G Series

Water Source/Geothermal Heat Pump

- **Commercial**
- **7-25 Tons**

G Series 7-25 Tons Installation Manual

Installation Information

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Preventive Maintenance

IM1021AG1 06/10

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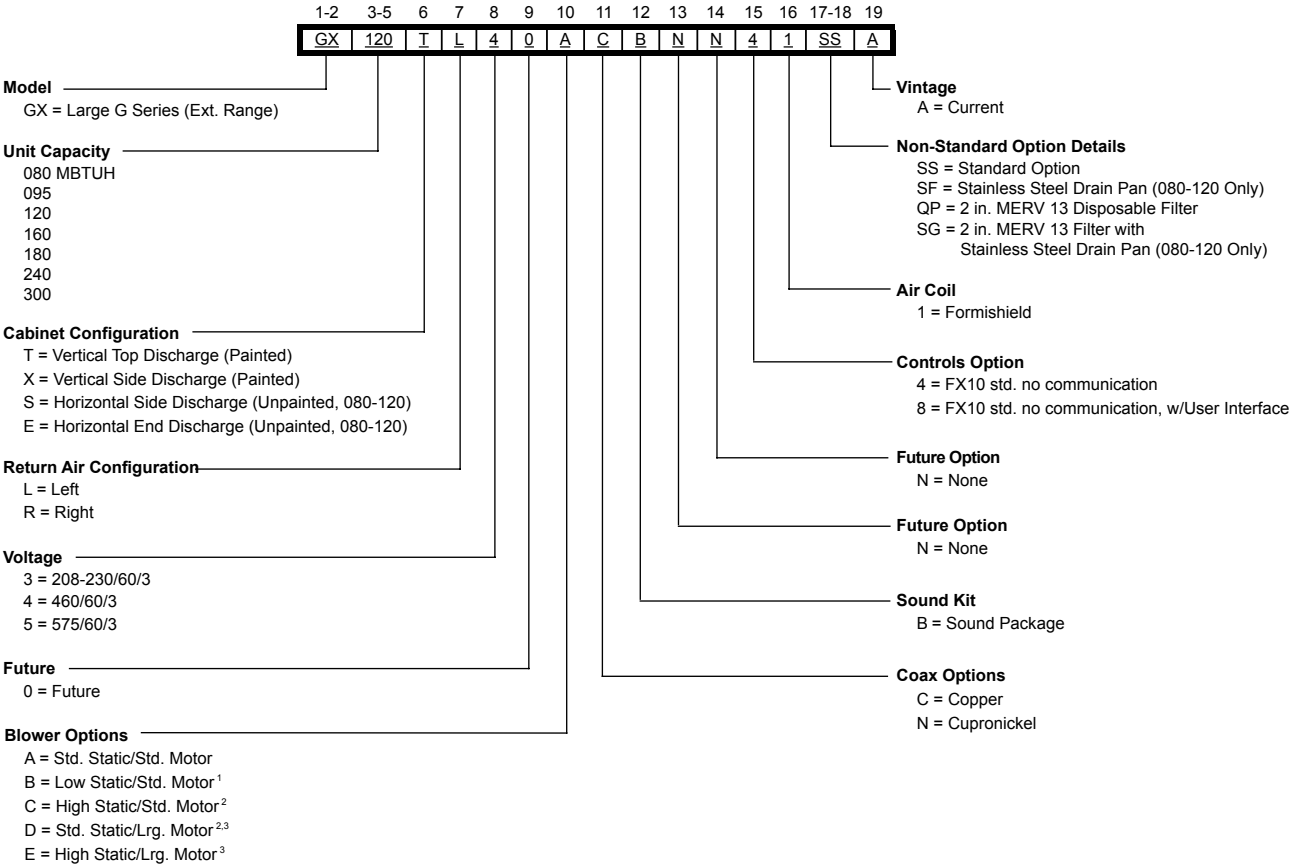
Model Nomenclature



Notes

[1] - Not available on Vertical GX095, Vertical GX180, Horizontal GX080

[2] - Not available on Vertical GX080, Vertical GX160

[3] - Not available on Horizontal GX120, Vertical GX300

[4] - Not available on Vertical GX160-300. Stainless steel is standard on Vertical GX160-300.

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

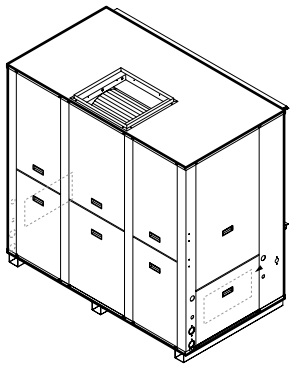
Locate the unit in an indoor area that allows for easy removal of the filter and access panels. Location should have enough space for service personnel to perform maintenance or repair. Provide sufficient room to make water, electrical and duct connection(s). If the unit is located in a confined space, 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 right).

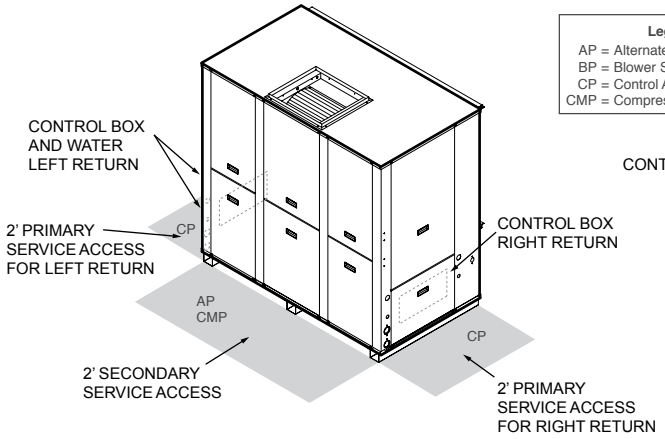
Figure 1: Vertical Unit Mounting
(GX080-300)



Vertical Dimensions

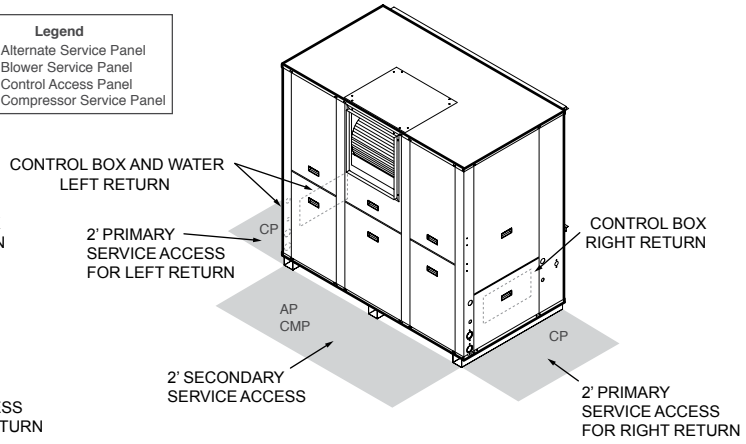
7-10 Tons

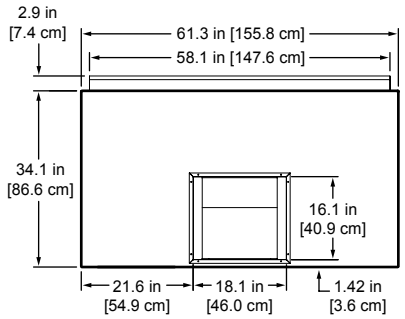
TOP DISCHARGE



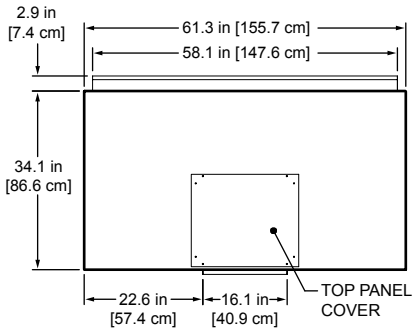
Legend
AP = Alternate Service Panel
BP = Blower Service Panel
CP = Control Access Panel
CMP = Compressor Service Panel

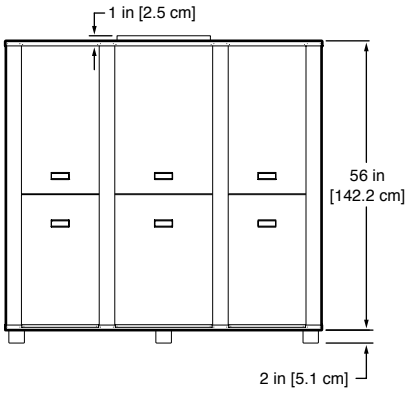
SIDE DISCHARGE



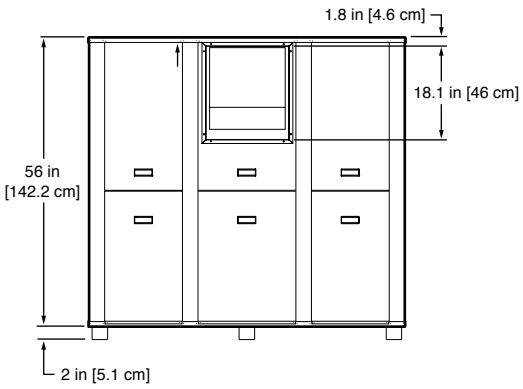


TOP VIEW
Left or Right Return

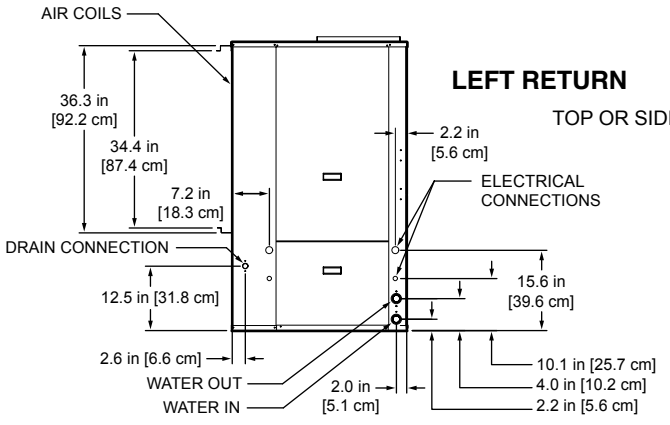




SIDE VIEW
Left or Right Return

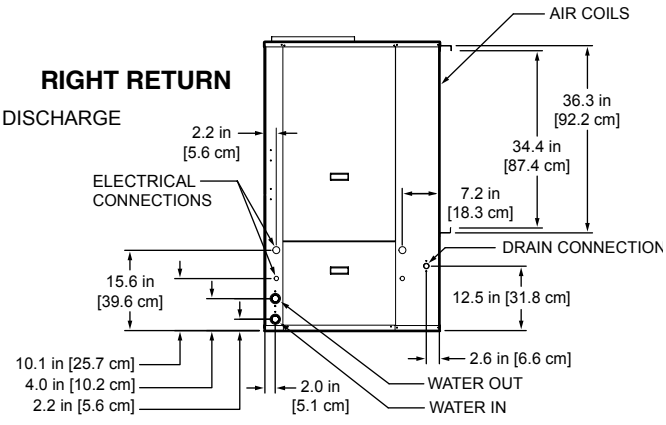


LEFT RETURN



RIGHT RETURN

TOP OR SIDE DISCHARGE



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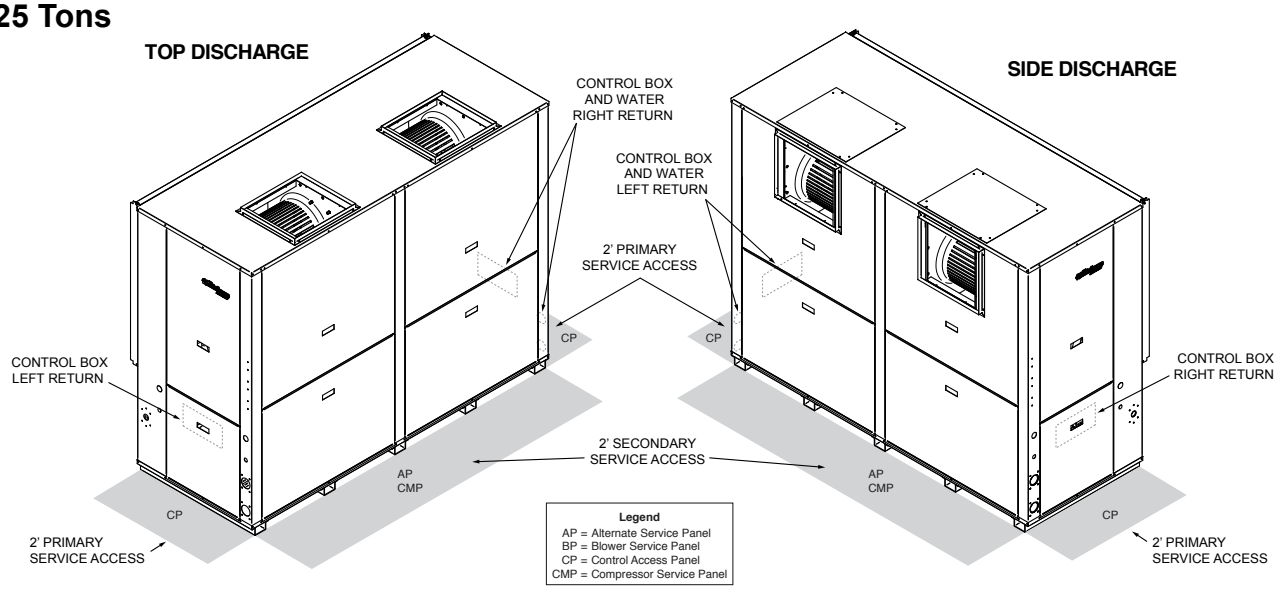
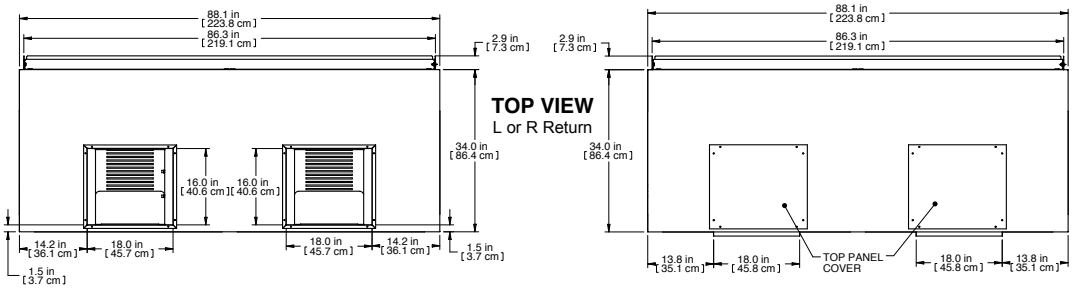
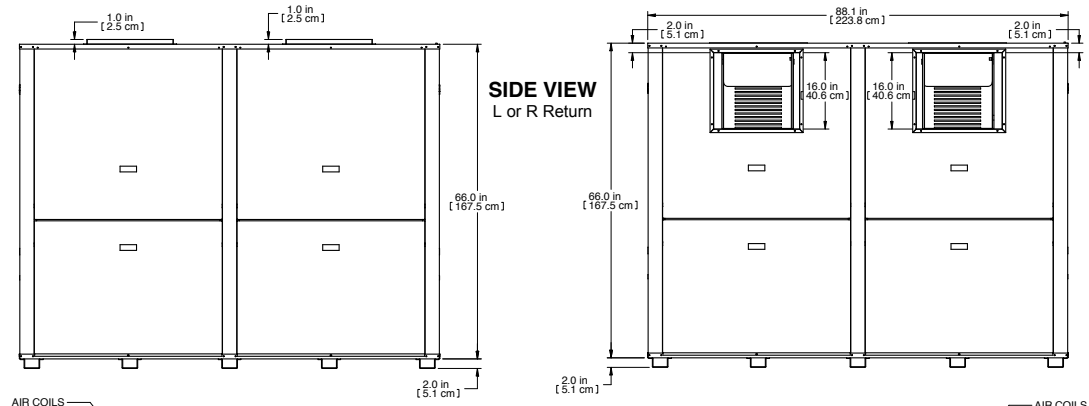
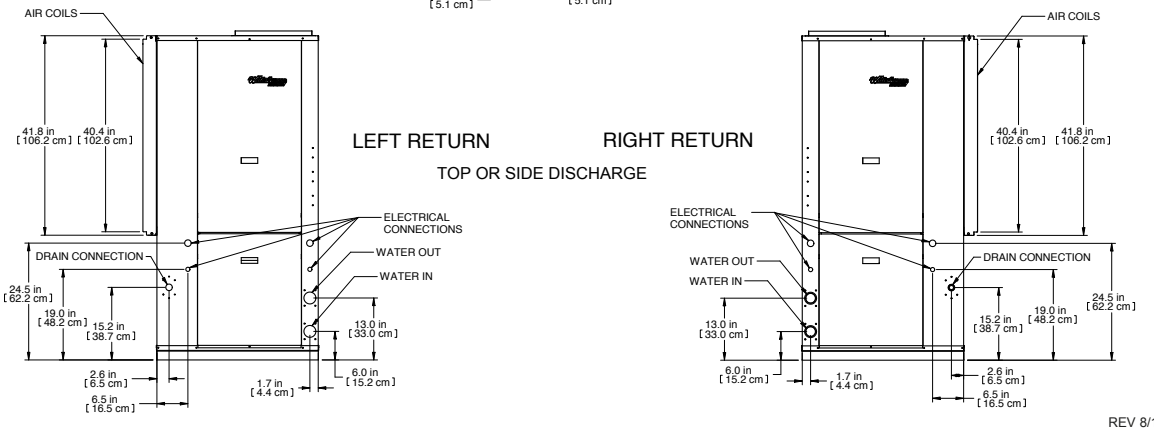
Vertical Dimensions cont.

13-25 Tons









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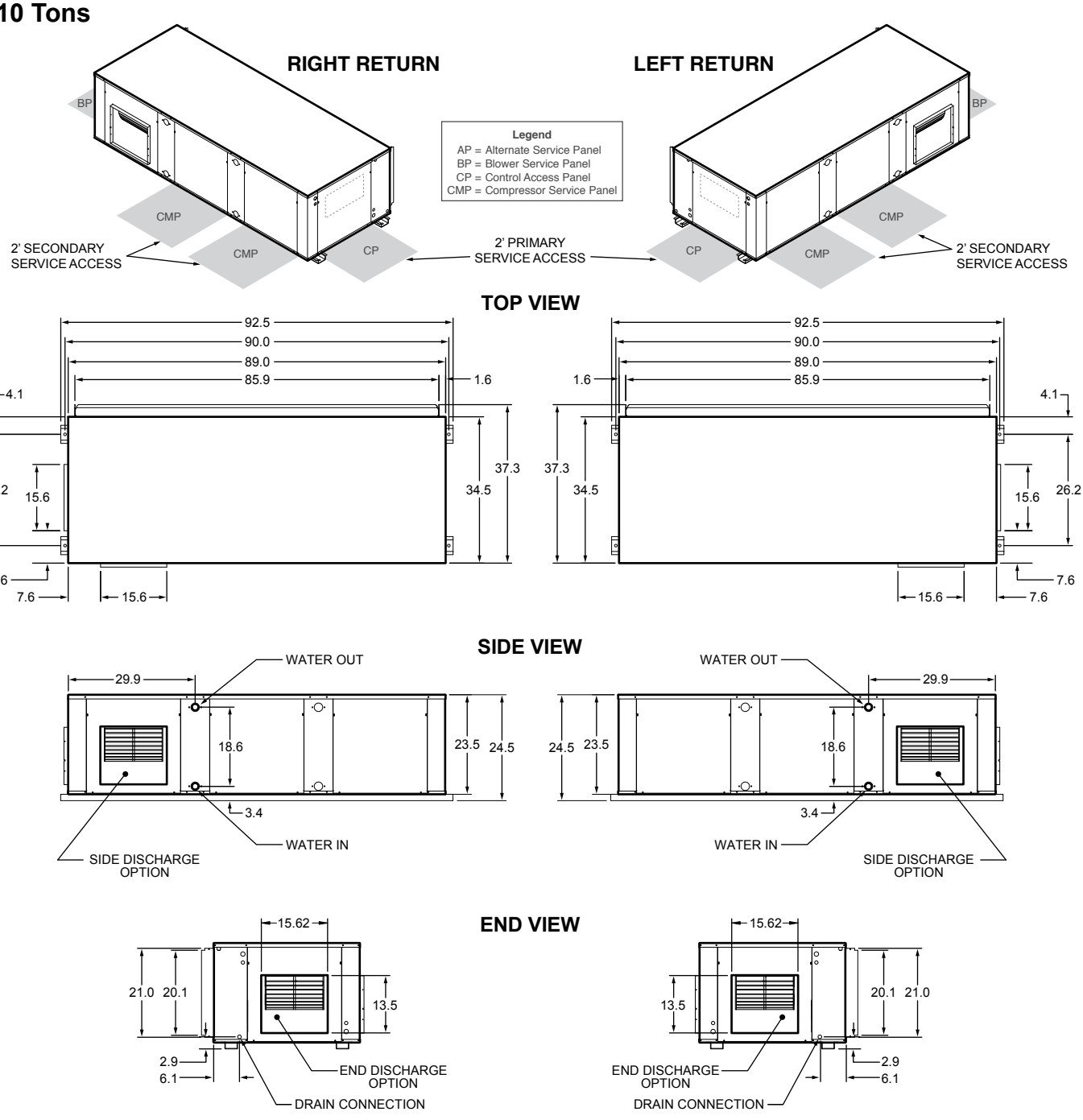
Horizontal Dimensions

7-10 Tons



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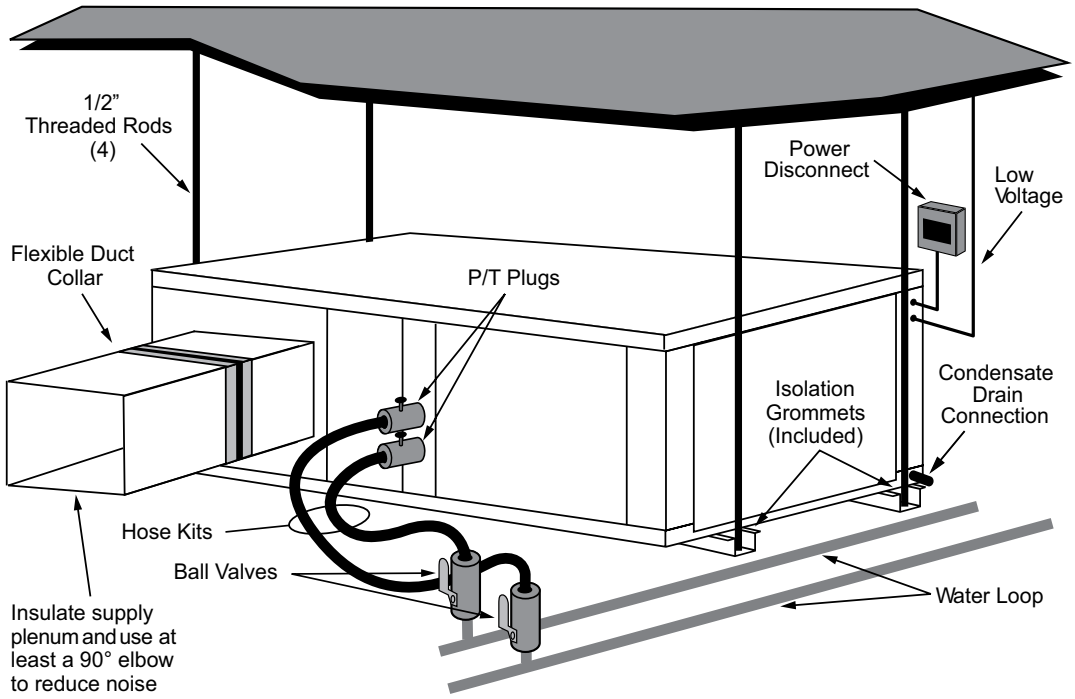
Installing Horizontal Units

Mounting Horizontal Units

Units are available with side or end discharge in left-hand or right-hand return air configurations. Horizontal units are normally suspended from a ceiling by four 1/2 in. diameter threaded rods. The rods are usually attached to the unit corners by the bottom panel mounting channel and the mounting grommets furnished with each unit.

CAUTION: Do not use rods smaller than 1/2 in. diameter since they may not be strong enough to support the unit. The rods must be securely anchored to the ceiling (the units are approximately 800 lbs.).

Figure 1: Typical Horizontal Application



Layout the threaded rods per the dimensions in Figure 2. Assemble the hangers to the unit as shown in Figure 3. Securely tighten the brackets to the unit. When attaching the hanger rods to the bracket, a double nut is recommended since vibration could loosen a single nut. The unit should be pitched approximately 1/2 in. towards the drain in both directions, to facilitate condensate removal.

Figure 2: Mounting Rod Layout

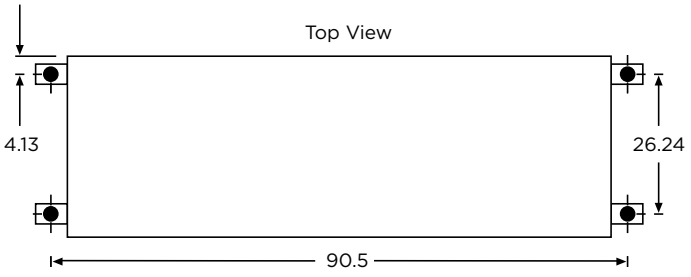
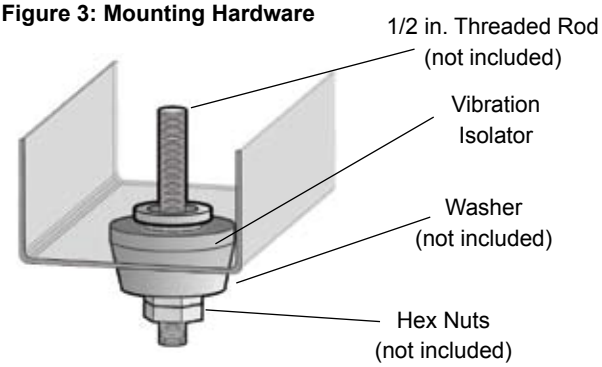


Figure 3: Mounting Hardware

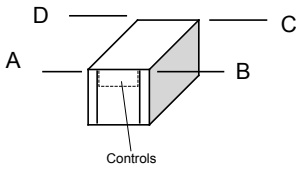


Installing Horizontal Units cont.

Horizontal Unit Corner Weight Distribution

Model	Return / Discharge	A Front Left	B Front Right	C Back Right	D Back Left
080 - 120	Left / Side or End	30%	26%	22%	22%
	Right / Side or End	26%	30%	22%	22%

Approximate



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.

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.

Figure 4: Suggested Layout of Condensate

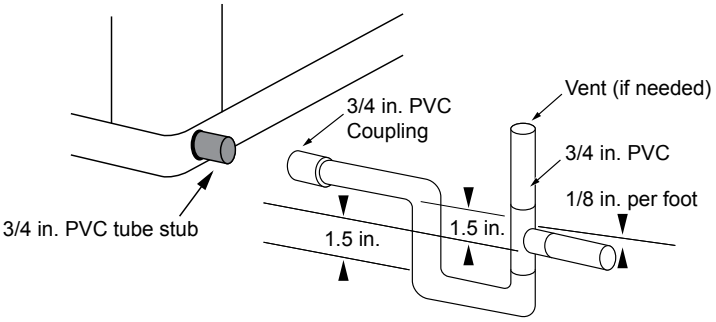
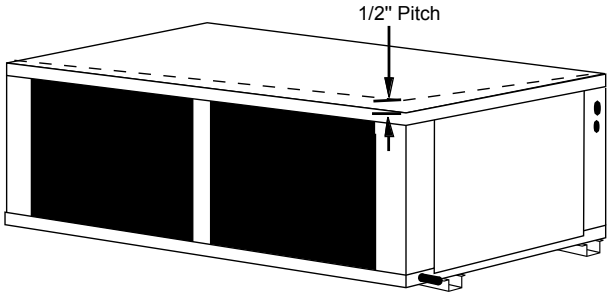


Figure 5: Unit Pitch for Drain



Installing Vertical Units

Mounting Vertical Units

Units are available with top/side discharge, left-hand or right-hand return air configurations. Vertical units are assembled on rails which facilitate moving and placement of the units. It is not necessary to anchor the unit to the floor.

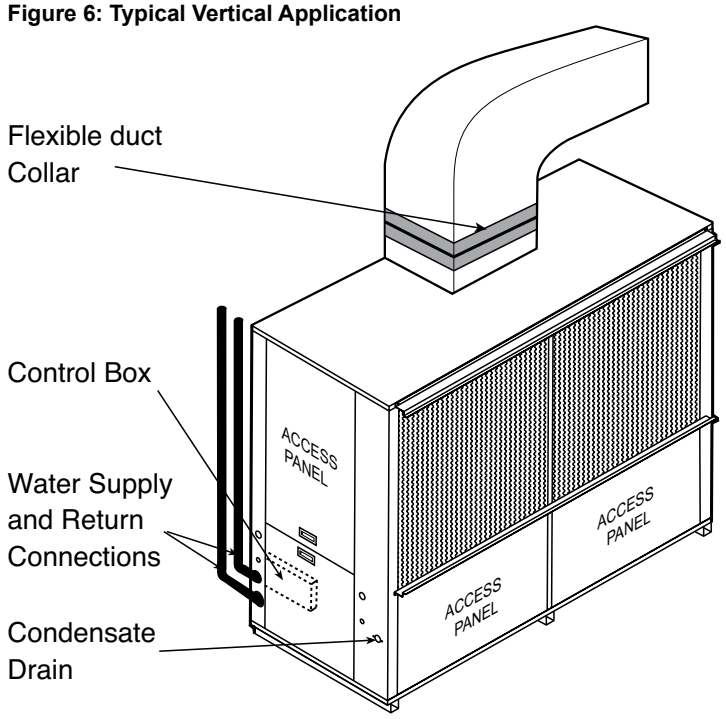
Duct System

A supply air duct flange is provided for field installation to facilitate the secure duct connection at the job site. A flexible connector is recommended for discharge and return air duct connections on metal duct systems to prevent vibration transmission. It is recommended that all ductwork be insulated with a minimum of 1/2-inch coated insulation. Installation of the units with uninsulated ductwork in an unconditioned space is not recommended, as the system's performance will be adversely affected.

Condensate Drain

In vertical units, the internal condensate drain assembly consists of a flexible drain tube which is attached to the drain pan and a 3/4-inch (7-10 tons) and 1-inch (13-25 tons) female pipe thread. An external water trap is not required as the drain tube serves as a trapping loop. The field-installed piping and unit connection must be properly installed and sealed to prevent water leakage.

Figure 6: Typical Vertical Application



Water Quality

Water Quality Guidelines

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
pH	Acidity/Alkalinity	7- 9	5 - 9
Scaling	Calcium and Magnesium Carbonate	(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
	Sulfates	Less than 125 ppm	Less than 125 ppm
	Chlorine	Less than .5 ppm	Less than .5 ppm
	Chlorides	Less than 20 ppm	Less than125 ppm
	Carbon Dioxide	Less than 50 ppm	10 - 50 ppm
	Ammonia	Less than 2 ppm	Less than 2 ppm
	Ammonia Chloride	Less than .5 ppm	Less than .5 ppm
	Ammonia Nitrate	Less than .5 ppm	Less than .5 ppm
	Ammonia Hydroxide	Less than .5 ppm	Less than .5 ppm
	Ammonia Sulfate	Less than .5 ppm	Less than .5 ppm
	Total Dissolved Solids (TDS)	Less than 1000 ppm	1000-1500 ppm
Iron Fouling (Biological Growth)	Iron, Fe^{2+} (Ferrous) Bacterial Iron Potential	None	None
	Iron Oxide	Less than 1 ppm. Above this level deposition will occur.	Less than 1 ppm. Above this level deposition will occur.
Erosion	Suspended Solids	Less than 10 ppm and filtered for max of 600 micron size	Less than 10 ppm and filtered for max of 600 micron size
	Threshold Velocity (Fresh Water)	5-8 ft/sec	8-12 ft/sec

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

Water Connections

All supply and return water connections are female pipe thread of size specified in physical dimensions. Never use flexible hoses smaller than separate water connections on the unit and limit hose length to 10 ft. per connection. Check carefully for water leaks.

Interior Piping

All units are recommended to be connected to supply and return piping in a two-pipe reverse return configuration. A reverse return system is inherently self-balancing and requires only trim balancing when multiple quantities of units with different flow and pressure drop characteristics are connected to the same loop. A direct return system may also be made to work acceptably, but proper water flow balance is more difficult to achieve and maintain.

Supply and return runouts are usually connected to the unit by short lengths of high pressure flexible hose which are sound attenuators for both unit operating noise and hydraulic pumping noise. One end of the hose should have a swivel fitting to facilitate removal for service. Hard piping can also be connected directly to the unit although it is not recommended since no vibration or noise attenuation can be accomplished. The hard piping must have unions to facilitate unit removal (see figure 1 & 6) for typical application).

Some flexible hose threaded fittings are supplied with sealant compound. If not, apply Teflon tape to assure a tight seal.
Supply and return shutoff valves are required at each unit. The return shutoff valve can be used for balancing and should be adjusted for proper flow required, or a manual or automatic flow control device should be on the leaving water hose assembly.

No unit should be connected to the supply and return piping until the water system has been cleaned and flushed completely. After the cleaning and flushing has taken place, the initial connection should have all valves wide open in preparation for water system filling.

System Cleaning and Flushing

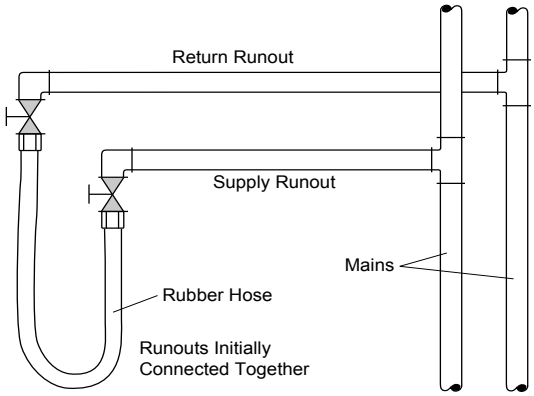
Cleaning and Flushing

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 Figure 7). The system should be filled at the water make-up connection with all air vents open. After filling, vents should be closed.

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.

Figure 7: Flushing with Water Shutoff Valve Equipped Systems



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.

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.

Unit Power Connection

Line voltage connection is made by connecting the incoming line voltage wires to the terminal block as shown on the unit's wiring diagram attached to the inside front panel. Consult the Unit Electrical Data below for correct fuse size.

208 Volt Operation

NOTE: All 208-230 volt units are factory wired for 230 volt operation. For 208 volt operation, the red and the blue transformer wires must be switched between terminal strip PS and contactor RB.

Electrical Data

Model	Rated Voltage	Voltage Min/Max	Compressor*			Blower Motor FLA***	Blower HP ***	Total Unit FLA	Min Circ Amp	Max Fuse/ HACR
			MCC	RLA	LRA					
Horizontal										
080	208-230/60/3	187/253	16.3	10.4	88.0	4.8	1.5	25.7	28.3	35.0
	460/60/3	414/506	9.0	5.8	38.0	2.4	1.5	13.9	15.4	20.0
	575/60/3	518/632	5.9	3.8	36.5	1.9	1.5	9.5	10.4	10.0
080**	208-230/60/3	187/253	16.3	10.4	88.0	6.2	2.0	27.1	29.7	40.0
	460/60/3	414/506	9.0	5.8	38.0	3.1	2.0	14.6	16.1	20.0
	575/60/3	518/632	5.9	3.8	36.5	2.5	2.0	10.1	11.0	10.0
095	208-230/60/3	187/253	21.2	13.6	83.1	6.2	2.0	33.3	36.7	50.0
	460/60/3	414/506	9.5	6.1	41.0	3.1	2.0	15.3	16.8	20.0
	575/60/3	518/632	7.8	5.0	34.0	2.5	2.0	12.5	13.7	15.0
095**	208-230/60/3	187/253	21.2	13.6	83.1	9.2	3.0	36.3	39.7	50.0
	460/60/3	414/506	9.5	6.1	41.0	4.3	3.0	16.5	18.0	20.0
	575/60/3	518/632	7.8	5.0	34.0	3.4	3.0	13.4	14.6	15.0
120	208-230/60/3	187/253	24.9	15.9	110.0	9.2	3.0	41.1	45.1	60.0
	460/60/3	414/506	12.1	7.7	52.0	4.3	3.0	19.8	21.7	25.0
	575/60/3	518/632	8.9	5.7	38.9	3.4	3.0	14.8	16.2	20.0
Vertical										
080	208-230/60/3	187/253	16.3	10.4	88.0	3.6	1.0	24.5	27.1	35.0
	460/60/3	414/506	9.0	5.8	38.0	1.8	1.0	13.3	14.8	20.0
	575/60/3	518/632	5.9	3.8	36.5	1.5	1.0	9.0	9.9	10.0
080**	208-230/60/3	187/253	16.3	10.4	88.0	4.8	1.5	25.7	28.3	35.0
	460/60/3	414/506	9.0	5.8	38.0	2.4	1.5	13.9	15.4	20.0
	575/60/3	518/632	5.9	3.8	36.5	1.9	1.5	9.5	10.4	10.0
095	208-230/60/3	187/253	21.2	13.6	83.1	4.8	1.5	31.9	35.3	45.0
	460/60/3	414/506	9.5	6.1	41.0	2.4	1.5	14.6	16.1	20.0
	575/60/3	518/632	7.8	5.0	34.0	1.9	1.5	11.9	13.1	15.0
095**	208-230/60/3	187/253	21.2	13.6	83.1	6.2	2.0	33.3	36.7	50.0
	460/60/3	414/506	9.5	6.1	41.0	3.1	2.0	15.3	16.8	20.0
	575/60/3	518/632	7.8	5.0	34.0	2.5	2.0	12.5	13.7	15.0
120	208-230/60/3	187/253	24.9	15.9	110.0	6.2	2.0	38.1	42.1	50.0
	460/60/3	414/506	12.1	7.7	52.0	3.1	2.0	18.6	20.5	25.0
	575/60/3	518/632	8.9	5.7	38.9	2.5	2.0	13.9	15.3	20.0
120**	208-230/60/3	187/253	24.9	15.9	110.0	9.2	3.0	41.1	45.1	60.0
	460/60/3	414/506	12.1	7.7	52.0	4.3	3.0	19.8	21.7	25.0
	575/60/3	518/632	8.9	5.7	38.9	3.4	3.0	14.8	16.2	20.0
160	208-230/60/3	187/253	35.0	22.4	149.0	3.6	1.0	52.0	57.6	80.0
	460/60/3	414/506	16.5	10.6	75.0	1.8	1.0	24.8	54.0	35.0
	575/60/3	518/632	12.0	7.7	54.0	1.5	1.0	18.4	20.3	25.0
160**	208-230/60/3	187/253	35.0	22.4	149.0	4.8	1.5	54.4	60.0	80.0
	460/60/3	414/506	16.5	10.6	75.0	2.4	1.5	26.0	28.7	35.0
	575/60/3	518/632	12.0	7.7	54.0	1.9	1.5	19.2	21.1	25.0
180	208-230/60/3	187/253	36.2	23.2	164.0	4.8	1.5	56.0	61.8	80.0
	460/60/3	414/506	17.5	11.2	75.0	2.4	1.5	27.2	30.0	40.0
	575/60/3	518/632	12.3	7.9	54.0	1.9	1.5	19.6	21.6	25.0
180**	208-230/60/3	187/253	36.2	23.2	164.0	6.2	2.0	58.8	64.6	80.0
	460/60/3	414/506	17.5	11.2	75.0	3.1	2.0	28.6	31.4	40.0
	575/60/3	518/632	12.3	7.9	54.0	2.5	2.0	20.8	22.8	30.0
240	208-230/60/3	187/253	47.0	30.1	225.0	6.2	2.0	72.6	80.1	110.0
	460/60/3	414/506	26.0	16.6	114.0	3.1	2.0	39.5	43.6	60.0
	575/60/3	518/632	19.0	12.2	80.0	2.5	2.0	29.3	32.4	40.0
240**	208-230/60/3	187/253	47.0	30.1	225.0	9.2	3.0	78.6	86.1	110.0
	460/60/3	414/506	26.0	16.6	114.0	4.3	3.0	41.9	46.0	60.0
	575/60/3	518/632	19.0	12.2	80.0	3.4	3.0	31.1	34.2	45.0
300	208-230/60/3	187/253	52.0	33.3	239.0	9.2	3.0	85.0	93.3	125.0
	460/60/3	414/506	28.0	17.9	125.0	4.3	3.0	44.4	48.9	60.0
	575/60/3	518/632	20.0	12.8	80.0	3.4	3.0	32.4	35.6	45.0

*Ratings per each compressor - unit supplied with two

9/10/07

**With optional motor

***Ratings per each blower motor - Vertical models 160-300 supplied with two.

HACR circuit breaker in USA only
All fuses Class RK-5

Horizontal GX080 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
2200	MTR/SHEAVE				1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP				0.37	0.40	0.43	0.47	0.52	**0.59**	**0.65**	**0.71**	**0.75**	**0.78**	**0.81**	**0.86**	**0.90**
	RPM				583	624	665	706	747	**770**	**791**	**821**	**865**	**911**	**957**	**986**	**1015**
	TURNS OPEN				5.0	4.0	3.0	2.0	1.0	**3.0**	**2.0**	**1.0**	**0.0**	**3.5**	**3.0**	**2.5**	**2.0**
2400	MTR/SHEAVE			1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP			0.45	0.49	0.53	0.59	0.62	**0.67**	**0.70**	**0.74**	**0.79**	**0.85**	**0.88**	**0.91**	**0.95**	**1.08**
	RPM			582	623	664	705	746	**765**	**790**	**820**	**861**	**906**	**938**	**970**	**1004**	**1030**
	TURNS OPEN			5.0	4.0	3.0	2.0	1.0	**3.0**	**2.0**	**1.0**	**0.0**	**4.0**	**3.0**	**2.5**	**2.0**	**1.5**
2600	MTR/SHEAVE			1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP			0.51	0.56	0.62	0.66	0.69	0.73	0.76	0.84	0.90	**0.93**	**0.96**	**1.04**	**1.12**	**1.17**
	RPM			602	643	684	726	760	783	805	853	877	**916**	**954**	**988**	**1021**	**1051**
	TURNS OPEN			4.5	3.5	2.5	1.5	4.0	3.5	2.5	2.0	1.5	**3.5**	**3.0**	**2.5**	**1.5**	**1.0**
2800	MTR/SHEAVE		1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**	**5.0**	
	BHP		0.53	0.58	0.64	0.69	0.76	0.79	0.80	0.94	0.99	1.03	**1.15**	**1.16**	**1.17**	**1.27**	
	RPM		581	622	663	704	744	776	802	851	876	900	**951**	**976**	**1001**	**1033**	
	TURNS OPEN		5.0	4.0	3.0	2.0	1.0	3.5	3.0	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.5**	
3000	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	
	BHP	0.59	0.66	0.73	0.80	0.87	0.90	0.92	1.07	1.08	1.10	**1.30**	**1.33**	**1.35**	**1.40**	**1.44**	
	RPM	580	621	662	702	743	775	801	848	873	898	**949**	**973**	**997**	**1022**	**1046**	
	TURNS OPEN	5.0	4.0	3.0	2.0	1.0	3.5	3.0	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**	
3200	MTR/SHEAVE	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**		
	BHP	0.72	0.81	0.90	0.98	1.02	1.04	1.19	1.21	1.23	**1.44**	**1.47**	**1.51**	**1.54**	**1.57**		
	RPM	620	661	701	741	773	799	846	871	895	**946**	**970**	**994**	**1019**	**1043**		
	TURNS OPEN	4.0	3.0	2.0	1.0	3.5	3.0	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**		
3400	MTR/SHEAVE	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**			
	BHP	0.87	0.98	1.08	1.12	1.16	1.31	1.34	1.36	**1.58**	**1.62**	**1.65**	**1.69**	**1.73**			
	RPM	660	700	740	772	797	844	869	893	**944**	**968**	**992**	**1016**	**1040**			
	TURNS OPEN	3.0	2.0	1.0	3.5	3.0	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**			

A C D E

07/25/07

Bold Face Requires Larger 2 HP Motor

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 2.5 turns open (2600 cfm @ 0.4 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 1.5 turns open (2600 cfm @ 0.5 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12in. wg.

Horizontal GX095 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
2600	MTR/SHEAVE			2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**
	BHP			0.44	0.47	0.52	0.57	0.66	0.78	0.79	0.80	0.92	**0.97**	**1.08**	**1.18**	**1.37**	**1.56**
	RPM			584	625	667	708	757	806	831	856	905	**960**	**1021**	**1082**	**1142**	**1202**
	TURNS OPEN			5.0	4.0	3.0	2.0	4.0	3.0	2.5	2.0	1.0	**3.0**	**2.0**	**1.0**	**0.0**	**3.0**
2800	MTR/SHEAVE		2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**	**5.0**
	BHP		0.51	0.56	0.61	0.67	0.77	0.89	0.90	0.91	1.06	**1.11**	**1.14**	**1.38**	**1.44**	**1.59**	**1.73**
	RPM		583	625	665	707	756	804	829	854	902	**933**	**982**	**1055**	**1100**	**1156**	**1212**
	TURNS OPEN		5.0	4.0	3.0	2.0	4.0	3.0	2.5	2.0	1.0	**3.5**	**2.5**	**1.5**	**0.5**	**3.5**	**2.5**
3000	MTR/SHEAVE	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**	**5.0**
	BHP	0.57	0.64	0.70	0.76	0.87	1.00	1.01	1.03	1.19	**1.25**	**1.28**	**1.33**	**1.59**	**1.64**	**1.68**	**1.91**
	RPM	582	624	665	705	754	802	827	852	900	**930**	**955**	**1005**	**1078**	**1110**	**1169**	**1228**
	TURNS OPEN	5.0	4.0	3.0	2.0	4.0	3.0	2.5	2.0	1.0	**3.5**	**3.0**	**2.0**	**0.5**	**0.0**	**3.0**	**2.0**
3200	MTR/SHEAVE	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	
	BHP	0.70	0.78	0.86	0.97	1.11	1.13	1.15	1.31	1.31	1.38	1.44	1.61	1.69	**1.80**	**2.02**	
	RPM	623	664	704	753	801	826	851	899	919	949	978	1036	1086	**1137**	**1196**	
	TURNS OPEN	4.0	3.0	2.0	4.0	3.0	2.5	2.0	1.0	4.0	3.5	3.0	2.5	1.5	**3.5**	**2.5**	
3400	MTR/SHEAVE	2.0	2.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	
	BHP	0.85	0.94	1.07	1.21	1.24	1.26	1.42	1.43	1.50	1.57	1.65	1.71	1.76	**2.10**	**2.35**	
	RPM	663	703	752	800	825	849	896	917	947	976	1020	1057	1094	**1164**	**1223**	
	TURNS OPEN	3.0	2.0	4.0	3.0	2.5	2.0	1.0	4.0	3.5	3.0	2.5	1.8	1.0	**3.0**	**2.0**	
3600	MTR/SHEAVE	2.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**		
	BHP	1.01	1.16	1.31	1.34	1.37	1.54	1.55	1.63	1.70	1.78	1.87	2.06	**2.15**	**2.40**		
	RPM	702	751	798	823	848	894	915	945	974	1003	1031	1088	**1133**	**1191**		
	TURNS OPEN	2.0	4.0	3.0	2.5	2.0	1.0	4.0	3.5	3.0	2.5	2.0	1.5	**3.5**	**2.5**		
3800	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**			
	BHP	1.23	1.40	1.44	1.48	1.66	1.67	1.75	1.83	1.91	2.00	2.10	**2.19**	**2.44**			
	RPM	750	797	821	845	893	913	942	971	1000	1029	1086	**1102**	**1160**			
	TURNS OPEN	4.0	3.0	2.5	2.0	1.0	4.0	3.5	3.0	2.5	2.0	1.5	**4.0**	**3.0**			

B D A C E

07/25/07

Bold Face Requires Larger 2 HP Motor

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 2 turns open (3200 cfm @ 0.6 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 2 turns open (3200 cfm @ 0.6 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12in. wg.

Horizontal GX120 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
3000	MTR/SHEAVE					2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0
	BHP					0.80	0.88	0.96	1.07	1.09	1.11	1.13	1.28	1.36	1.48	1.67	1.86
	RPM					707	748	789	830	857	882	907	931	956	1032	1115	1198
	TURNS OPEN					5.0	4.0	3.0	2.0	5.0	4.5	4.0	3.5	2.5	1.0	4.5	3.5
3200	MTR/SHEAVE				2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0
	BHP				0.90	0.99	1.09	1.16	1.22	1.25	1.27	1.34	1.49	1.63	1.77	1.98	2.08
	RPM				707	747	788	830	855	880	905	930	955	1031	1107	1166	1210
	TURNS OPEN				5.0	4.0	3.0	2.0	5.0	4.5	4.0	3.5	2.5	1.0	4.0	3.0	2.5
3400	MTR/SHEAVE			2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0
	BHP			0.99	1.09	1.20	1.19	1.35	1.38	1.41	1.44	1.47	1.55	1.76	2.06	2.15	2.24
	RPM			706	747	787	829	854	879	904	929	954	1004	1070	1137	1180	1224
	TURNS OPEN			5.0	4.0	3.0	2.0	5.0	4.5	4.0	3.5	3.0	2.0	4.5	3.5	2.5	2.0
3600	MTR/SHEAVE		2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0
	BHP		1.05	1.18	1.30	1.32	1.47	1.51	1.54	1.58	1.61	1.85	1.90	2.12	2.22	2.32	2.51
	RPM		706	746	787	828	853	878	903	928	953	1001	1044	1103	1134	1184	1233
	TURNS OPEN		5.0	4.0	3.0	2.0	5.0	4.5	4.0	3.5	3.0	2.0	5.0	4.0	3.5	2.5	1.5
3800	MTR/SHEAVE	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0
	BHP	1.11	1.25	1.39	1.53	1.59	1.63	1.67	1.71	1.75	1.99	2.08	2.16	2.27	2.37	2.64	2.75
	RPM	705	756	786	827	853	878	902	927	951	999	1037	1075	1118	1161	1219	1255
	TURNS OPEN	5.0	4.0	3.0	2.0	5.0	4.5	4.0	3.5	3.0	2.0	1.0	4.5	3.5	3.0	2.0	1.5
4000	MTR/SHEAVE	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0
	BHP	1.31	1.46	1.61	1.68	1.74	1.79	1.84	1.89	2.13	2.17	2.20	2.43	2.68	2.76	2.84	2.94
	RPM	745	786	826	852	877	901	926	950	998	1023	1047	1100	1157	1188	1231	1275
	TURNS OPEN	4.0	3.0	2.0	5.0	4.5	4.0	3.5	3.0	2.0	1.0	5.0	4.0	3.0	2.5	1.5	1.0
4200	MTR/SHEAVE	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	3.0	
	BHP	1.52	1.69	1.85	1.88	1.90	1.96	2.02	2.26	2.30	2.34	2.57	2.84	2.91	2.97	3.28	
	RPM	785	825	851	876	900	925	949	997	1018	1039	1098	1155	1184	1214	1270	
	TURNS OPEN	3.0	2.0	5.0	4.5	4.0	3.5	3.0	2.0	1.0	5.0	4.5	3.5	2.5	2.0	1.0	

07/23/07

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 3.0 turns open (3600 cfm @ 0.9 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 2.0 turns open (3600 cfm @ 1.0 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12in. wg.

Vertical GX080 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
2200	MTR/SHEAVE	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP	0.29	0.33	0.38	0.37	0.45	0.47	0.50	0.54	0.58	0.64	0.69	**0.71**	**0.73**	**0.84**	**0.95**	**1.05**
	RPM	437	478	518	539	586	617	647	677	707	736	765	**775**	**809**	**843**	**876**	**909**
	TURNS OPEN	4.0	3.0	2.0	1.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**
2400	MTR/SHEAVE	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP	0.38	0.44	0.43	0.52	0.56	0.59	0.63	0.68	0.73	0.78	**0.81**	**0.83**	**0.94**	**1.05**	**1.13**	**1.20**
	RPM	477	517	538	585	615	645	675	704	734	763	**774**	**807**	**841**	**874**	**907**	**940**
	TURNS OPEN	3.0	2.0	1.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**
2600	MTR/SHEAVE	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	
	BHP	0.49	0.50	0.59	0.63	0.67	0.72	0.77	0.83	0.89	**0.91**	**0.94**	**1.05**	**1.17**	**1.24**	**1.32**	
	RPM	516	537	584	614	643	673	702	732	761	**772**	**806**	**839**	**871**	**905**	**938**	
	TURNS OPEN	2.0	1.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**	
2800	MTR/SHEAVE	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**		
	BHP	0.56	0.66	0.71	0.75	0.81	0.86	0.92	0.99	**1.02**	**1.05**	**1.17**	**1.29**	**1.37**	**1.44**		
	RPM	536	582	612	642	671	700	729	758	**770**	**804**	**837**	**869**	**903**	**936**		
	TURNS OPEN	1.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**		
3000	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**			
	BHP	0.72	0.78	0.83	0.89	0.95	1.02	1.09	**1.12**	**1.16**	**1.29**	**1.41**	**1.49**	**1.57**			
	RPM	581	611	640	669	698	727	756	**768**	**802**	**835**	**867**	**900**	**933**			
	TURNS OPEN	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**			
3200	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**				
	BHP	0.83	0.90	0.97	1.03	1.11	1.18	**1.14**	**1.27**	**1.40**	**1.53**	**1.61**	**1.70**				
	RPM	610	639	668	697	726	754	**767**	**800**	**833**	**865**	**898**	**930**				
	TURNS OPEN	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**				
3400	MTR/SHEAVE	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**					
	BHP	0.97	1.04	1.11	1.19	**1.23**	**1.30**	**1.37**	**1.51**	**1.64**	**1.73**	**1.82**					
	RPM	637	666	695	725	**731**	**765**	**798**	**830**	**862**	**895**	**927**					
	TURNS OPEN	4.0	3.5	3.0	2.5	**4.0**	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**					

07/25/07

Bold Face Requires 1.5 HP Motor

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 3 turns open (2600 cfm @ 0.6 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 3 turns open (2600 cfm @ 0.6 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12in. wg.

Vertical GX095 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
2600	MTR/SHEAVE				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**			
	BHP				0.61	0.64	0.66	0.68	0.76	0.81	0.87	0.89	**0.94**	**1.05**			
	RPM				581	601	621	663	703	739	774	784	**827**	**867**			
	TURNS OPEN				5.0	4.5	4.0	3.0	2.0	1.5	1.0	0.0	**2.0**	**1.0**			
2800	MTR/SHEAVE			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**			
	BHP			0.65	0.66	0.68	0.75	0.86	0.87	0.88	1.02	**1.05**	**1.14**	**1.23**			
	RPM			580	600	621	662	701	722	742	782	**805**	**855**	**905**			
	TURNS OPEN			5.0	4.5	4.0	3.0	2.0	1.5	1.0	0.0	**2.5**	**1.5**	**0.0**			
3000	MTR/SHEAVE		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**
	BHP		0.72	0.73	0.74	0.84	0.96	0.98	0.99	1.13	1.14	1.17	1.23	1.36	1.48	**1.59**	**1.69**
	RPM		579	600	620	660	700	721	741	780	797	813	845	890	940	**960**	**991**
	TURNS OPEN		5.0	4.5	4.0	3.0	2.0	1.5	1.0	0.0	3.0	2.5	2.0	1.0	0.0	**3.0**	**2.5**
3200	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**
	BHP	0.79	0.80	0.82	0.93	1.06	1.08	1.10	1.25	1.26	1.31	1.36	1.49	1.62	**1.67**	**1.85**	**2.03**
	RPM	578	599	619	659	699	719	739	778	795	819	843	890	937	**942**	**967**	**991**
	TURNS OPEN	5.0	4.5	4.0	3.0	2.0	1.5	1.0	0.0	3.0	2.5	2.0	1.0	0.0	**3.0**	**2.5**	**2.0**
3400	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**	**5.0**
	BHP	0.84	0.89	1.01	1.15	1.17	1.20	1.35	1.36	1.42	1.48	1.52	1.61	**1.82**	**1.90**	**1.99**	**2.03**
	RPM	597	619	658	697	718	738	776	794	818	841	857	888	**940**	**963**	**986**	**1034**
	TURNS OPEN	4.5	4.0	3.0	2.0	1.5	1.0	0.0	3.0	2.5	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.0**
3600	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP	0.97	1.09	1.23	1.26	1.29	1.45	1.47	1.53	1.60	1.67	1.74	**1.95**	**2.05**	**2.14**	**2.19**	**2.41**
	RPM	618	657	696	716	736	775	792	815	838	862	885	**937**	**960**	**983**	**1031**	**1077**
	TURNS OPEN	4.0	3.0	2.0	1.5	1.0	0.0	3.0	2.5	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.0**	**0.0**
3800	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	
	BHP	1.17	1.32	1.35	1.38	1.55	1.57	1.64	1.71	1.78	1.86	**2.09**	**2.18**	**2.28**	**2.34**	**2.57**	
	RPM	656	695	715	735	773	790	814	837	860	883	**935**	**958**	**981**	**1029**	**1074**	
	TURNS OPEN	3.0	2.0	1.5	1.0	0.0	3.0	2.5	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.0**	**0.0**	

A C D E

7/25/07

Bold Face Requires Larger 2 HP Motor

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 2 turns open (2800 cfm @ 0.6 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 1 turns open (2800 cfm @ 0.7 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12in. wg.

Vertical GX120 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
3200	MTR/SHEAVE	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	
	BHP	0.50	0.51	0.59	0.68	0.68	0.79	0.92	0.92	0.92	1.08	1.16	1.30	1.31	1.41	1.59	
	RPM	418	438	480	521	541	582	623	644	665	705	732	787	826	867	932	
	TURNS OPEN	4.5	4.0	3.0	2.0	1.0	5.0	4.0	3.5	3.0	2.0	1.5	0.5	2.0	1.0	0.0	
3400	MTR/SHEAVE	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0		
	BHP	0.58	0.67	0.77	0.78	0.90	1.04	1.05	1.07	1.16	1.26	1.28	1.37	1.47	1.65		
	RPM	438	480	520	541	582	622	643	664	694	724	746	795	843	888		
	TURNS OPEN	4.0	3.0	2.0	1.0	5.0	4.0	3.5	3.0	2.5	1.5	1.0	3.0	1.5	0.5		
3600	MTR/SHEAVE	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0		
	BHP	0.74	0.86	0.88	1.00	1.02	1.17	1.20	1.22	1.24	1.44	1.47	1.52	1.82	1.90		
	RPM	479	519	540	581	602	643	663	684	704	745	765	806	866	906		
	TURNS OPEN	3.0	2.0	1.0	5.0	4.5	3.5	3.0	2.5	2.0	1.0	3.5	2.5	1.0	0.0		
3800	MTR/SHEAVE	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0			
	BHP	0.94	0.96	1.10	1.15	1.24	1.32	1.35	1.38	1.41	1.62	1.66	1.91	2.06			
	RPM	519	539	581	622	642	662	683	704	723	764	784	823	884			
	TURNS OPEN	2.0	1.0	5.0	4.0	3.5	3.0	2.5	2.0	1.5	3.5	3.0	2.0	0.5			
4000	MTR/SHEAVE	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**
	BHP	1.04	1.20	1.26	1.35	1.44	1.47	1.51	1.55	1.58	1.81	1.86	1.96	2.17	**2.25**	**2.39**	**2.66**
	RPM	539	580	621	641	661	682	703	724	744	783	803	843	893	**933**	**970**	**1017**
	TURNS OPEN	1.0	5.0	4.0	3.5	3.0	2.5	2.0	1.5	1.0	3.0	2.5	1.5	0.0	**3.5**	**2.5**	**1.5**
4200	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**	**5.0**	**5.0**
	BHP	1.28	1.36	1.45	1.54	1.59	1.63	1.67	1.72	**1.95**	**2.01**	**2.06**	**2.19**	**2.31**	**2.48**	**2.75**	**3.03**
	RPM	580	620	641	661	682	702	722	742	**782**	**802**	**822**	**863**	**902**	**944**	**991**	**1037**
	TURNS OPEN	5.0	4.0	3.5	3.0	2.5	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.0**	**0.0**	**3.0**	**2.0**	**1.0**
4400	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**	**5.0**	**5.0**	
	BHP	1.46	1.55	1.65	1.70	1.75	1.80	1.85	**2.09**	**2.15**	**2.21**	**2.28**	**2.41**	**2.54**	**2.80**	**3.08**	
	RPM	620	640	660	681	701	722	742	**781**	**801**	**821**	**841**	**881**	**919**	**965**	**1012**	
	TURNS OPEN	4.0	3.5	3.0	2.5	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.5**	**0.5**	**3.5**	**2.5**	**1.5**	

07/25/07

Bold Face Requires Larger 3 HP Motor

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 3 turns open (3600 cfm @ 0.6 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 1 turns open (3600 cfm @ 0.9 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12 in. wg.

Vertical GX160 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
4400	MTR/SHEAVE	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP	0.29	0.33	0.38	0.37	0.45	0.47	0.50	0.54	0.58	0.64	0.69	**0.71**	**0.73**	**0.84**	**0.95**	**1.05**
	RPM	437	478	518	539	586	617	647	677	707	736	765	**775**	**809**	**843**	**876**	**909**
	TURNS OPEN	4.0	3.0	2.0	1.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**
4600	MTR/SHEAVE	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP	0.33	0.38	0.41	0.44	0.50	0.53	0.57	0.61	0.66	0.71	0.75	**0.77**	**0.84**	**0.95**	**1.04**	**1.13**
	RPM	457	498	528	562	601	631	661	691	720	750	770	**791**	**825**	**858**	**892**	**925**
	TURNS OPEN	3.5	2.5	1.5	0.5	4.5	4.0	3.5	3.0	2.5	2.0	1.0	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**
4800	MTR/SHEAVE	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP	0.38	0.44	0.43	0.52	0.56	0.59	0.63	0.68	0.73	0.78	**0.81**	**0.83**	**0.94**	**1.05**	**1.13**	**1.20**
	RPM	477	517	538	585	615	645	675	704	734	763	**774**	**807**	**841**	**874**	**907**	**940**
	TURNS OPEN	3.0	2.0	1.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**
5000	MTR/SHEAVE	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	BHP	0.44	0.47	0.51	0.58	0.62	0.66	0.70	0.75	0.81	0.85	**0.87**	**0.94**	**1.05**	**1.15**	**1.22**	**0.60**
	RPM	497	527	561	599	629	659	688	718	747	768	**790**	**823**	**856**	**889**	**923**	**470**
	TURNS OPEN	2.5	1.5	1.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**	**0.5**
5200	MTR/SHEAVE	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	
	BHP	0.49	0.50	0.59	0.63	0.67	0.72	0.77	0.83	0.89	**0.91**	**0.94**	**1.05**	**1.17**	**1.24**	**1.32**	
	RPM	516	537	584	614	643	673	702	732	761	**772**	**806**	**839**	**871**	**905**	**938**	
	TURNS OPEN	2.0	1.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**	
5400	MTR/SHEAVE	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	
	BHP	0.53	0.58	0.65	0.69	0.74	0.79	0.85	0.91	0.95	**0.98**	**1.05**	**1.17**	**1.27**	**1.34**	**0.66**	
	RPM	526	560	598	628	657	686	716	745	766	**788**	**821**	**854**	**887**	**920**	**469**	
	TURNS OPEN	1.5	1.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**	**0.5**	
5600	MTR/SHEAVE	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**		
	BHP	0.56	0.66	0.71	0.75	0.81	0.86	0.92	0.99	**1.02**	**1.05**	**1.17**	**1.29**	**1.37**	**1.44**		
	RPM	536	582	612	642	671	700	729	758	**770**	**804**	**837**	**869**	**903**	**936**		
	TURNS OPEN	1.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0	**3.5**	**3.0**	**2.5**	**2.0**	**1.5**	**1.0**		

B A E

7/25/07

Bold Face Requires Larger 1.5 HP Motor

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 3 turns open (5000 cfm @ 0.6 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 2.0 turns open (5000 cfm @ 0.7 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12 in. wg.

BHP is given for each blower. Multiply BHP x 2 for unit BHP.

Vertical GX180 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
5200	MTR/SHEAVE				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**			
	BHP				0.61	0.64	0.66	0.68	0.76	0.81	0.87	0.89	**0.94**	**1.05**			
	RPM				581	601	621	663	703	739	774	784	**827**	**867**			
	TURNS OPEN				5.0	4.5	4.0	3.0	2.0	1.5	1.0	0.5	**2.0**	**1.0**			
5400	MTR/SHEAVE				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**			
	BHP				0.64	0.66	0.71	0.77	0.82	0.85	0.94	0.97	**1.04**	**1.14**			
	RPM				591	611	642	682	712	740	778	795	**841**	**886**			
	TURNS OPEN				4.5	4.0	3.5	2.5	1.5	1.0	0.5	0.0	**1.5**	**0.5**			
5600	MTR/SHEAVE			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**			
	BHP			0.65	0.66	0.68	0.75	0.86	0.87	0.88	1.02	**1.05**	**1.14**	**1.23**			
	RPM			580	600	621	662	701	722	742	782	**805**	**855**	**905**			
	TURNS OPEN			5.0	4.5	4.0	3.0	2.0	1.5	1.0	0.0	**2.5**	**1.5**	**0.0**			
5800	MTR/SHEAVE			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**
	BHP			0.69	0.70	0.76	0.86	0.92	0.93	1.01	1.08	1.11	1.19	1.30	0.74	**0.80**	**0.85**
	RPM			590	610	641	681	711	731	761	790	809	850	898	470	**480**	**496**
	TURNS OPEN			4.5	4.0	3.5	2.5	1.5	1.0	0.5	0.0	3.0	2.5	2.0	1.0	**3.0**	**2.5**
6000	MTR/SHEAVE		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**
	BHP		0.72	0.73	0.74	0.84	0.96	0.98	0.99	1.13	1.14	1.17	1.23	1.36	1.48	**1.59**	**1.69**
	RPM		579	600	620	660	700	721	741	780	797	813	845	890	940	**960**	**991**
	TURNS OPEN		5.0	4.5	4.0	3.0	2.0	1.5	1.0	0.0	3.0	2.5	2.0	1.0	0.0	**3.0**	**2.5**
6200	MTR/SHEAVE		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**
	BHP		0.76	0.77	0.84	0.95	1.02	1.04	1.12	1.20	1.23	1.27	1.36	1.49	**1.58**	**1.72**	**1.86**
	RPM		589	609	640	680	710	730	760	788	808	828	868	914	**941**	**963**	**991**
	TURNS OPEN		4.5	4.0	3.5	2.5	1.5	1.0	0.5	0.0	2.5	2.0	1.5	0.5	**3.5**	**2.5**	**2.0**
6400	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**
	BHP	0.79	0.80	0.82	0.93	1.06	1.08	1.10	1.25	1.26	1.31	1.36	1.49	1.62	**1.67**	**1.85**	**2.03**
	RPM	578	599	619	659	699	719	739	778	795	819	843	890	937	**942**	**967**	**991**
	TURNS OPEN	5.0	4.5	4.0	3.0	2.0	1.5	1.0	0.0	3.0	2.5	2.0	1.0	0.0	**3.0**	**2.5**	**2.0**

A D C E

7/25/07

Bold Face Requires Larger 2.0 HP Motor

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 3 turns open (5600 cfm @ 0.6 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 1.5 turns open (5600 cfm @ 0.7 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12 in. wg.

BHP is given for each blower. Multiply BHP x 2 for unit BHP.

Vertical GX240 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
6400	MTR/SHEAVE	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	
	BHP	0.50	0.51	0.59	0.68	0.68	0.79	0.92	0.92	0.92	1.08	1.16	1.30	1.31	1.41	1.59	
	RPM	418	438	480	521	541	582	623	644	665	705	732	787	826	867	932	
	TURNS OPEN	4.5	4.0	3.0	2.0	1.0	5.0	4.0	3.5	3.0	2.0	1.5	0.5	2.0	1.0	0.0	
6800	MTR/SHEAVE	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0		
	BHP	0.58	0.67	0.77	0.78	0.90	1.04	1.05	1.07	1.16	1.26	1.28	1.37	1.47	1.65		
	RPM	438	480	520	541	582	622	643	664	694	724	746	795	843	888		
	TURNS OPEN	4.0	3.0	2.0	1.0	5.0	4.0	3.5	3.0	2.5	1.5	1.0	3.0	1.5	0.5		
7200	MTR/SHEAVE	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0		
	BHP	0.74	0.86	0.88	1.00	1.02	1.17	1.20	1.22	1.24	1.44	1.47	1.52	1.82	1.90		
	RPM	479	519	540	581	602	643	663	684	704	745	765	806	866	906		
	TURNS OPEN	3.0	2.0	1.0	5.0	4.5	3.5	3.0	2.5	2.0	1.0	3.5	2.5	1.0	0.0		
7600	MTR/SHEAVE	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0			
	BHP	0.94	0.96	1.10	1.15	1.24	1.32	1.35	1.38	1.41	1.62	1.66	1.91	2.06			
	RPM	519	539	581	622	642	662	683	704	723	764	784	823	884			
	TURNS OPEN	2.0	1.0	5.0	4.0	3.5	3.0	2.5	2.0	1.5	3.5	3.0	2.0	0.5			
8000	MTR/SHEAVE	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	**5.0**	**5.0**	**5.0**
	BHP	1.04	1.20	1.26	1.35	1.44	1.47	1.51	1.55	1.58	1.81	1.86	1.96	2.17	**2.25**	**2.39**	**2.66**
	RPM	539	580	621	641	661	682	703	724	744	783	803	843	893	**933**	**970**	**1017**
	TURNS OPEN	1.0	5.0	4.0	3.5	3.0	2.5	2.0	1.5	1.0	3.0	2.5	1.5	0.0	**3.5**	**2.5**	**1.5**
8400	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**	**5.0**	**5.0**
	BHP	1.28	1.36	1.45	1.54	1.59	1.63	1.67	1.72	**1.95**	**2.01**	**2.06**	**2.19**	**2.31**	**2.48**	**2.75**	**3.03**
	RPM	580	620	641	661	682	702	722	742	**782**	**802**	**822**	**863**	**902**	**944**	**991**	**1037**
	TURNS OPEN	5.0	4.0	3.5	3.0	2.5	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.0**	**0.0**	**3.0**	**2.0**	**1.0**
8800	MTR/SHEAVE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**5.0**	**5.0**	**5.0**	
	BHP	1.46	1.55	1.65	1.70	1.75	1.80	1.85	**2.09**	**2.15**	**2.21**	**2.28**	**2.41**	**2.54**	**2.80**	**3.08**	
	RPM	620	640	660	681	701	722	742	**781**	**801**	**821**	**841**	**881**	**919**	**965**	**1012**	
	TURNS OPEN	4.0	3.5	3.0	2.5	2.0	1.5	1.0	**3.0**	**2.5**	**2.0**	**1.5**	**0.5**	**3.5**	**2.5**	**1.5**	

B A C D E

7/25/07

Bold Face Requires Larger 3.0 HP Motor

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 2.5 turns open (7600 cfm @ 0.6 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 2 turns open (7600 cfm @ 0.7 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

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, and 400 fpm by 0.12 in. wg.

BHP is given for each blower. Multiply BHP x 2 for unit BHP.

Vertical GX300 - Blower Performance Data

Belt Drive

Airflow in CFM with dry coil and clean air filter.

Rated CFM		External Static Pressure (in. w.g.)															
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
8400	MTR/SHEAVE				2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	
	BHP				1.46	1.49	1.77	1.94	2.11	2.29	2.32	2.39	2.65	2.72	2.80	2.36	
	RPM				677	696	745	778	810	841	858	878	912	932	951	994	
	TURNS OPEN				5.0	4.0	3.0	2.0	1.0	4.0	3.5	3.0	2.0	1.5	1.0	4.5	
8800	MTR/SHEAVE			2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	
	BHP			1.55	1.70	1.86	2.03	2.21	2.39	2.42	2.50	2.75	2.83	2.91	2.63	2.61	
	RPM			674	708	742	774	806	837	853	873	907	926	945	981	1010	
	TURNS OPEN			5.0	4.0	3.0	2.0	1.0	4.0	3.5	3.0	2.0	1.5	1.0	4.5	4.0	
9200	MTR/SHEAVE		2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	
	BHP		1.63	1.79	1.96	2.13	2.31	2.49	2.52	2.60	2.85	2.93	3.01	2.87	2.87	2.86	
	RPM		671	705	738	771	802	833	849	869	903	922	940	969	997	1025	
	TURNS OPEN		5.0	4.0	3.0	2.0	1.0	4.0	3.5	3.0	2.0	1.5	1.0	4.5	4.0	3.5	
9600	MTR/SHEAVE	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0		
	BHP	1.72	1.88	2.04	2.22	2.40	2.58	2.62	2.70	2.95	3.03	3.11	3.09	3.10	3.11		
	RPM	668	702	735	767	799	829	845	864	898	917	935	959	985	1012		
	TURNS OPEN	5.0	4.0	3.0	2.0	1.0	4.0	3.5	3.0	2.0	1.5	1.0	4.5	4.0	3.5		
10000	MTR/SHEAVE	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0			
	BHP	1.96	2.13	2.31	2.49	2.68	2.71	2.79	3.05	3.13	3.21	3.29	3.31	3.33			
	RPM	699	732	764	795	825	841	860	894	912	931	949	975	1001			
	TURNS OPEN	4.0	3.0	2.0	1.0	4.0	3.5	3.0	2.0	1.5	1.0	4.5	4.0	3.5			
10400	MTR/SHEAVE	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0			
	BHP	2.21	2.39	2.58	2.77	2.81	2.89	3.13	3.22	3.31	3.39	3.51	3.54	3.56			
	RPM	729	761	792	821	837	856	890	908	926	944	965	990	1016			
	TURNS OPEN	3.0	2.0	1.0	4.0	3.5	3.0	2.0	1.5	1.0	4.5	4.0	3.5	3.0			
10800	MTR/SHEAVE	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0				
	BHP	2.48	2.66	2.85	2.90	2.98	3.23	3.32	3.40	3.48	3.61	3.73	3.76				
	RPM	758	788	818	833	852	885	904	922	939	960	980	1005				
	TURNS OPEN	2.0	1.0	4.0	3.5	3.0	2.0	1.5	1.0	4.5	4.0	3.5	3.0				

B A C

7/25/07

A=Std Static/Std Mtr;B=Low Static/Std. Mtr;C=High Static/Std. Mtr;D=Std Static/Large Mtr;E=High Static/Large Mtr

Units factory shipped with standard static sheave and drive at 3.0 turns open (9500 cfm @ 0.7 in. ESP). Other speeds require field selection.

ISO/AHRI rating point with standard static sheave and drive at 3.0 turns open (9500 cfm @ 0.7 in. ESP). Other speeds require field selection.

For applications requiring higher static pressures, contact your local representative.

Performance data does not include drive losses and is based on sea level conditions.

Do not operate in gray region. "na" = information not available at time of printing.

All airflow is rated at lowest Voltage if unit is dual Voltage rated, i.e. 208V for 208-230V units.

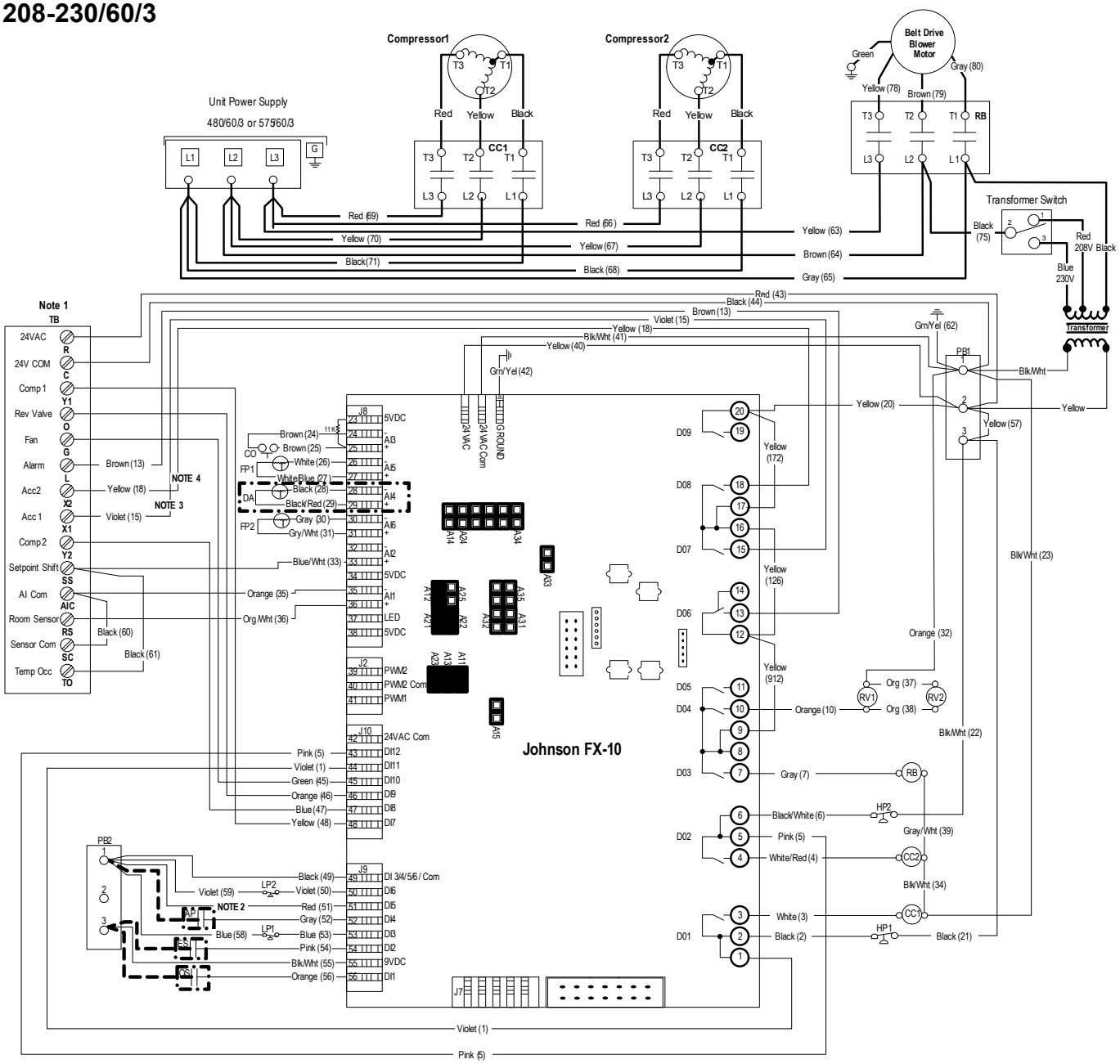
For wet coil performance first calculate the face velocity of the air coil (Face Velocity [fpm] = Airflow [cfm] / Face Area [sq ft]).

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

BHP is given for each blower. Multiply BHP x 2 for unit BHP.

Wiring Schematic - FX10 Control

208-230/60/3



Legend

Factory low voltage wiring Factory line voltage wiring Field low voltage wiring Field line voltage wiring Optional block	Relay Contacts- N.O., N.C.	Switch - High pressure	AP - Air Proving CC1 - Compressor contactor 1 CC2 - Compressor contactor 2 CO - Condensate overflow CPM1 - Compressor Protection Module 1 CPM2 - Compressor Protection Module 2 DA - Discharge Air Temperature ES - Emergency Shutdown FP1 - Freeze protection sensor 1 FP2 - Freeze protection sensor 2	HP1 - Stage 1 High Pressure HP2 - Stage 2 High Pressure LP1 - Stage 1 Low Pressure LP2 - Stage 2 Low Pressure OS - Occupied Switch RB - Blower power relay RV1 - Reversing Valve coil 1 RV2 - Reversing Valve coil 2
Internal junction	Thermistor - Johnson Control	Switch - Low pressure		
Quick connect terminal	Relay coil	Polarized connector		
Wire nut		Condensate Overflow		
Field wire lug				
Ground				

Notes:
1 - R, C, Y1, Y2, O, and G are for use with a wall mounted thermostat
2 - Disconnect for 15 degree freeze protection
3 - Acc 1 output is cycled with the compressor
4 - Acc 2 output is cycled with the fan

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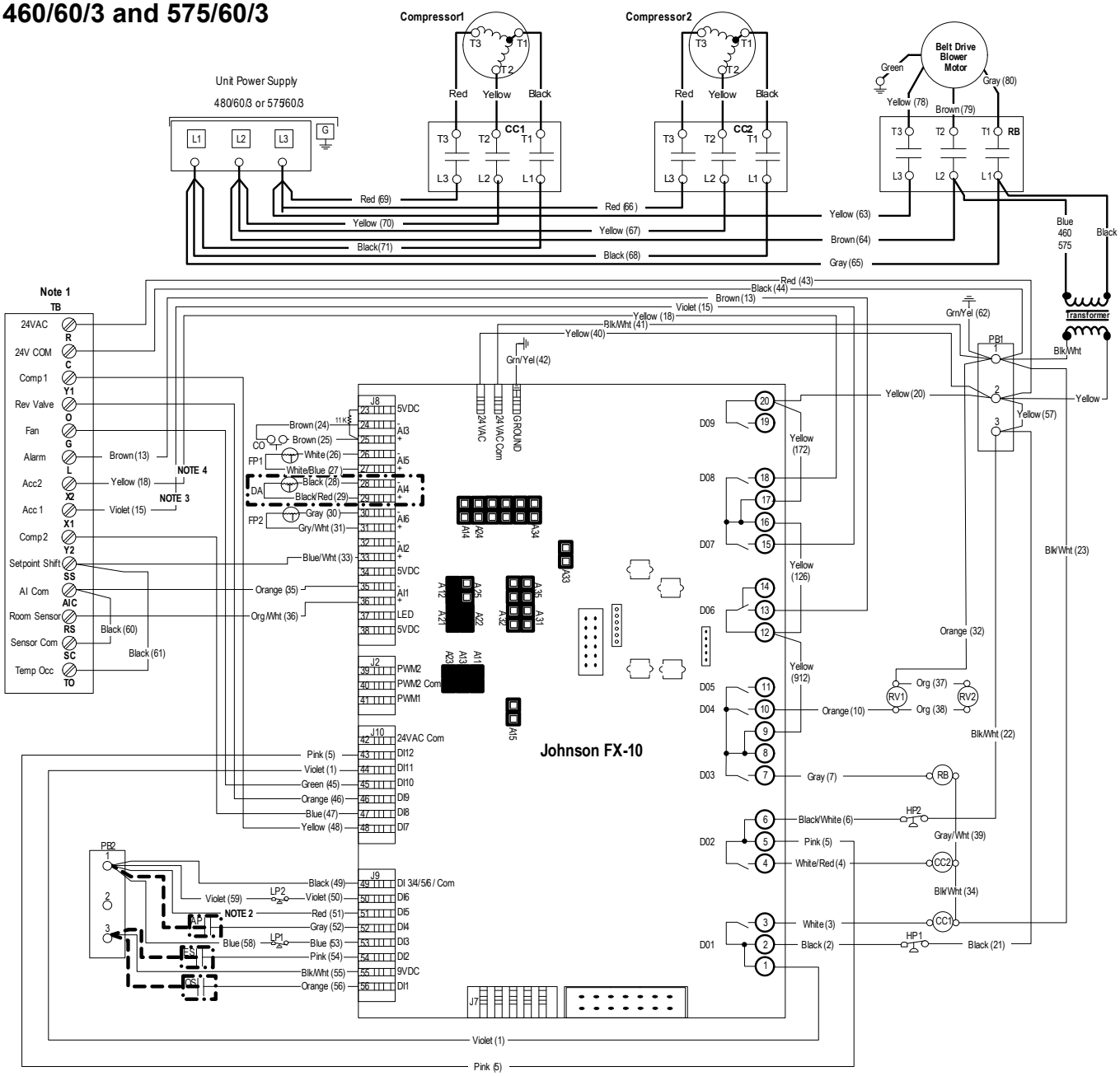
Wiring Schematic - FX10 Control cont.

460/60/3 and 575/60/3



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Optional FX10 Microprocessor Control

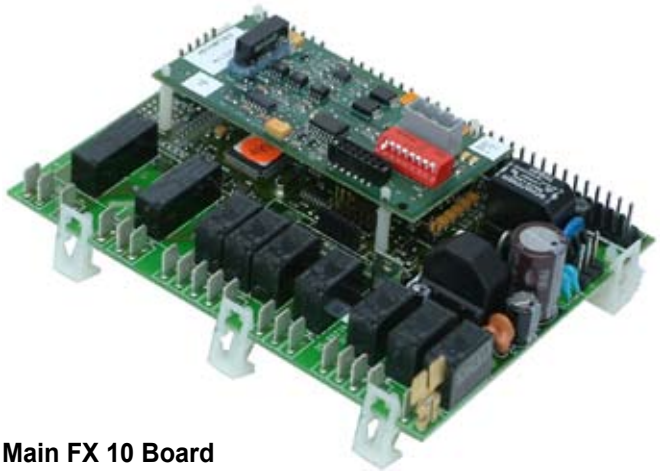
FX10 Control Overview

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 output programmed to enable emergency heat in the event that the compressor is locked out. This output 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 humidity sensor and displayed over the network and 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.

The FX10 control has unused analog and digital inputs for field installed items such as air temperature, water temperature, or current status switches. The control has unused binary and PWM outputs that can be commanded over the BAS for field use.



Main FX 10 Board

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.

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 DDC control add-on

DDC Operation and Connection

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

- Johnson Control N2
- BACnet
- LonWorks

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.

Lockout Mode

Lockout mode can be activated by any of the following fault signals: refrigerant system high pressure, refrigerant system low pressure, heating 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 the holding the ESC and Return keys on the MUI for 5 seconds.

Optional FX10 Microprocessor Control cont.

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 detectopm 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.

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 degrees 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.

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.

Compressor Fixed On Delay Time

The Compressor Fixed On Delay Time will ensure that the compressor output (B02) 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 (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 (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.

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 PID 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

Optional FX10 Microprocessor Control cont.

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 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.

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, 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.

Network Enabled Output/ Electric Heat Output (BO-5)

This output can be enabled by the BAS network for use as needed in the field. There is a soft switch in the application that can be enabled through the BAS or MUI that will allow this output to be used for auxiliary electric heat. A second soft switch is available that can be enabled through the BAS or MUI that will interlock this output with the blower proving input (BI-6) for operating electric heat. If the blower proving input is open when the interlock is enabled, the Electric Heat Output (BO-5) will be immediately disabled.

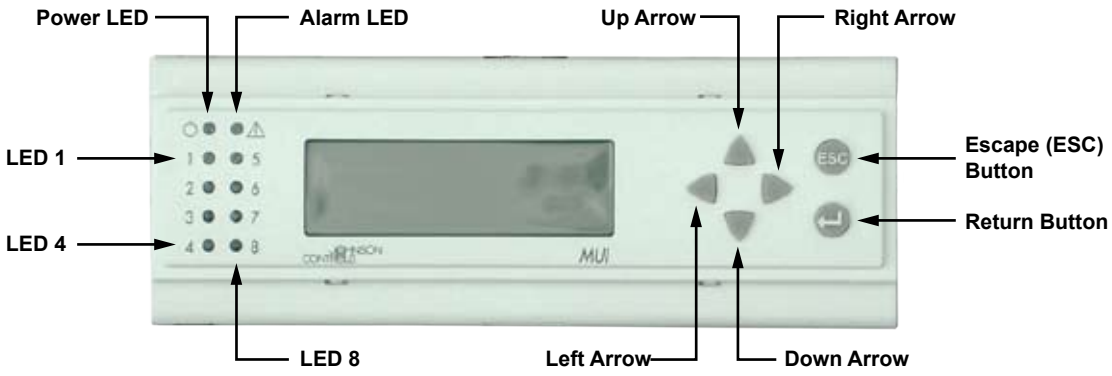
If this output is enabled for electric heat then it shall be used as a backup for the compressor in the event that a compressor fault occurs during heating operation.

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.

Optional FX10 Microprocessor Control 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 - G Series Water-to-Air

Welcome

Info Status Temps Outputs Settings Maint Alarms Alm-History

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 ºF
Dis Air Temp	51.0 ºF
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

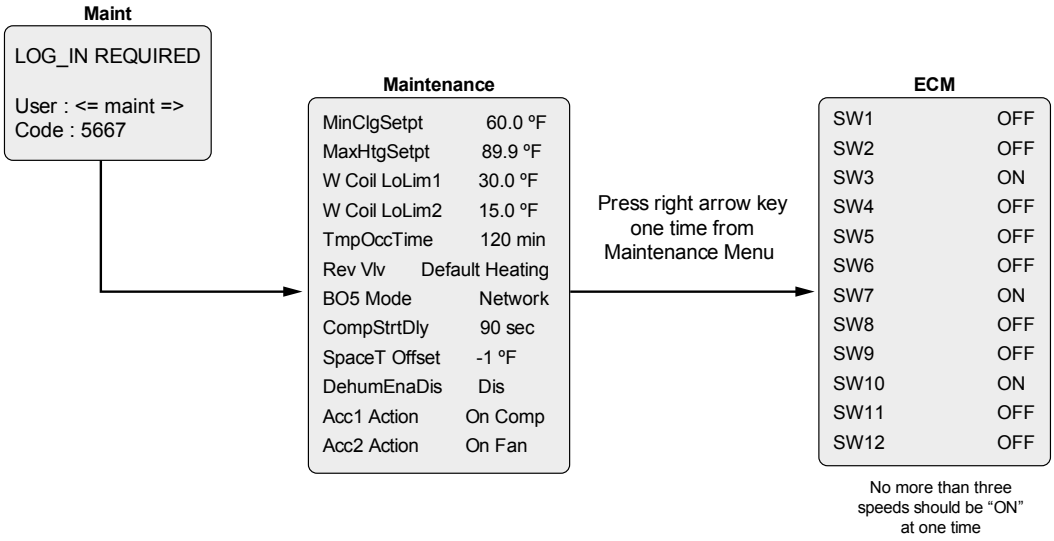
nvoFanStatus	ON
CmpCmd Status	OFF
Cmp Capacity	OFF
Rev Valve	Heat
X1 Output	OFF
X2 Output	OFF
PWMOut	98%
BO5	OFF
BO9	OFF
AO2 Output	0%

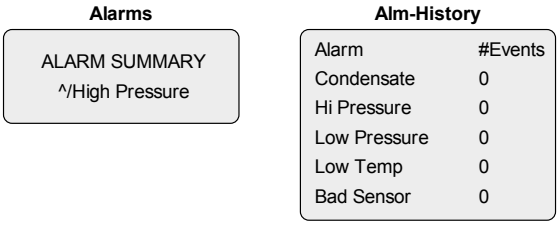
Settings

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

Optional FX10 Microprocessor Control cont.

MUI Menu Navigation for Single Compressor - G Series 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.

Optional FX10 Microprocessor Control - 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	nvoEffHtgSetpt	Effective Heating Setpoint Value (Read Only)
ADF	13	nviSpaceTemp	Space or Zone Temperature Value Override(Write)
ADF	16	nciAux1Temp	Heating Freeze Protection Temperature Setpoint Value (Read/Write)
ADF	17	nciAux2Temp	Heating Freeze Protection Temperature Setpoint Value (Read/Write)
ADF	18	nvoUnitStatus.Heat_Outpu	1st Stage Compressor Heating Output (Read Only)
ADF	20	nvoUnitStatus.Cool_Outpu	1st Stage Compressor Cooling Output (Read Only)
ADF	22	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	23	nciPropBand	Heating/Cooling Prop Band Input (Read/Write)
ADF	26	nciRemoteSetptMin	Warm/Cool Adjust Min (Read/Write)
ADF	27	nciRemoteSetptMax	Warm/Cool Adjust Max (Read/Write)
ADF	28	nciTempOffset	Space or Zone Temperature Sensor Calibration Input (Read/Write)
ADF	33	nviSetpoint	General Setpoint Input (Read/Write)
ADF	40	nvoHtgFrzPro1Tmp	Heating Freeze Protection Temperature 1 Value (Read Only)
ADF	41	nvoHtgFrzPro2Tmp	Heating Freeze Protection Temperature 2 Value (Read Only)
ADF	53	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	54	nvoSrcLoopTmp	Main Loop Temp for Economizer Control (Read Only)
ADF	55	nciSummerSetpt	Setpoint for Economizer (Read/Write)
ADF	56	nciAuxTempOffset	Economizer Temperature Sensor Calibration Input (Read/Write)
ADF	58	nvoHtgFrzSetpt	Heating Freeze Protection Temperature Setpoint Value (Read Only)
ADI	3	nciHours	Compressor Stage Lead/Lag hour setting (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	14	nviFanSpeedCmd.State	Network equivelant of a thermostatic 'G' call. (Write)
BD	15	nviComprEnable.State	Network equivelant of a thermostatic 'Y1' call. (Write)
BD	25	nviCompr2Enable.State	Network equivelant of a thermostatic 'Y2' call. (Write)
BD	16	nviValveEnable.State	Network equivelant of a thermostatic 'O' call. (Write)
BD	18	nvoComp1Status	Compressor 1 Command Status (Read Only)
BD	19	nvoRV1Status	Reversing Valve Output Status (Read Only)
BD	23	nviOccSchedule.Current_s	Occupancy Supervisory Scheduler Command Input (Read/Write)
BD	26	nvoComp2Status	Compressor 2 Command Status (Read Only)
BD	27	nciLogic_19	Compressor Stage Lead/Lag Enable/Disable (Read/Write)
BD	30	nciLogic_35	Water Side Economizer Enable/Disable (Read/Write)
BD	31	nvoCompFanProv	Compressor/Fan Proving Switch Status (Read Only)
BD	32	nviBO5	Command for output BO5 used for Emg Heat-Interlocked with Fan DP9Read/Write)
BD	34	nvoDirtyFilter	Value Output for BO5 used for Emg Heat (Read Only)
BD	35	nviBO9	Command for output BO9(Read/Write)
BD	36	nvoBO9	Value output for BO9 (Read Only)

Optional FX10 Microprocessor Control - 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)
nvoEffHtgSetpt	SNVT_temp_p	105				Effective Heating Setpoint Value (Read Only)
nviSpaceTemp	SNVT_temp_p	105				Space or Zone Temperature Value Override(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 Min (Read/Write)
nciRemoteSetptMax	SNVT_temp_diff_p	147			97	Warm/Cool Adjust Max (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 1 Value (Read Only)
nvoHtgFrzPro2Tmp	SNVT_temp_p	105				Heating Freeze Protection Temperature 2 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)
nvoSrcLoopTmp	SNVT_temp_p	105				Main Loop Temp for Economizer Control (Read Only)
nciSummerSetpt	SNVT_temp_p	105				Setpoint for Economizer (Read/Write)
nciAuxTempOffset	SNVT_temp_diff_p	147			11	Economizer Temperature Sensor Calibration Input (Read/Write)
nvoHtgFrzSetpt	SNVT_temp_p	105				Heating Freeze Protection Temperature Setpoint Value (Read Only)
nciHours	SNVT_time_hour	22				Compressor Stage Lead/Lag hour setting (Read/Write)
nvoEffectOccup	SNVT_occupancy	109				Effective Occupancy State (Read Only)
nviOccManCmd	SNVT_occupancy	109				Occupancy Override Command Input (Read/Write)
nviEmergOverride	SNVT_hvac_emerg	103				Emergency Override Input (Read/Write)
nvoFanStatus	SNVT_lev_disc	22				Fan Output Status (Read Only)
nvoAccStatus	SNVT_lev_disc	22				Accessory 2 Output Status (Read Only)
nvoLP_WVStatus	SNVT_lev_disc	22				Accessory 1 Output Status (Read Only)
nvoAlarmStatus	SNVT_lev_disc	22				Alarm Output Status (Read Only)
nviAlarmReset	SNVT_lev_disc	22				Alarm Reset Input (Read/Write)
nviFanSpeedCmd.State	SNVT_switch	95				Network equivelant of a thermostatic 'G' call. (Write)
nviComprEnable.State	SNVT_switch	95				Network equivelant of a thermostatic 'Y1' call. (Write)
nviCompr2Enable.State	SNVT_switch	95				Network equivelant of a thermostatic 'Y2' call. (Write)
nviValveEnable.State	SNVT_switch	95				Network equivelant of a thermostatic 'O' call. (Write)
nvoComp1Status	SNVT_lev_disc	22				Compressor 1 Command Status (Read Only)
nvoRV1Status	SNVT_lev_disc	22				Reversing Valve Output Status (Read Only)
nviOccSchedule	SNVT_tod_event	128				Occupancy Supervisory Scheduler Command Input (Read/Write)
nvoComp2Status	SNVT_lev_disc	22				Compressor 2 Command Status (Read Only)
nciLogic_19	UNVT_logic	24				Compressor Stage Lead/Lag Enable/Disable (Read/Write)
nciLogic_35	UNVT_logic	35				Water Side Economizer Enable/Disable (Read/Write)
nvoCompFanProv	SNVT_lev_disc	22				Compressor/Fan Proving Switch Status (Read Only)
nviBO5	SNVT_lev_disc	22				Command for output BO5 used for Emg Heat-Interlocked with Fan DP9Read/Write)
nvoDirtyFilter	SNVT_lev_disc	22				Value Output for BO5 used for Emg Heat (Read Only)
nviBO9	SNVT_lev_disc	22				Command for output BO9(Read/Write)
nvoBO9	SNVT_lev_disc	22				Value output for BO9 (Read Only)

Optional FX10 Microprocessor Control - BACnet

BACnet						Point Description
Object Identifier			Property		Full Reference	
Object Type	Type Enumeration	Instance	Name	Enumeration		
Analog Value	2	1	Present_Value	85	WFI##########.Occupied Cool.Present_Value	Occupied Cooling Setpoint Input (Read/Write)
						Standby Cooling Setpoint Input (Read/Write)
Analog Value	2	3	Present_Value	85	WFI##########.Unoccupied Cool.Present_Value	Unoccupied Cooling Setpoint Input (Read/Write)
Analog Value	2	2	Present_Value	85	WFI##########.Occupied Heat.Present_Value	Occupied Heating Setpoint Input (Read/Write)
						Standby Heating Setpoint Input (Read/Write)
Analog Value	2	4	Present_Value	85	WFI##########.Unoccupied Heat.Present_Value	Unoccupied Heating Setpoint Input (Read/Write)
Analog Value	2	7	Present_Value	85	WFI##########.Min Clg Setpt.Present_Value	Minimum Cooling Setpoint Input (Read/Write)
Analog Value	2	6	Present_Value	85	WFI##########.Max Htg Setpt.Present_Value	Maximum Heating Setpoint Input (Read/Write)
Analog Input	0	1	Present_Value	85	WFI##########.Space Temp.Present_Value	Space or Zone Temperature Value (Read Only)
Analog Input	0	2	Present_Value	85	WFI##########.Discharge Air Temp.Present_Value	Discharge Air Temp **Field Supplied Only** (Read Only)
Analog Input	0	5	Present_Value	85	WFI##########.Effective Clg Setpt.Present_Value	Effective Cooling Setpoint Value (Read Only)
Analog Input	0	6	Present_Value	85	WFI##########.Effective Htg Setpt.Present_Value	Effective Heating Setpoint Value (Read Only)
Analog Output	1	2	Present_Value	85	WFI##########.Space temp Ovrd.Present_Value	Space or Zone Temperature Value Override(Write)
						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	WFI##########.Mode.Present_Value	Unit Mode of Operation (Read Only)
						Unit Alarm mode (Read Only)
						Heating/Cooling Prop Band Input (Read/Write)
Analog Value	2	9	Present_Value	85	WFI##########.Remote Setpt Min.Present_Value	Warm/Cool Adjust Min (Read/Write)
Analog Value	2	8	Present_Value	85	WFI##########.Remote Setpt Max.Present_Value	Warm/Cool Adjust Max (Read/Write)
Analog Value	2	10	Present_Value	85	WFI##########.Zone Temp Offset.Present_Value	Space or Zone Temperature Sensor Calibration Input (Read/Write)
Analog Output	1	1	Present_Value	85	WFI##########.Common Setpoint.Present_Value	General Setpoint Input (Read/Write)
Analog Input	0	3	Present_Value	85	WFI##########.Freez Temp 1.Present_Value	Heating Freeze Protection Temperature 1 Value (Read Only)
Analog Input	0	3	Present_Value	85	WFI##########.Freez Temp 2.Present_Value	Heating Freeze Protection Temperature 2 Value (Read Only)
Analog Input	0	8	Present_Value	85	WFI##########.nvoAlarms.Present_Value	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)
Analog Input	0	9	Present_Value	85	WFI##########.Economizer Temp.Present_Value	Main Loop Temp for Economizer Control (Read Only)
Analog Input	2	5	Present_Value	85	WFI##########.Economizer Setpt.Present_Value	Setpoint for Economizer (Read/Write)
Analog Value	2	11	Present_Value	85	WFI##########.EconomizerTempOffset.Present_Value	Economizer Temperature Sensor Calibration Input (Read/Write)
Analog Input	0	7	Present_Value	85	WFI##########.Freez Temp Limit.Present_Value	Heating Freeze Protection Temperature Setpoint Value (Read Only)
						Compressor Stage Lead/Lag hour setting (Read/Write)
Multistate Input	13	1	Present_Value	85	WFI##########.Effective Occupancy.Present_Value	Effective Occupancy State (Read Only)
Multistate Output	14	1	Present_Value	85	WFI##########.Occupancy Command.Present_Value	Occupancy Override Command Input (Read/Write)
Multistate Output	14	6	Present_Value	85	WFI##########.Emergency Override.Present_Value	Emergency Override Input (Read/Write)
Binary Input	3	1	Present_Value	85	WFI##########.Fan Cmd Status.Present_Value	Fan Output Status (Read Only)
						Accessory 2 Output Status (Read Only)
						Accessory 1 Output Status (Read Only)
						Alarm Output Status (Read Only)
Multistate Output	14	7	Present_Value	85	WFI##########.Alarm Reset.Present_Value	Alarm Reset Input (Read/Write)
Multistate Output	14	2	Present_Value	85	WFI##########.Fan Command (G).Present_Value	Network equivelant of a thermostatic 'G' call. (Write)
Multistate Output	14	3	Present_Value	85	WFI##########.Comp1 Command (Y1).Present_Value	Network equivelant of a thermostatic 'Y1' call. (Write)
Multistate Output	14	4	Present_Value	85	WFI##########.Comp2 Command (Y2).Present_Value	Network equivelant of a thermostatic 'Y2' call. (Write)
Multistate Output	14	5	Present_Value	85	WFI##########.Rev Vlv Cmd (O).Present_Value	Network equivelant of a thermostatic 'O' call. (Write)
Binary Input	3	2	Present_Value	85	WFI##########.Comp1 Cmd Status.Present_Value	Compressor 1 Command Status (Read Only)
Binary Input	3	4	Present_Value	85	WFI##########.Reversing Valve.Present_Value	Reversing Valve Output Status (Read Only)
						Occupancy Supervisory Scheduler Command Input (Read/Write)
Binary Input	3	3	Present_Value	85	WFI##########.Comp2 Cmd Status.Present_Value	Compressor 2 Command Status (Read Only)
						Compressor Stage Lead/Lag Enable/Disable (Read/Write)
Multistate Value	19	1	Present_Value	85	WFI##########.Economizer Ena/Dis.Present_Value	Water Side Economizer Enable/Disable (Read/Write)
Multistate Input	13	3	Present_Value	85	WFI##########.Compressor/Fan Prove.Present_Value	Compressor/Fan Proving Switch Status (Read Only)
Multistate Output	14	8	Present_Value	85	WFI##########.Emergency Heat BO5.Present_Value	Command for output BO5 used for Emg Heat-Interlocked with Fan DP9Read/Write)
Binary Input	3	5	Present_Value	85	WFI##########.BO5 ElecHeat.Present_Value	Value Output for BO5 used for Emg Heat (Read Only)
Multistate Output	14	9	Present_Value	85	WFI##########.BO9.Present_Value	Command for output BO9(Read/Write)
Binary Input	3	9	Present_Value	85	WFI##########.BO9 Output.Present_Value	Value output for BO9 (Read Only)

Optional FX10 Microprocessor Control - BACnet Variables

The network variables will be listed by point type:instance convention. 2:1 would mean point type 2, point instance 1. All volatile points will revert to the uncommanded values after a power interruption.

Analog Input (Type 0)

0:1 Space Temp
[Read, shows the sensor value connected to terminals RS and AIC on the terminal board]

0:2 Disch Air Temp
[Read, shows sensor value connected to AI4 on the FX10]

0:3 Freez Temp 1
[Read, shows the water coil heat exchanger temperature For circuit 1.]

0:4 Freez Temp 2
[Read, shows the water coil heat exchanger temperature For circuit2.]

0:5 Active Clg Setpt
[Read, shows the active cooling setpoint value]

0:6 Active Htg Setpt
[Read, shows the active heating setpoint value]

0:7 Freez Temp Limit
[Read, shows the low temperature limit of the water coil heat exchanger.]

0:8 nvoAlarms
[Read, shows the current alarm status of the heat pump, 0=No alarms, 1=Condensate detected, 2=Compressor 1 Hi Discharge Pressure, 3=Compressor 1 Low Suction Pressure, 4=Circuit 1 Low Temp Limit on Coax, 5= Compressor 2 Hi Discharge Pressure, 6= Compressor 1 Low Suction Pressure, 7= Circuit 1 Low Temp Limit on Coax, 8=Circuit 1 Bad Refrigerant Temp Sensor, 9= Circuit 2 Bad Refrigerant Temp Sensor]

0:9 Economizer Temp
[Read, Shows the source water temperature for Economizer operation.(effective on units released after 8/11/07]

Analog Output (Type 1)

1:1 Common Setpoint
[Write, Adjust the midpoint value between Active Clg Setpt and Active Htg Setpt, raises and lowers both from a single command.]

1:2 Space Temp Ovrd
[Write, Override the space temperature.]

Analog Value (Type 2)

2:1 Occupied Cool
[Read/Write, Occupied cooling setpoint, nonvolatile]

2:3 Occupied Heat
[Read/Write, Occupied heating setpoint, nonvolatile]

2:2 Unoccupied Cool
[Read/Write, Unoccupied cooling setpoint, nonvolatile]

2:4 Unoccupied Heat
[Read/Write, Unoccupied heating setpoint, nonvolatile] Shutdown with antifreeze, nonvolatile.]

2:5 Economizer Setpt
[Read/Write, adjust the temperature threshold for economizer operation.]

2:6 Max Htg Setpt
[Read/Write, The upper limit that the heating setpoint may be adjusted to.]

2:7 Min Clg Setpt
[Read/Write, The lower limit that the cooling setpoint may be adjusted to.]

2:8 Remote Setpt Max
[Read/Write, Sets the upper value for the remote setpoint adjust. A 2 setting gives you + 2 degrees maximum.]

2:9 Remote Setpt Min
[Read/Write, Sets the lower value for the remote setpoint adjust. A 2 setting gives you - 2 degrees maximum.]

2:10 Zone Temp Offset
[Read/Write, This value is added to the sensor value for For zone temp, and the sum is shown on the Space Temp Variable. This is used for calibrating the Space Temperature, nonvolatile.]

2:11 Economizer TempOffset
[Read/Write, This value is used for calibrating the Economizer water temperature.]

Binary Input (Type 3)

3:1 Blower Cmd Status
[Read, shows the commanded status of the blower.]

3:2 Comp1 Cmd Status
[Read, shows the commanded status of compressor 1]

3:3 Comp2 Cmd Status
[Read, shows the commanded status of compressor 2]

3:4 Rev Valve Status
[Read, shows the reversing valve position, inactive = heating, active = cooling.]

3:5 BO-5 ElectHeat
[Read, shows command status of BO-5 for electric heat]

3:6 BO9 Spare
[Read, shows command status of BO-9]

Optional FX10 Microprocessor Control - BACnet Variables

Multistate Input (Type 13)

13:1 Effective Occupancy
[Read, shows the occupancy status of the heat pump. 1=Occupied, 2=Unoccupied, 3=Bypass (temporary occupancy)]

13:2 Mode
[Read, shows heat pump as normal or emergency shutdown 1=Auto(normal), 7=Off(shutdown)]

13:3 Compressor/Blower Prove
[Read, shows the contact status of BI-4.]

Multistate Output (Type 14)

14:1 Occupancy Command
[Read/Write, controls the occupancy mode of the heat Pump. 1=Occupied, 2=Unoccupied, 3=Bypass (Temporary Occupancy), 4=Standby, 255=Uncommanded]

14:2 Blower Command (G)
[Read/Write, network command to run the blower]

14:3 Comp1 Command (Y1)
[Read/Write, network Y1 command (compressor 1 call).]

14:4 Comp2 Command (Y2)
[Read/Write, network Y2 command (compressor 2 call).]

14:5 Rev Vlv Cmd (O)
[Read/Write, network O command. 1= heating, 2= cooling.]

14:6 Emergency Override
[Read/Write, provide means of emergency shutdown]

14:7 Alarm Reset
[Read/Write, allows remote reset of manual reset alarms, Command to a ‘2’ value for reset action, 1 for normal Operation.]

14:8 BO5 ElectHeat
[Read/Write, network command to enable electric heat (interlocked with BI4)]

14:9 BO9 Spare
[Read/Write, network command to enable/disable BO9]

Blower Drive Sheaves

Blower Sheave Adjustment

Follow the procedures listed below if airflow of heat pump is to be changed from factory setting. (Refer to Figure 10.)

1. Loosen the blower motor fastening nuts from the motor mount.
2. Turn the adjusting bolts until the tension is off the drive belt.
3. Remove belt from sheave and loosen allen heat set screw “B”.
4. Adjust sheave pitch diameter for desired speed by opening or closing moveable portion in or out in 1/2-turn increments. Do not open more than 5 full turns.
5. Sheave should be mounted with set screw “A” toward the motor. Be sure driven and drive sheaves are in alignment and parallel.
6. Retighten set screw “B” and replace drive belt on sheaves.
7. Turn motor mount adjusting bolts until belt has approximately 1/2-inch of deflection midway between sheaves (4 lbs. tension if measured with gauge, see Figure 11).
8. Retighten motor mounting nuts. Belt tension of a new belt will drop rapidly during the first few hours of operation.
9. Check and readjust as needed.

Figure 10: Blower Motor Sheave Adjustments and Settings

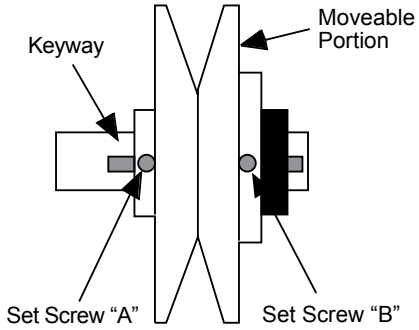
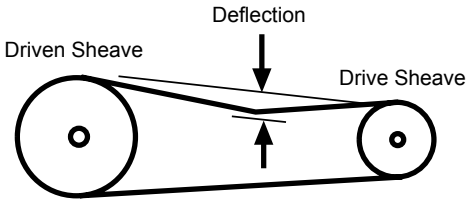


Figure 11: Checking Drive Belt Tension



Unit Startup

Before powering the unit, check the following:

- High voltage is correct and matches nameplate
- Fuses, breakers and wire size are correct
- Low voltage wiring is complete
- Piping has been completed and water system cleaned and flushed
- Air is purged from closed loop system
- Isolation valves are open and water control valves or loop pumps wired
- Condensate line is open and correctly pitched
- Transformer has been switched to lower voltage tap if needed
- Blower rotates freely
- Blower speed is correct
- Air filter is clean and in position
- Service/access panels are in place
- Return air temperature is between 60°F-80°F in heating and 70°F-95°F in cooling
- Air coil has been cleaned

Startup Steps

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 set point must be set below room temperature.
3. First stage cooling will energize after a time delay. Check for correct rotation of scroll compressors in 120, 080, 095 units. Incorrect rotation will cause unusual noise and low refrigerant pressures. Switch any two power leads at the compressor or contractor to reverse rotation.
4. Be sure the compressor and water control valve or loop pumps are activated.
5. Initiate a control signal to energize second stage cooling.
6. Second stage cooling will energize after a time delay. Check for correct rotation as indicated in step 3.
7. Verify that the water flow rate is correct by measuring pressure drop through the heat exchanger using the P/T plugs and comparing to Water Pressure Drop Table on page 24.
8. Check the temperature of both the supply and discharge water. ***Refer to Unit Operating Pressures and Temperatures***
9. Check for an air temperature drop of 15° to 25°F across the air coil, depending on blower speed and entering water temperature.
10. Adjust the cooling setpoint above the room temperature and verify that the compressor and water valve or pumps deactivate.
11. Initiate a control signal to place the unit in the heating mode. Heating setpoint must be set above room temperature.
12. First stage heating will energize after a time delay.
13. Initiate a control signal to energize second stage heating.
14. Second stage heating will energize after a time delay.
15. Check the temperature of both the supply and discharge water. ***Refer to Unit Operating Pressures and Temperatures.***
16. Check for an air temperature rise of 20°F to 25°F across the air coil, depending on the blower speed and entering water temperature.
17. Adjust the heating setpoint below room temperature and verify that the compressor and water valve or loop pumps deactivate.
18. During all testing, check for excessive vibration, noise or water leaks.
19. Set system to desired normal operating mode and set temperature to maintain desired comfort level.
20. Instruct the owner/operator in the proper operation of the thermostat and system maintenance.
21. Check belt tension and readjust as necessary after first few hours.

Operating Parameters

Entering Water Temp °F	Water Flow GPM/Ton	Cooling					
		Suction Pressure PSIG	Discharge Pressure PSIG	080-300 Superheat	080-300 Subcooling	Water Temp Rise °F	Air Temp Drop °F DB
50	1.5	110-130	160-190	10-17	13-17	17-22	20-30
	3.0	110-130	160-190	20-30	11-15	8-12	20-30
70	1.5	120-140	260-300	9-13	15-19	17-22	20-30
	3.0	120-140	260-300	9-13	11-15	8-12	20-30
90	1.5	130-150	340-380	8-12	15-19	15-19	15-25
	3.0	130-150	340-380	8-12	11-15	7-11	15-25

Entering Water Temp °F	Water Flow GPM/Ton	Heating					
		Suction Pressure PSIG	Discharge Pressure PSIG	080-300 Superheat	080-300 Subcooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.5	-	-	-	-	-	-
	3.0	60-80	280-310	10-14	5-12	4-8	20-30
50	1.5	80-110	300-330	8-12	5-12	6-12	20-30
	3.0	80-110	300-330	8-12	5-12	6-12	20-30
70	1.5	110-140	330-360	8-12	1-8	10-15	30-40
	3.0	110-140	330-360	8-12	1-8	10-15	30-40

7/25/07

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

Pressure Drop

Model	GPM	Pressure Drop (psi)				
		30°F	50°F	70°F	90°F	110°F
080	10.0	2.48	2.36	2.29	2.21	2.14
	16.0	5.96	5.62	5.22	4.89	4.69
	22.0	10.91	10.38	9.73	9.12	8.50
095	12.0	2.22	2.00	1.92	1.83	1.67
	18.0	4.62	4.02	3.80	3.75	3.65
	24.0	7.31	6.81	5.80	5.60	5.19
120	16.0	2.03	1.93	1.88	1.80	1.50
	22.0	3.69	3.58	3.40	3.19	2.99
	28.0	5.58	5.50	5.32	5.00	4.84
160	20.0	1.20	1.19	1.18	1.17	1.16
	28.0	2.64	2.50	2.37	2.24	2.12
	35.0	3.72	3.65	3.41	3.36	3.21
180	22.0	1.50	1.50	1.50	1.50	1.50
	34.0	3.95	3.90	3.85	3.80	3.75
	45.0	6.40	6.10	6.00	5.80	5.70
240	30.0	0.90	0.82	0.75	0.69	0.63
	45.0	2.22	2.06	1.91	1.77	1.64
	60.0	3.47	3.29	3.06	2.88	2.40
300	35.0	1.84	1.60	1.39	1.21	1.05
	56.0	4.09	3.88	3.69	3.51	3.33
	75.0	6.10	5.95	5.77	5.45	5.10

DEALER: _____

PHONE #: _____ DATE: _____

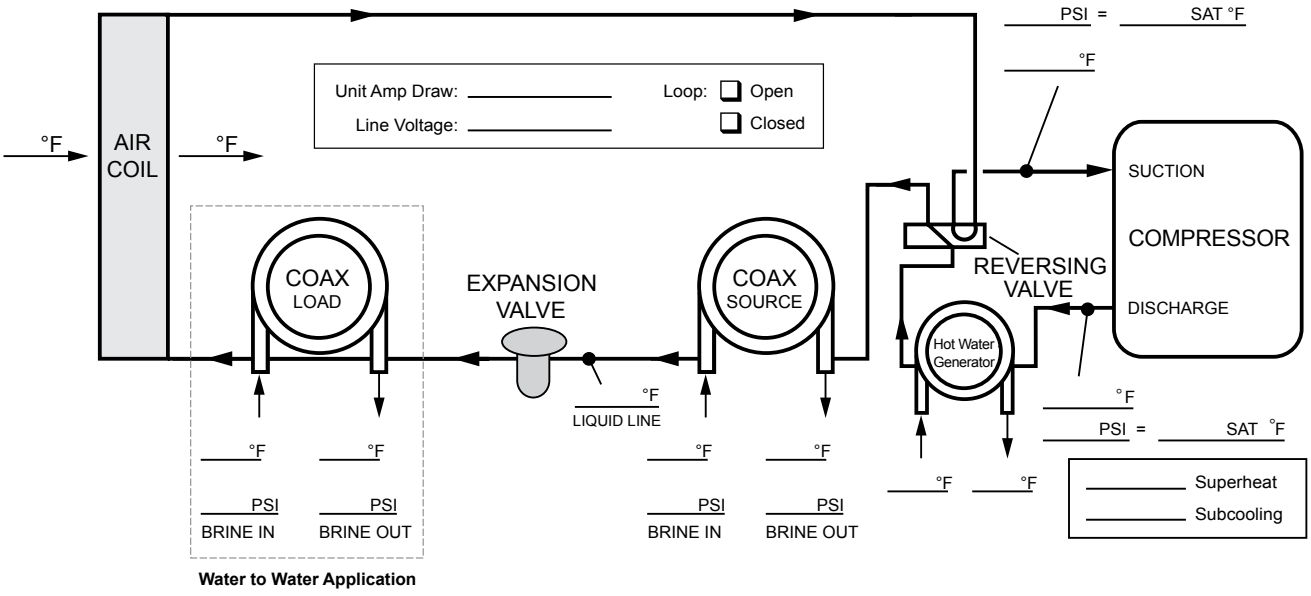
PROBLEM: _____

MODEL #: _____

SERIAL #: _____

Startup/Troubleshooting Form

COOLING CYCLE ANALYSIS

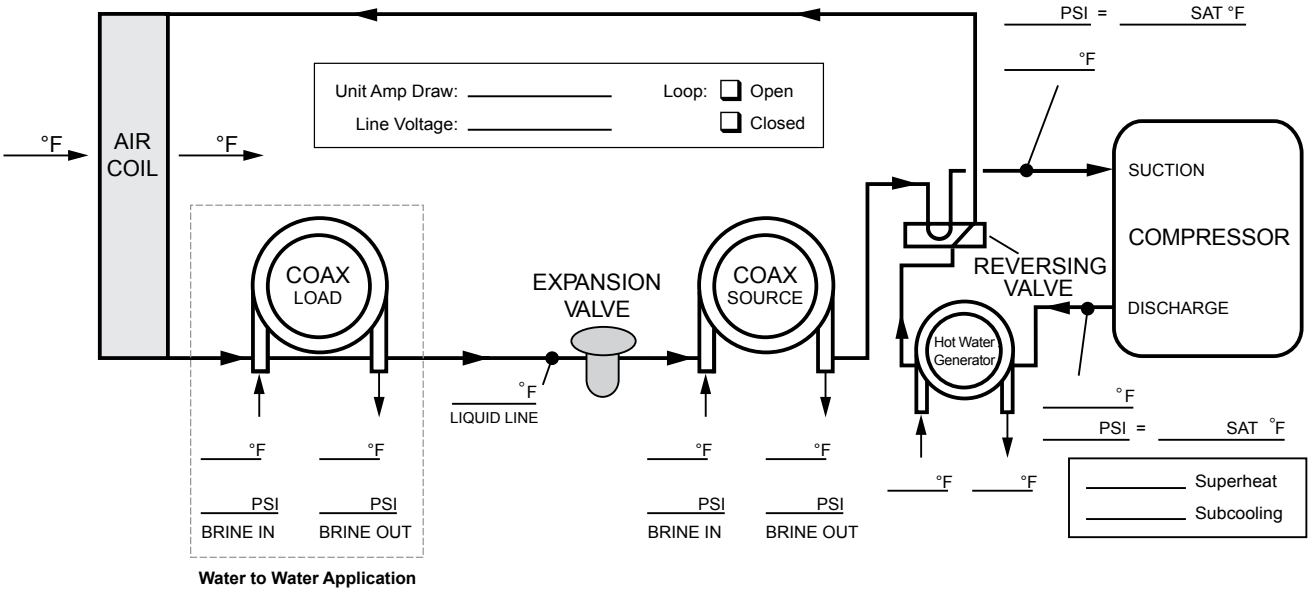


Water to Water Application

Heat of Extraction/Rejection = GPM x 500 (485 for water/antifreeze) x ΔT

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

HEATING CYCLE ANALYSIS



Water to Water Application

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 or air vents may draw air into the system.

NOTES: If the installation is performed in an area with a known high mineral content (125 P.P.M. 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 every two to three months 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 residual buildup in the drain pan, it may be necessary to chemically treat the pan 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.

Air Coil

The air coil must be clean to obtain maximum performance. Check once a year under normal operating conditions and brush, vacuum or chemically clean the air coil if necessary. Care must be taken not to damage or disturb the aluminum fins while cleaning.

CAUTION: Fin edges are sharp.

Drive Belts

Check periodically for proper tension.

Replacement Procedures

Obtaining Parts

Contact your distributor for service or replacement parts required.

In-warranty Material Return

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

Product:	**G Series Commercial**
Type:	Water Source/Geothermal Heat Pump
Size:	7-25 Tons
Document Type:	Installation Manual
Part Number:	IM1021AG1
Release Date:	06/10