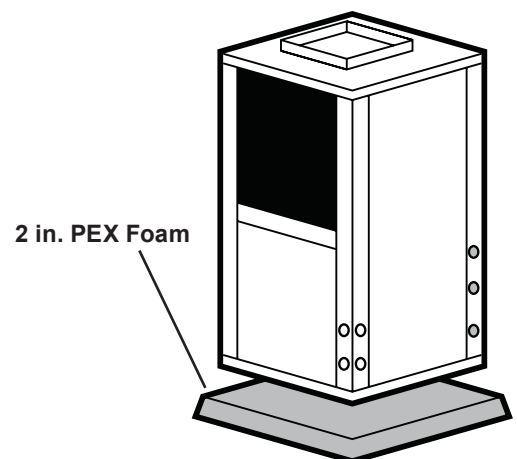
Locate the unit in an indoor area that allows for easy removal of the filter and access panels. Location should have enough space for service personnel to perform maintenance or repair. Provide sufficient room to make water, electrical and duct connection(s). If the unit is located in a confined space, 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. On horizontal units, allow adequate room below the unit for a condensate drain trap and do not locate the unit above supply piping. **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

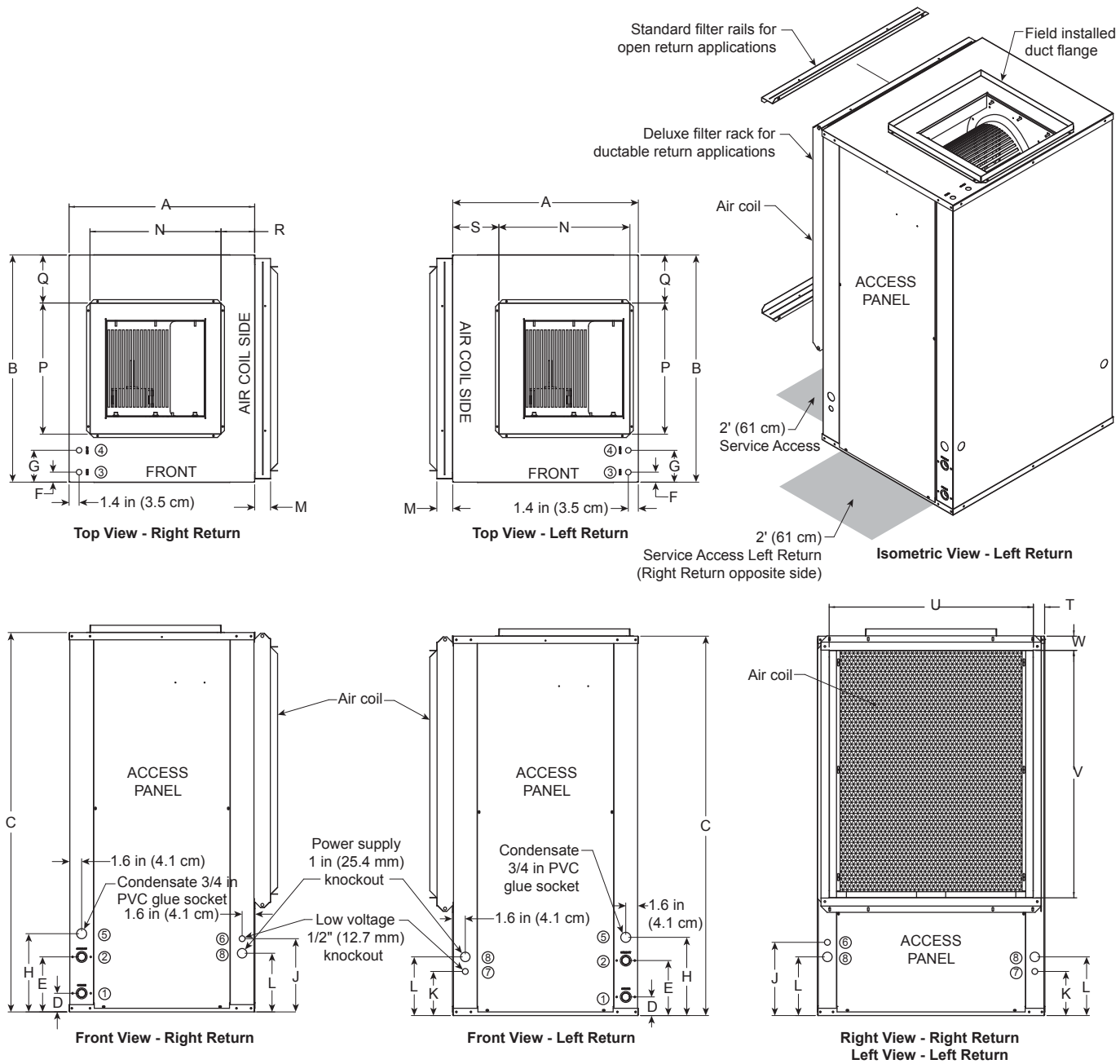
Prior to setting the unit in place, remove and discard the compressor hold down shipping bolt located at the front of the compressor mounting bracket.

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 (see figure below).

Vertical Unit Mounting



Vertical Dimensional Data



Vertical Dimensional Data cont.

Vertical Models		Overall Cabinet			Water Connections							Electrical Knockouts		
		A	B	C	1	2	3	4	5	Loop	Knock-out	6	7	8
					D	E	F	G	H			J	K	L
					In	Out	HWG In	HWG Out	Condensate			1/2 in. cond	1/2 in. cond	1 in. cond
009-012	in.	22.5	22.2	23.7	2.6	5.6	N/A	N/A	8.8	1/2	N/A	7.4	3.4	5.4
	cm.	57.2	56.4	60.2	6.6	14.2	N/A	N/A	22.4	12.7 mm	N/A	18.8	8.6	13.7
015-018	in.	22.5	22.2	36.2	2.6	7.6	1.4	2.9	10.8	3/4	0.875	9.4	5.4	7.4
	cm.	57.2	56.4	91.9	6.6	19.3	3.6	7.4	27.4	19.1 mm	22.2 mm	23.9	13.7	18.8
024-030	in.	22.5	26.2	40.2	2.6	7.6	1.4	4.4	10.8	3/4	0.875	10.1	6.1	8.1
	cm.	57.2	66.5	102.1	6.6	19.3	3.6	11.2	27.4	19.1 mm	22.2 mm	25.7	15.5	20.6
036	in.	22.5	26.2	44.2	2.6	7.6	1.4	4.4	10.8	3/4	0.875	10.1	6.1	8.1
	cm.	57.2	66.5	112.3	6.6	19.3	3.6	11.2	27.4	19.1 mm	22.2 mm	25.7	15.5	20.6
041	in.	22.5	26.2	44.2	2.6	7.6	1.4	2.9	10.8	3/4	0.875	10.1	6.1	8.1
	cm.	57.2	66.5	112.3	6.6	19.3	3.6	7.4	27.4	19.1 mm	22.2 mm	25.7	15.5	20.6
042-048	in.	25.5	31.2	44.2	2.6	7.6	1.4	4.4	10.8	1	0.875	10.1	6.1	8.1
	cm.	64.8	79.2	112.3	6.6	19.3	3.6	11.2	27.4	25.4 mm	22.2 mm	25.7	15.5	20.6
060	in.	25.5	31.2	48.2	2.6	7.6	1.4	4.4	10.8	1	0.875	10.1	6.1	8.1
	cm.	64.8	79.2	122.4	6.6	19.3	3.6	11.2	27.4	25.4 mm	22.2 mm	25.7	15.5	20.6
070	in.	25.5	31.2	52.2	2.6	7.6	1.4	4.4	10.8	1	0.875	10.1	6.1	8.1
	cm.	64.8	79.2	132.6	6.6	19.3	3.6	11.2	27.4	25.4 mm	22.2 mm	25.7	15.5	20.6

Vertical Models		Discharge Connection						Return Connection*			
		duct flange installed (±0.10 in)						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	
009-012	in.	2.2	10.0	10.0	6.1	9.4	9.4	2.1	18.1	10.0	1.9
	cm.	5.6	25.4	25.4	15.5	23.9	23.9	5.3	46.0	25.4	4.8
015-018	in.	2.2	14.0	14.0	4.1	4.3	7.7	2.1	18.1	20.0	1.9
	cm.	5.6	35.6	35.6	10.4	10.9	19.6	5.3	46.0	50.8	4.8
024-030	in.	2.2	14.0	14.0	6.1	4.5	7.7	2.1	22.1	22.1	1.9
	cm.	5.6	35.6	35.6	15.5	11.4	19.6	5.3	56.1	56.1	4.8
036	in.	2.2	14.0	14.0	6.1	4.5	7.7	2.1	22.1	26.1	1.9
	cm.	5.6	35.6	35.6	15.5	11.4	19.6	5.3	56.1	66.3	4.8
041	in.	2.2	18.0	18.0	4.1	3.9	3.9	2.1	22.1	26.1	1.9
	cm.	5.6	45.7	45.7	10.4	9.9	9.9	5.3	56.1	66.3	4.8
042-048	in.	2.2	18.0	18.0	6.6	4.6	6.3	1.6	28.1	26.0	2.0
	cm.	5.6	45.7	45.7	16.8	11.7	16.0	4.1	71.4	66.0	5.1
060	in.	2.2	18.0	18.0	6.6	4.6	6.3	1.6	28.1	30.0	2.0
	cm.	5.6	45.7	45.7	16.8	11.7	16.0	4.1	71.4	76.2	5.1
070	in.	2.2	18.0	18.0	6.6	4.6	6.3	1.6	28.1	34.0	2.0
	cm.	5.6	45.7	45.7	16.8	11.7	16.0	4.1	71.4	86.4	5.1

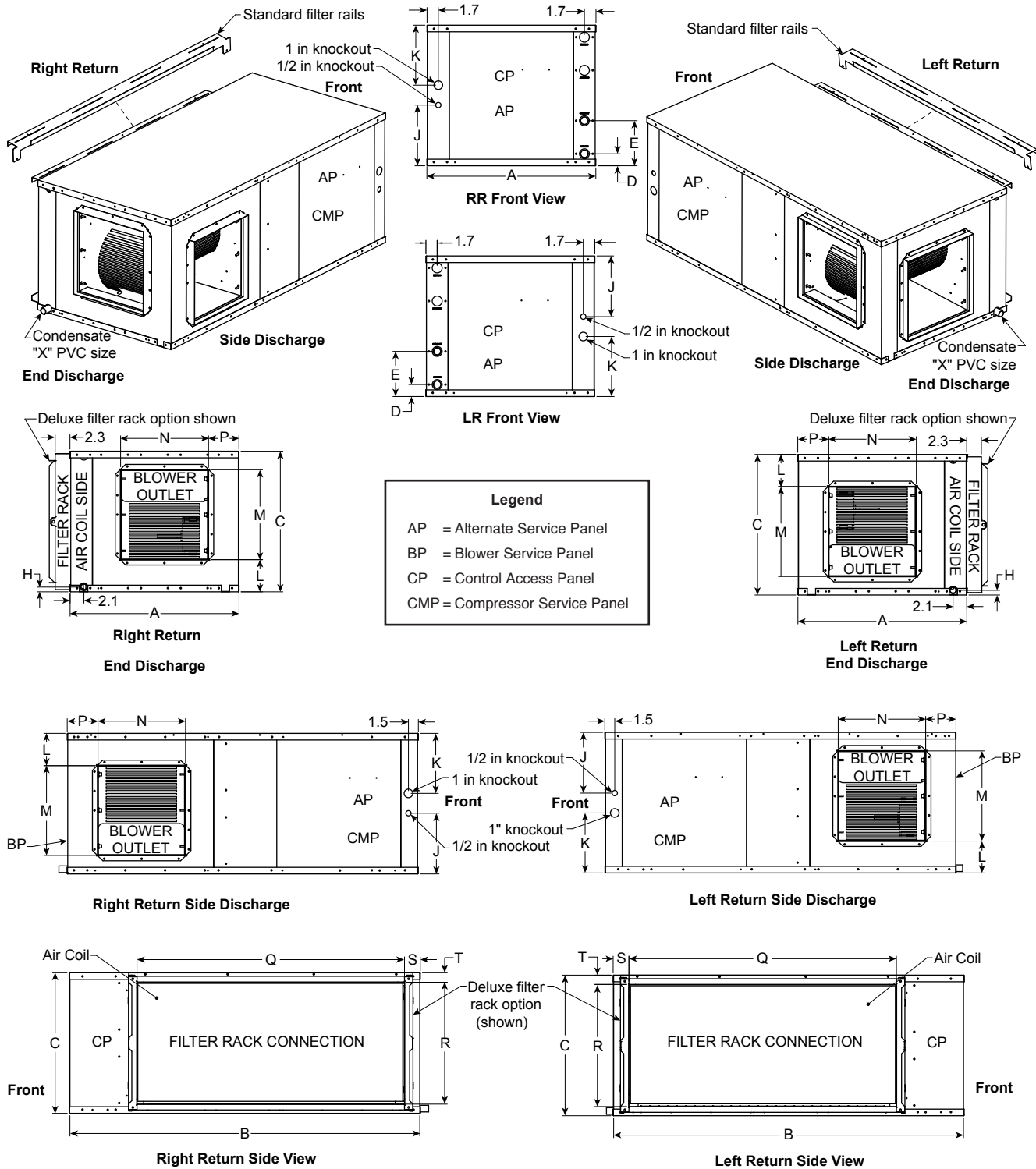
Condensate is 3/4 in. PVC female glue socket and is switchable from side to front.

*Dimensions for return connections are for the deluxe filter rack that is suitable for ducted return applications and extends 3.25 in. [8.26 cm] from the unit. The open filter rack, used in non-ducted returns, extends 2.2 in. [5.59 cm] from the unit.

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

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Horizontal Dimensional Data



Horizontal Dimensional Data cont.

Horizontal Models		Overall Cabinet			Water Connections				Electrical Knockouts	
		A	B	C	1	2	3		J	K
		Width	Depth	Height*	D	E	H	Loop	1/2 in. cond	1 in. cond
					In	Out	Cond-ensate	Water FPT	Low Voltage	Power Supply
009-012	in.	19.2	29.0	12.1	1.8	4.8	0.8	1/2	4.5	4.5
	cm.	48.8	73.7	30.7	4.6	12.2	2.0	12.7 mm	11.4	11.4
015-018/023	in.	22.5	42.0	17.2	1.8	6.8	0.8	3/4	7.1	7.1
	cm.	57.2	106.7	43.7	4.6	17.3	2.0	19.05 mm	18.0	18.0
024-030	in.	22.5	42.0	19.2	1.8	6.8	0.8	3/4	9.2	7.1
	cm.	57.2	106.7	48.8	4.6	17.3	2.0	19.05 mm	23.4	18.0
036	in.	22.5	45.0	19.2	1.8	6.8	0.8	3/4	9.2	7.1
	cm.	57.2	114.3	48.8	4.6	17.3	2.0	19.05 mm	23.4	18.0
042-048	in.	25.5	48.0	21.2	1.8	6.8	0.8	1	9.2	9.1
	cm.	64.8	121.9	53.8	4.6	17.3	2.0	25.4 mm	23.4	23.1
060	in.	25.5	53.0	21.2	1.8	6.8	0.8	1	9.2	9.1
	cm.	64.8	134.6	53.8	4.6	17.3	2.0	25.4 mm	23.4	23.1
070	in.	25.5	61.0	21.2	1.8	6.8	0.8	1	9.2	9.1
	cm.	64.8	154.9	53.8	4.6	17.3	2.0	25.4 mm	23.4	23.1

Horizontal Models		Discharge Connection				Return Connection*				PVC Size
		duct flange installed (±0.10 in)				using deluxe filter rack option (±0.10 in)				
		L	M	N	P	Q	R	S	T	X
			Supply Width	Supply Depth		Return Depth	Return Height			
009-012	in.	2.3	8.0	10.0	2.3	15.4	9.4	3.0	1.4	1/2
	cm.	5.8	20.3	25.4	5.8	39.1	23.9	7.6	3.6	1.3
015-018/023	in.	5.7	10.5	9.4	4.9	23.4	14.5	2.0	1.4	3/4
	cm.	14.5	26.7	23.9	12.4	59.4	36.8	5.1	3.6	1.9
024-030	in.	6.7	10.5	9.4	4.9	27.4	16.4	2.0	1.5	3/4
	cm.	17.0	26.7	23.9	12.4	69.6	41.7	5.1	3.8	1.9
036	in.	6.7	10.5	9.4	4.9	30.4	16.4	2.1	1.5	3/4
	cm.	17.0	26.7	23.9	12.4	77.2	41.7	5.3	3.8	1.9
042-048	in.	4.9	13.6	13.2	4.6	35.4	18.6	2.4	1.5	3/4
	cm.	12.4	34.5	33.5	11.7	89.9	47.2	6.1	3.8	1.9
060	in.	4.9	13.6	13.2	4.6	40.4	18.4	2.4	1.5	3/4
	cm.	12.4	34.5	33.5	11.7	102.6	46.7	6.1	3.8	1.9
070	in.	4.9	13.6	13.2	4.6	45.6	18.6	2.3	1.5	3/4
	cm.	12.4	34.5	33.5	11.7	115.8	47.2	5.8	3.8	1.9

*Dimensions for return connections are for the deluxe filter rack that is suitable for ducted return applications and extends 3.25 in. [8.26 cm] from the unit. The open filter rack, used in non-ducted returns, extends 2.2 in. [5.59 cm] from the unit.

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Installing Horizontal Units

Installing Horizontal Units

Remove and discard the compressor hold down shipping screws located on the outside of the cabinet prior to setting the unit in place. Horizontal units are available with side or end discharge and may be easily field converted by flipping the blower discharge panel. Horizontal units are normally suspended from a ceiling by four 3/8 in. diameter threaded rods. The rods are usually attached to the unit by hanger bracket kits furnished with each unit. Lay out the threaded rods per the dimensions below. Assemble the hangers to the unit as shown. Securely tighten the brackets to the unit using the weld nuts located on the underside of the bottom panel. When attaching the hanger rods to the bracket, a double nut is required since vibration could loosen a single nut. To allow filter access, one bracket on the filter side should be installed 180° from the position shown in the figure below.

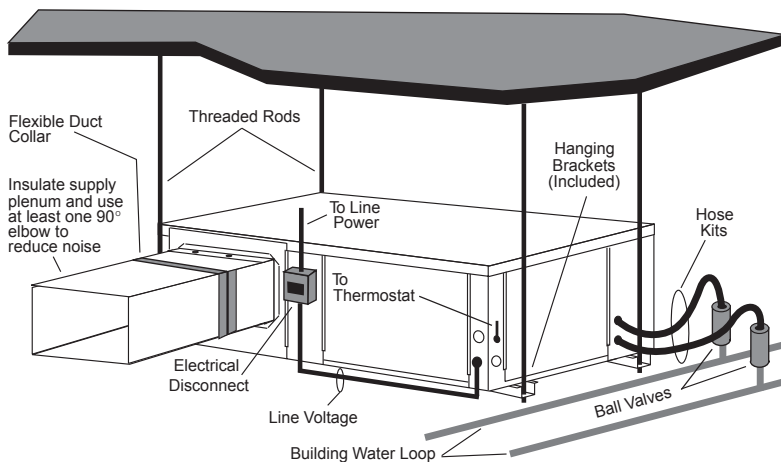
NOTE: The unit should be pitched approximately 1/4 in. towards the drain in both directions to facilitate the removal of condensate.

Use only the bolts provided in the kit to attach hanger brackets. The use of longer bolts could damage internal parts. Some applications require the installation of horizontal units on an attic floor. In this case, the unit should be set in a full size secondary drain pan on top of a vibration absorbing pad. The secondary drain pan prevents possible condensate overflow or water leakage damage to the ceiling. The secondary drain pan is usually placed on a plywood base isolated from the ceiling joists by additional layers of vibration absorbing material. Insulate supply plenum and use at least one 90° elbow and flexible duct collar to reduce noise.

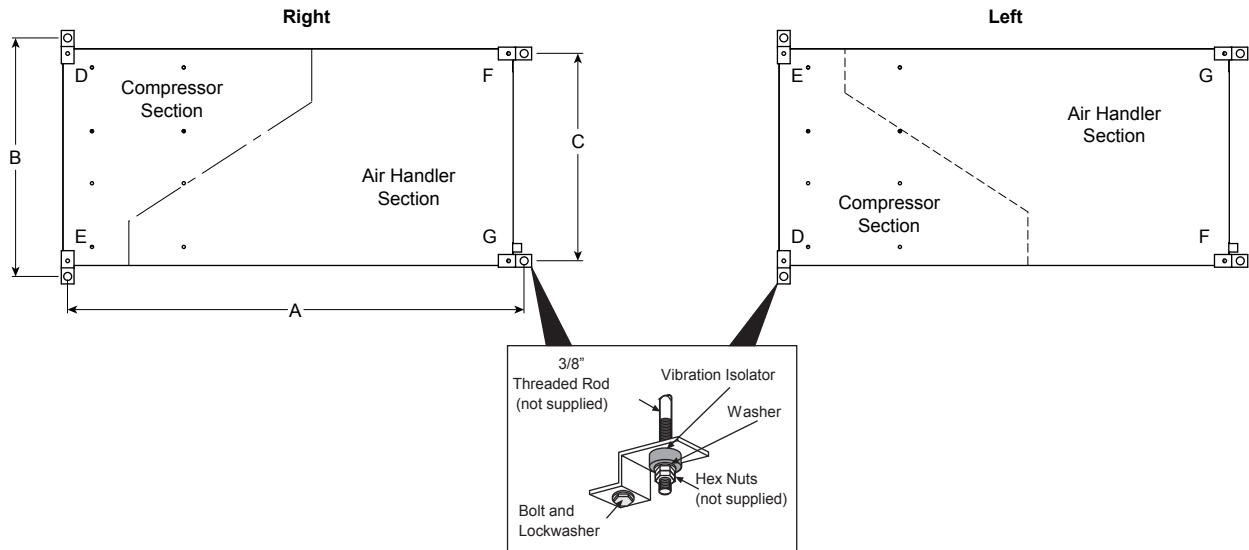


CAUTION: Do not use rods smaller than 3/8 in. diameter since they may not be strong enough to support the unit. The rods must be securely anchored to the ceiling.

Horizontal Unit Mounting



Hanger Bracket Locations



Hanger Dimensions

Model		Hanger Kit Part Number	Unit Hanger Dimensions		
			A	B	C
009-012	in.	99S500A04	29.8	21.8	18.1
	cm.		75.7	55.4	46.0
015-023	in.	99S500A04	42.8	25.1	21.4
	cm.		108.6	63.8	54.4
024-030	in.	99S500A04	42.8	25.1	21.4
	cm.		108.7	63.8	54.4
036	in.	99S500A04	45.8	25.1	21.4
	cm.		116.3	63.8	54.4
042-048	in.	99S500A04	48.8	28.1	24.4
	cm.		124.0	71.4	62.0
060	in.	99S500A04	53.8	28.1	24.4
	cm.		136.7	71.4	62.0
070	in.	99S500A04	61.8	28.1	24.4
	cm.		157.0	71.4	62.0

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Weight Distribution

Model	Vertical Shipping Weight	Horizontal Shipping Weight	Horizontal Weight Distribution			
			Front		Back	
			D	E	F	G
009	110	120	46	23	26	25
	[50]	[54]	[21]	[11]	[12]	[11]
012	115	125	48	24	27	26
	[52]	[57]	[22]	[11]	[12]	[12]
015	165	175	67	34	37	36
	[75]	[79]	[31]	[15]	[17]	[17]
018	170	180	69	35	38	38
	[77]	[82]	[31]	[16]	[17]	[17]
023	na	185	71	36	39	39
	na	[84]	[32]	[16]	[18]	[17]
024	230	245	94	47	52	51
	[104]	[111]	[43]	[22]	[24]	[23]
030	240	255	98	49	54	53
	[109]	[116]	[44]	[22]	[25]	[24]
036	265	285	110	55	61	59
	[120]	[129]	[50]	[25]	[28]	[27]
041	275	na	na	na	na	na
	[125]	na	na	na	na	na
042	285	300	115	58	64	63
	[129]	[136]	[52]	[26]	[29]	[28]
048	290	310	119	60	66	65
	[132]	[141]	[54]	[27]	[30]	[29]
060	335	360	138	70	77	75
	[152]	[163]	[63]	[32]	[35]	[34]
070	380	405	156	78	86	84
	[172]	[184]	[71]	[36]	[39]	[38]

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Duct System

An air outlet collar is provided on vertical top flow units and all horizontal units to facilitate a duct connection. A flexible connector is recommended for discharge and return air duct connections on metal duct systems. Uninsulated duct should be insulated with a minimum of 1-inch duct insulation. Application of the unit to uninsulated ductwork in an unconditioned space is not recommended as the unit's performance will be adversely affected.

If the unit is connected to existing ductwork, check the duct system to ensure that it has the capacity to accommodate the air required for the unit application. If the duct is too small, as in the replacement of heating only systems, larger ductwork should be installed. All existing ductwork should be checked for leaks and repaired if necessary.

The duct system should be sized to handle the design airflow quietly and efficiently. To maximize sound attenuation of the unit blower, the supply and return plenums should include an internal duct liner of fiberglass or constructed of ductboard for the first few feet. On systems employing a sheet metal duct system, canvas connectors should be used between the unit and the ductwork. If air noise or excessive airflow is a problem, the blower speed can be changed.



CAUTION: Be sure to remove the shipping material from the blower discharge before connecting ductwork.

Water Piping

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.

All source water connections on commercial units 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. When connecting to an open loop (groundwater) system, thread any copper MPT fitting into the connector and tighten in the same manner as described above.

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.

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 Cupro-Nickel	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 .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 .5 ppm	Less than .5 ppm	Less than .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 .5 ppm	Less than .5 ppm	Less than .5 ppm
	Ammonia Nitrate	Less than .5 ppm	Less than .5 ppm	Less than .5 ppm
	Ammonia Hydroxide	Less than .5 ppm	Less than .5 ppm	Less than .5 ppm
	Ammonia Sulfate	Less than .5 ppm	Less than .5 ppm	Less than .5 ppm
Iron Fouling (Biological Growth)	Total Dissolved Solids (TDS)	Less than 1000 ppm	1000-1500 ppm	1000-1500 ppm
	LSI Index	+0.5 to -.05	+0.5 to -.05	+0.5 to -.05
	Iron, Fe ²⁺ (Ferrous) Bacterial Iron Potential	< .2 ppm	< .2 ppm	< .2 ppm
Erosion	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.
	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
Erosion	Threshold Velocity (Fresh Water)	< 6 ft/sec	< 6 ft/sec	< 6 ft/sec

Grains = PPM divided by 17 • mg/l is equivalent to PPM

2/8/08

Freeze Detection

For Versatec board, set SW1-2 on the printed circuit board for applications using a closed loop antifreeze solution to "LOOP" (15°F) [-9.4°C]. On applications using an open loop/ground water system (or closed loop no antifreeze), set this dip switch to "WELL" (30°F) [-1.1°C], the factory default setting. (Refer to the Dip Switch Field Selection table).

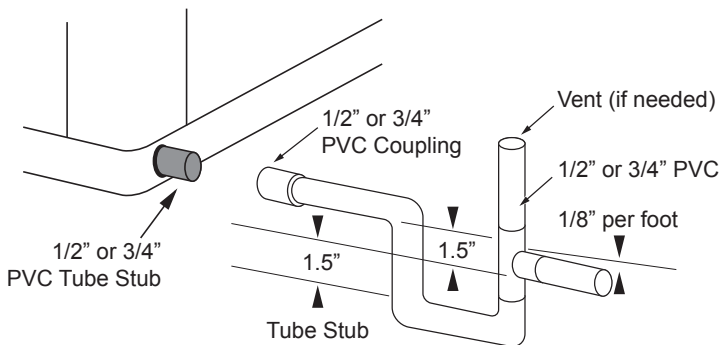
For FX10 board, the "red" wire must be removed from PB2-3 to change from "WELL", the factory default setting, to "LOOP".

Condensate Drain

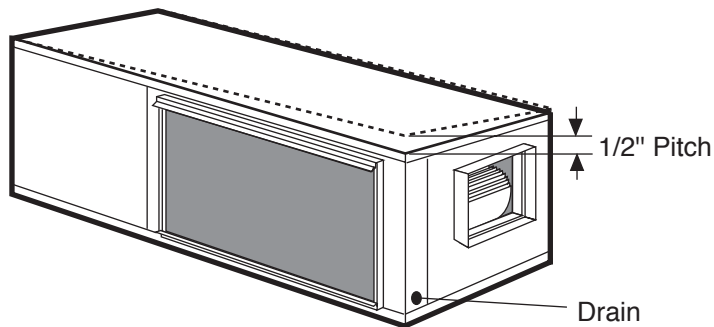
On vertical units, the internal condensate drain assembly consists of a drain tube which is connected to the drain pan, a 3/4 in. PVC female adapter and a flexible connecting hose. The female adapter may exit either the front or the side of the cabinet. The adapter should be glued to the field-installed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

On horizontal units, a PVC stub or stainless steel tube is provided for condensate drain piping connection. An external trap is required (see below). If a vent is necessary, an open stand pipe may be applied to a tee in the field-installed condensate piping.

Horizontal Drain Connection (Composite Drain Pan)



Unit Pitch for Drain



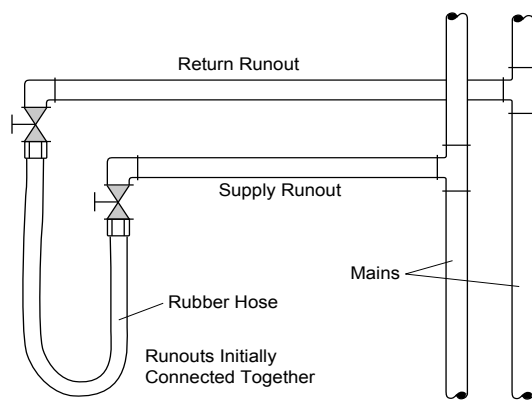
System Cleaning and Flushing

Cleaning and Flushing

Prior to start up of any heat pump, the water circulating system must be cleaned and flushed of all dirt and debris.

If the system is equipped with water shutoff valves, the supply and return runouts must be connected together at each unit location (This will prevent the introduction of dirt into the unit, see Flushing with Water Shutoff Valve Equipped Systems illustration). The system should be filled at the water make-up connection with all air vents open. After filling, vents should be closed.

Flushing with Water Shutoff Valve Equipped Systems



The contractor should start the main circulator with the pressure reducing valve makeup open. Vents should be checked in sequence to bleed off any trapped air and to verify circulation through all components of the system.

As water circulates through the system, the contractor should check and repair any leaks found in the piping system. Drain(s) at the lowest point(s) in the system should be opened for initial flush and blowdown, making sure water fill valves are set at the same rate. Check the pressure gauge at the pump suction and manually adjust the make-up water valve to hold the same positive pressure both before and after opening the drain valves. Flushing should continue for at least two hours, or longer if required, until drain water is clean and clear.

The supplemental heater and/or circulator pump, if used, should be shut off. All drains and vents should be opened to completely drain the system. Short-circuited supply and return runouts should now be connected to the unit supply and return connections.

Refill the system with clean water. Test the system water for acidity and treat as required to leave the water slightly alkaline (pH 7.5 to 8.5). The specified percentage of antifreeze may also be added at this time. Use commercial grade antifreeze designed for HVAC systems only. Environol™ brand antifreeze is recommended.

Once the system has been filled with clean water and antifreeze (if used), precautions should be taken to protect the system from dirty water conditions. Dirty water will result in system-wide degradation of performance, and solids may clog valves, strainers, flow regulators, etc. Additionally, the heat exchanger may become clogged which reduces compressor service life and can cause premature unit failure.

In boiler/tower application, set the loop control panel set points to desired temperatures. Supply power to all motors and start the circulating pumps. After full flow has been established through all components including the heat rejector (regardless of season), air vented and loop temperatures stabilized, each of the units will be ready for check, test and start up and for air and water balancing.

Ground Source Loop System Checkout

Once piping is completed between the unit pumping system and ground loop, final purging and charging of the loop is needed. A high pressure pump is needed to achieve adequate flow velocity in the loop to purge air and dirt particles from the loop itself. Antifreeze solution is used in most areas to prevent freezing. Flush the system adequately to remove as much air as possible; then pressurize the loop to a static pressure of 40-50 PSI (summer) or 50-75 PSI (winter). This is normally adequate for good system operation. Loop static pressure may decrease soon after initial installation, due to pipe expansion and loop temperature change. Running the unit for at least 30 minutes after the system has been completely purged of air will allow for the "break-in" period. It may be necessary to adjust static loop pressure (by adding water) after the unit has run for the first time. Loop static pressure will also fluctuate with the seasons. Pressures will be higher in the winter months than during the cooling season. This fluctuation is normal and should be considered when charging the system initially.

Ensure the pump provides adequate flow through the unit by checking pressure drop across the heat exchanger. Usually 2.25-3.0 GPM of flow per ton of cooling capacity is recommended in earth loop applications.

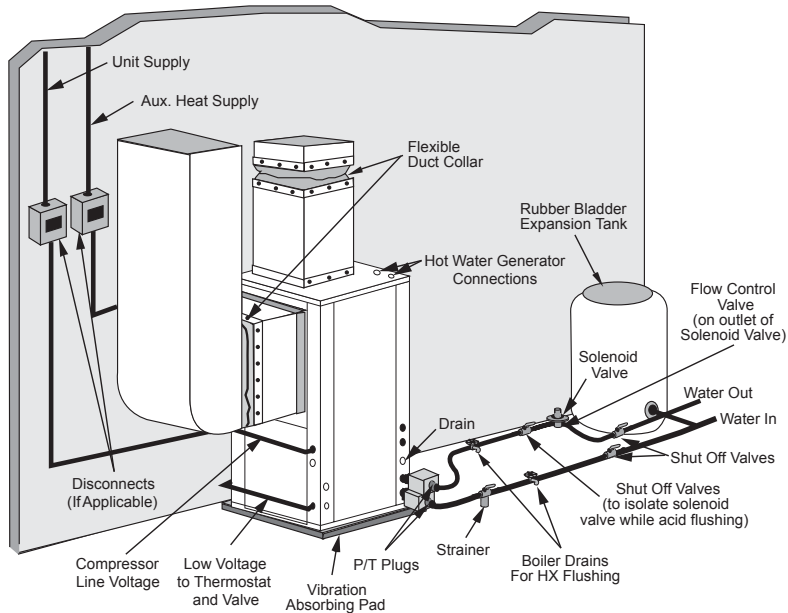
Open Loop Ground Water Systems

Typical open loop piping is shown below. Always maintain water pressure in the heat exchanger by placing water control valves at the outlet of the unit to prevent mineral precipitation. Use a closed, bladder-type expansion tank to minimize mineral formation due to air exposure. Insure proper water flow through the unit by checking pressure drop across the heat exchanger and comparing it to the figures in unit capacity data tables in the specification catalog.

1.5-2 GPM of flow per ton of cooling capacity is recommended in open loop applications. Due to only minor differences in flow rate from low to high, only one solenoid valve should be used. The valve should be sized for full flow.

Discharge water from the unit is not contaminated in any manner and can be disposed of in various ways, depending on local codes, i.e. recharge well, storm sewer, drain field, adjacent stream or pond, etc. Most local codes forbid the use of sanitary sewer for disposal. Consult your local building and zoning departments to assure compliance in your area.

Open System - Groundwater Application



Electrical Connections

General

Be sure the available power is the same voltage and phase as that shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable.

Unit Power Connection

Connect the incoming line voltage wires to L1 and L2 of the contactor for single-phase unit. Consult the Unit Electrical Data for correct fuse sizes.

208 Volt Operation

All ECO-Z 208/230 units are factory wired for 230 volt operation. For 208 volt operation, the red and blue transformer wires must be switched on terminal strip PS.

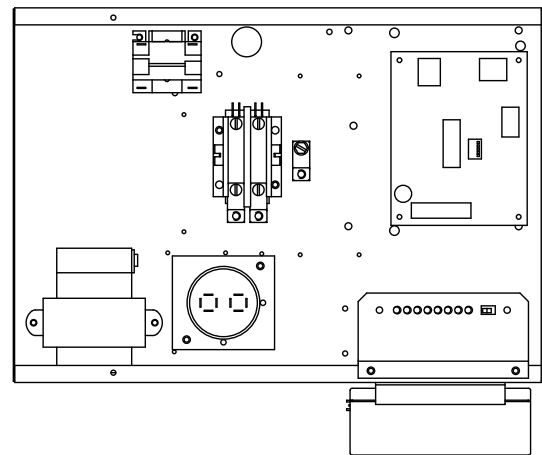


CAUTION: When installing a unit with an ECM2.3 blower motor in 460/60/3 voltage, a neutral wire is required to allow proper unit operation.

Control Box



208-230/60/1 Control Box



Auxiliary Heat Ratings

Model	KW	BTU/HR	Voltage	Phase	Stages	ECO-Z				
						009-012	015-018	023-036	041-042	048-070
ECS4	4.0	13,650	240	1	1	•				
ECS42	4.0	13,650	277	1	1	•				
ECM4	4.0	13,650	240	1	1		•	•		
ECM42	4.0	13,650	277	1	1		•	•		
ECM8	8.0	27,300	240	1	2			•		
ECM83	8.0	27,300	240	3	2			•		
ECM84	8.0	27,300	480	3	2			•		
ECL10	10.0	34,120	240	1	2				•	•
ECL103	10.0	34,120	240	3	2				•	•
ECL104	10.0	34,120	480	3	2				•	•
ECL15	15.0	51,180	240	1	2				•	•
ECL153	15.0	51,180	240	3	2				•	•
ECL154	15.0	51,180	480	3	2				•	•
ECL20	20.0	68,240	240	1	2					•
ECL203	19.9	67,900	240	3	2					•

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Electrical Data

PSC Motor

Model	Rated Voltage	Voltage Min/Max	Compressor				Blower Motor FLA	Total Unit FLA	Min Circ Amp	Max Fuse/HACR
			MCC	RLA	LRA	LRA**				
009	208-230/60/1	187/253	6.4	4.1	21.0	n/a	0.6	4.7	5.7	10
	265/60/1	238/292	6.7	4.3	22.0	n/a	0.6	4.9	6.0	10
012	208-230/60/1	187/253	7.7	4.9	25.0	n/a	0.6	5.5	6.7	10
	265/60/1	238/292	7.0	4.5	22.0	n/a	0.6	5.1	6.2	10
015	208-230/60/1	187/253	9.2	5.9	29.0	n/a	1.1	7.0	8.5	10
	265/60/1	238/292	7.8	5.0	28.0	n/a	1.0	6.0	7.2	10
018	208-230/60/1	187/253	10.4	6.7	33.5	n/a	1.1	7.8	9.5	15
	265/60/1	238/292	8.7	5.6	28.0	n/a	1.0	6.6	8.0	10
023	208-230/60/1	187/253	21.0	13.5	58.3	21.0	1.2	14.7	18.1	30
	265/60/1	238/292	14.0	9.0	54.0	n/a	1.1	10.1	12.4	20
	208-230/60/3	187/253	12.1	8.6	55.0	n/a	1.2	9.8	12.0	20
024	208-230/60/1	187/253	21.0	13.5	58.3	21.0	1.2	14.7	18.1	30
	265/60/1	238/292	14.0	9.0	54.0	n/a	1.1	10.1	12.4	20
	208-230/60/3	187/253	12.1	8.6	55.0	n/a	1.2	9.8	12.0	20
024*	208-230/60/1	187/253	21.0	13.5	58.3	21.0	1.5	15.0	18.4	30
	265/60/1	238/292	14.0	9.0	54.0	n/a	2.0	11.0	13.3	20
	208-230/60/3	187/253	12.1	8.6	55.0	n/a	1.5	10.1	12.3	20
030	208-230/60/1	187/253	22.0	14.1	73.0	26.0	1.5	15.6	19.1	30
	208-230/60/3	187/253	13.9	8.9	58.0	n/a	1.5	10.4	12.6	20
030*	208-230/60/1	187/253	22.0	14.1	73.0	26.0	2.2	16.3	19.8	30
	265/60/1	238/292	17.5	11.2	60.0	n/a	2.0	13.2	16.0	25
	208-230/60/3	187/253	13.9	8.9	58.0	n/a	2.2	11.1	13.3	20
	460/60/3	414/506	6.5	4.2	28.0	n/a	1.1	5.3	6.4	10
036	208-230/60/1	187/253	27.0	17.3	96.7	34.0	2.2	19.5	23.8	40
	208-230/60/3	187/253	20.0	12.8	95.0	n/a	2.2	15.0	18.2	30
	460/60/3	414/506	10.0	6.4	45.0	n/a	1.1	7.5	9.1	15
041	208-230/60/1	187/253	31.0	20.0	115.0	41.0	3.5	23.5	28.5	45
	208-230/60/3	187/253	20.0	12.8	95.0	n/a	3.5	16.3	19.5	30
	460/60/3	414/506	10.0	6.4	45.0	n/a	1.8	8.2	9.8	15
	575/60/3	517/633	8.5	5.4	38.0	n/a	1.4	6.8	8.2	10
042	208-230/60/1	187/253	31.0	20.0	115.0	41.0	3.5	23.5	28.5	45
	208-230/60/3	187/253	20.0	12.8	95.0	n/a	3.5	16.3	19.5	30
	460/60/3	414/506	10.0	6.4	45.0	n/a	1.8	8.2	9.8	15
	575/60/3	517/633	8.5	5.4	38.0	n/a	1.4	6.8	8.2	10
042*	208-230/60/1	187/253	31.0	20.0	115.0	41.0	4.6	24.6	29.6	45
	208-230/60/3	187/253	20.0	12.8	95.0	n/a	4.6	17.4	20.6	30
	460/60/3	414/506	10.0	6.4	45.0	n/a	2.3	8.7	10.3	15
	575/60/3	517/633	8.5	5.4	38.0	n/a	1.9	7.3	8.7	10
048	208-230/60/1	187/253	32.0	21.0	115.0	41.0	3.5	24.5	29.8	50
	208-230/60/3	187/253	25.0	16.0	115.0	n/a	3.5	19.5	23.5	35
	460/60/3	414/506	12.0	7.7	50.0	n/a	1.8	9.5	11.4	15
	575/60/3	517/633	10.0	6.4	40.0	n/a	1.4	7.8	9.4	15
048*	208-230/60/1	187/253	32.0	21.0	115.0	41.0	4.6	25.6	30.9	50
	208-230/60/3	187/253	25.0	16.0	115.0	n/a	4.6	20.6	24.6	40
	460/60/3	414/506	12.0	7.7	50.0	n/a	2.3	10.0	11.9	15
	575/60/3	517/633	10.0	6.4	40.0	n/a	1.9	8.3	9.9	15
060	208-230/60/1	187/253	41.0	26.3	150.0	53.0	5.9	32.3	38.8	60
	208-230/60/3	187/253	27.5	17.6	120.0	n/a	5.9	23.5	27.9	45
	460/60/3	414/506	13.0	8.3	70.0	n/a	3.0	11.3	13.4	20
	575/60/3	517/633	11.5	7.4	53.0	n/a	1.9	9.3	11.2	15
070	208-230/60/1	187/253	47.0	30.1	145.0	51.0	5.9	36.0	43.5	70
	208-230/60/3	187/253	28.0	17.3	120.0	n/a	5.9	23.2	27.5	40
	460/60/3	414/506	15.0	9.6	70.0	n/a	3.0	12.6	15.0	20
	575/60/3	517/633	12.5	8.0	53.0	n/a	1.9	9.9	11.9	15

HACR circuit breaker in USA only

* With optional high-static PSC motor

** With optional GeoStart™, only available on 208-230/60/1

NOTE: High-static option not available on all model sizes.

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Electrical Data cont.

ECM2.3 Motor

Model	Rated Voltage	Voltage Min/Max	Compressor				Blower Motor FLA	Total Unit FLA	Min Circ Amp	Max Fuse/HACR
			MCC	RLA	LRA	LRA**				
015	208-230/60/1	197/253	9.2	5.9	29.0	n/a	4.0	9.9	11.4	15
	265/60/1	238/292	7.8	5.0	28.0	n/a	4.1	9.1	10.3	15
018	208-230/60/1	197/253	10.4	6.7	33.5	n/a	4.0	10.7	12.4	15
	265/60/1	238/292	8.7	5.6	28.0	n/a	4.1	9.7	11.1	15
023	208-230/60/1	197/253	21.0	13.5	58.3	21.0	4.0	17.5	20.9	30
	265/60/1	238/292	14.0	9.0	54.0	n/a	4.1	13.1	15.4	20
	208-230/60/3	187/253	12.1	8.6	55.0	n/a	4.0	12.6	14.8	20
	460/60/3	414/506	6.2	4.4	22.4	n/a	4.1	8.5	9.6	10
024	208-230/60/1	197/253	21.0	13.5	58.3	21.0	4.0	17.5	20.9	30
	265/60/1	238/292	14.0	9.0	54.0	n/a	4.1	13.1	15.4	20
	208-230/60/3	187/253	12.1	8.6	55.0	n/a	4.0	12.6	14.8	20
	460/60/3	414/506	6.2	4.4	22.4	n/a	4.1	8.5	9.6	10
030	208-230/60/1	197/253	22.0	14.1	73.0	26.0	4.0	18.1	21.6	35
	265/60/1	238/292	17.5	11.2	60.0	n/a	4.1	15.3	18.1	25
	208-230/60/3	187/253	13.9	8.9	58.0	n/a	4.0	12.9	15.1	20
	460/60/3	414/506	6.5	4.2	28.0	n/a	4.1	8.3	9.4	10
036	208-230/60/1	197/253	27.0	17.3	96.7	34.0	4.0	21.3	25.6	40
	208-230/60/3	187/253	20.0	12.8	95.0	n/a	4.0	16.8	20.0	30
	460/60/3	414/506	10.0	6.4	45.0	n/a	4.1	10.5	12.1	15
041	208-230/60/1	197/253	31.0	20.0	115.0	41.0	4.0	24.0	29.0	45
	208-230/60/3	187/253	20.0	12.8	95.0	n/a	4.0	16.8	20.0	30
	460/60/3	414/506	10.0	6.4	45.0	n/a	4.1	10.5	12.1	15
042	208-230/60/1	197/253	31.0	20.0	115.0	41.0	4.0	24.0	29.0	45
	208-230/60/3	187/253	20.0	12.8	95.0	n/a	4.0	16.8	20.0	30
	460/60/3	414/506	10.0	6.4	45.0	n/a	4.1	10.5	12.1	15
042*	208-230/60/1	197/253	31.0	20.0	115.0	41.0	7.0	27.0	32.0	50
	208-230/60/3	187/253	20.0	12.8	95.0	n/a	7.0	19.8	23.0	35
	460/60/3	414/506	10.0	6.4	45.0	n/a	6.9	13.3	14.9	20
048	208-230/60/1	197/253	32.0	21.0	115.0	41.0	4.0	25.0	30.3	50
	208-230/60/3	187/253	25.0	16.0	115.0	n/a	4.0	20.0	24.0	40
	460/60/3	414/506	12.0	7.7	50.0	n/a	4.1	11.8	13.7	20
048*	208-230/60/1	197/253	32.0	21.0	115.0	41.0	7.0	28.0	33.3	50
	208-230/60/3	187/253	25.0	16.0	115.0	n/a	7.0	23.0	27.0	40
	460/60/3	414/506	12.0	7.7	50.0	n/a	6.9	14.6	16.5	20
060	208-230/60/1	197/253	41.0	26.3	150.0	53.0	7.0	33.3	39.9	60
	208-230/60/3	187/253	27.5	17.6	120.0	n/a	7.0	24.6	29.0	45
	460/60/3	414/506	13.0	8.3	70.0	n/a	6.9	15.2	17.3	25
070	208-230/60/1	197/253	47.0	30.1	145.0	51.0	7.0	37.1	44.6	70
	208-230/60/3	187/253	32.0	20.5	155.0	n/a	7.0	27.5	32.6	50
	460/60/3	414/506	15.0	9.6	75.0	n/a	6.9	16.5	18.9	25

HACR circuit breaker in USA only

* With optional 1 HP ECM2.3 motor

** With optional GeoStart™, only available on 208-230/60/1

11/10/09

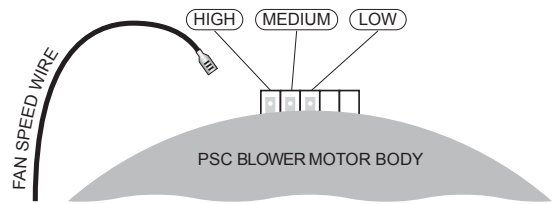


CAUTION: When installing a unit with an ECM2.3 blower motor in 460/60/3 voltage, a neutral wire is required to allow proper unit operation.

Setting Blower Speed - PSC



CAUTION: Disconnect all power before performing this operation.



Setting Blower Speed - ECM2.3

ECM2.3 blower motors have 12 selectable speeds and are factory set for optimum performance. To change speeds, using a Medium User Interface (MUI) enter the MAINT menu to adjust the 12 soft switches. When applicable, the speed settings may also be adjusted through the Building Automation System (BAS).



CAUTION: Disconnect all power before performing this operation.

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	
009	H	6 x 8	1/10	530	515	500	485	470	450	430	405	385	355	330	-	-	-	-	-	
	MH			475	460	450	435	420	405	385	365	345	320	300	-	-	-	-	-	
	ML*			435	420	410	395	380	365	345	325	300	-	-	-	-	-	-	-	
	L			370	355	340	325	310	290	275	-	-	-	-	-	-	-	-	-	
012	H	6 x 8	1/10	530	515	500	485	470	450	430	405	385	355	330	-	-	-	-	-	
	MH*			475	460	450	435	420	405	385	365	345	320	300	-	-	-	-	-	
	ML			435	420	410	395	380	365	345	325	300	-	-	-	-	-	-	-	
	L			370	355	340	325	310	290	275	-	-	-	-	-	-	-	-	-	
015	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	-	-	-	-	-	
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	1065	1045	1030	1005	975	950	925	900	870	835	800	715	-	-	-	-	
	M			880	865	850	830	815	795	775	750	725	700	670	-	-	-	-	-	
	L			805	790	780	765	745	725	710	685	660	630	600	-	-	-	-	-	
024	H	9 x 7	1/5	1020	990	960	930	900	870	850	830	800	770	690	-	-	-	-	-	
	M			960	840	820	800	780	760	740	720	690	670	-	-	-	-	-	-	
	L			720	700	680	650	640	620	600	580	570	550	-	-	-	-	-	-	
030	H	9 x 7	1/3	1120	1100	1070	1050	1040	1030	1020	1010	1000	980	830	-	-	-	-	-	
	M			1020	1000	980	960	920	880	860	840	820	790	-	-	-	-	-	-	
	L			860	850	840	830	810	800	780	760	740	710	-	-	-	-	-	-	
036	H	9 x 7	1/2	1360	1340	1320	1290	1260	1220	1185	1130	1080	1045	1010	910	855	-	-	-	
	M			1205	1190	1170	1145	1120	1085	1050	1015	980	940	900	845	-	-	-	-	
	L			1070	1060	1050	1035	1020	995	970	940	910	875	840	780	-	-	-	-	
041	H	10x10	1/2	1655	1635	1615	1590	1570	1535	1500	1425	1350	1270	1185	1080	970	-	-	-	
	M			1470	1455	1445	1425	1410	1380	1350	1285	1240	1205	1170	905	-	-	-	-	
	L			1150	1140	1130	1110	1090	1050	1010	970	930	900	865	800	-	-	-	-	
042	H	10 x 10	1/2	1705	1685	1665	1645	1625	1595	1565	1530	1500	1450	1405	1260	1140	-	-	-	
	M			1485	1475	1465	1445	1430	1410	1390	1350	1315	1260	1210	1110	1010	-	-	-	
	L			1180	1165	1150	1135	1120	1090	1060	1030	1000	965	920	855	-	-	-	-	
048	H	10 x 10	1/2	1930	1910	1885	1860	1830	1790	1750	1710	1665	1620	1580	1280	1235	-	-	-	
	M			1580	1565	1550	1535	1525	1505	1485	1445	1410	1310	1215	1130	1030	-	-	-	
	L			1180	1170	1160	1140	1120	1100	1080	1050	1020	970	930	875	-	-	-	-	
060	H	11 x 10	1	2360	2330	2300	2270	2240	2215	2190	2160	2130	2095	2060	1985	1920	1855	-	-	
	M			2165	2130	2095	2070	2050	2030	2010	1985	1965	1930	1900	1850	1775	1700	-	-	
	L			1965	1940	1920	1900	1885	1870	1855	1825	1800	1780	1760	1720	1625	1530	-	-	
070	H	11 x 10	1	2450	2435	2420	2395	2370	2340	2310	2280	2250	2225	2200	2040	2000	1950	-	-	
	M			2215	2190	2170	2155	2140	2120	2095	2070	2045	2015	1990	1940	1876	1795	-	-	
	L			2005	1990	1975	1962	1950	1938	1925	1910	1890	1865	1845	1780	1710	1565	-	-	

Factory settings are in Bold

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 0.12 in. wg. and 500 fpm by 0.16 in. wg.

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Optional High Static 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
024	H	9 x 7	1/3	1120	1100	1070	1050	1040	1030	1020	1010	1000	980	830	-	-	-	-	-
	M			1020	1000	980	960	920	880	860	840	820	790	-	-	-	-	-	-
	L			860	850	840	830	810	800	780	760	740	710	-	-	-	-	-	-
030	H	9 x 7	1/2	1340	1320	1300	1270	1240	1200	1160	1115	1070	1025	985	880	-	-	-	-
	M			1185	1175	1165	1130	1095	1065	1035	1000	965	920	880	795	-	-	-	-
	L			1050	1040	1030	1015	1000	980	960	925	895	855	815	-	-	-	-	-
042	H	10 x 10	3/4	2095	2080	2060	2020	1980	1950	1920	1880	1840	1780	1725	1550	1335	1120	-	-
	M			1960	1940	1920	1890	1865	1830	1800	1760	1725	1670	1620	1435	1300	-	-	-
	L			1800	1780	1760	1740	1725	1695	1670	1625	1585	1525	1465	1300	1200	-	-	-
048	H	10 x 10	3/4	2095	2080	2060	2020	1980	1950	1920	1880	1840	1780	1725	1550	1335	1120	-	-
	M			1960	1940	1920	1890	1865	1830	1800	1760	1725	1670	1620	1435	1300	-	-	-
	L			1800	1780	1760	1740	1725	1695	1670	1625	1585	1525	1465	1300	1200	-	-	-

Factory settings are in Bold

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 0.12 in. wg. and 500 fpm by 0.16 in. wg.

* Setting for 265 V operation.

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Blower Performance Data cont.

ECM2.3 Motor

MODEL	MAX ESP	AIR FLOW DIP SWITCH SETTINGS											
		1	2	3	4	5	6	7	8	9	10	11	12
015	0.50	300 L	400	500 M	600 H	700							
018	0.50	300	400 L	500	600 M	700 H	800						
023	0.50		400	500 L	600 M	700	800 H	900	1000	1100	1200		
024	0.50		400	500 L	600 M	700	800 H	900	1000	1100	1200		
030	0.50		400	500 L	600	700 M	800	900 H	1000	1100	1200		
036	0.50				600	700 L	800	900 M	1000	1100 H	1150	1225	1300
041	0.50	650	750	850 L	950	1050 M	1150	1250	1325 H	1375	1475	1550	1600
042	0.50	650	750	850 L	950	1050 M	1150	1250	1325 H	1375	1475	1550	1600
042 w/1hp*	0.75	800 L	1000 M	1100	1300 H	1500	1600	1800					
048	0.50	650	750	850	950	1050 L	1150	1250 M	1325	1375	1475	1550 H	1600
048 w/1hp*	0.75	800	1000 L	1100	1300 M	1500 H	1600	1800					
060	0.75	750	900	1000	1200 L	1400 M	1600	1700	1850 H	2000	2200	2300	2400
070	0.75	800	950	1100	1300	1500	1750 M	1950	2100 H	2300			

Factory settings are at recommended L-M-H DIP switch locations

M-H settings MUST be located within boldface CFM range

Lowest and Highest DIP switch settings are assumed to be L and H respectively

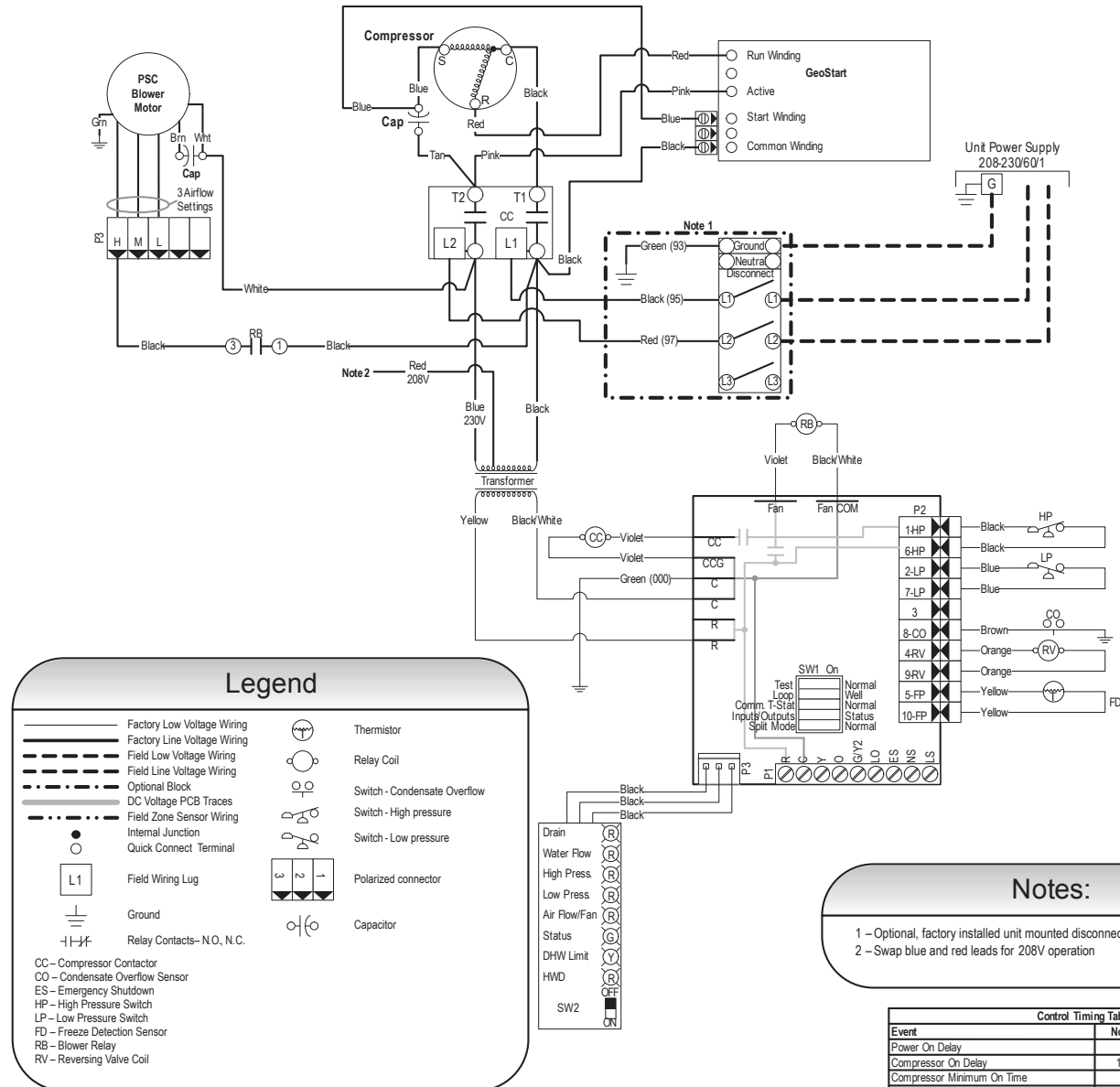
CFM is controlled within $\pm 5\%$ up to the maximum ESP

Max ESP includes allowance for wet coil and standard filter

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Wiring Schematics

Versatec Microprocessor 208-230/60/1 PSC with GeoStart



LED Display Mode Table	
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	
LED	Current Fault Display Mode
Drain	SW1-4 On, SW2 On
Water Flow	SW1-4 Off, SW2 Off
High Press.	Y
Low Press.	G
Air Flow	O
Status	ES
DHW Limit	NS
DHW	LS
HWD	Not Used
SW2	SW2 = On

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

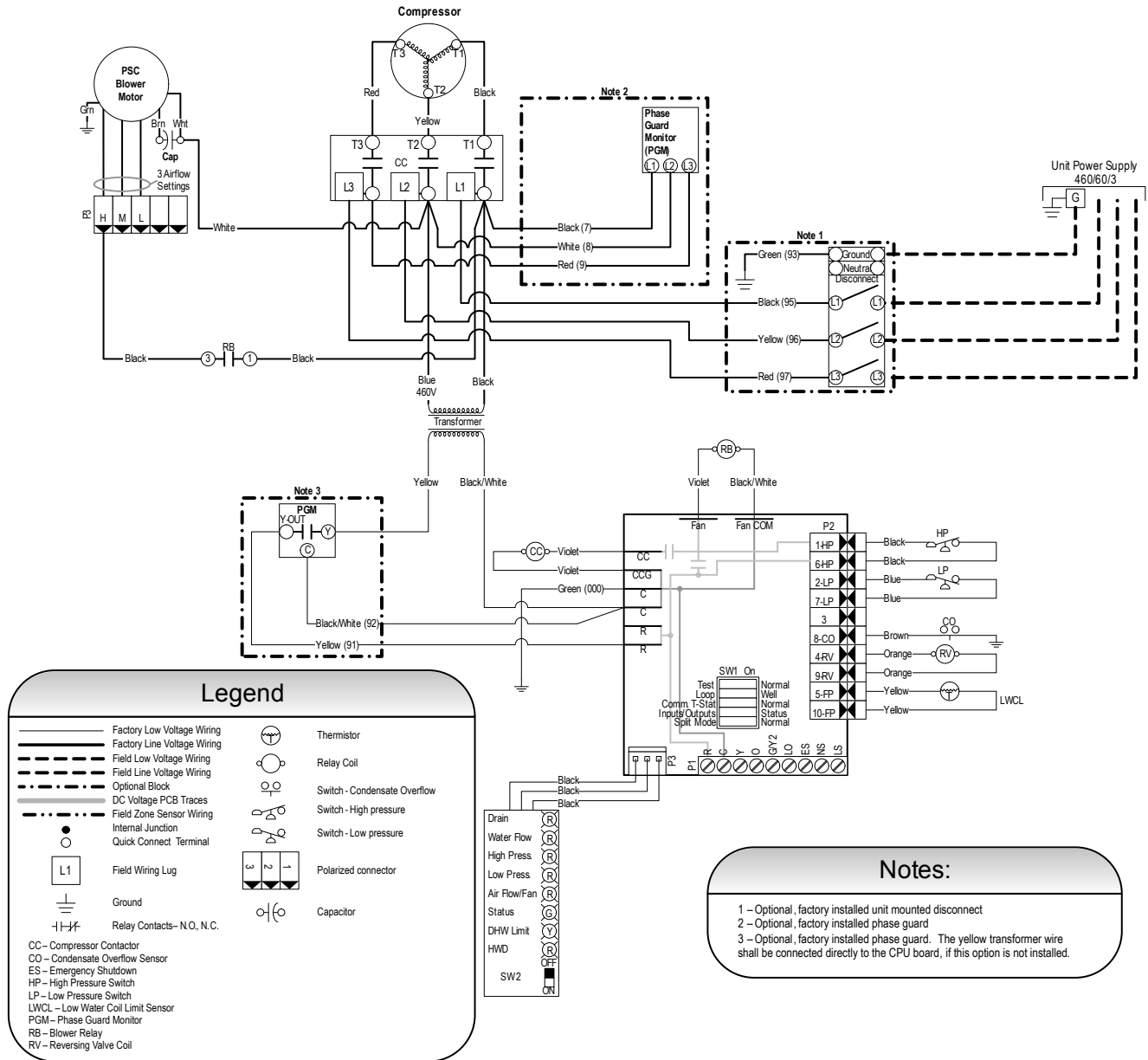
Operational Logic Table				
Single-Speed				
Mode	Inputs	Fan	Comp	RV
Htg	Y	Auto	ON	OFF
Clg	Y.O	Auto	ON	ON
Blower Only	G	ON	OFF	OFF

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
StartUp Bypass - Low Pressure	2 minutes	0 seconds
Fault Recognition Delay - Low Pressure	30 seconds	30 seconds
StartUp 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

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 Input Display Mode	Current Fault or Output Display Mode

Wiring Schematics cont.

Versatec Microprocessor 460/60/3 PSC



Logic Board DIP Switch Settings		
DIP	OFF	ON
SW1-1	Test Mode - Speedup Mode	Normal Mode - Standard Timings
SW1-2	Loop - 15°F Low Water Coil Limit	Well - 30°F Low Water Coil Limit
SW1-3	Commercial TA2U02 T-Stat	Normal - Standard Thermostat Operation
SW1-4	*IO Display - Enables Input/Output Display on LED Board	*Normal - Unit Status Display Mode
SW1-5	Split Mode - DualSpeed Compressor without Fan	Normal - SingleSpeed Compressor with Fan
SW2	*OFF - Status or Inputs Display Mode	*ON - Current Fault or Output Display Mode

* Refer to LED Display Mode Table for Operation and Positioning of SW1-4 and SW2

Operational Logic Table					
Single-Speed					
Mode	Inputs	Fan	Comp	RV	
Htg	Y	ON	ON	OFF	OFF
Cig	Y.O	ON	ON	ON	ON
Blower Only	G	ON	OFF	OFF	OFF
Dual-Speed					
Mode	Inputs	Comp Low	Comp High	RV	
Low Speed Htg	Y	ON	OFF	OFF	
High Speed Htg	Y.G	ON	ON	OFF	
Low Speed Cig	Y.O	ON	OFF	ON	
High Speed Cig	Y.G.O	ON	ON	ON	

Normal Mode 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	0 seconds	
StartUp Bypass - Low Water Coil Limit	2 minutes	0 seconds	
Fault Recognition Delay - Low Water Coil Limit	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	Low Water Coil Limit 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		
HWD	SW2 Status (Off=Down Position, On=Up Position)		
Diagnostic Display Modes			
LED	Current Fault Display Mode	Inputs Display Mode	Outputs Display Mode
Drain	SW1-4 On, SW2 On	SW1-4 Off, SW2 Off	SW1-4 Off, SW2 On
Drain	Drain Pan Overflow Lockout	Y	Compressor
Water Flow	Low Water Coil Limit Lockout	G	Fan
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





Controls - Versatec Microprocessor

Standard Versatec Microprocessor



Flexible Control Options

The ECO-Z 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. LEDs are located on the control box to assist the technician when servicing the unit.

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.

Controls - Versatec Microprocessor cont.

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.

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.

Condensate Overflow

This lockout mode occurs when the condensate overflow level has been reached 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

Troubleshooting

Standard Microprocessor Controls

To check the unit control board for proper operation:

- 1) Disconnect thermostat wires at the control board.
- 2) Jumper the desired test input (Y1, W, O or G) to the R terminal to simulate a thermostat signal.
- 3) If control functions properly:
 - Check for thermostat and field control wiring (use the diagnostic inputs mode).
- 4) If control responds improperly:
 - Ensure that component being controlled is functioning (compressor, blower, reversing valve, etc.).
 - Ensure that wiring from control to the component is functioning (refer to the LED Definition table below and use the diagnostic outputs mode).
 - If steps above check properly, replace unit control.

LED Definitions and Diagnostics

Versatec Microprocessor

Status Display Mode

LED	SW1-4 On, SW2 Off
Drain	Drain Pan Overflow Lockout
Water Flow	Freeze Detection (Loop <= 15°F, Well <= 30°F)
High Pressure	High Pressure Lockout
Low Pressure	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, SP2 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
DHW	SW2 = On	SW2 = Off	SW2 = On

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

Refrigerant Systems

To maintain sealed circuit integrity, do not install service gauges unless unit operation appears abnormal. Compare the change in temperature on the air side as well as the water side to the Unit Operating Parameters tables. If the unit's performance is not within the ranges listed, and the airflow and water flow are known to be correct, gauges should then be installed and superheat and subcooling numbers calculated. If superheat and subcooling are outside recommended ranges, an adjustment to the refrigerant charge may be necessary.

NOTE: Refrigerant tests must be made with hot water generator turned "OFF". Verify that air and water flow rates are at proper levels before servicing the refrigerant circuit.

Controls - FX10 (optional)

FX10 Advanced Control Overview

The Johnson Controls FX10 board is specifically designed for commercial heat pumps and provides control of the entire unit as well as input ports for Open N2, LonTalk, BACnet (MS/TP @ 19,200 Baud rate) communication protocols as well as an input port for a user interface. The user interface is an accessory item that can be used to aid in diagnostics and unit setup. A 16-pin low voltage terminal board provides terminals for common field connections. The FX10 Control provides:

- Operational sequencing
- High and low-pressure switch monitoring
- General lockout
- Freeze Detection
- Condensate overflow sensing
- Lockout mode control
- Emergency shutdown mode
- Random start and short cycle protection

Short Cycle Protection

Allows a minimum compressor "OFF" time of four minutes and a minimum "ON" time of two minutes.

Random Start

A delay of 1 to 120 seconds is generated after each power-up to prevent simultaneous startup of all units within a building after the release from an unoccupied cycle or power loss.

Emergency Shutdown

A field-applied dry contact can be used to place the control into emergency shutdown mode. During this mode, all outputs on the board are disabled.

Freeze Detection

Field selectable for 15° or 30°F (-9° or -1°C)

Installation Options

- Standalone controlled by standard room thermostat
- Standalone with a Zone Temperature Sensor (must have user interface to change set points beyond the allowed +/- 5°F)
- Integrated into BAS by adding communication module

Accessory Outputs

Quantity 2, one cycled with blower, other with compressor

User Interface

4 x 20 backlit LCD



Main FX 10 Board

Optional Plug-in Communication Modules - (compatible with standard BAS protocols)

- Open N2
- LonTalk
- BACnet (MS/TP @ 19,200 Baud rate)

Display

Requires DLI Card/Kit. Up to 2 displays, either 1 local and 1 remote, or 2 remote. (A 2-display configuration requires identical displays.) Local display can be up to 3 meters from the controller, power supply, and data communication. Remote display can be up to 300 meters from the controller. Remote display must be independently powered with data communication done via 3 pole shielded cable.

Control Timing & Fault Recognition Delays

Lead compressor "ON" delay	90 seconds
(not applicable for single compressor models)	
Minimum compressor "ON" time.....	2 minutes
(except for fault condition)	
Short cycle delay	5 minutes
Random start delay	0-120 seconds
High pressure fault	<1 second
Low pressure fault	30 seconds
Freeze Detection fault	30 seconds
Condensate overflow fault.....	30 seconds
Low pressure fault bypass.....	2 minutes
Freeze sensing fault bypass.....	2 minutes

Controls - FX10 (optional) cont.

Optional FX10 Microprocessor and BAS Interface



The FX10 is a microprocessor based control that not only monitors and controls the heat pump but also can communicate any of this information back to the building automation system (BAS). This means that not only does the control monitor the heat pump at the unit you can also monitor and control many the features over the BAS. This clearly puts the FX10 in a class of its own.

The control will enumerate all fault conditions (HP, LP, CO, LOC, and Freeze Detection) over a BAS as well as display them on a medium user interface (MUI). HP, LP, CO and Freeze Detection faults can all be reset over a BAS. A Loss Of Charge fault can not be reset or bypassed until the problem has been corrected. A MUI is invaluable as a service tool for the building service team.

The unit can be commanded to run by a typical heat pump thermostat or run based on heating and cooling set points supplied by a BAS. The control board is wired with quick connect harnesses for easy field change out of a bad control board. All ECM2.3 variable blower speed settings can be changed over a BAS or with a MUI. The control has an input programmed to enable field installed emergency heat in the event that the compressor is locked out. This input can also be commanded on from a BAS as needed. An alarm history can be viewed through the MUI and will be held in memory until the unit is power cycled. Relative humidity can be read by a 0-5VDC humidity sensor that is displayed over the network. If you are using an ECM2.3 blower motor the control can enable dehumidification mode based on a set point in the control. The dehumidification set point itself can also be changed over a BAS or with a MUI. Dehumidification mode can also be enabled by the BAS. Because the FX10 is not factory configured to read CO² levels, contact the factory for application assistance.

The FX10 control has unused analog and digital inputs for field installed items such as air temperature, water temperature, CO² or current status switches. The control has

unused binary and PWM outputs that can be commanded over the BAS for field use.

An optional Medium User Interface (MUI) for control setup and advanced diagnostics is available with some mounting kits, MUIK1 - Panel mount version and the MUIK2-Wall mount version.

Zone Sensors

There are two options for zone sensors that can be used with the FX10 control. Both sensors use a Johnson controls A99 positive temperature coefficient type sensor. The TAXXJ02 has a set point adjustment now which will give the end user a +/- 5°F adjustment from the set point as well as a push button that can be used for temporary occupancy. The control leaves the factory set to operate with a TAXXJ02 sensor and can be changed to read the TAXXA04 sensor through a building automation system or with a user interface.

Standard Features

- Anti Short Cycle
- High Pressure Protection
- Low Pressure Protection
- Freeze Detection
- Loss Of Charge Detection
- Random Start
- Display for diagnostics
- Reset Lockout at disconnect or through BAS
- 2 Accessory outputs
- Optional BAS add-on controls

DDC Operation & Connection

Other optional network protocol boards that can be added to the FX10 are:

- Johnson Control N2
- LonWorks
- BACnet
 - MS/TP @ 19,200 Baud rate
 - Limit devices to 30 on a single trunk line

Control and Safety Feature Details Emergency Shutdown

The emergency shutdown mode can be activated by a command from a facility management system or a closed contact on BI-2. The default state for the emergency shutdown data point is off. When the emergency shutdown mode is activated, all outputs will be turned off immediately and will remain off until the emergency shutdown mode is de-activated. The first time the compressor starts after the emergency shutdown mode has been de-activated, there will be a random start delay present.

Controls - FX10 (optional) cont.

Lockout Mode

Lockout mode can be activated by any of the following fault signals: refrigerant system high pressure, refrigerant system low pressure, freeze detection, and condensate overflow. When any valid fault signal remains continuously active for the length of its recognition delay, the controller will go into fault retry mode, which will turn off the compressor. After the Compressor short cycle delay, the compressor will attempt to operate once again. If three consecutive faults occur in 60 minutes during a single heating or cooling demand, the unit will go into lockout mode, turning off the compressor, enabling the alarm output, and setting the blower back to low speed operation until the controller is reset. If the control faults due to the low pressure input (BI-3) being open during the pre-compressor startup check, the control will go into lockout mode immediately, disabling the compressor from starting and enabling the alarm output (BO-6). The lockout condition can be reset by powering down the controller, by a command from the BAS, or by holding the ESC and Return keys on the MUI for 5 seconds.

Freeze Detection (AI-5)



The freeze detection sensor will monitor the liquid refrigerant temperature entering the water coil in the heating mode. If the temperature drops below the freeze detection trip point for the recognition delay period, the condition will be recognized as a fault. The freeze detection trip point will be factory set for 30°F and will be field selectable for 15°F by removing a jumper wire on BI-5. The freeze detection fault condition will be bypassed 2 minutes at normal compressor startup, to allow the refrigeration circuit to stabilize. If the freeze detection sensor becomes unreliable at any time compressor operation will immediately be suspended until the problem is corrected. This should be displayed as an alarm on the BAS and the MUI. This alarm will be reported a "Water Low Temp Limit" fault.

High Pressure (BI-11)

The high-pressure switch shall be a normally closed (NC) switch that monitors the systems refrigerant pressure. If the input senses the high-pressure switch is open it must disable the compressor output immediately and count the fault. The compressor minimum on time does not apply if the high-pressure switch opens. The compressor will not restart until the compressor short cycle time delay has been satisfied.

Low Pressure (BI-3)

The low-pressure switch shall be a normally closed (NC) switch that monitors the systems refrigerant pressure. The input shall be checked 15 seconds before compressor start up to be sure the pressure switch is closed and then ignored for the first 2 minutes after the compressor output (BO-2) is enabled. If the switch is open continuously for (30) seconds during compressor operation the compressor output (BO-2) will be disabled. The compressor will not restart until the compressor short cycle time delay has been satisfied.

Condensate Overflow

The condensate overflow sensing circuit will monitor the condensate level as a resistance input to AI-3. If the condensate water level rises resulting in the input resistance rising above the set point for the recognition delay period, the condition will be recognized as a fault. The condensate will be subjected to a (30) second lockout delay which requires that the fault be sensed for a continuous (30) seconds before suspending unit operation.

Alarm Output (BO-6)

The alarm output will be enabled when the control is in the lockout mode and will be disabled when the lockout is reset.

Test Mode

Raising the zone temperature input (AI-1) reading to 180–220°F or by holding the ESC and down arrow keys on the MUI for 5 seconds will put the control into test mode. In test mode the random start delay and the compressor fixed on delay time will both be shortened to 5 seconds and the reversing valve will be allowed to cycle with out shutting down the compressor. If an MUI is connected to the control LED 8 will flash and the words "Test Mode Enabled" will be shown on the LCD display when the control is in test mode. Test mode will be disabled after a power cycle, 30 minute timeout, or by holding the ESC and Up arrow keys on the MUI.

Sequence of Operation

Power Fail Restart

When the controller is first powered up, the outputs will be disabled for a random start delay. The delay is provided to prevent simultaneous starting of multiple heat pumps. Once the timer expires, the controller will operate normally.

Random Start Delay

This delay will be used after every power failure, as well as the first time the compressor is started after the control exits the unoccupied mode or the emergency shutdown mode. The delay should not be less than 1 second and not longer than 120 seconds. If the control is in test mode the random start delay will be shortened to 5 seconds.

Controls - FX10 (optional) cont.

Compressor Fixed On Delay Time

The Compressor Fixed On Delay Time will ensure that the compressor output (BO2) is not enabled for 90 seconds after the control receives a call to start the compressor. This delay is adjustable from 30 – 300 seconds over a BAS or a MUI. If the control is in test mode the Compressor Fixed On Delay Timer will be shortened to 5 seconds.

Compressor Minimum On Delay

The compressor minimum on delay will ensure that the compressor output is enabled for a minimum of two (2) minute each time the compressor output is enabled. This will apply in every instance except in the event the high pressure switch is tripped or emergency shutdown then the compressor output will be disable immediately.

Compressor Short Cycle Delay Time

The compressor short cycle time delay will ensure that the compressor output will not be enabled for a minimum of five (5) minutes after it is disabled. This allows for the system refrigerant pressures to equalize after the compressor is disabled.

Heating Cycle

On a call for heating, the blower enable output and accessory output 2 will turn on immediately after the random start delay timer has been satisfied. If the compressor short cycle time delay has been satisfied, the compressor will turn on after the blower enable and accessory output 2 are on and the fixed compressor start delay timers have been satisfied.

Auxiliary heat output can be controlled over the BAS.

Set Point Control Mode

In set point control mode the reversing valve output will be disabled. As the temperature drops below the heating set point and begins to operate in the heating proportional band, the low capacity compressor output (BO-2) will be enabled. A PI loop in the programming of the control will determine when the full capacity compressor output (BO-4) is to be enabled. The compressor must be operating in low capacity for a minimum of 30 seconds before the full capacity compressor output can be enabled. During low capacity compressor operation the ECM2.3 blower will operate in medium speed and will operate in high speed when the compressor is operating at full capacity.

Thermostat Control Mode

In thermostat mode the compressor will be cycled based on Y1 and Y2 calls from a room thermostat. When the control receives a Y1 command (BI-7) from the thermostat the low

capacity compressor output (BO2) will be enabled and the ECM2.3 blower will operate in medium speed. When the control receives a Y2 command (BI-8) from the thermostat the ECM2.3 blower will operate in high speed. During the heating cycle the reversing valve will be commanded into the off position.

Cooling Cycle

On a call for cooling, the blower enable output and accessory output 2 will turn on immediately after the random start delay timer has been satisfied. If the compressor short cycle time delay has been satisfied, the compressor will turn on after the blower enable and accessory output 2 are on and the fixed compressor start delay timers have been satisfied.

Set Point Control Mode

In set point control mode the reversing valve output will be enabled. As the temperature falls below the cooling set point and begins to operate in the cooling proportional band, the low capacity compressor output (BO-2) will be enabled. A PI loop in the programming of the control will determine when the full capacity compressor output (BO-4) is to be enabled. The compressor must be operating in low capacity for a minimum of 30 seconds before the full capacity compressor output can be enabled. During low capacity compressor operation the ECM2.3 blower will operate in medium speed and will operate in high speed when the compressor is operating at full capacity.

Thermostat Control Mode

In thermostat mode the compressor will be cycled based on Y1 and Y2 calls from a room thermostat. When the control receives a Y1 command (BI-7) from the thermostat the low capacity compressor output (BO2) will be enabled and the ECM2.3 blower will operate in medium speed. When the control receives a Y2 command (BI-8) from the thermostat the full capacity compressor output will be enabled and the ECM2.3 blower will operate in high speed. During the cooling cycle the reversing valve will be commanded into the "ON" position.

ECM2.3 Blower Operation

Blower speeds will be selected through the user interface or the facility management system. There will be a total of 12 speeds selectable with only three being selected at any one time. The lowest numbered speed selection set to ON will select the low-speed blower setting, the middle selection set to ON will select the medium-speed blower setting and the highest selection set to ON will select the high-speed blower setting. If all selections are set to OFF the software shall select speed setting 10 for low-speed,

Controls - FX10 (optional) cont.

11 for medium-speed, and will select speed setting 12 for high speed. If only one selection is set to ON, that selection will set the low-speed blower setting, the medium-speed setting will be 11, and the high-speed setting will be speed 12. The maximum low-speed setting will be speed 10 and the minimum high-speed setting will be speed 3. In addition there is a low limit setting in the software to prevent the ECM2.3 blower speed from being set below acceptable limits for each unit size.

ECM2.3 Blower air flow “Soft Switch Settings”

A set of 12 “soft switches” accessible through the user interface or building automation system are used to select the three blower speed settings for the ECM2.3 blower motor. The 12 soft switches work in exactly the same way as the hardware switches used on the Premier control (Refer to Blower Performance Data - ECM2.3 Motor for proper settings). No more than three soft switches may be set to the “ON” position. The first “ON” switch (the lowest number switch) determines the “low speed blower” setting. The second determines the “medium speed blower” setting, and the third determines the “high speed blower” setting.

Emergency Heat/Network Enabled Output (BO5)

This output is set from the factory to enable/disable emergency heat. If a problem occurs with the unit resulting in the compressor being locked out in heating mode, the control will automatically enable this output to turn on field installed electric heat. This output is interlocked with the blower proving input BI-6 (Blower proving sensors must be field supplied and installed). BI-6 must be connected to PB2 position 3 (see unit schematic) in the field if no blower proving sensor is desired. There is a configurable parameter available through a BAS network that must be enabled if this output is to be commanded over the BAS network.

MUI Alarm History Reporting

If a fault occurs the fault will be recorded in history for display on the medium user interface in the History Menu. Each fault type will be displayed in the history menu with a number between 0 and 3. A reading of 3+ will mean that fault has occurred more than three times in the past. The history menu can be cleared with a power cycle only. Alarm date and time are not included in the history.

Inputs and Outputs Configuration

Field Selectable Options

Freeze Detection Set Point (BI-5)

The freeze detection set point input allows you to adjust the freeze detection set point (AI-5). When the jumper is installed on BI-5 (Wire #24) the freeze detection set point is factory set for 30°F. When the jumper on BI-5 (Wire #24) is removed the freeze detection set point will be 15°F.

Accessory Outputs (BO-7 and BO-8)

Accessory Output 1 will be energized 90 seconds prior to the compressor output being energized. Accessory Output 2 will be energized with the blower output (BO-1). When the corresponding compressor output is turned off the accessory output will be deactivated immediately. These outputs are selectable for normally open or normally closed operation through the Medium User interface or through the Building Automation System.

SINGLE and DUAL STAGE WATER-TO-AIR			
Input Name	Input	Output Name	Output
Zone Temp 1	AI 1	Fan Enable	BO1
Relative Humidity Input	AI 2	Comp – Low Capacity	BO2
Condensate Level	AI 3	Reversing Valve	BO3
Universal Temp Input	AI 4	Comp – Full Capacity	BO4
Water Coil Low Temperature Limit	AI 5	Network Output/EH Output	BO5
Warm/Cool Adjust and Temp Occ	AI 6	Alarm	BO6
		Accessory 1 Output	BO7
Occupied	BI 1	Accessory 2 Output	BO8
Emergency Shutdown	BI 2	Network Controlled Output	BO9
Stage 1 Low Pressure	BI 3		
Network Viewable Input 1	BI 4	ECM2.3 Blower	PWM1
Water Coil Low Temp Limit Set Point	BI 5	Network Controlled Output	PWM2
Network Viewable Input 2	BI 6		
Thermostat Y1	BI 7		
Thermostat Y2	BI 8		
Thermostat O	BI 9		
Thermostat G	BI 10		
Stage 1 High Pressure	BI 11		
Compressor Proving	BI 12		
XP10 Expansion Card			
Input Name	Input	Output Name	Output
Unused	AI 1	Unused	BO 1
Unused	AI 2	Unused	BO 2
Unused	AI 3	Unused	BO 3
Unused	AI 4	Unused	BO 4

Control Accessories

Zone Sensors

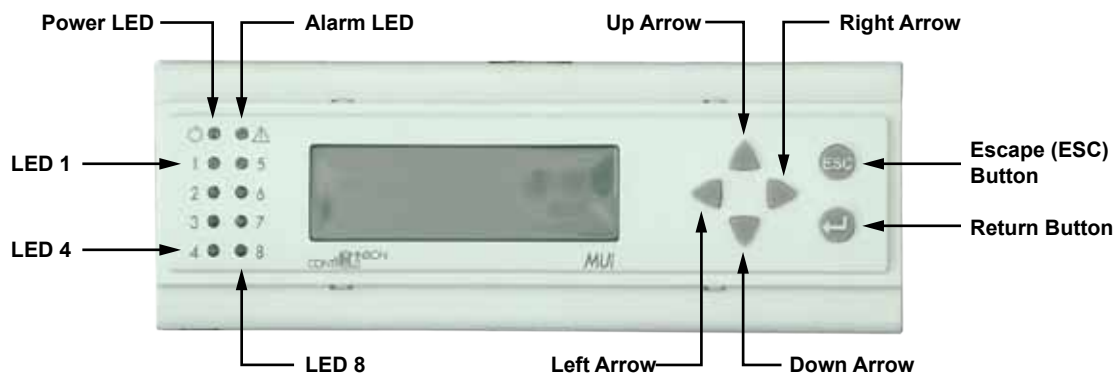
- TAXXJ02 Room Command Module
- TAXXA04 LCD Room Command Module
- A99 Sensor

MUI (LCD User interface) for diagnostics and commissioning.

- MUIK1 - Panel Mount, Portable
- MUIK2 - Wall Mount

FX10 Controller (optional) cont.

FX10 User Interface (MUI) Physical Layout



Alarm LED - Indicates a **Lock-Out** or a bad **Freeze Sensor**

Power LED - Shows FX processor is operational

LED 1 - Flashing shows **Compressor 1** running

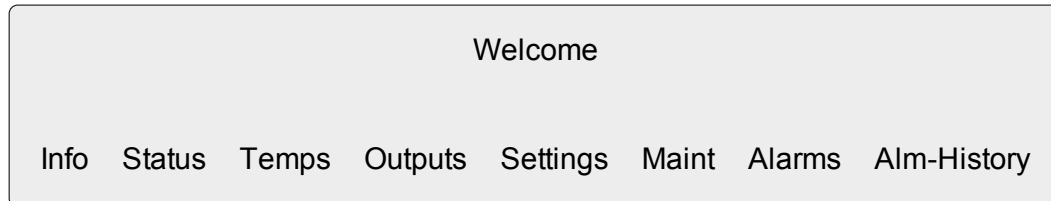
LED 2 - Flashing shows **Full Capacity Compressor** running

LED 3 - On shows **Fan** running

LED 4 - On shows **Reversing Valve** in cool

LED 8 - Flashing shows unit in '**Test**' Mode

MUI Menu Navigation for Single Compressor - ECO-Z Water-to-Air



Info

PROFXENV-XX
3/8/07

Status

Run Mode	Auto
Eff Occup'y	Occ
Y1 Input	OFF
Y2 Input	OFF
G Input	OFF
O Input	OFF
Occ Input	Occ
Temp Occ Inp	OFF
Condensate	NML
Emg Input	Run
Lo Press	ON
Hi Press	ON
Rndm Tmr	0
BI-4 Input	OFF

Temps

Zone Temp	77.2 °F
Dis Air Temp	51.0 °F
Eff Clg Setpt	70.0°F
Eff Htg Setpt	66.0°F
Water Coil	77.8°F
Low WC Limit	30.0°F
Humidity	56.7 %RH
WarmCool AI	14.6
WarmCoolAdj	0.2

Outputs

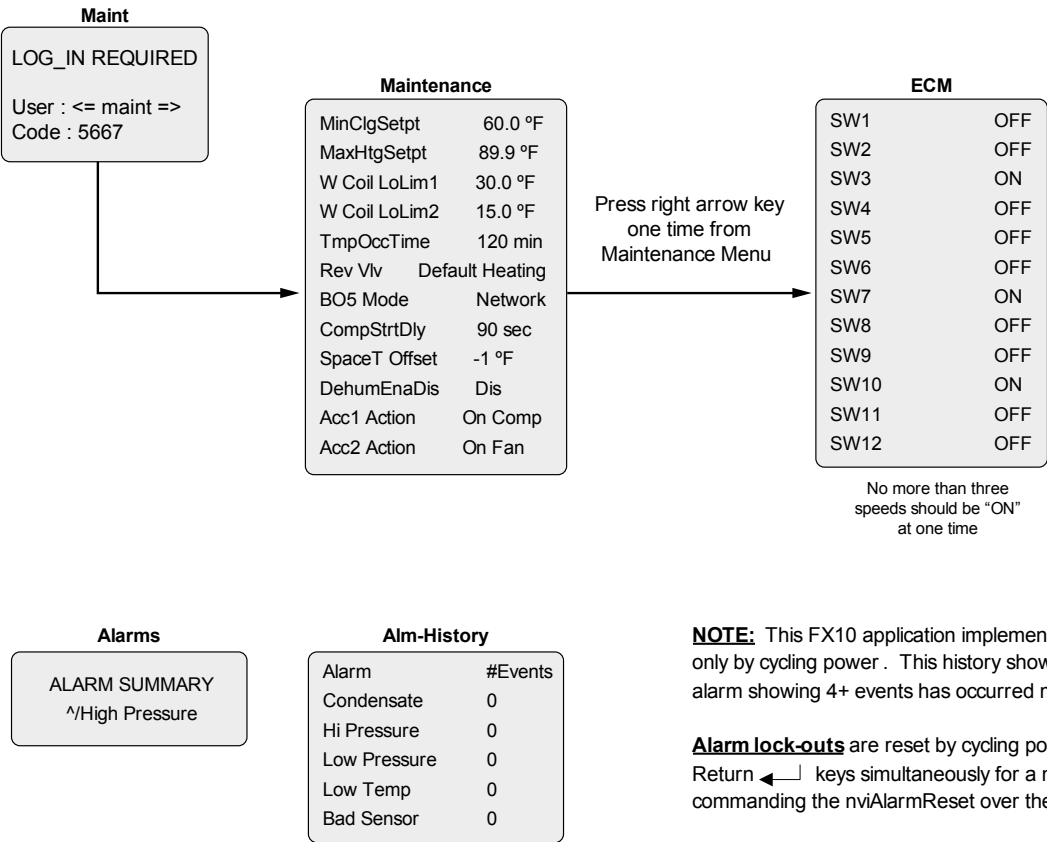
nvoFanStatus	ON
CmpCmd Status	OFF
Cmp Capacity	OFF
Rev Valve	Heat
X1 Output	OFF
X2 Output	OFF
PWMOut	98%
BO5	OFF
BO9	OFF
AO2 Output	0%

Settings

Unit of Measure	F
Occ Clg Setpt	73.9 °F
Occ Htg Setpt	69.9 °F
Unocc Clg	84.0 °F
Unocc Htg	60.0 °F
DeHumSetpt	0%
SensorSelect	TAXXJ02

FX10 Controller (optional) cont.

MUI Menu Navigation for Single Compressor - ECO-Z Water-to-Air



NOTE: This FX10 application implements an **alarm history** which is reset only by cycling power . This history shows on the Alm-History page. Any alarm showing 4+ events has occurred more than 4 times.

Alarm lock-outs are reset by cycling power, by pressing the “ESC” and Return  keys simultaneously for a minimum of 15 seconds, or by commanding the nviAlarmReset over the BAS network.

Test mode is enabled by holding the ‘Esc’ and Down Arrow simultaneously for a minimum of 15 seconds and releasing. Test mode times out after 30 minutes, and may also be ended by pressing ‘ESC’ and Up Arrow simultaneously and releasing. Test Mode bypasses the On Delay (90 sec) and Random Start timers for quicker troubleshooting. It also allows cycling the reversing valve without compressor shutdown.

FX10 Controller (optional) cont.

Some Cool Heading - N2

N2 Open			Point Description
Point Type	Point Address	Long Name	
ADF	1	nciSetpoints.Occupied_Co	Occupied Cooling Setpoint Input (Read/Write)
ADF	2	nciSetpoints.Standby_Coo	Standby Cooling Setpoint Input (Read/Write)
ADF	3	nciSetpoints.Unoccupied_	Unoccupied Cooling Setpoint Input (Read/Write)
ADF	4	nciSetpoints.Occupied_He	Occupied Heating Setpoint Input (Read/Write)
ADF	5	nciSetpoints.Standby_Hea	Standby Heating Setpoint Input (Read/Write)
ADF	6	nciSetpoints.Unoccupi5#6	Unoccupied Heating Setpoint Input (Read/Write)
ADF	7	nciMinClgSetpt	Minimum Cooling Setpoint Input (Read/Write)
ADF	8	nciMaxHtgSetpt	Maximum Heating Setpoint Input (Read/Write)
ADF	9	nvoSpaceTemp	Space or Zone Temperature Value (Read Only)
ADF	10	nvoDischAirTemp	Discharge Air Temp Field Supplied Only (Read Only)
ADF	11	nvoEffClgSetpt	Effective Cooling Setpoint Value (Read Only)
ADF	12	nviSpaceTemp	Space or Zone Temperature Value Override(Write)
ADF	64	nvoEffHtgSetpt	Effective Heating Setpoint Value (Read Only)
ADF	54	nciAux5LevP	Dehumidification Setpoint (Read/Write)
ADF	15	nciAux1Temp	Heating Freeze Protection Temperature Setpoint Value (Read/Write)
ADF	16	nciAux2Temp	Heating Freeze Protection Temperature Setpoint Value (Read/Write)
ADF	17	nvoUnitStatus.Heat_Outpu	1st Stage Compressor Heating Output (Read Only)
ADF	19	nvoUnitStatus.Cool_Outpu	1st Stage Compressor Cooling Output (Read Only)
ADF	21	nvoUnitStatus.Fan_Output	Fan Output (Read Only)
BD	9	nvoUnitStatus.Mode	Unit Mode of Operation (Read Only)
BD	10	nvoUnitStatus.In_Alarm	Unit Alarm mode (Read Only)
ADF	22	nciPropBand	Heating/Cooling Prop Band Input (Read/Write)
ADF	23	nciRemoteSetptSpan	Warm/Cool Adjust Span (Read/Write)
ADF	24	nciRemoteSetptBias	Warm/Cool Adjust Offset Value (Read/Write)
ADF	27	nciTempOffset	Space or Zone Temperature Sensor Calibration Input (Read/Write)
ADF	32	nviSetpoint	General Setpoint Input (Read/Write)
ADF	39	nvoHtgFrzPro1Tmp	Heating Freeze Protection Temperature Value (Read Only)
ADF	40	nvoHtgFrzSetpt	Heating Freeze Protection Temperature Setpoint Value (Read Only)
ADF	41	nvoAlarms	Alarms Enumerated [0=no alarms, 1=condensate alarm, 2=Compressor Hi Discharge Pressure alarm, 3=Compressor low Suction Pressure alarm, 4=Freeze protection alarm, 8=Faulty Freeze Sensor alarm, 9=Loss of Charge] (Read Only)
ADF	62	nvoPWMOut	ECM PWM Control signal value (Read Only)
ADF	65	nvoECMOvrd	ECM PWM Control signal Override (Read/Write)
ADF	63	nvoHumidity	Space Humidity value (Read Only)
ADF	66	nviAO2	Spare PWM Output AO2 Command (Write)
ADF	67	nvoAO2	Spare PWM Output AO2 Value (Read Only)
ADI	2	nciBypassTime	Temporary Occupancy Time Period Input (Read/Write)
BD	1	nvoEffectOccup	Effective Occupancy State (Read Only)
BD	2	nviOccManCmd	Occupancy Override Command Input (Read/Write)
BD	4	nviEmergOverride	Emergency Override Input (Read/Write)
BD	5	nvoFanStatus	Fan Output Status (Read Only)
BD	6	nvoAccStatus	Accessory 2 Output Status (Read Only)
BD	7	nvoLP_WVStatus	Accessory 1 Output Status (Read Only)
BD	8	nvoAlarmStatus	Alarm Output Status (Read Only)
BD	12	nviAlarmReset	Alarm Reset Input (Read/Write)
BD	13	nviFanSpeedCmd.State	Network equivalent of a thermostatic 'G' call. (Write)
BD	14	nviComprEnable.State	Network equivalent of a thermostatic 'Y1' call. (Write)
BD	46	nviY2HiSpeed.State	Network equivalent of a thermostatic 'Y2' call. (Write)
BD	18	nvoRV1Status	Reversing Valve Output Status (Read Only)
BD	22	nviOccSchedule.Current_s	Occupancy Supervisory Scheduler Command Input (Read/Write)
BD	25	nvoCompFanProv	Compressor/Fan Proving Switch Status (Read Only)
BD	24	nvoDirtyFilter	Dirty Filter Switch Status (Read Only)
BD	26	nvoComp2Status	Compressor Hi Capacity Command Status (Read Only)
BD	42	nviBO5	Command for output BO5 used for Emg Heat-Interlocked with Fan DP9Read/Write)
BD	41	nviBO9	Command for output BO9(Read/Write)
BD	47	nvoBO5	Value output for BO5 used for Emg Heat (Read Only)
BD	48	nvoBO9	Value output for BO9 (Read Only)
BD	44	nviDehumEna.State	Dehumidification command-like a Humidistat (Read/Write)

FX10 Controller (optional) cont.

Some Cool Heading - LonWorks

LonWorks						Point Description
LonWorks Name	SNVT Type	SNVT Index	SCPT Reference	SCPT Index	UCPT Index	
nciSetpoints	SNVT_temp_setpt	106	SCPTsetPnts	60		Occupied Cooling Setpoint Input (Read/Write)
						Standby Cooling Setpoint Input (Read/Write)
						Unoccupied Cooling Setpoint Input (Read/Write)
						Occupied Heating Setpoint Input (Read/Write)
						Standby Heating Setpoint Input (Read/Write)
						Unoccupied Heating Setpoint Input (Read/Write)
nciMinClgSetpt	SNVT_temp_p	105			4	Minimum Cooling Setpoint Input (Read/Write)
nciMaxHtgSetpt	SNVT_temp_p	105			3	Maximum Heating Setpoint Input (Read/Write)
nvoSpaceTemp	SNVT_temp_p	105				Space or Zone Temperature Value (Read Only)
nvoDischAirTemp	SNVT_temp_p	105				Discharge Air Temp Field Supplied Only (Read Only)
nvoEffClgSetpt	SNVT_temp_p	105				Effective Cooling Setpoint Value (Read Only)
nviSpaceTemp	SNVT_temp_p	105				Space or Zone Temperature Value Override(Write)
nvoEffHtgSetpt	SNVT_temp_p	105				Effective Heating Setpoint Value (Read Only)
nciAux5LevP	SNVT_lev_percent	81				Dehumidification Setpoint (Read/Write)
nciAux1Temp	SNVT_temp_p	105			147	Heating Freeze Protection Temperature Setpoint Value (Read/Write)
nciAux2Temp	SNVT_temp_p	105			148	Heating Freeze Protection Temperature Setpoint Value (Read/Write)
nvoUnitStatus	SNVT_hvac_type	112				1st Stage Compressor Heating Output (Read Only)
						1st Stage Compressor Cooling Output (Read Only)
						Fan Output (Read Only)
						Unit Mode of Operation (Read Only)
						Unit Alarm mode (Read Only)
nciPropBand	SNVT_temp_diff_p	147			177	Heating/Cooling Prop Band Input (Read/Write)
nciRemoteSetptMin	SNVT_temp_diff_p	147			98	Warm/Cool Adjust Span (Read/Write)
nciRemoteSetptMax	SNVT_temp_diff_p	147			97	Warm/Cool Adjust Offset Value (Read/Write)
nciTempOffset	SNVT_temp_diff_p	147			11	Space or Zone Temperature Sensor Calibration Input (Read/Write)
nviSetpoint	SNVT_temp_p	105				General Setpoint Input (Read/Write)
nvoHtgFrzPro1Tmp	SNVT_temp_p	105				Heating Freeze Protection Temperature Value (Read Only)
nvoHtgFrzSetpt	SNVT_temp_p	105				Heating Freeze Protection Temperature Setpoint Value (Read Only)
nvoAlarms	SNVT_lev_cont	21				Alarms Enumerated [0=no alarms, 1=condensate alarm, 2=Compressor Hi Discharge Pressure alarm, 3=Compressor low Suction Pressure alarm, 4=Freeze protection alarm, 8=Faulty Freeze Sensor alarm, 9=Loss of Charge]
						(Read Only)
						ECM PWM Control signal value (Read Only)
						ECM PWM Control signal override (Read/Write)
						Space Humidity value (Read Only)
						Spare PWM Output AO2 Command (Write)
						Spare PWM Output AO2 Value (Read Only)
						Temporary Occupancy Time Period Input (Read/Write)
						Effective Occupancy State (Read Only)
						Occupancy Override Command Input (Read/Write)
nciBypassTime	SNVT_time_min	123	SCPTbypassTime	34		Emergency Override Input (Read/Write)
nvoEffectOccup	SNVT_occupancy	109				Fan Output Status (Read Only)
nviOccManCmd	SNVT_occupancy	109				Accessory 2 Output Status (Read Only)
nviEmergOverride	SNVT_hvac_emerg	103				Accessory 1 Output Status (Read Only)
nvoFanStatus	SNVT_lev_disc	22				Alarm Output Status (Read Only)
nvoAccStatus	SNVT_lev_disc	22				Alarm Reset Input (Read/Write)
nvoLP_VVStatus	SNVT_lev_disc	22				Network equivalent of a thermostatic 'G' call. (Write)
nvoAlarmStatus	SNVT_lev_disc	22				Network equivalent of a thermostatic 'Y1' call. (Write)
nviAlarmReset	SNVT_lev_disc	22				Network equivalent of a thermostatic 'Y2' call. (Write)
nviFanSpeedCmd.State	SNVT_switch	95				Reversing Valve Output Status (Read Only)
nviComprEnable.State	SNVT_switch	95				Occupancy Supervisory Scheduler Command Input (Read/Write)
nviComprEnable.State	SNVT_switch	95				Compressor/Fan Proving Switch Status (Read Only)
nvoRV1Status	SNVT_lev_disc	22				Dirty Filter Switch Status (Read Only)
nviOccSchedule	SNVT_tod_event	128				Compressor Hi Capacity Command Status (Read Only)
nvoCompFanProv	SNVT_lev_disc	22				Command for output BO5 used for Emg Heat-Interlocked with Fan DP9Read/Write)
nvoDirtyFilter	SNVT_lev_disc	22				Command for output BO9(Read/Write)
nvoComp2Status	SNVT_lev_disc	22				Value output for BO5 used for Emg Heat (Read Only)
nviBO5	SNVT_lev_disc	22				Value output for BO9 (Read Only)
nviBO9	SNVT_lev_disc	22				Dehumidification command-like a Humidistat (Read/Write)
nvoBO5	SNVT_lev_disc	22				
nvoBO9	SNVT_lev_disc	22				
nviDehumEna.State	SNVT_lev_disc	22				

FX10 Controller (optional) cont.

Some Cool Heading - BACNet

Object Identifier		BACnet Property			Full Reference	Point Description
Object Type	Type Enumeration	Instance	Name	Enumeration		
Analog Value	2	1	Present_Value	85	WF##### Occupied Cool.Present_Value	Occupied Cooling Setpoint Input (Read/Write)
						Standby Cooling Setpoint Input (Read/Write)
Analog Value	2	2	Present_Value	85	WF##### Unoccupied Cool.Present_Value	Unoccupied Cooling Setpoint Input (Read/Write)
Analog Value	2	3	Present_Value	85	WF##### Occupied Heat.Present_Value	Occupied Heating Setpoint Input (Read/Write)
						Standby Heating Setpoint Input (Read/Write)
Analog Value	2	4	Present_Value	85	WF##### Unoccupied Heat.Present_Value	Unoccupied Heating Setpoint Input (Read/Write)
						Minimum Cooling Setpoint Input (Read/Write)
						Maximum Heating Setpoint Input (Read/Write)
						Space or Zone Temperature Value (Read Only)
Analog Input	0	1	Present_Value	85	WF##### Space Temp.Present_Value	Space or Zone Temperature Value (Read Only)
Analog Input	0	2	Present_Value	85	WF##### Discharge Air Temp.Present_Value	Discharge Air Temp Field Supplied Only (Read Only)
Analog Input	0	3	Present_Value	85	WF##### Effective Clg Setpt.Present_Value	Effective Cooling Setpoint Value (Read Only)
Analog Output	1	4	Present_Value	85	WF##### Space temp Ovrd.Present_Value	Space or Zone Temperature Value Override(Write)
Analog Input	0	4	Present_Value	85	WF##### Effective Htg Setpt.Present_Value	Effective Heating Setpoint Value (Read Only)
Analog Value	2	9	Present_Value	85	WF##### Dehumidify Setpt.Present_Value	Dehumidification Setpoint (Read/Write)
Analog Value	2	10	Present_Value	85	WF##### Low Temp Limit Adj.Present_Value	Heating Freeze Protection Temperature Setpoint Value (Read/Write)
						Heating Freeze Protection Temperature Setpoint Value (Read/Write)
						1st Stage Compressor Heating Output (Read Only)
						1st Stage Compressor Cooling Output (Read Only)
						Fan Output (Read Only)
Multistate Input	13	2	Present_Value	85	WF##### Mode.Present_Value	Unit Mode of Operation (Read Only)
						Unit Alarm mode (Read Only)
						Heating/Cooling Prop Band Input (Read/Write)
Analog Value	2	6	Present_Value	85	WF##### Remote Setpt Span.Present_Value	Warm/Cool Adjust Span (Read/Write)
Analog Value	2	7	Present_Value	85	WF##### Remote Setpt Bias.Present_Value	Warm/Cool Adjust Offset Value (Read/Write)
Analog Value	2	8	Present_Value	85	WF##### Space Temp Offset.Present_Value	Space or Zone Temperature Sensor Calibration Input (Read/Write)
Analog Output	1	1	Present_Value	85	WF##### General Setpoint.Present_Value	General Setpoint Input (Read/Write)
Analog Input	0	6	Present_Value	85	WF##### Heating Freeze Protection Temperature Value	Heating Freeze Protection Temperature Value (Read Only)
Analog Input	0	7	Present_Value	85	WF##### Heating Freeze Protection Temperature Setpoint Value	Heating Freeze Protection Temperature Setpoint Value (Read Only)
						Alarms Enumerated [0=no alarms, 1=condensate alarm, 2=Compressor Hi Discharge Pressure alarm, 3=Compressor low Suction Pressure alarm, 4=Freeze protection alarm, 8=Faulty Freeze Sensor alarm, 9=Loss of Charge]
Analog Input	0	9	Present_Value	85	WF##### Alarms Enumerated.Present_Value	(Read Only)
Analog Input	0	8	Present_Value	85	WF##### ECM PWM Control signal value	ECM PWM Control signal value (Read Only)
Analog Output	1	2	Present_Value	85	WF##### ECM Cmd Output.Present_Value	ECM PWM Control signal Override (Read/Write)
Analog Input	0	5	Present_Value	85	WF##### Space Humidity.Present_Value	Space Humidity value (Read Only)
Analog Output	1	3	Present_Value	85	WF##### Spare PWM Output AO2 Command	Spare PWM Output AO2 Command (Write)
Analog Input	0	10	Present_Value	85	WF##### Spare PWM Output AO2 Value	Spare PWM Output AO2 Value (Read Only)
Analog Value	2	5	Present_Value	85	WF##### Temporary Occ Time.Present_Value	Temporary Occupancy Time Period Input (Read/Write)
Multistate Input	13	1	Present_Value	85	WF##### Effective Occupancy.Present_Value	Effective Occupancy State (Read Only)
Multistate Output	14	1	Present_Value	85	WF##### Occupancy Command.Present_Value	Occupancy Override Command Input (Read/Write)
Multistate Output	14	6	Present_Value	85	WF##### Emergency Override.Present_Value	Emergency Override Input (Read/Write)
Binary Input	3	1	Present_Value	85	WF##### Fan Cmd Status.Present_Value	Fan Output Status (Read Only)
Binary Input	3	6	Present_Value	85	WF##### Accessory 2 Output.Present_Value	Accessory 2 Output Status (Read Only)
Binary Input	3	5	Present_Value	85	WF##### Accessory 1 Output.Present_Value	Accessory 1 Output Status (Read Only)
Binary Input	3	8	Present_Value	85	WF##### Alarm Status.Present_Value	Alarm Output Status (Read Only)
Multistate Output	14	7	Present_Value	85	WF##### Alarm Reset.Present_Value	Alarm Reset Input (Read/Write)
Multistate Output	14	2	Present_Value	85	WF##### Network equivalent of a thermostatic 'G' call.	Network equivalent of a thermostatic 'G' call. (Write)
Multistate Output	14	3	Present_Value	85	WF##### Network equivalent of a thermostatic 'Y1' call.	Network equivalent of a thermostatic 'Y1' call. (Write)
Multistate Output	14	3	Present_Value	85	WF##### Network equivalent of a thermostatic 'Y2' call.	Network equivalent of a thermostatic 'Y2' call. (Write)
Binary Input	3	4	Present_Value	85	WF##### Reversing Valve Output Status	Reversing Valve Output Status (Read Only)
						Occupancy Supervisory Scheduler Command Input (Read/Write)
						Compressor/Fan Proving Switch Status (Read Only)
Binary Input	3	7	Present_Value	85	WF##### Dirty Filter (BI-12).Present_Value	Dirty Filter Switch Status (Read Only)
Binary Input	3	3	Present_Value	85	WF##### Compressor Hi Capacity Cmd.Present_Value	Compressor Hi Capacity Command Status (Read Only)
Multistate Output	14	8	Present_Value	85	WF##### Command for output BO5 used for Emg Heat-Interlocked with Fan DP9	Command for output BO5 used for Emg Heat-Interlocked with Fan DP9(Read/Write)
Multistate Output	14	9	Present_Value	85	WF##### Command for output BO9	Command for output BO9(Read/Write)
Binary Input	3	9	Present_Value	85	WF##### Value output for BO5 used for Emg Heat	Value output for BO5 used for Emg Heat (Read Only)
Binary Input	3	10	Present_Value	85	WF##### Value output for BO9	Value output for BO9 (Read Only)
Multistate Output	14	10	Present_Value	85	WF##### Dehumidification command-like a Humidistat	Dehumidification command-like a Humidistat (Read/Write)

FX10 Controller (optional) cont.

ECO-Z BACnet Variables

The variables will be listed with the point type and instance preceding the variable name.

Analog Input (Type 0)

- 0:1 Space Temp**
[Read only, shows the space temperature]
- 0:2 Discharge Air Temp**
[Read only, field mounted sensor unless supplied as a factory special]
- 0:3 Effective Clg Setpt**
[Read only, shows the active cooling setpoint]
- 0:4 Effective Htg Setpt**
[Read only, shows the active heating setpoint]
- 0:5 Space Humidity**
[Read]
- 0:6 Water Coil Temp**
[Read, shows the refrigerant temperature at its coldest, for predictive freeze condition detection]
- 0:7 Low Temp Limit**
[Read, shows the water coil low temp limit that will result in unit shutdown.]
- 0:8 ECM2.3 Cmd Output**
[Read, shows the commanded speed (0-100%) of the ECM2.3 Blower]
- 0:9 Alarms Enumerated**
[Read only, 0=no alarms, 1=condensate alarm, 2=Compressor Hi Discharge Pressure alarm, 3=Compressor low Suction Pressure alarm, 4=Freeze protection alarm, 8=Faulty Freeze alarm, 9=Loss of Charge] Sensor
- 0:10 AO2 Value**
[Read, shows the output value (0-100%) of AO2]

Analog Output (Type 1)

- 1:1 Space Setpoint**
[Write, Raise and lower the heating and cooling setpoints from a single command point (volatile, reverts to 'uncommanded' after power outage).]
- 1:2 ECM2.3 Blower Ovrd**
[Write, allows network direct control of the ECM2.3 blower speed (volatile, reverts to 'uncommanded' after power outage)]
- 1:3 AO2 Override**
[Write, allows network direct control of the Analog Output 2, volatile, reverts to 'uncommanded' after power outage)]
- 1:4 Space temp Ovrd**
[Write, allows the network to send space temperature values to the heat pump controller, volatile, these will supersede any temperature sensor connected to the space temperature Analog Input.]

Analog Value (Type 2)

- 2:1 Occupied Cool**
[Write, Cooling setpoint in Occupied mode]
- 2:2 Unoccupied Cool**
[Write, Cooling setpoint in Unoccupied mode]
- 2:3 Occupied Heat**
[Write, Heating setpoint in Occupied mode]
- 2:4 Unoccupied Heat**
[Write, Heating setpoint in Unoccupied mode]
- 2:5 Temporary Occ Time**
[Write, set the duration of the temporary occupancy timer which is initiated by pressing the button on the zone sensor]
- 2:6 Remote Setpt Span**
[Write, sets the offset range that the setpoint knob on the zone sensor may apply to the effective Htg/ Clg setpoints]
- 2:7 Remote Setpt Bias**
[Write, biases the entire readjust range of the remote setpoint adjust to allow zeroing from the network.]
- 2:8 Space Temp Offset**
[Write, Adds an offset to the Space Temp value for calibration]
- 2:9 Dehumidify Setpt**
[Write, sets the humidity value that will cause the heat pump to enter passive dehumidification]
- 2:10 Low Temp Limit Adj**
[Write, sets the low water coil temperature limit for shutdown]

Binary Input (Type 3)

- 3:1 Blower Cmd Status**
[Read, show the commanded condition of the Blower Output, Inactive=Off, Active=On]
- 3:2 Comp Cmd Status**
[Read, show the commanded condition of the Compressor Output, Inactive=Off, Active=On]
- 3:3 Comp Hi Capacity Cmd**
[Read, show the commanded condition of the 'Hi Capacity' Compressor control, Inactive=Off, Active=On.]
- 3:4 Reversing Valve**
[Read, show the commanded condition of the Reversing Valve Output, Inactive =Heating, Active =Cooling]
- 3:5 Accessory 1 Output**
[Read, Shows the commanded value of the X1 (Accessory
- 3:8 Alarm Status**
[Read, shows the in alarm/out of alarm status, Inactive=Off, Active=On]
- 3:9 BO5 Output**

FX10 Controller (optional) cont.

ECO-Z BACnet Variables

[Read, shows the BO5 (electric heat) output value,
Inactive=Off, Active=On]

3:10 BO9 Output

[Read, shows the BO9 output value, Inactive=Off,
Active=On]

Multistate Input (Type 13)

13:1 Effective Occupancy

[Read, show the prevailing occupancy status of
the heatpump 1=Occupied, 2=Unoccupied,
3=Bypass, 255=Invalid]

13:2 Mode Status

[Read, Shows unit status as Auto or Shutdown,
1=Auto, 7=Shutdown]

Multistate Output (Type 14)

14:1 Occupancy Command

[Write, Control the occupancy mode of the
heatpump. 1=Occupied, 2=Unoccupied, 3=Bypass,
255=Invalid]

14:2 Blower Command (G)

[Write, allows a network command equivalent of
a thermostatic 'G' call]

14:3 Compressor Cmd (Y1)

[Write, allows a network command equivalent of a
thermostatic 'Y1' call]

14:4 Compressor Cmd (Y2)

[Write, allows a network command equivalent of a
thermostatic 'Y2' call]

14:5 Reversing Vlv Cmd (O)

[Write, allows a network command equivalent of a
thermostatic 'O' call]

14:6 Emergency Override

[Write, provide rapid shutdown of the heatpump
for fire, etc. 1=Normal, 5=Shutdown]

14:7 Alarm Reset

[Write, Reset lock-out 'manual reset' alarms. Alarm
conditions must be cleared before a reset can
succeed. This variable should be commanded
'On' for 20 seconds, then returned to the 'Off'
condition. 1=Off, 2=On]

14:8 Emergency Heat BO5

[Write, allows a network command for emergency
heat, also allows the network to stop automatic
emergency heat.]

14:9 BO9

[Write, allow network control of spare output BO9.
1 = Off, 2=On.]

14:10 Dehum Cmd

Unit Startup

Before Powering Unit, Check The Following:

NOTE: Remove and discard the compressor shipping bolts. The bolts can then be discarded.

- High voltage is correct and matches nameplate.
- Fuses, breakers and wire size correct.
- Low voltage wiring complete.
- Piping completed and water system cleaned and flushed.
- Air is purged from closed loop system.
- Isolation valves are open, water control valves or loop pumps wired.
- Condensate line open and correctly pitched.
- Transformer switched to 208V if applicable.
- Dip switches are set correctly.
- Blower rotates freely – foam shipping support has been removed.
- Blower speed correct.
- Air filter/cleaner is clean and in position.
- Service/access panels are in place.
- Return air temperature is between 50-80°F heating and 60-95°F cooling.
- Check air coil cleanliness to insure optimum performance. Clean as needed according to maintenance guidelines. To obtain maximum performance the air coil should be cleaned before startup. A 10-percent solution of dishwasher detergent and water is recommended for both sides of coil, a thorough water rinse should follow.

Startup Steps

NOTE: Complete the Equipment Start-Up/Commissioning Check Sheet during this procedure. Refer to thermostat operating instructions and complete the startup procedure.

1. Initiate a control signal to energize the blower motor. Check blower operation.
2. Initiate a control signal to place the unit in the cooling mode. Cooling setpoint must be set below room temperature.
3. Cooling will energize after a time delay. Check for correct rotation of scroll compressors in 3 phase applications. Incorrect rotation will cause low refrigerant pressures and possibly unusual noise. Switch any two power leads at the compressor or contactor to reverse rotation.
4. Be sure that the compressor and water control valve or loop pump(s) are activated.
5. Verify that the water flow rate is correct by measuring the pressure drop through the heat exchanger using the P/T plugs and comparing to the pressure drop table.
6. Check the temperature of both the supply and discharge water (Refer to Unit Operating Parameters tables).
7. Check for an air temperature drop of 15°F to 25°F across the air coil, depending on the blower speed and entering water temperature.
8. Decrease the cooling set point several degrees and verify high-speed blower operation (ECM2.3 only).
9. Adjust the cooling setpoint above the room temperature and verify that the compressor and water valve or loop pumps deactivate.
10. Initiate a control signal to place the unit in the heating mode. Heating set point must be set above room temperature.
11. Heating will energize after a time delay.
12. Check the temperature of both the supply and discharge water (Refer to Unit Operating Parameters tables).
13. Check for an air temperature rise of 20°F to 35°F across the air coil, depending on the blower speed and entering water temperature.
14. If auxiliary electric heaters are installed, increase the heating setpoint until the electric heat banks are sequenced on. All stages of the auxiliary heater should be sequenced on when the thermostat is in the Emergency Heat mode. Check amperage of each element.
15. Adjust the heating setpoint below room temperature and verify that the compressor and water valve or loop pumps deactivate.
16. During all testing, check for excessive vibration, noise or water leaks. Correct or repair as required.
17. Set system to desired normal operating mode and set temperature to maintain desired comfort level.
18. Instruct the owner/operator in the proper operation of the thermostat and system maintenance.

NOTE: Be certain to fill out and forward all warranty registration papers.

Operating Parameters

Entering Water Temp °F	Water Flow GPM/Ton	Cooling -- No Hot Water Generation					
		Suction Pressure PSIG	Discharge Pressure PSIG	Superheat	Subcooling	Water Temp Rise °F	Air Temp Drop °F DB
30	1.5	100-115	170-190	17 - 26	10 - 14	18 - 22	18 - 22
	3.0	95-110	150-170	20 - 29	7 - 11	8 - 10	18 - 22
50	1.5	133 - 148	205 - 225	17 - 26	10 - 14	18 - 22	18 - 22
	3.0	129 - 144	185 - 205	20 - 29	7 - 11	8 - 10	18 - 22
70	1.5	139 - 154	280 - 300	8 - 11	8 -12	18 - 22	18 - 22
	3.0	137 - 152	250 - 270	9 - 12	7 - 11	8 - 10	18 - 22
90	1.5	143 - 158	360 - 380	8 - 11	9 - 13	18 - 22	16 - 20
	3.0	141 - 156	330 - 350	9 - 12	8 - 12	8 - 10	16 - 20
110	2.3	143 - 158	360 - 380	8 - 11	9 - 13	18 - 22	16 - 20
	3.0	141 - 156	440-460	9 - 12	8 - 12	8 - 10	16 - 20

Entering Water Temp °F	Water Flow GPM/Ton	Heating -- No Hot Water Generation					
		Suction Pressure PSIG	Discharge Pres- sure PSIG	Superheat	Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	73 - 79	279 - 304	7 - 13	2 - 6	7 -10	18 - 24
	3.0	79 - 85	285 - 310	8 - 14	2 - 6	3 - 6	20 - 26
50	1.5	103 - 109	308 - 333	8 - 12	4 - 8	8 - 11	20 - 26
	3.0	110 - 116	315 - 340	9 - 13	4 - 8	4 - 7	22 - 28
70	1.5	140 - 146	330 - 365	10 - 14	7 - 11	11 - 14	26 - 32
	3.0	146 - 153	340 - 375	10 - 14	7 - 11	7 - 10	28 - 34
90	1.5	170-177	425-460	14-18	12-16	8-11	42-50
	3.0	174-181	435-470	14-18	12-16	8-11	42-50
110	2.3						
	3.0						

NOTES: Cooling performance based on entering air temperatures of 80°F DB, 67°F WB.
Heating performance based on entering air temperature of 70°F DB.

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Operating Limits

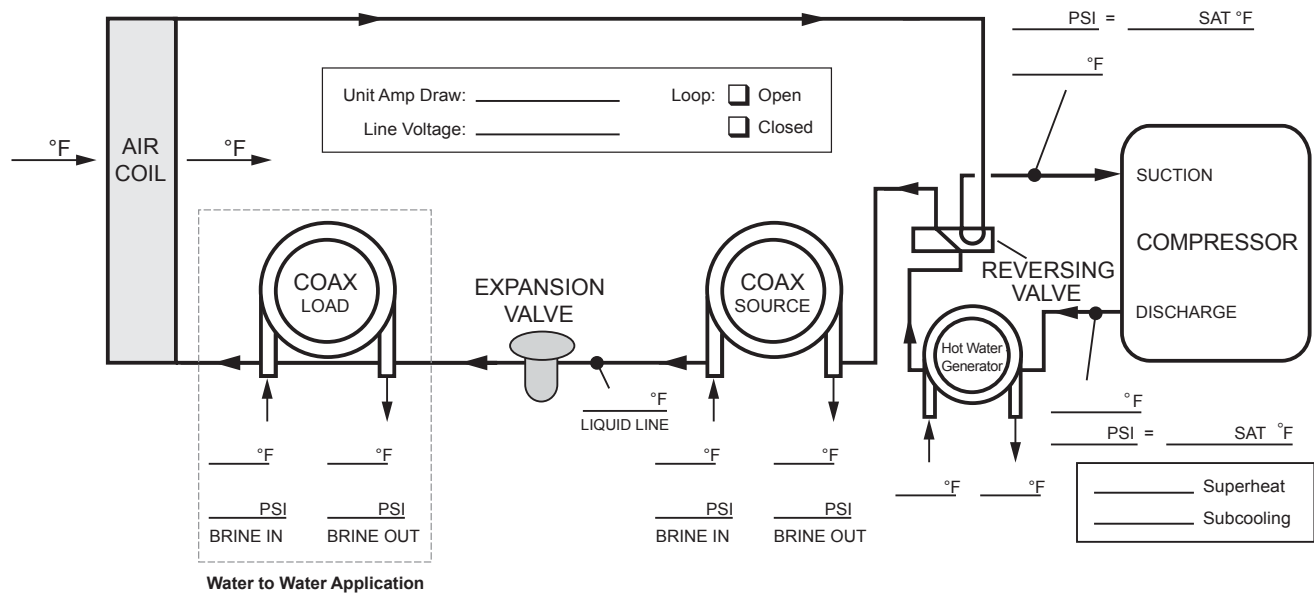
Operating Limits	Cooling		Heating	
	(°F)	(°C)	(°F)	(°C)
Air Limits				
Min. Ambient Air	45	7.2	45	7.2
Rated Ambient Air	80	26.7	70	21.1
Max. Ambient Air	100	37.8	85	29.4
Min. Entering Air	50	10.0	40	4.4
Rated Entering Air db/wb	80.6/66.2	27/19	68	20.0
Max. Entering Air db/wb	110/83	43/28.3	80	26.7
Water 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.

DEALER: _____
 PHONE #: _____ DATE: _____
 PROBLEM: _____
 MODEL #: _____
 SERIAL #: _____

Startup/Troubleshooting Form

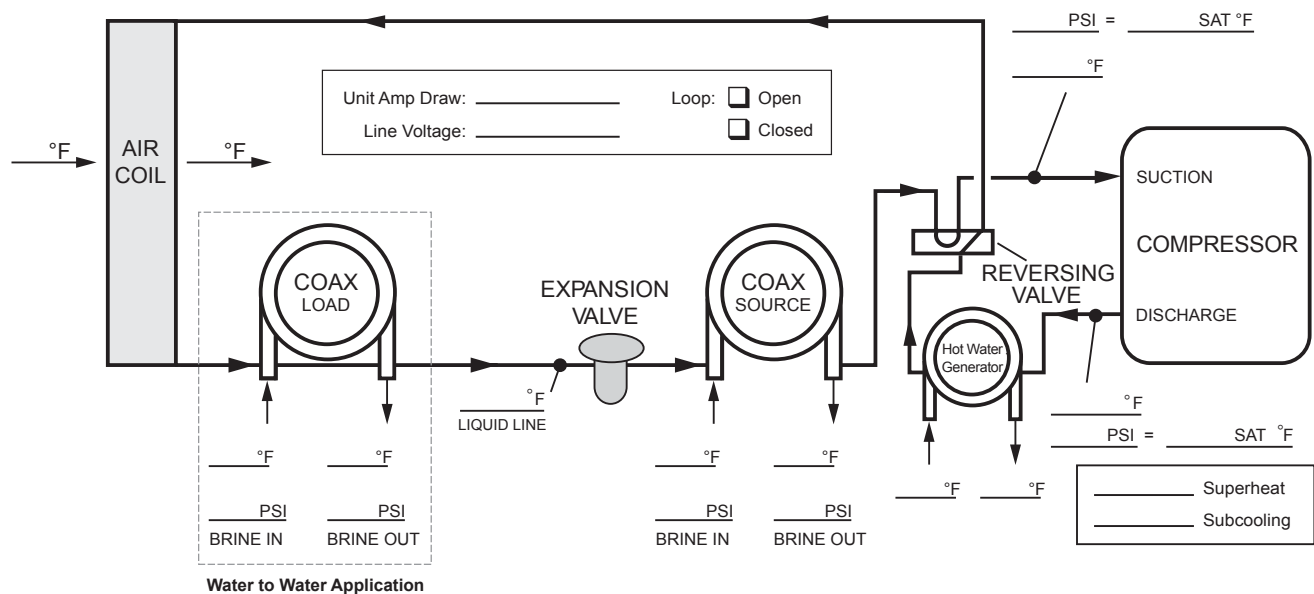
COOLING CYCLE ANALYSIS



$$\text{Heat of Extraction/Rejection} = \text{GPM} \times 500 \text{ (485 for water/antifreeze)} \times \Delta T$$

Note: DO NOT hook up pressure gauges unless there appears to be a performance problem.

HEATING CYCLE ANALYSIS



Pressure Drop

Model	GPM	Pressure Drop (psi)				
		30°F	50°F	70°F	90°F	110°F
009	1.5	2.0	1.7	1.4	1.3	1.0
	2.0	3.8	3.2	2.8	2.3	1.8
	3.0	7.2	6.0	5.1	4.5	4.0
	4.0	12.0	10.0	9.0	7.5	6.0
012	1.5	1.1	1.0	0.9	0.8	0.7
	2.5	2.5	2.3	2.1	1.8	1.5
	3.5	3.9	3.6	3.2	2.7	2.3
	4.5	5.3	4.9	4.5	3.8	3.5
015	2.0	0.6	0.5	0.5	0.4	0.4
	3.0	1.1	1.0	0.9	0.8	0.6
	4.0	1.9	1.8	1.6	1.5	1.3
	5.0	3.3	3.2	3.0	2.9	2.7
018	3.0	1.1	1.0	0.9	0.8	0.6
	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
024	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
030	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
036	5.0	1.4	1.1	0.9	0.7	0.5
	7.0	2.5	2.3	2.1	1.8	1.6
	9.0	6.0	5.8	5.5	5.3	5.1
	12.0	6.6	6.4	6.2	6.0	5.7
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
042	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
048	6.0	2.8	2.6	2.4	2.2	2.0
	9.0	6.5	6.3	6.0	5.8	5.5
	12.0	10.2	9.9	9.6	9.3	9.0
	16.0	12.9	12.6	12.2	11.8	11.4
060	9.0	4.1	3.8	3.6	3.4	3.1
	12.0	7.1	6.7	6.3	5.9	5.6
	15.0	9.6	9.2	8.9	8.6	8.3
	20.0	15.5	14.5	13.3	12.0	10.7
070	12.0	4.0	3.6	3.2	3.0	2.7
	15.0	6.4	6.0	5.6	5.2	4.8
	18.0	8.8	8.4	7.9	7.5	7.1
	24.0	13.6	13.2	12.6	12.0	11.5

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Valve	GPM	Cv	Pressure Drop (psi)
1/2 in.	1.5	9.6	0.02
	2.0	9.7	0.04
	3.0	9.9	0.09
	4.0	10.1	0.16
1/2 in.	1.5	9.6	0.02
	2.5	9.8	0.06
	3.5	10.0	0.12
	4.5	10.2	0.19
1/2 in.	2.0	9.7	0.04
	3.0	9.9	0.09
	4.0	10.1	0.16
	5.0	10.4	0.23
1/2 in.	3.0	9.9	0.09
	4.0	10.1	0.16
	5.0	10.4	0.23
	6.0	10.6	0.32
3/4 in.	3.0	9.9	0.09
	4.5	10.2	0.19
	6.0	10.6	0.32
	8.0	11.0	0.53
3/4 in.	3.0	9.9	0.09
	4.5	10.2	0.19
	6.0	10.6	0.32
	8.0	11.0	0.53
3/4 in.	4.0	10.1	0.16
	6.0	10.6	0.32
	8.0	11.0	0.53
	10.0	11.5	0.76
3/4 in.	5.0	10.4	0.23
	7.0	10.8	0.42
	9.0	11.2	0.64
	12.0	11.9	1.02
3/4 in.	5.0	10.4	0.23
	8.0	11.0	0.53
	11.0	11.7	0.89
	14.0	12.3	1.29
1 in.	5.0	15.9	0.10
	8.0	16.6	0.23
	11.0	17.2	0.41
	14.0	17.9	0.61
1 in.	6.0	16.1	0.14
	9.0	16.8	0.29
	12.0	17.4	0.47
	16.0	18.3	0.76
1 in.	9.0	16.8	0.29
	12.0	17.4	0.47
	15.0	18.1	0.69
	20.0	19.2	1.09
1 in.	12.0	17.4	0.47
	15.0	18.1	0.69
	18.0	18.7	0.92
	24.0	20.1	1.43

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Service Parts

Part Description	Single Speed Vertical Units											
	009	012	015	018	024	030	036	041	042	048	060	070
Compressor												
208-230/60/1	34P590-01	34P591-01	34P592-01	34P593-01	34P624-01	34P583-01	34P625-01	34P621-01	34P621-01	34P623-01	34P613-01	34P616-01
265/60/1	34P590-02	34P591-02	34P592-02	34P593-02	34P624-02	34P583-02	Not Available					
230/60/3	Not Available				34P626-03	34P583-03	34P625-03	34P621-03	34P621-03	34P623-03	34P613-03	34P616-03
460/60/3	Not Available				34P626-04	34P583-04	34P625-04	34P621-04	34P621-04	34P623-04	34P613-04	34P616-04
575/60/3	Not Available							34P621-05	34P621-05	34P623-05	34P613-05	34P616-05
Run Capacitor 208-230/60/1	16P002D17	16P002D18	16P002D19	16P002D19	16P002D19	16P002D20	16P002D21	16P002D35	16P002D35	16P002D23	16P002D25	16P002D24
Run Capacitor 265/60/1	16P002D27	16P002D27	16P002D30	16P002D30	16P002D20	16P002D20	Not Available					
Sound Jacket	92P504A01				92P504A05						92P519-02	
ECM2.3 Motor & Blower												
208-230/60/1	Not Available		14P515B01					14P516B01			14P517B01	
265/60/1	Not Available		14P515B03				Not Available					
230/60/3	Not Available				14P515B01				14P506B01		14P517B01	
460/60/3	Not Available				14P515B03				14P516B03		14P517B03	
ECM2.3 Blower Housing	Not Available		53P512B01					53P517-02	53P515B01			
PSC Motor & Blower												
208-230/60/1	14P506-02		14P507B01		14P508B01	14P509B01	14P510B01	14P511B01	14P511B01	14P512B01	14P514B01	
265/60/1	14P506-02		14P507B02		14P508B02	14P510B02	Not Available					
230/60/3	Not Available				14P508B01	14P509B01	14P510B01	14P511B01	14P511B01	14P512B01	14P514B01	
460/60/3	Not Available				Not Available		14P510B03	14P511B02	14P511B02	14P512B02	14P514B02	
575/60/3	Not Available				Not Available			14P511B03	14P511B03	14P512B03	14P514B03	
Refrigeration Components												
Air Coil	61P570-01		61P569-01		61P503C01		61P548-01		61P505C01		61P506C01	61P507C01
Coax	62P570-01	62P571-01	62P572-01			62P566-01	62P568-01			62P534-04	62P535-04	62P543-04
TXV	33P613-01		33P605-16			33P605-02		33P605-10			33P608-10	33P605-13
Reversing Valve	33P502-05		33P505-04			33P506-04			33P503-05			33P526-04
Filter Dryer	36P500B01											36P508B02
Hot Water Generation												
Hot Water Generation	Not Available			62P516-05					62P516-03			
Control												
GeoStart	Not Available				IS60S					IS60L		
Transformer 208-230/60/1	15P501B01											
Transformer 265/60/1	15P507B01						Not Available					
Transformer 230/60/3	Not Available				15P501B01							
Transformer 460/60/3	Not Available				15P505B01							
Transformer 575/60/3	Not Available								15P506B01			
Phase Guard	Not Available				19P541A06							
Sensors & Safeties												
High Pressure Switch						35P506B02						
Low Pressure Switch						35P506B01						

NOTE: Part numbers subject to change.

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Service Parts cont.

Part Description	Single Speed Horizontal Units												
	009	012	015	018	023	024	030	036	042	048	060	070	
Compressor													
208-230/60/1	34P590-01	34P591-01	34P592-01	34P593-01	34P624-01	34P624-01	34P583-01	34P625-01	34P621-01	34P623-01	34P613-01	34P616-01	
265/60/1	34P590-02	34P591-02	34P592-02	34P593-02	34P624-02	34P624-02	34P583-02	Not Available					
230/60/3	Not Available				34P626-03	34P626-03	34P583-03	34P625-03	34P621-03	34P623-03	34P613-03	34P616-03	
460/60/3	Not Available				34P626-04	34P626-04	34P583-04	34P625-04	34P621-04	34P623-04	34P613-04	34P616-04	
575/60/3	Not Available								34P621-05	34P623-05	34P613-05	34P616-05	
Run Capacitor 208-230/60/1	16P002D17	16P002D18	16P002D19				16P002D20	16P002D21	16P002D35	16P002D23	16P002D25	16P002D24	
Run Capacitor 265/60/1	16P002D27		16P002D30		16P002D20			Not Available					
Sound Jacket	92P504A01				92P504A05							92P519-02	
ECM2.3 Motor & Blower													
208-230/60/1	Not Available		14P515B01						14P516B01		14P517B01		
265/60/1	Not Available		14P515B03					Not Available					
230/60/3	Not Available				14P515B01				14P506B01		14P517B01		
460/60/3	Not Available				14P515B03				14P516B03		14P517B03		
ECM2.3 Blower Housing	Not Available		53P512B01						53P515B01				
PSC Motor & Blower													
208-230/60/1	14P506-02		14P507B01		14P508B01		14P509B01	14P510B01	14P511B01	14P512B01	14P514B01		
265/60/1	14P506-02		14P507B02		14P508B02		14P510B02	Not Available					
230/60/3	Not Available				14P508B01		14P509B01	14P510B01	14P511B01	14P512B01	14P514B01		
460/60/3	Not Available				Not Available			14P510B03	14P511B02	14P512B02	14P514B02		
575/60/3	Not Available				Not Available				14P511B03	14P512B03	14P514B03		
PSC Blower & Housing	53P506B01		53P512B01						53P517-02		53P515B01		
Refrigeration Components													
Air Coil (no coat)	61P535C01		61P568-01			61P509C01		61P510C01	61P511C01		61P512C01	61P513C01	
Coax (Copper)	62P570-01	62P571-01	62P572-01			62P566-01	62P568-01		62P534-04	62P535-04	62P543-04		
TXV	33P613-01		33P605-16			33P605-02	33P605-02	33P605-10		33P608-10	33P605-13		
Reversing Valve	33P502-05		33P505-04			33P506-04			33P503-05		33P526-04		
Filter Dryer	36P500B01											36P508B02	
Controls													
GeoStart	Not Available				IS60S					IS60L			
Transformer 208-230/60/1	15P501B01												
Transformer 265/60/1	15P507B01							Not Available					
Transformer 230/60/3	Not Available				15P501B01								
Transformer 460/60/3	Not Available				15P505B01								
Transformer 575/60/3	Not Available								15P506B01				
Phase Guard	Not Available				19P541A06								
Sensors & Safeties													
High Pressure Switch	35P506B02												
Low Pressure Switch	35P506B01												

NOTE: Part numbers subject to change.

11/10/09

Preventive Maintenance

Water Coil Maintenance

1. Keep all air out of the water. An open loop system should be checked to ensure that the well head is not allowing air to infiltrate the water line. Lines should always be airtight.
2. Keep the system under pressure at all times. It is recommended in open loop systems that the water control valve be placed in the discharge line to prevent loss of pressure during off cycles. Closed loop systems must have positive static pressure.

NOTE: On open loop systems, if the installation is in an area with a known high mineral content (125 PPM or greater) in the water, it is best to establish with the owner a periodic maintenance schedule so the coil can be checked regularly. Should periodic coil cleaning be necessary, use standard coil cleaning procedures which are compatible with either the cupronickel or copper water lines. Generally, the more water flowing through the unit the less chance for scaling.

Other Maintenance

Filters

Filters must be clean to obtain maximum performance. They should be inspected monthly under normal operating conditions and be replaced when necessary. Units should never be operated without a filter.

Condensate Drain

In areas where airborne bacteria produce a slime in the drain pan, it may be necessary to treat chemically to minimize the problem. The condensate drain can pick up lint and dirt, especially with dirty filters. Inspect twice a year to avoid the possibility of overflow.

Blower Motors

Blower motors are equipped with sealed ball bearings and require no periodic oiling.

Hot Water Generator Coil

See Water Coil Maintenance section above.

Air Coil

The air coil must be cleaned to obtain maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum (with a brush attachment) clean. Care must be taken not to damage the aluminum fins while cleaning.



CAUTION: Fin edges are sharp.

Replacement Procedures

Obtaining Parts

When ordering service or replacement parts, refer to the model number and serial number of the unit as stamped on the serial plate attached to the unit. If replacement parts are required, mention the date of installation of the unit and the date of failure, along with an explanation of the malfunctions and a description of the replacement parts required.

In-Warranty Material Return

Material may not be returned except by permission of authorized warranty personnel. Contact your local distributor for warranty return authorization and assistance.

Notes

GEOSMART ENERGY



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GEOSMARTENERGY.COM

Product: **ECO-Z Series**
Type: Geothermal/Water Source Heat Pump
Size: 0.75-6 Ton

Document Type: Installation, Operation & Maintenance Manual
Ref. Number: IM1200AZ1
Revision Date: 02/10
Revision Number: 1
Document Name: TEC-IOM-Z-0210v1