ENVISION™ 2

NXW 10 to 50 Tons

Commercial Reversible Chiller - 60 Hz

NXW Reversible Chiller Installation Manual

- Installation Information
- Water Piping Connections
- Electrical Data
- Microprocessor Control
- Startup Procedures
- Preventive Maintenance

ETL LISTED

WaterFurnace® Smarter from the Ground Up™

IM2502WN 06/14

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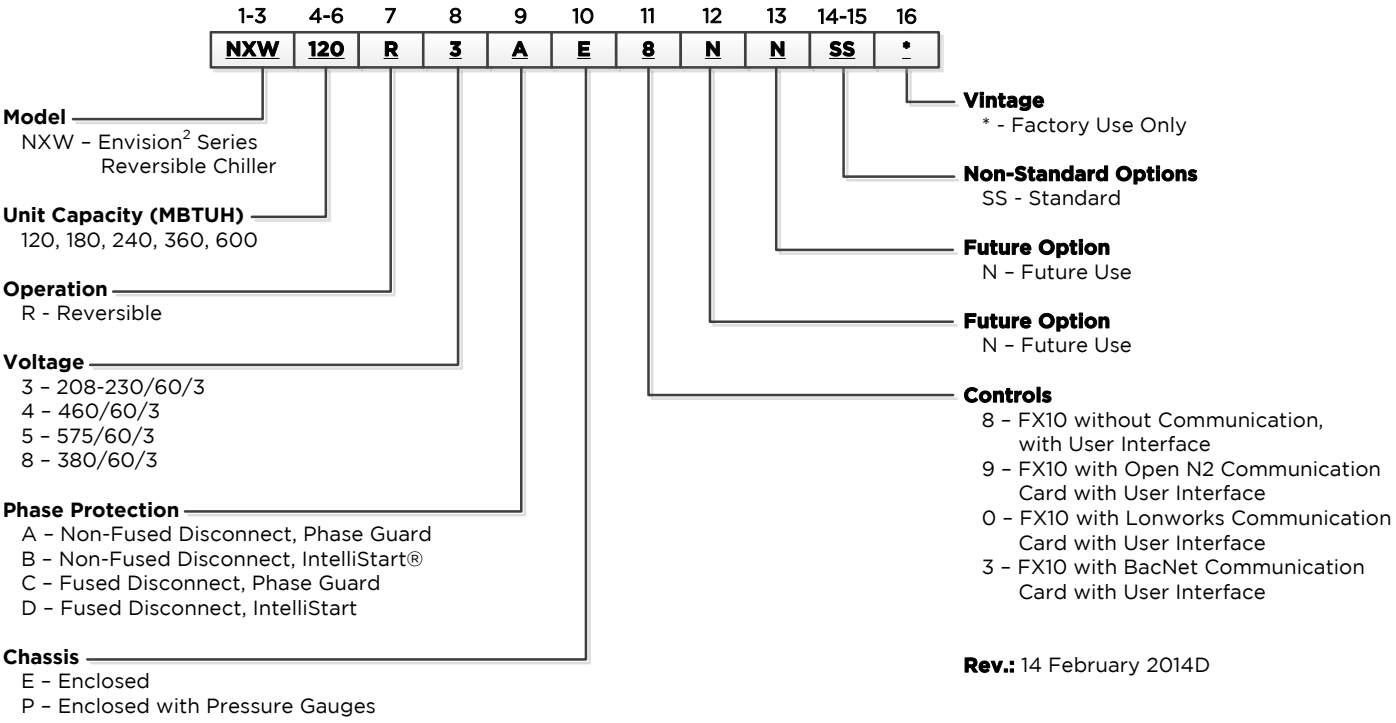
Model Nomenclature



Rev.: 14 February 2014D

Notes:
See electrical availability table for detailed offering by voltage

Voltage Availability

Voltage	Model				
	120	180	240	360	600
208-230/60/3	●	●	●	●	NA
460/60/3	●●	●●	●●	●	●
575/60/3	●	●	●	●	●
380/60/3	●●	NA	NA	●	●

03/05/14

Legend:
NA = Not Available
● = Voltage available in this size
●● = Voltage and IntelliStart available in this size

General Installation Information

Safety Considerations

Installing and servicing air conditioning and heating 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. 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 quenching cloth for brazing operations. Have fire extinguisher available for all brazing operations.

NOTE: Before installing, check voltage of unit(s) to ensure proper voltage.

WARNING: Before performing service or maintenance operations on the system, turn off main power switches to the unit. Electrical shock could cause serious personal injury.

Application

Units are not intended for heating domestic (potable water) by direct coupling. If used for this type of application, a secondary heat exchanger must be used.

Moving and Storage

Move units in the normal "Up" orientation as indicated by the labels on the unit packaging. When the equipment is received, all items should be carefully checked against the bill of lading to ensure that all crates and cartons have been received in good condition. Examine units for shipping damage, removing unit packaging if necessary to properly inspect unit. Units in question should also be internally inspected. If any damage is observed, the carrier should make the proper notation on delivery receipt acknowledging the damage. Units are to be stored in a location that provides adequate protection from dirt, debris and moisture.

WARNING: To avoid equipment damage, do not leave the system filled in a building without heat during cold weather, unless adequate freeze protection levels of antifreeze are used. Heat exchangers do not fully drain and will freeze unless protected, causing permanent damage.

Unit Location

Provide sufficient room to make water and electrical connections. If the unit is located in a confined space, provisions must be made for unit servicing. Locate the unit in an indoor area that allows easy removal of the access panels and has enough space for service personnel to perform maintenance or repair. These units are not approved for outdoor installation and, therefore, must be installed inside the structure being conditioned. Do not locate units in areas subject to freezing conditions.

WARNING: Do not store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g. attics, garages, rooftops, etc.). Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life.

WARNING: To avoid equipment damage and possible voiding of warranty, be sure that properly sized strainers are installed upstream of both brazed plate heat exchangers to protect them against particles in the fluid.

General Installation Information cont.

Mounting Units

Remove the unit from the wooden shipping skids (see physical dimensions). Units will be shipped with heavy duty rubber grommets to reduce sound that can be transmitted through the floor via the frame (see isolator drawing). For additional sound attenuation, use heavy duty spring isolation that can reduce sound levels by 3 dBA (see springs drawing).

Rubber Isolators

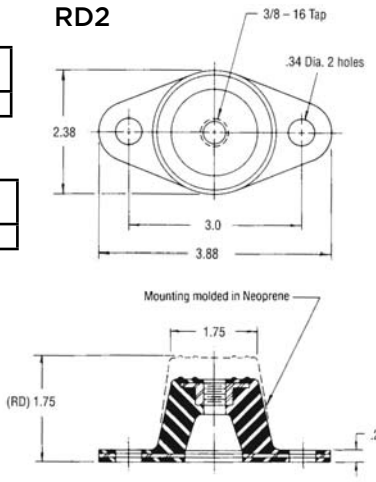
Part Number	Type	Color Code	Max Load, lbs	Deflection, in	Qty
99S502-01	RD2	Green	380	0.50	4

• Compatible with NXW120-180

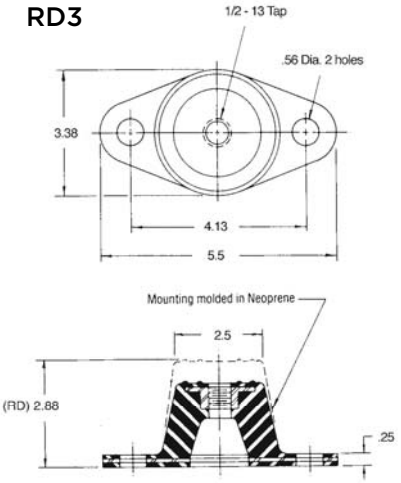
Part Number	Type	Color Code	Max Load, lbs	Deflection, in	Qty
99S502-02	RD3	Green	750	0.50	4

• Compatible with NXW240-600

RD2

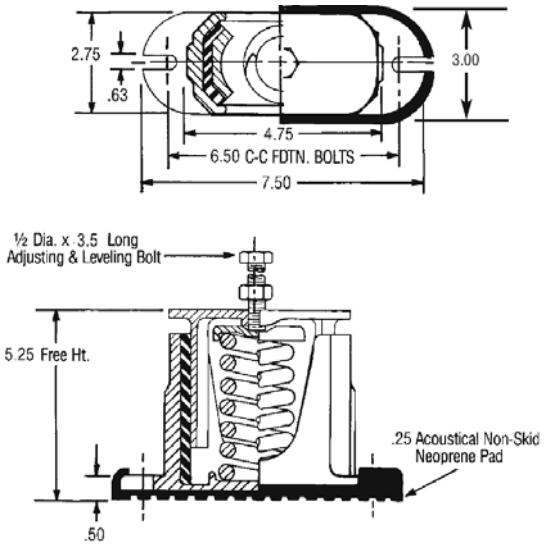


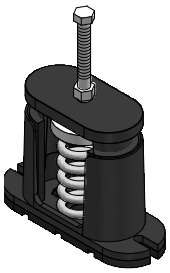
RD3



Spring Isolators

Number	Compatible With	Spring Color	Rated Capacity	Rated Deflection	Isolator Constant	Adjustment Bolt	Qty
IS-325-01	NXW120-180	Brown	325 lbs	1.23"	264 lbs/in	1/2 x 3.5	4
IS-750-01	NXW240-600	Orange	750 lbs	1.06"	707 lbs/in	1/2 x 3.5	4

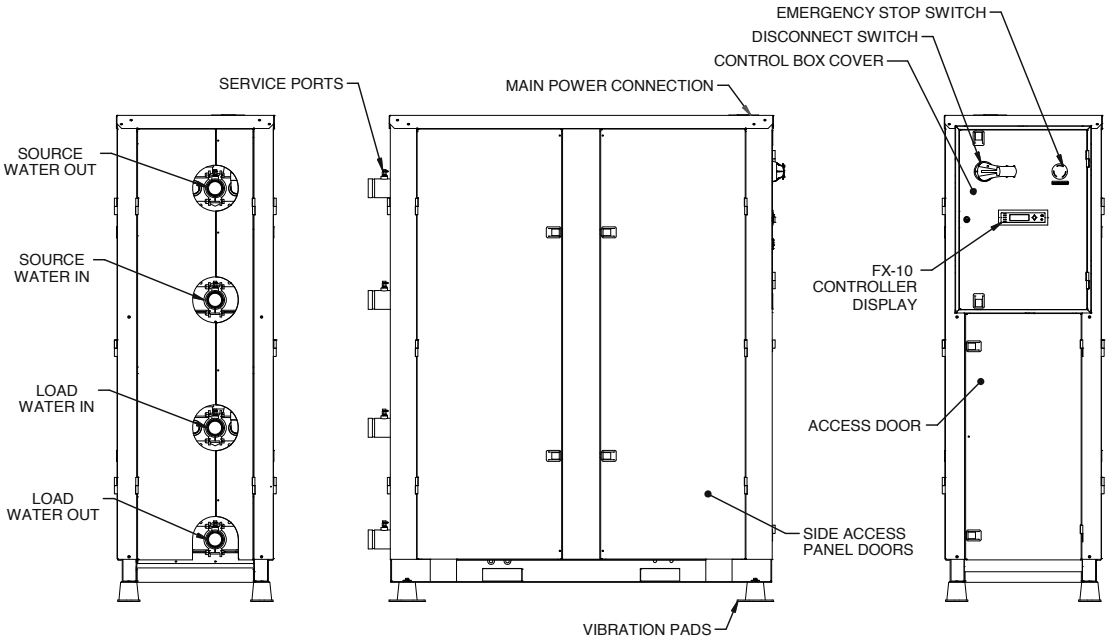




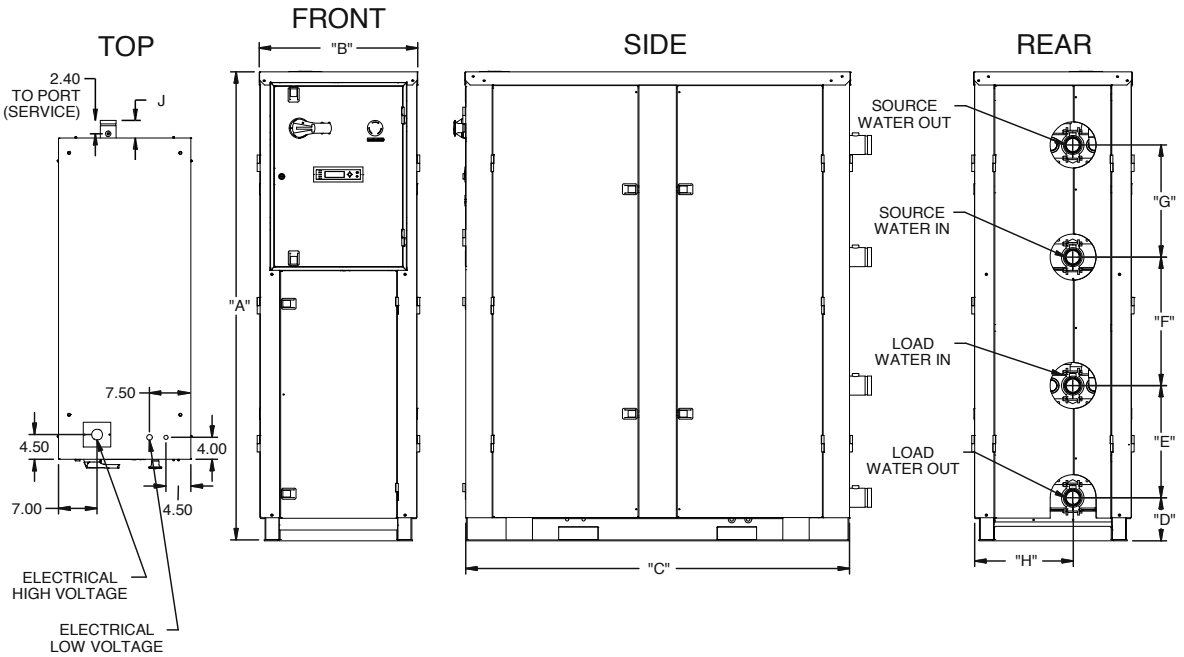
Unpacking the Unit

Remove the stretch warp and protective cardboard from the unit. Where applicable, remove the compressor shipping brackets located at the base of each compressor. To do so, lift up the bottom of the compressor sound jacket and remove the two bolts that hold the bracket .

Physical Dimensions



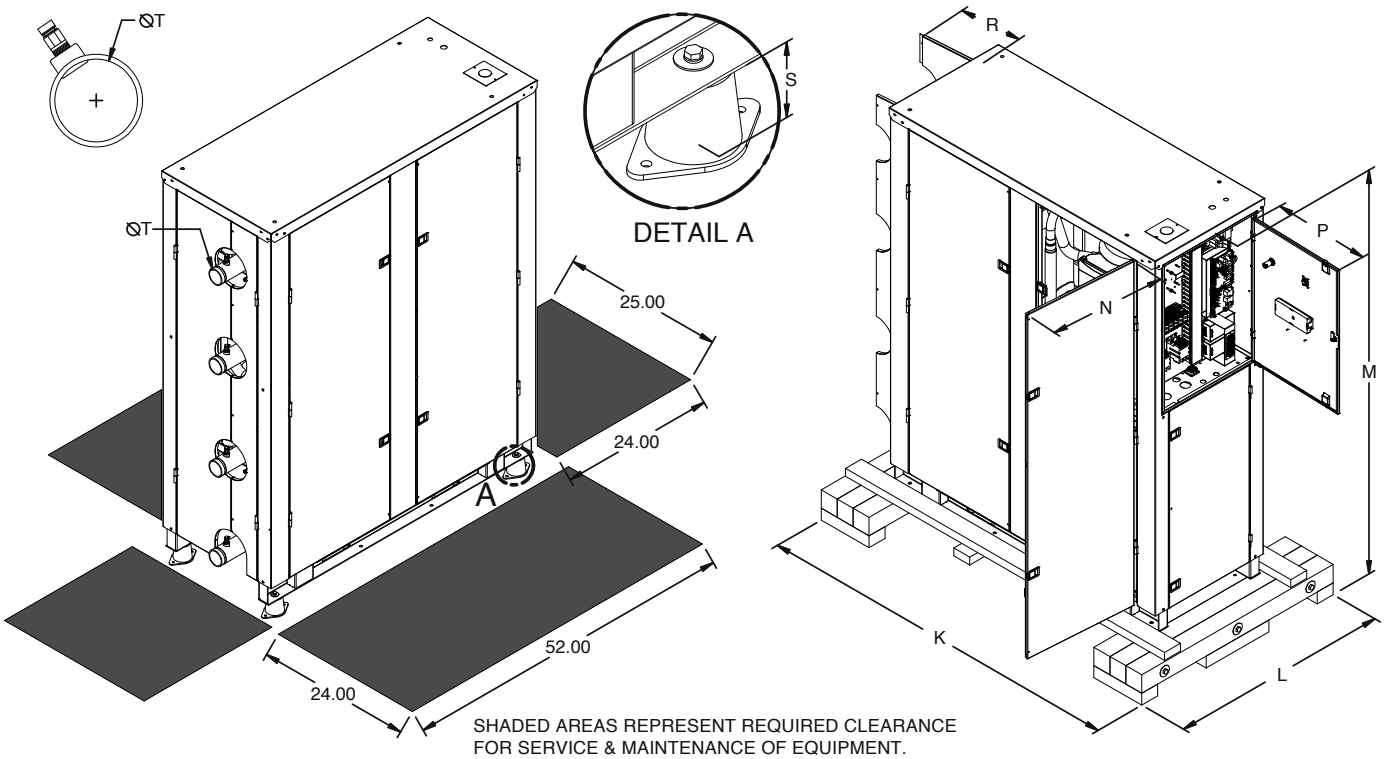
NOTES:
1. DO NOT SCALE DRAWING.



Model	A	B	C	D	E	F	G	H	J
120-180	57.3 [1455]	24.1 [612]	42.5 [1080]	5.0 [127]	17.0 [432]	8.8 [224]	17.0 [432]	11.9 [302]	4.6 [117]
240-360	64.2 [1631]	24.1 [612]	50.5 [1283]	6.9 [175]	17.0 [432]	13.9 [353]	17.0 [432]	12.1 [307]	3.6 [91]
600	71.1 [1806]	24.0 [610]	58.5 [1486]	6.5 [165]	17.0 [432]	19.5 [495]	17.0 [432]	15.0 [381]	3.2 [81]

All dimensions in inches, [mm] 5/12/14

Physical Dimensions, cont.



Model	K	L	M	N	P	R	S	T*
120-180	57.0 [1448]	42.0 [1067]	63.1 [1603]	15.9 [404]	19.5 [495]	9.7 [246]	1.3 [33]	2.0 [50.8]
240-360	65.0 [1651]	42.0 [1067]	69.9 [1775]	19.9 [505]	19.5 [495]	9.7 [246]	1.8 [46]	2.0 [50.8]
600	70.0 [1778]	42.0 [1067]	76.8 [1951]	22.0 [559]	19.5 [495]	12.7 [323]	1.8 [46]	2.5 [63.5]

All dimensions in inches, [mm]
*T - Units shipped with groove pipe connection

5/12/14

Physical Data

Model	Compressor	Refrigerant Charge*	Total Weight	
			Shipping	Installed
120	Scroll (2)	5.3	720	710
		[2.4]	[327]	[323]
180	Scroll (2)	7.8	838	844
		[3.5]	[381]	[384]
240	Scroll (2)	10.5	1130	1152
		[4.8]	[514]	[524]
360	Scroll (2)	17.9	1320	1388
		[8.1]	[600]	[631]
600	Scroll (2)	27.3	1748	1850
		[12.4]	[795]	[841]

Weights shown in Pounds, [kg] 1/30/2014

* Refrigerant per circuit in Pounds, [kg]

Add 32 lbs [15 kg] for fluid weight when full. (120)

Add 48 lbs [22 kg] for fluid weight when full. (180)

Add 64 lbs [29 kg] for fluid weight when full. (240)

Add 110 lbs [50 kg] for fluid weight when full. (360)

Add 144 lbs [65 kg] for fluid weight when full. (600)

NOTE: See page 12 for minimum fluid volume guidelines.

Field Connected Water Piping

General

System piping should be kept as simple as possible to minimize the pressure drop, but hand valves should be field installed to facilitate unit servicing. The piping installation should provide service personnel with the ability to measure and/or monitor water temperatures and pressures.

Source and load fluid connections are provided with 2-inch [50.8mm] Victaulic grooved nipples (see Figure 4). Each nipple will also have a PT port installed for test and balance purposes. It will be the installing contractor's responsibility to adequately support incoming piping to avoid damage to the unit's piping or heat exchangers. The water lines should be routed so as not to interfere with access to the unit.

For any installation where the transmission of vibration through the piping connections could cause unacceptable noise levels in occupied spaces it is important to provide adequate vibration damping. One method is to use the optional Adapter Hose Kit (kit number TKC16S-4). This Kit consists of four pieces of a braided stainless steel flexible hose with a 2" Victaulic connection on one end and a 2" MPT connection with pipe union on the other. Overall length of each piece is 18".

NOTE: Units are factory run-tested using propylene glycol. Prior to connecting piping to unit, thoroughly flush heat exchangers.

Before final connection to the unit, the supply and return hose kits must be connected to each other, bypassing the unit, and the system flushed to remove dirt, piping chips and other foreign material. Normally, a combination balancing and close-off (ball) valve is installed at the return, and a rated gate or ball valve is installed at the supply. The return valve can be adjusted to obtain the proper water flow. The valves allow the unit to be removed for servicing.

The proper water flow must be delivered to each unit whenever the unit heats or cools. The proper flow rate cannot be accurately set without measuring the water pressure drop through the refrigerant-to-water heat exchanger. **A 3 GPM flow rate per ton [0.054 LPS per kW] of cooling capacity (2.25 GPM per ton [0.0404 LPS per kW] minimum) is required.**

NOTE: The placement and connection of the water circulating pump(s) must be taken into consideration prior to designing the final water piping systems.

Closed Loop Tower/Boiler Systems

The water loop is usually maintained between 60°F [15.5°C] and 90°F [32.2°C] for proper heating and cooling operation. This is accomplished with a cooling tower and a boiler.

To reject excess heat from the condenser water loop, the use of a closed-circuit evaporative cooler or an open type cooling tower with a secondary heat exchanger between the tower and the condenser water loop is recommended. If an open type cooling tower is used without a secondary heat exchanger, continuous chemical treatment and filtering of the water must be performed to ensure the water is free from damaging materials.

CAUTION: Water piping exposed to outside temperature may be subject to freezing.

Open Loop Well Water Systems

Installation of an open loop system is not recommended without using a secondary heat exchanger unless water quality guidelines are met.

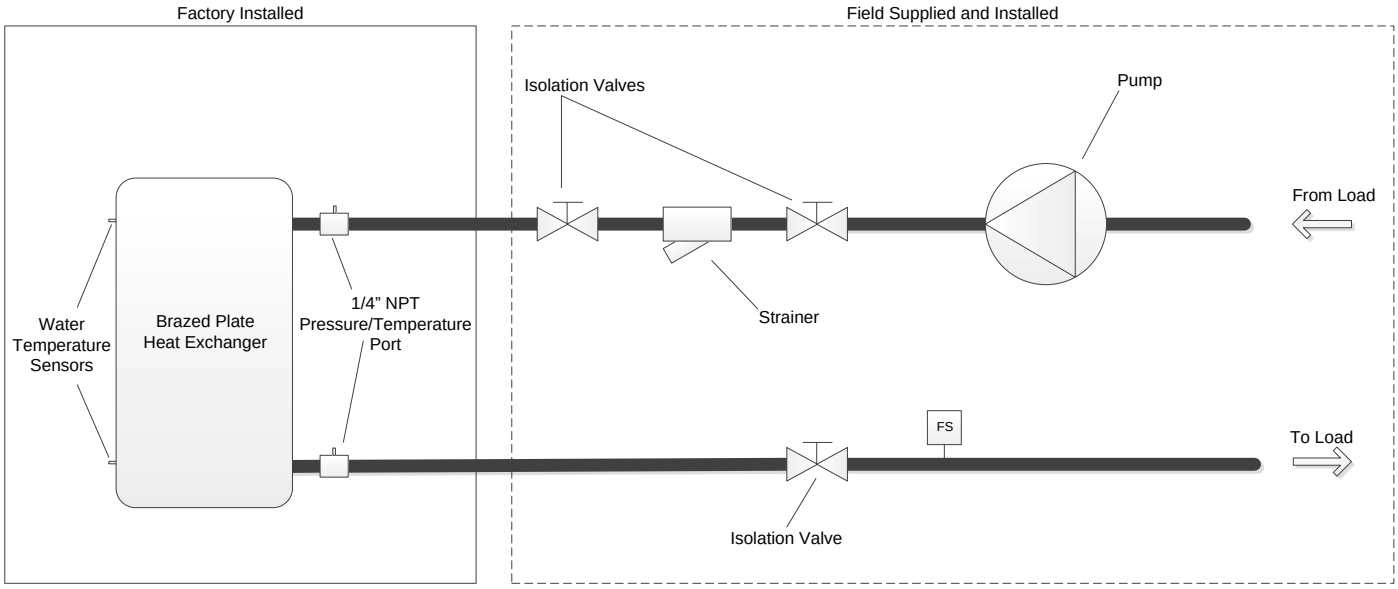
Earth Coupled Systems

All supply and return water piping should be insulated to prevent excess condensation from forming on the water lines. Ensure pumping system is capable of providing adequate flow rate at the system pressure drop, 3.0 GPM per ton [0.054 LPS per kW] (source side) is recommended. Antifreeze in the loop is strongly recommended.

CAUTION: Remove the plastic protective caps in the ends of each of the four water pipes on the heat exchangers prior to piping connection. Failure to remove the caps will result in serious damage and could void the warranty.

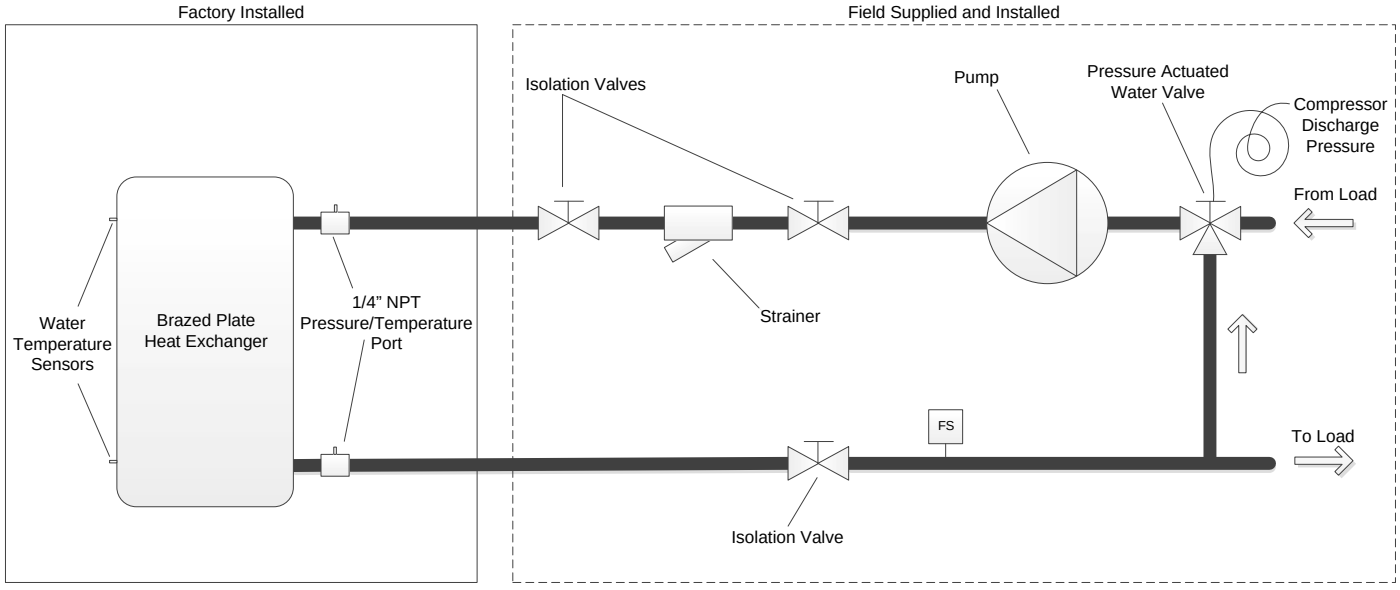
Envision² NXW Typical Piping

Standard Piping



Note: System piping should have drain ports to enable flushing and cleaning of heat exchangers. On systems utilizing pumps with VFDs, an automatic flow control valve must be installed.

Pressure Regulated Piping



Note: System piping should have drain ports to enable flushing and cleaning of heat exchangers. On systems utilizing pumps with VFDs, an automatic flow control valve must be installed.

Envision² NXW Application Data

1.0. Minimum Fluid Volume

A. Water-to-water heat pumps require a minimum amount of source and load side fluid volume to ensure accurate and stable temperatures during system operation. For normal air conditioning type applications, it is recommended to use at least 7 gallons/ton.
B. Applications that require more precise temperature control or low loading will occur the minimum fluid volume shall be no less than 10 gallons/ton. Installation of a buffer tank that will properly mix the fluid is recommended.

1.1. Water-to-Water Heat Pump Sizing

A. Heat pumps should be adequately sized for optimal system efficiency and run time. Oversizing by more than 15% can diminish performance resulting in higher power consumption, short cycling of compressors, and unstable conditioning temperatures.
B. In applications where the minimum load is significantly less than the design condition, it is better to install 2 smaller heat pumps for load matching rather than a single large heat pump.

1.2. Heat Pump Piping

A. Multiple heat pumps can be installed in series or parallel configurations. The preferred system design is to pipe the equipment in parallel due to its simplicity and flexibility. In parallel systems, the heat pump equipment can vary in size as long as flow rate and system volume are accounted for.
B. Piping equipment in series is not desired; however, it can be done if proper guidelines are followed. Always observe proper temperature and flow rate requirements for each unit. Sometimes this method is desired to achieve larger temperature differences.

1.3. Strainers

A. All brazed-plate heat exchangers shall have a strainer within 8 ft of the water/brine inlet. It is highly recommended to use a minimum of 60 mesh in order to provide maximum filtration. In any case, the strainers should never have a mesh size less than 20.
B. Failure to install proper stainers and perform regular service can result in serious damage to the unit, and cause degraded performance, reduced operating life and failed compressors. Improper installation of the unit (which includes not having proper strainers to protect the heat exchangers) can also result in voiding the warranty.
C. Strainers should be selected on the basis of acceptable pressure drop, and not on pipe diameter. The strainers selected should have a pressure drop at the nominal flow rate of the units; low enough to be within the pumping capacity of the pump being used.

1.4. Flow Sensing Devices

A. A flow switch or equivalent must be installed on the evaporator for each unit to be installed. If the unit is to operate as both modes (heating/cooling), a flow switch is needed on both heat exchangers.
B. A differential pressure switch can be used in place of a flow switch. The differential switch must be capable of pressure range as indicated in the pressure drop tables.

1.5. Water Quality

A. **General:** Reversible chiller systems may be successfully applied in a wide range of commercial and industrial applications. It is the responsibility of the system designer and installing contractor to ensure that acceptable water quality is present and that all applicable codes have been met in these installations.

B. **Water Treatment:** Do not use untreated or improperly treated water. Equipment damage may occur. The use of improperly treated or untreated water in this equipment may result in scaling, erosion, corrosion, algae or slime. The services of a qualified water treatment specialist should be engaged to determine what treatment, if any, is required. The product warranty specifically excludes liability for corrosion, erosion or deterioration of equipment.

   The heat exchangers in the units are 316 stainless steel plates with copper brazing. The water piping in the heat exchanger is steel. There may be other materials in the building's piping system that the designer may need to take into consideration when deciding the parameters of the water quality.

   If an antifreeze or water treatment solution is to be used, the designer should confirm it does not have a detrimental effect on the materials in the system.

C. **Contaminated Water:** In applications where the water quality cannot be held to prescribed limits, the use of a secondary or intermediate heat exchanger is recommended to separate the unit from the contaminated water.

   The following table outlines the water quality guidelines for unit heat exchangers. If these conditions are exceeded, a secondary heat exchanger is required. Failure to supply a secondary heat exchanger where needed will result in a warranty exclusion for primary heat exchanger corrosion or failure.

WARNING: Must have intermediate heat exchanger when used in pool applications.

Envision² NXW Application Data cont.

1.6. Insulation

A. Heat pumps are built with factory installed insulation on any surface that may be subject to temperatures below the room dew point.

Surface Condensation Chart

Room Ambient Condition	Surface Temperature		
	50°F	35°F	0°F
Normal (Max 85°F, 70% RH)	1/2"	3/4"	1"
Mild (Max 80°F, 50% RH)	1/8"	1/4"	1/2"
Severe (Max 90°F, 80% RH)	3/4"	1"	2"

1.7. Brine Applications

A. Applications where the leaving fluid temperature goes below 40°F a suitable brine solution must be used. Failure to do so can cause immediate damage to the system. The brine must be approved for use with heat exchangers. Automotive antifreeze solutions are not suitable for use in brazed plate heat exchangers.

B. The freeze detection must be adjusted appropriately for brine applications. The brine solution concentration should be at least 15°F below the lowest leaving fluid temperature.

Water Quality Guidelines

Material		316 Stainless Steel
pH	Acidity/Alkalinity	7 - 9
Scaling	Calcium and Magnesium Carbonate	(Total Hardness) less than 350 ppm
Corrosion	Hydrogen Sulfide	Less than 1 ppm
	Sulfates	Less than 200 ppm
	Chlorine	Less than 0.5 ppm
	Chlorides	Less than 300 ppm
	Carbon Dioxide	10 - 50 ppm
	Ammonia	Less than 20 ppm
	Ammonia Chloride	Less than 0.5 ppm
	Ammonia Nitrate	Less than 0.5 ppm
	Ammonia Hydroxide	Less than 0.5 ppm
	Ammonia Sulfate	Less than 0.5 ppm
	Total Dissolved Solids (TDS)	1000 - 1500 ppm
	LSI Index	+0.5 to -0.5
Iron Fouling (Biological Growth)	Iron, FE^{2}+ (Ferrous) Bacterial Iron Potential	< 0.2 ppm
	Iron Oxide	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
	Threshold Velocity (Fresh Water)	< 6 ft/sec

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

2/22/12

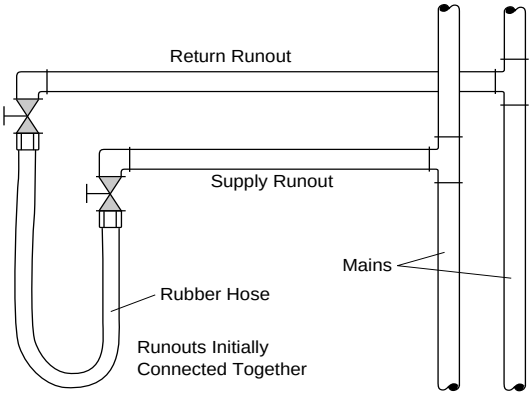
System Cleaning and Flushing

Cleaning and Flushing

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

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

Flushing with Water Shutoff Valve Equipped Systems



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

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

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

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

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

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

Ground Source Loop System Checkout

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

Electrical Data

Model	Rated Voltage	Voltage Min/Max	Compressor[1]			Total Unit FLA	Min Circ Amp	Min Fuse/ HACR	Max Fuse/ HACR[2]
			MCC	RLA	LRA				
120	208-230/60/3	187/253	36.0	23.1	160.0	46.2	52.0	60.0	70
	460/60/3	414/506	19.0	12.2	87.0	24.4	27.5	30.0	35
	575/60/3	517/633	13.5	8.7	62.0	17.4	19.6	20.0	25
	380/60/3	342/418	19.0	12.2	95.0	24.4	27.5	30.0	35
180	208-230/60/3	187/253	45.0	28.8	235.0	57.6	64.8	70.0	90
	460/60/3	414/506	19.0	12.2	110.0	24.4	27.5	30.0	35
	575/60/3	517/633	16.5	10.9	95.0	21.8	24.5	25.0	35
240	208-230/60/3	187/253	52.2	35.2	250.0	70.4	79.2	80.0	110
	460/60/3	414/506	27.0	19.2	140.0	38.4	43.2	45.0	60
	575/60/3	517/633	19.1	14.5	100.0	29.0	32.6	35.0	45
360	208-230/60/3	187/253	75.0	48.1	351.0	96.2	108.2	110.0	150
	460/60/3	414/506	38.6	24.7	197.0	49.4	55.6	60.0	80
	575/60/3	517/633	35.0	22.4	135.0	44.8	50.4	60.0	70
	380/60/3	342/418	51.0	32.7	239.0	65.4	73.6	80.0	100
600	460/60/3	414/506	62.0	39.7	260.0	79.4	89.3	100.0	125
	575/60/3	517/633	45.0	28.8	210.0	57.6	64.8	70.0	90
	380/60/3	342/418	72.0	46.2	310.0	92.4	104.0	110.0	150

HACR circuit breaker in USA only 3/5/14

[1] - MCC, RLA, & LRA rating per compressor. Breaker & FLA sized for both compressors.

[2] - Equipment supplied with Class J fuses per minimum fuse size.

Compressor Protection Module

An electronic protection module is provided with compressors utilized in model size 600. This module will protect against phase reversal and phase loss at start-up. Protection is active for 5 seconds after the first second of compressor operation. In the event that either phase sequencing or phase loss has occurred the following blink sequence will display on the module.

In case of phase reverse error:

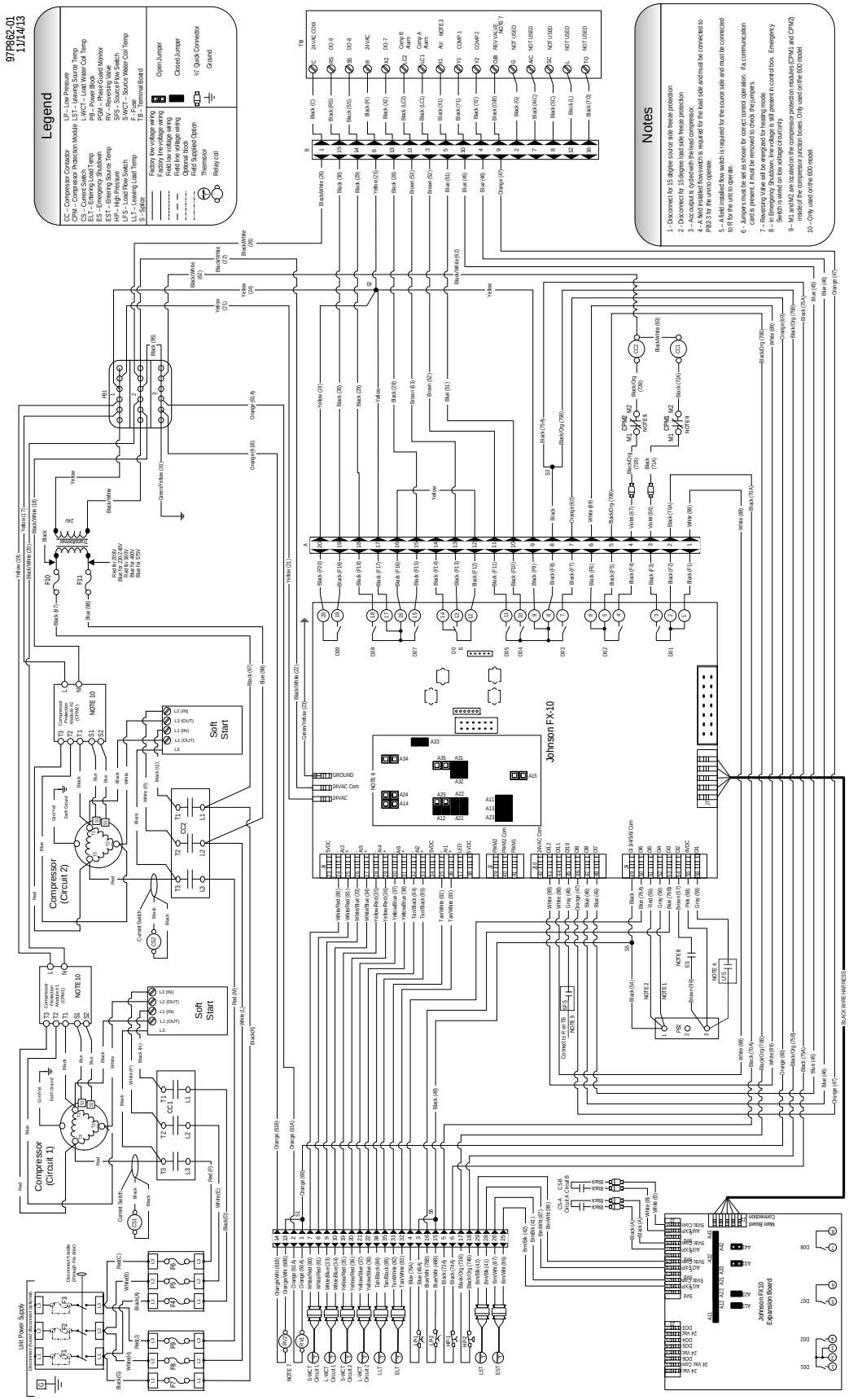
In case of phase loss error:

Electrical Data cont.

Figure 6: Control Box

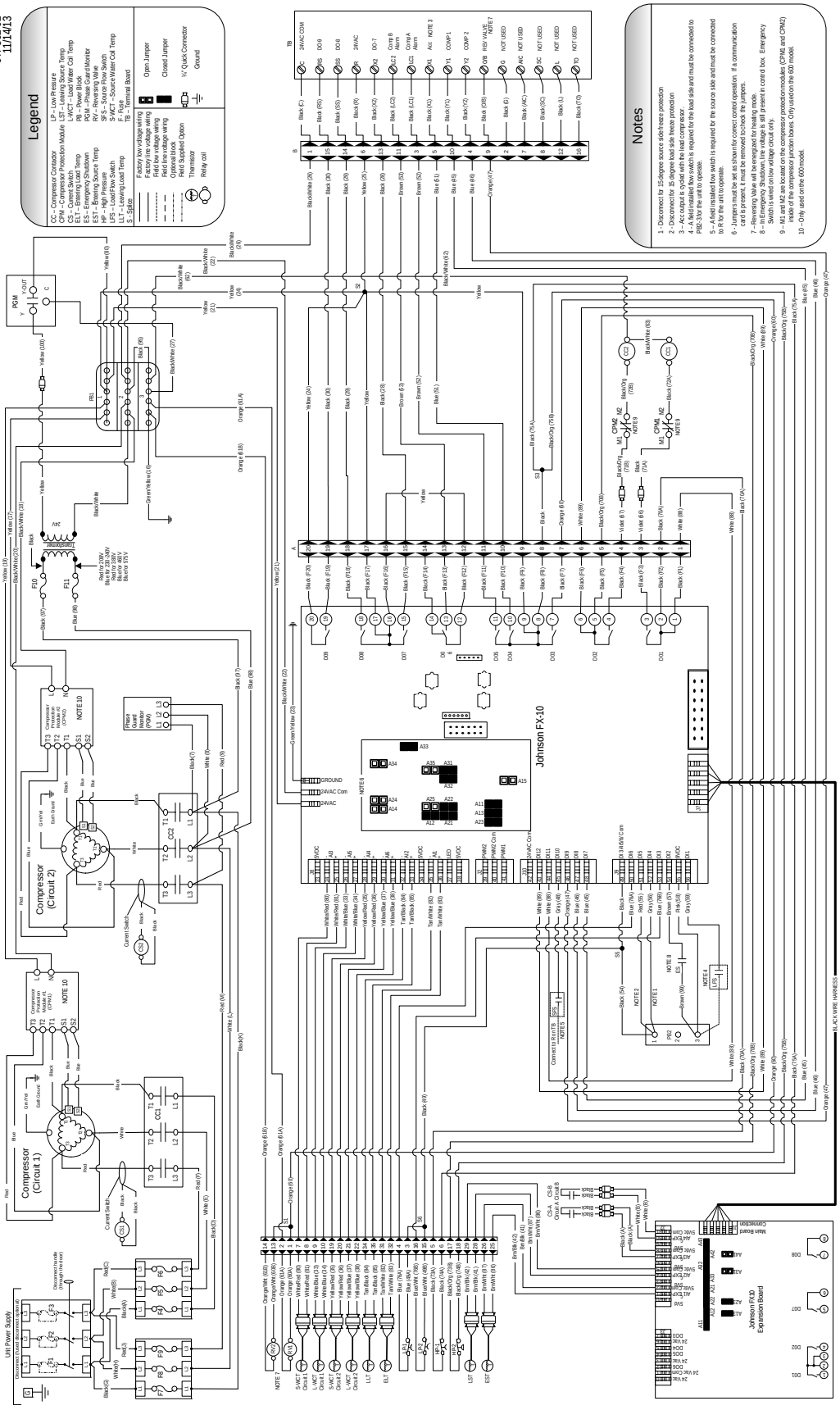
Wiring Schematics

Chiller with IntelliStart



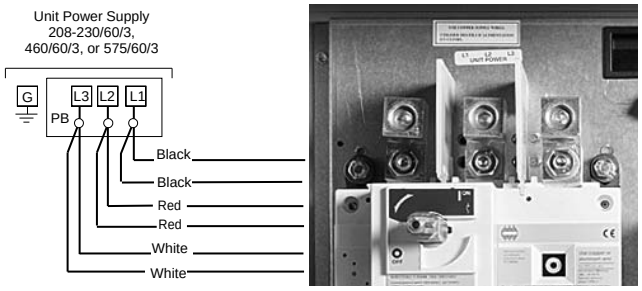
Wiring Schematics cont.

Chiller with Phase Guard

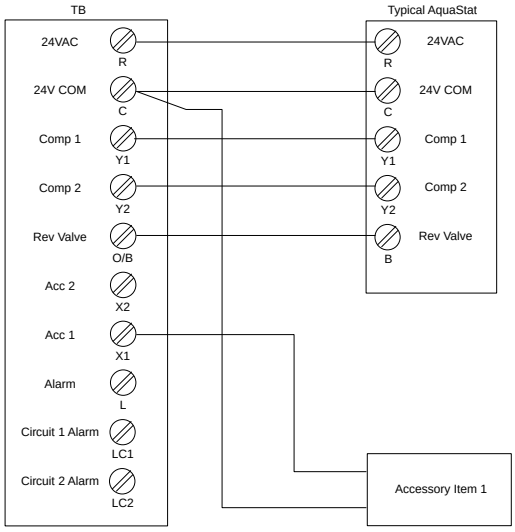


Field Wiring and Control Setup

High Voltage Connections

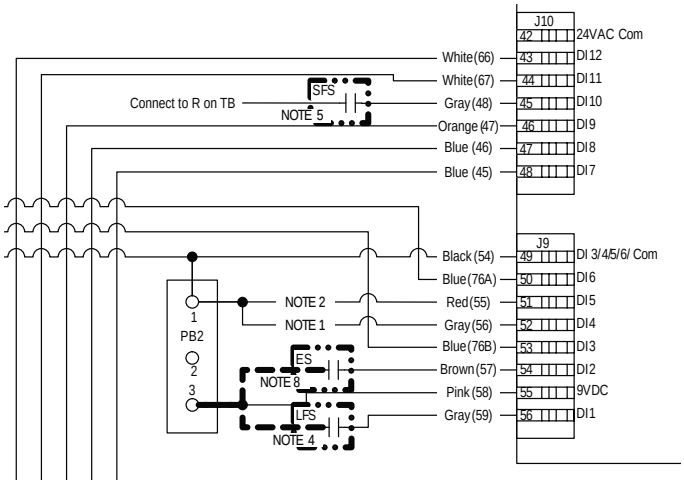


Low Voltage Connections



NOTES:
1) Acc Output 1 is cycled with the lead compressor
2) Acc Output 2 is cycled with the lag compressor

Wiring Schematic



Line Voltage

Power supply wiring connects directly to lugs on the topo of the electrical disconnect. In 208-230V applications, heat pumps are factory wired for 208V supply. In the case of 230V supply, the blue and red wires from the primary of the transformer will need to be swapped.

Low Voltage Operation

Thermostat/Controller (Aquastat)

A two-stage 24VAC aquastat or liquid controller (field supplied) must be used to turn the reversible chiller on/off, and to switch modes for heating/cooling. Multiple chillers in the same bank must be controlled from one aquastat/controller (must be isolation relays for multiple unit applications).

Low Voltage Connections

Connect low voltage wiring as shown in Figure 9. Connections shown are for typical aquastat. Actual connections may vary with specific device used.

NOTE: If a separate transformer is used to supply a Y1, Y2, or B signal to the unit controls, isolation relays must be used.

CAUTION: Use only copper conductors for field installed wiring. Terminals in the unit are not designed for other types of conductors.

WARNING: All wiring must comply with local and state codes. Disconnect the power supply before beginning to wire to prevent electrical shock or equipment damage.

NOTE: Accessory 1 output is selectable as on with compressor or off with compressor using the unit display. on with compressor is the factory default setting.

Source Flow Switch (SFS)

Unit is factory shipped with no connections on Flow Switch pins J10-45 (entering). If flow proving switch is required, hook up as shown in Fig. 10 and Note 5. The unit will not operate without flow proving inputs open.

Load Flow Switch (LFS)

Unit is factory shipped with no connections on Flow Switch pins J9-56 (leaving). If flow proving switch is required, hook up as shown in Fig. 10 and Note 4. The unit will not operate without flow proving inputs open.

ATTENTION: Flow Switch inputs must be made before unit will operate!

Field Wiring and Control Setup cont.

Accessory Relay Setup

The accessory output set to "close" upon Y1 compressor call (compressor is delayed 90 sec. after Y1) but can be set to "open" with Y1.

To change ACC1:
- Using up and down keys, scroll to "Acc 1 Sel" hit "ENTER" and "ON Comp" begins flashing
- Using up and down keys, select "ON Comp" for activation with Y1 Call or "OFF Comp" for deactivation with Y1

Lead/Lag Selection

Compressor Lead/Lag Selection is factory set to "ON" but can be set to "OFF".

To change Lead/Lag On/Off:
- Using up and down keys, scroll to "LEAD/LAG SELECT" hit "ENTER" and "ON" begins flashing
- Using up and down keys, select "ON" for activation or " OFF" for deactivation

°F or °C - Unit of Measure

Degrees Fahrenheit is factory set, however degrees Celsius can be selected using the following procedure:

To Change Unit of Measure:
- On FX10 control using up and down keys, scroll to "SETTINGS"
- Using up and down keys, scroll to "UNIT OF MEASURE" hit "ENTER" and "UNIT OF MEASURE" begins flashing
- Using up and down keys, select "F" for degrees Fahrenheit or "C" for degrees Celsius

Other Field Options

Other field selectable options are available as shown in the maintenance menu on page 24 of the FX10 control using a similar procedure as shown in the above examples. These would include aquastat enabling, and emergency shutdown.

Control Features

Anti Short Cycle
High Pressure Protection
Low Pressure Protection
Advanced Freeze Detection Setpoint
Random Start
Display for diagnostics
Reset Lockout at disconnect
Intelligent reset for field installed flow switches
1 Accessory output
Compressor Lead/Lag
Compressor Current Switches

Field Selectable Options

Freeze Detection Sensing Select (DI-4 and DI-5)

The freeze detection temperature sensing selection inputs allow the user to adjust the setpoints. The source sensors are wired to inputs AI-3 and AI-4 while the load sensors are wired to inputs AI-5 and AI-6. The setpoints for both, the load and source, are factory set for 33°F. In order to change the setpoint to 15°F on the source, remove the jumper wire from DI-4 (wire #56). The load setpoint can be changed by removing the jumper wire from DI-5 (wire #55).

Accessory Output (DO-4)

The accessory output will be energized 90 seconds prior to the lead compressor output being energized. When the lead compressor output is turned off the accessory output will be deactivated after 90 seconds. The output is selectable for on with compressor or off with compressor operation through the unit mounted user interface.

Control and Safety Features

Emergency Shutdown

The emergency shutdown mode can be activated by a command from a facility management system or a closed contact on DI-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 deactivated. The first time the compressor starts after the emergency shutdown mode has been deactivated, 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, cooling freeze detection, and compressor current sensor. 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 both compressors. After the compressor short cycle delay, the compressors will attempt to operate once again. If three consecutive faults occur in 60 minutes, the unit will go into lockout mode, turning off the compressor(s), enabling the alarm output until the controller is reset. If the control faults due to the low pressure input being open during the pre-compressor startup check, the control will go into lockout mode immediately, disabling the compressors from starting and enabling the alarm output. 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 user interface for 5 seconds.

Control Features

Advanced Freeze Detection System

The source and load heat exchangers are protected by a multi-sourced temperature logic strategy. The temperature logic is based upon the refrigerant temperature sensed as the refrigerant is about to enter the heat exchanger; while entering and leaving water temperatures are being used as correlating factors. The detection scheme is shown as basic and advanced algorithms.

Basic Freeze Detection Operation: "Comp1 or Comp2 Freeze" Alarm

This alarm can be triggered by one of two detection schemes.

Hard Limit Freeze Detection
If the refrigerant temperature drops below the freeze detection setpoint by 1.8°F, the associated compressor is locked out immediately regardless of any other factors and requires a manual reset. **NOTE: This Lockout produces a "Comp 1 or Comp 2 Freeze" error on the MUI display.**

Freeze Detection
The refrigerant temperature is compared to the freeze detection setpoint (15°F [antifreeze] or 33°F [water] field selectable), and if the temperature falls below the setpoint for 30 continuous seconds, the associated compressor will be halted. This function becomes enabled after the first two minutes of compressor operation. Three such events in 60 minutes will trigger a compressor lockout that requires a manual reset. **NOTE: This Lockout produces a "Comp 1 or Comp 2 Freeze" error on the MUI display.**

In addition to the above:
Entering Water Temperature Influence
If the entering water temperature of the evaporative heat exchanger is within 10°F of the freeze setpoint, the previously mentioned two minute delay will be eliminated. This allows the freeze detection to operate immediately when the compressor starts based on entering water temperature.

Leaving Water Temperature Influence
If the leaving water temperature of the evaporative heat exchanger is within 10°F of the freeze setpoint, the previously mentioned 30 second delay will begin to be proportionately reduced, ending at a 1 second delay when the leaving water temperature is 1.5°F above the freeze setpoint.

Dual Circuited Heat Exchanger Protection
A low temperature condition on either refrigerant circuit will prevent the start of both compressors. If the low temperature condition exists for 5 minutes when both compressors are off, a lockout is triggered for both compressors. However, if –for instance-both compressors are operating and circuit 1 experiences a refrigerant temperature below the freeze detection setpoint such that compressor 1 is halted, compressor 2 will not be halted as a result.

Advanced Freeze Detection Operation: "Pre Freeze" Alarm

Predictive freeze condition detection:
If the refrigerant temperature is within 7.2°F of the freeze detection setpoint, the predictive freeze detection algorithm is enabled, and if the logic determines that a freeze condition is likely to happen based on current conditions, the compressor of the involved refrigerant circuit is immediately stopped. Three (3) such events in 60 minutes will trigger a compressor lockout that requires a manual reset. In the absence of such a condition, the compressor is allowed to operate so that the refrigerant temperature may eventually be at the threshold of the freeze detection setpoint. **NOTE: This Lockout produces a "Pre Freeze" detection error on the MUI display.**

Capacity Limiting

If the leaving water temperature drops to 1.8°F above the freeze detection setpoint, the lead compressor is halted. When the leaving water temperature rises to 3.6°F above the freeze detection setpoint, it will be allowed to resume operation. This limiting is allowed to repeat indefinitely. This causes "COMP1 Low Limit" to be displayed on the MUI.

If the leaving water temperature drops to the freeze detection setpoint, the lag compressor is halted. When the leaving water temperature rises to 1.8°F above the freeze detection setpoint, it will be allowed to resume operation. This limiting is allowed to repeat indefinitely. This causes "COMP2 Low Limit" to be displayed on the MUI.

Compressor Current Switch (AI-3 EXP and AI-4 EXP)

The compressor current switch is designed to insure that the compressor is on when the compressor output is energized. This switch is normally open and closes when current is flowing to the compressor. If the compressor fails to start the switch will open. The switch must be open for a continuous 15 seconds for a fault to occur. After 3 faults in 60 minutes the control will put the unit into an alarm state.

Flow Proving Switch (DI-1 and DI-10)

The load and source flow-proving switches are optional and can be field installed. These switches shall be normally open flow switches that will close when the water flow through the heat exchangers reach an acceptable level. The flow-proving switches must be closed 15 seconds prior to enabling either compressor output (DO-1 and DO-2). If the load flow-proving switch opens at any time both compressor outputs (DO-1 and DO-2) must be disabled immediately.

High Pressure (DI-11 and DI-12)

The high-pressure switches shall be a normally closed (NC) switch that monitors the systems compressor discharge refrigerant pressures. There shall be an individual high pressure switch for each circuit. If the input senses the high-pressure switch is open during the period that the compressor output is enabled, it must shut down the compressor immediately and count the fault. The compressor

Control Features cont.

minimum on time does not apply if the high-pressure switch trips. The compressor will not restart until the short cycle time delay has been satisfied. If the high-pressure fault occurs in one circuit the other compressor will continue to operate based on the heating or cooling demand.

Low Pressure (DI-3 and DI-6)

The low-pressure switches shall be a normally closed (NC) switch that monitors the systems compressor suction line refrigerant pressure. The input shall be checked 15 seconds before compressor start up to insure the pressure switch is closed and then ignored for the first 2 minutes after the compressor output (DO-1 or DO-2) is enabled. If the switch is open continuously for (30) seconds the compressor output for that circuit will be disabled. The compressor will not restart until the short cycle time delay has been satisfied. If a low-pressure fault occurs in one circuit the other compressor will continue to operate based on the heating or cooling demand.

Compressor 1 Alarm Output (DO-5)

The compressor 1 alarm output will be enabled when stage 1 is in the lockout mode and will be disabled when the lockout is reset.

Compressor 2 Alarm Output (DO-6)

The compressor 2 alarm output will be enabled when stage 2 is in the lockout mode and will be disabled when the lockout is reset.

Test Mode

The unit controls system can be put into test mode to eliminate startup delays to aid in trouble shooting. To put the unit into test mode hold the “ESC” and “Down Arrow” keys until LED 8 begins to flash. The control will remain in test mode until power is cycled or after 30 minutes.

Reversible Chiller Setpoint Control

This control software is by default set to operate in ‘Aquastat’ mode, which requires external setpoint logic to generate the Y1 or Y2 call. The mode may be changed to ‘Setpoint’ by use of the ‘Settings’ menu in the MUI in the ‘Mode’ item which is on the 5th line from the top.

CAUTION! Setpoint mode is not recommended on applications that have more than two water-to-water heat pumps installed. Unique temperature setting should be set for each unit on a common load.

To operate in setpoint mode, consider the following:

- The selected mode must be changed from Aquastat to Setpoint
- The ‘Y1’ input must be activated. This may be done by connecting ‘R’ to ‘Y1’ on the terminal board, or by commanding Y1 to ‘ON’ in the Maint menu of the MUI, or by commanding the ComprEnable network variable from the BAS.
- The Heat/Cool mode is by default in the cooling mode, and may be set to heating by connecting R to O/B on the terminal board, or by commanding the ‘B’ item in the Maint menu of the MUI, or by commanding the reversing valve variable from the BAS network.
- The setpoint mode temperature sensor can be selected to either Load LW Temp (Leaving Water) or Load EW Temp (Entering Water Temp). The default is set for Entering Water Temp control.
- The cooling setpoint and the heating setpoint are two separate setpoints, and can be adjusted in the MUI Settings menu.
- When the controlling temperature sensor is set to select the Load EW Temp, the setpoint control will operate in a PID (Proportional-Integrating-Derivative) mode. In this mode, the temperature rate of change and direction of change will be part of deciding whether or not to add or reduce capacity. Additionally the amount of difference between setpoint and temperature AND the length of time that the difference existed are used to determine if adding or reducing capacity is needed.
    - o The tuning parameters for this mode should only be adjusted if you know why you are choosing the value that you plan to use. You should keep a permanent record of the beginning values and record any changes that you make. The parameters used in PID operation and their (default values) are:
        - D NegThrshld (-0.03)
        - Int Rate (200)
        - Stage Delay (30)
        - Gain (2)
        - D PosThrshld (0.04)
        - PIDY1 Ref (7.2)
        - PID Y1 Diff (7)
        - PID Y2RefShift (5)
        - PID Y2 Diff (6)

Control Features cont.

- When the controlling temperature sensor is set to select the Load LW Temp, the setpoint control will operate strictly in a proportional mode with offsets and differentials used to determine the appropriate capacity to use. In this mode, the following parameters are used:
  - Stage Delay (30)
  - Gain (2)
  - PIDY1 Ref (7.2)
  - PID Y1 Diff (7)
  - PID Y2RefShift (5)
  - PID Y2 Diff (6)
- The default values were used in the test lab and seem to be a reasonably good beginning point for parameter settings.

Compressor Lead-Lag Operation

In the Maint menu of the MUI, Lead –Lag operation may be enabled or disabled. When disabled, a Y1 call will always be a request for compressor 1 and a Y2 call will be a request for compressor 2. When Lead-Lag is enabled, the operation is as follows:

- If only a single Y call is introduced (either Y1 or Y2), then one compressor will start and it will be the compressor that has been Off the longest. When that call is removed, the compressor will stop—if the compressor minimum run time has been satisfied.
- If the single Y call is re-introduced, then the 'other' compressor will start. In this manner, if single compressor operation is used, then each time a call is given, the compressors will alternate.
- If a Y call is existing and a compressor is running, then adding a second Y call will bring on the second compressor. When one of the Y calls is dropped and the other remains, then the compressor that was first started will be dropped. In this manner, if the chiller is alternating between one and two compressor operation, both compressors will be cycled.
- If no Y calls exist and a sudden and simultaneous application of both Y1 and Y2 occur, then fist the 'longest off' compressor will start. After 150 seconds, the second compressor will start.

Sequence of Operation

Power Fail Restart

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

Random Start Delay

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

Lead Compressor Start Delay Time

The Lead Compressor Fixed On Delay Time will ensure that the lead compressor output 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 Lead Compressor Start Delay Timer will be shortened to 5 seconds.

Lag Compressor Start Delay Time

The Lag Compressor Fixed On Delay Time will ensure that the lag compressor output 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 Lag Compressor Start 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 five (5) minutes each time the compressor output is enabled. This will apply in every instance except in the event the high pressure switch is tripped, freeze protection, or emergency shutdown then the compressor output will be disable immediately.

Compressor Minimum Off Delay Time

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

Compressor Lead/Lag

Compressor lead/lag is a standard part of the FX10 control system. The unit is shipped from the factory with lead/lag enabled. Lead/lag can be activated through the unit mounted user interface.

Heating Cycle

The control will run the unit in heating mode when there is a command on the O/B terminal on the terminal board.

Cooling Cycle

The control will run the unit in cooling mode when there is no command on the O/B terminal on the terminal board.

MUI Alarm History Reporting

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

Inputs and Outputs Configuration

DUAL STAGE WW			
Input Name	**Input**	**Output Name**	**Output**
Entering Load Water Temperature	AI 1	Compressor 1	DO1
Leaving Load Water Temperature 1	AI 2	Compressor 2	DO2
Source Heating Freeze Detection 1	AI 3	Reversing Valve	DO3
Source Heating Freeze Detection 2	AI 4	Accessory	DO4
Load Cooling Freeze Detection 1	AI 5	Compressor 1 Alarm	DO5
Load Cooling Freeze Detection 2	AI 6	Compressor 2 Alarm	DO6
		Network Output	DO7
Load Flow Proving Switch	DI 1	Network Output	DO8
Emergency Shutdown	DI 2	Network Output	D09
Stage 2 Low Pressure	DI 3		
Source Htg Freeze Detection Select - 30ºF	DI 4	Future	PWM1
Load Htg Freeze Detection Select - 30ºF	DI 5	Future	PWM2
Stage 1 Low Pressure	DI 6		
Thermostat Y1	DI 7		
Thermostat Y2	DI 8		
Thermostat B	DI 9		
Source Flow Proving Switch	D10		
Stage 1 High Pressure	DI11		
Stage 2 High Pressure	DI12		
XP10 Expansion Card			
Input Name	**Input**	**Output Name**	**Output**
Entering Source Water Temperature	AI 1	Unused	DO 1
Leaving Source Water Temperature 1	AI 2	Unused	DO 2
Current Switch 1 - Compressor 1	AI 3	Unused	DO 3
Current Switch 2 - Compressor 2	AI 4	Unused	DO 4

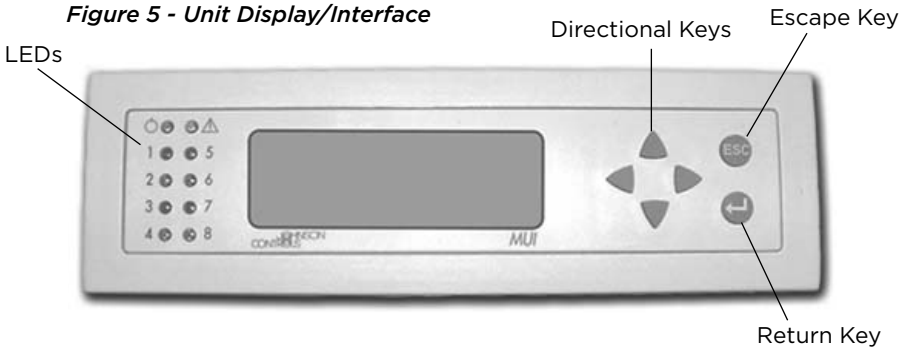
Unit Display and Interface

The Unit Display allows the user to view entering and leaving water temperatures, freeze detection readings, inputs and outputs, and allows the user enable and disable certain control functions through the various menus. The interface also displays all faults on the LCD once the unit has locked out to aid in diagnostics.

There are 10 LED indicator lights that indicate the following:

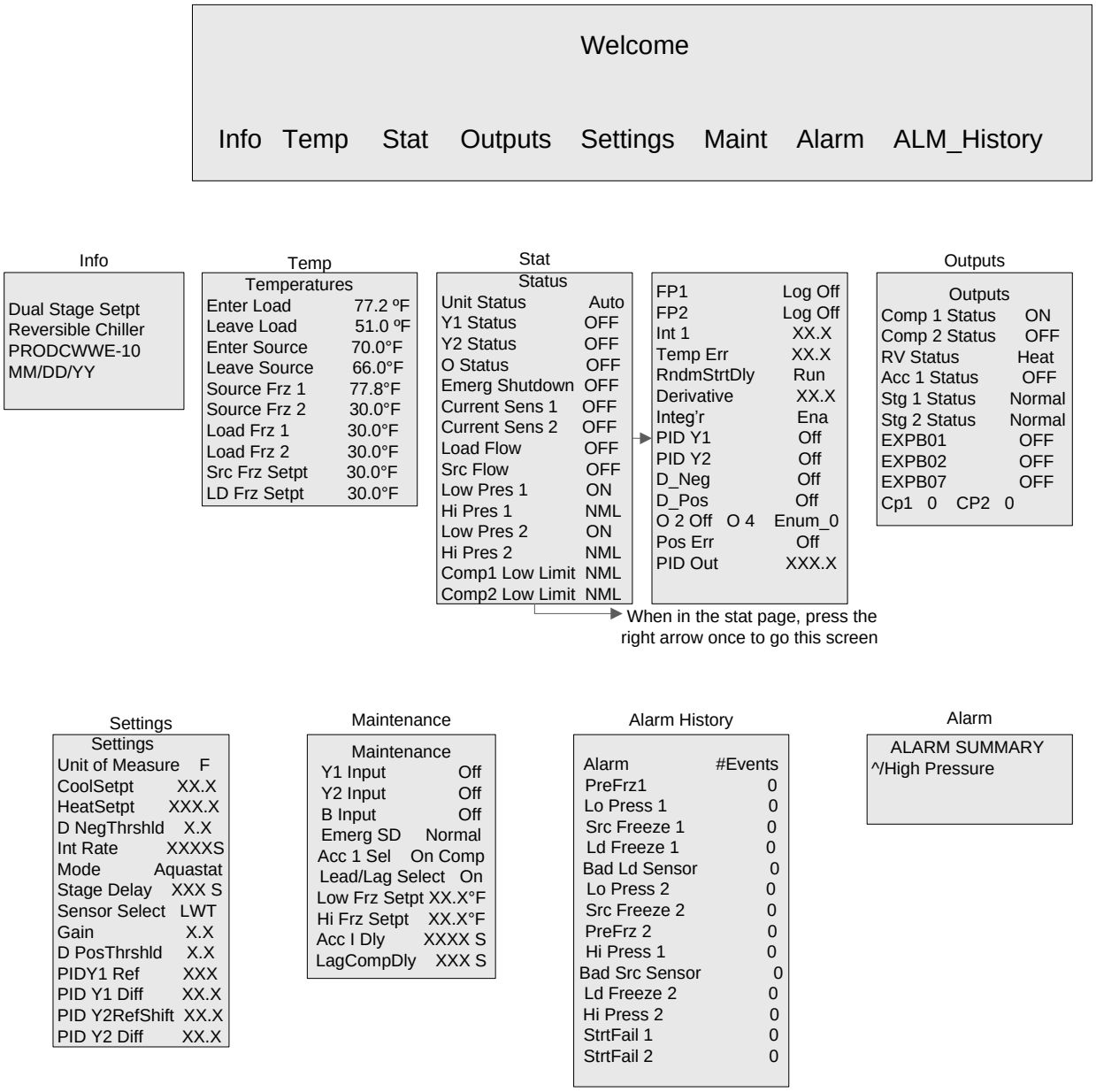
- ○ Power - Shows that the FX processor is operational
- ⚠ Alarm - Lights when there is a lock-out or faulty freeze detection sensor
- 1 - Flashing shows Compressor 1 is running
- 2 - Flashing shows Compressor 2 is running
- 3 - On shows Compressor 2 is lead
- 4 - On shows Reversing valve in cool
- 8 - On shows unit in 'Test' mode

Figure 5 - Unit Display/Interface



Unit Display and Interface Cont.

MUI Menu Navigation



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 2+ events has occurred more than 2 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.

Unit Display and Interface cont.

Menu and Menu Contents

Alarm

- Displays unit alarms until the unit has been reset (Unit alarms can be reset by holding both the Escape (ESC) key and Return (←) key for five seconds or by power cycling the unit.)

Alarm History

If a fault occurs the fault will be recorded in history viewable on the unit mounted display. Each fault type will be displayed in the history menu with a number between 0 and 3. A reading of 3+ means that the fault has occurred more than 3 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.

Unit Alarms

Unit alarms are shown on the display once the unit has locked out.

Load Flow – Load Flow Switch is Not Closed

- The load flow switch must be closed prior to either compressor starting and must remain closed for the entire run time of the compressor(s).

Low Pressure 1 – Compressor Circuit 1 Low Pressure Switch

- The low pressure switch is checked before compressor start up and is monitored during compressor operation.

Src FP 1 Temp Low – Source Freeze Detection Sensor 1

- The source freeze detection sensor on compressor circuit 1 has reached its setpoint.

Src FP 1 Sensor Bad

- The sensor for source freeze detection on compressor circuit 1 is unreliable or is not reading.

LD FP 1 Temp Low – Load Freeze Detection Sensor 1

- The load freeze detection sensor on compressor circuit 1 has reached its setpoint.

LD FP 1 Sensor Bad

- The sensor for load freeze detection on compressor circuit 1 is unreliable or is not reading.

Source Flow – Source Flow Switch is Not Closed

- The source flow switch must be closed prior to either compressor starting and must remain closed for the entire run-time of the compressor(s).

High Pressure 1 – Compressor Circuit 1 High Pressure Switch

- If high pressure switch 1 opens at any time during compressor 1 run time the compressor will be shut down immediately.

Low Pressure 2 - Compressor Circuit 2 Low Pressure Switch

- The low pressure switch is checked before compressor start up and is monitored during compressor operation.

Src FP 2 Temp Low - Source Freeze Detection Sensor 2

- The source freeze detection sensor on compressor circuit 2 has reached its setpoint.

Src FP 2 Sensor Bad

- The sensor for source freeze detection on compressor circuit 2 is unreliable or is not reading.

LD FP 2 Temp Low - Load Freeze Detection Sensor 2

- The load freeze detection sensor on compressor circuit 2 has reached its setpoint.

LD FP 2 Sensor Bad

- The sensor for load freeze detection on compressor circuit 2 is unreliable or is not reading.

High Pressure 2 - Compressor Circuit 2 High Pressure Switch

- If high pressure switch 2 opens at any time during compressor 2 run time the compressor will be shut down immediately.

Comp Start Failure – Compressor Start Failure

- If either compressor fails to start when the contactor pulls in the compressor current switch will cause that compressor to be locked out after 2 retries. The other compressor will continue to operate normally in this condition.

Reference Calculations

Heating Calculations:	Cooling Calculations:
$LWT = EWT - \frac{HE}{GPM \times 500^*}$	$LWT = EWT + \frac{HR}{GPM \times 500^*}$

NOTE: * When using water. Use 485 for 15% methanol/water or Environol solution.

Legend

Abbreviations and Definitions

ELT = entering load fluid temperature to heat pump
LLT = leaving load fluid temperature from heat pump
LGPM = load flow in gallons per minute
LWPD = load heat exchanger water pressure drop
EST = entering source fluid temperature to heat pump
LST = leaving source fluid temperature from heat pump
SGPM = source flow in gallons per minute
SWPD = source heat exchanger water pressure drop
EER = cooling energy effciency (TC/KW)
PSI = pressure drop in pounds per square inch
FT HD = pressure drop in feet of head
KW = kilowatt
HR = heat rejected in MBTUH
TC = total cooling capacity in MBTUH
COP = coefficient of performance (HC/KW x 3.413)
HC = heating capacity in MBTUH
HE = heat of extraction in MBTUH

Unit Startup

Verify the following:

- High voltage is correct and matches nameplate
- Fuses, breakers and wire size are correct
- Low voltage wiring is complete
- Piping is complete and the water system has been cleaned and flushed
- Air is purged from closed loop system
- Isolation valves are open and water control valves or loop pumps are wired
- Service/access panels are in place
- Transformer has been switched to lower voltage tap if needed (208/230 volt units only)
- Unit controls are in “off” position
- Flow switches are installed and ready or wires are jumpered
- Freeze detection setpoints have been set in the microprocessor

WARNING: Verify ALL water controls are open and allow water flow PRIOR to engaging the compressor. Failure to do so can result in freezing the heat exchanger or water lines causing permanent damage to the unit.

Startup Steps

- Set aquastat control above cooling setpoint.
- Set aquastat control in cooling mode.
- Slowly reduce the control setting until both the compressor and water control valve/loop pumps are activated. Verify that the compressor is on and that the water flow rate is correct by measuring pressure drop through the heat exchanger and comparing to the Pressure Drop table (page 32). Check for correct rotation of scroll compressors. Switch any two power leads at the L1, L2, and L3 line voltage termination block if incorrect.
- Perform a cooling capacity test by multiplying GPM x ΔT x 485 (antifreeze/water). Use 500 for 100% water. Check capacity against catalog data at same conditions.
- Set control to “OFF” position.
- Leave unit “OFF” for approximately five (5) minutes to allow pressure to equalize.
- Adjust control below heating setpoint.
- Set control in “HEAT” position mode.
- Slowly increase the control setting until both compressor and water control valve/loop pumps are activated. The reversing valve should be heard changing over.
- Perform a heating capacity test by multiplying GPM x ΔT x 485 (antifreeze/water). Use 500 for 100% water. Check capacity against catalog data at same conditions.
- Check for vibrations, noise and water leaks.
- Set system to maintain desired setpoint.
- Instruct the owner/operator of correct control and system operation.

Operating Parameters

Heating Mode

Entering Load Temp (°F)	Entering Source Temp (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Superheat (°F)	Subcooling (°F)
60	30	75-100	200-215	10-12	10-13
	50	100-125	200-215	12-14	8-12
	70	125-150	215-230	14-18	8-12
	90	150-165	230-255	25-30	8-12
80	30	75-100	285-300	10-12	10-13
	50	100-125	300-315	12-14	8-12
	70	125-150	315-330	14-18	8-12
	90	150-165	330-345	25-30	8-12
100	30	85-110	365-380	10-12	7-11
	50	110-135	385-400	12-14	7-11
	70	135-165	400-415	14-18	3-7
120	50	110-135	485-500	12-14	7-11
	70	135-165	500-515	14-18	3-7

NOTE: Operating data based on normal conditions with 4 gpm/ton for the load and source.

1/30/14

Cooling Mode

Entering Load Temp (°F)	Entering Source Temp (°F)	Suction Pressure (psig)	Discharge Pressure (psig)	Superheat (°F)	Subcooling (°F)
50	30	80-90	140-175	15-20	3-6
	50	90-100	200-235	11-15	6-9
	70	100-110	250-285	11-15	9-12
	90	100-120	330-365	8-12	12-14
	110	110-130	430-465	8-12	14-19
70	30	80-90	150-185	15-20	3-6
	50	90-100	210-245	11-15	6-9
	70	100-110	260-295	11-15	9-12
	90	110-120	340-375	8-12	12-14
	110	110-140	440-485	8-12	14-19
90	30	80-90	150-185	15-20	3-6
	50	90-100	210-245	11-15	6-9
	70	100-110	260-295	11-15	9-12
	90	110-120	340-375	8-12	12-14
110	30	90-100	160-195	40-45	3-6
	50	110-130	220-255	30-40	6-9

NOTE: Operating data based on normal conditions with 4 gpm/ton for the load and source.

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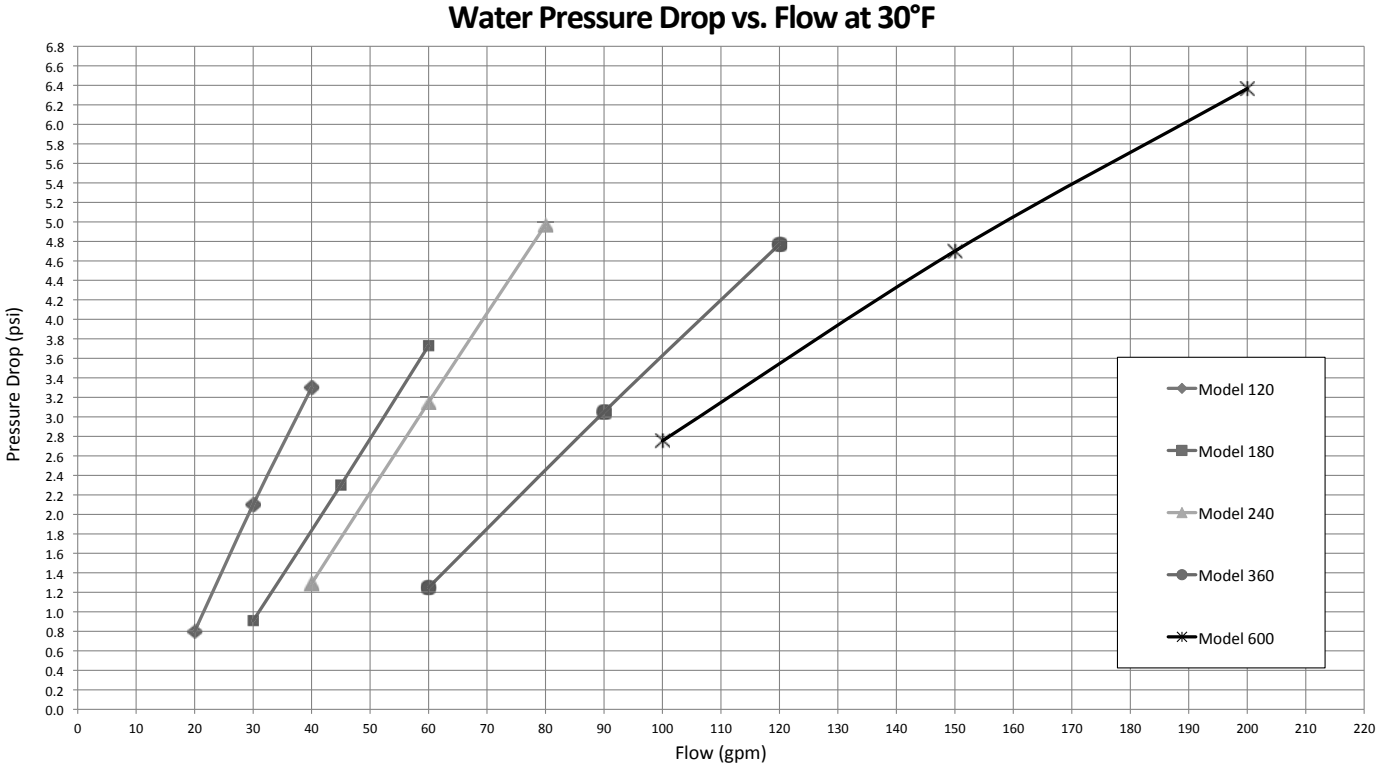
Pressure Drop

Model	GPM	Pressure Drop (psi)				
		30°F	50°F	70°F	90°F	110°F
120	20	0.8	0.7	0.6	0.6	0.5
	30	2.1	1.9	1.8	1.7	1.5
	40	3.3	3.1	2.9	2.8	2.5
180	30	0.9	0.8	0.7	0.7	0.6
	45	2.3	2.2	2.0	2.0	1.8
	60	3.7	3.5	3.3	3.2	2.9
240	40	1.3	1.2	1.1	1.1	1.0
	60	3.2	3.0	2.9	2.8	2.6
	80	5.0	4.7	4.6	4.4	4.2
360	60	1.3	1.2	1.1	1.0	0.9
	90	3.1	2.9	2.8	2.7	2.4
	120	4.8	4.6	4.4	4.3	3.9
600	100	2.8	2.5	2.4	2.2	2.0
	150	4.7	4.5	4.4	4.0	3.9
	200	6.4	6.2	6.1	5.7	5.6

4/29/14



Note: Pressure drop is the same for load and source heat exchangers at 30°F fluid temperature.

Compressor Resistance

Model	208-230	380	460	575
120	.539 / .528 /.528	.575 / .575 / .575	2.116 / 2.088 / 2.072	3.333 / 3.289 / 3.263
180	.32 / .32 / .33	N/A	1.29 / 1.28 / 1.33	1.99 / 1.96 / 2.05
240	.33 / .33 / .33	N/A	1.13 / 1.11 / 1.10	1.73 / 1.66 / 1.75
360	.20 / .20 / .20	0.57 / 0.57 / 0.57	.83 / .83 / .83	1.32 / 1.32 / 1.32
600	N/A	.36 / .36 / .36	0.52 / .52 / .52	.82 / .82 / .82

1/30/14

Resistance values listed in ohms and measured at 25C between phases 1-2, 1-3, 2-3, respectively.
Specialized measurement device should be used for accurate resistance readings due to low resistance values.

Thermistor Resistance

Thermistor Temperature (°F)	FX10 Resistance (Ohms)
5	746-770
14	775-803
23	808-836
32	841-869
41	875-903
50	910-938
59	946-974
68	981-1013
77	1019-1051
86	1058-1090
95	1097-1129
104	1137-1169
113	1179-1211
122	1221-1253
131	1261-1297
140	1305-1341
149	1350-1386

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Operating Limits

Operating Limits	Cooling		Heating	
	(°F)	(°C)	(°F)	(°C)
Source Side Water Limits				
Min. Entering Water	30	-1.1	30	-1.1
Normal Entering Water	85	29.4	60	15.6
Max. Entering Water	110	43.3	90	32.2
Load Side Water Limits				
Min. Entering Water	50	10.0	60	15.6
Normal Entering Water	60	15.6	100	37.8
Max. Entering Water	90	32.2	120	48.9

Notes:

Minimum/maximum limits are only for start-up conditions, and are meant for bringing the space up to occupancy temperature. Units are not designed to operate at the minimum/maximum conditions on a regular basis. The operating limits are dependant upon three primary factors: 1) entering source temperature, 2) entering load temperature, and 3) flow rate (gpm). When any of the factors are at the minimum or maximum levels, the other two factors must be at the normal level for proper and reliable unit operation. Consult the Capacity Tables for each model to determine allowable normal operating conditions. Units are not designed for outdoor installation.

Troubleshooting

Should a major problem develop, refer to the following information for possible causes and corrective steps.

If compressor won't run:

1. The fuse may be open or the circuit breaker is tripped. Check electrical circuits and motor windings for shorts or grounds. Investigate for possible overloading. Replace fuse or reset circuit breakers after fault is corrected.
2. Supply voltage may be too low. Check it with a volt meter.
3. Control system may be faulty. Check control for correct wiring of aquastat and check the 24 volt transformer for proper voltage.
4. Wires may be loose or broken. Replace or tighten.
5. The low pressure switch may have tripped due to one or more of the following:
    a) Heating
        1) Plugged heat exchanger on source side
        2) Water flow source side -(Low)
        3) Water too cold source side
        4) Low refrigerant
    b) Cooling
        1) Plugged heat exchanger on load side
        2) Water flow load side - (Low)
        3) Water too cold load side
        4) Low refrigerant
6. The high pressure switch may have tripped due to one or more of the following:
    a) Heating
        1) Plugged heat exchanger on load side
        2) Low water flow load side
        3) Water too warm load side
    b) Cooling
        1) Plugged heat exchanger on source side
        2) Low water flow on source side
        3) Water too warm source side
7. The compressor overload protection may be open. Disconnect power. Remove S1 & S2 wires from the compressor protection module. Measure the resistance between the S1 & S2 wires. If the resistance measures > 2750 ohms, then the internal compressor resistance has tripped the compressor protection module. The compressor protection module will reset after a 30 minute delay and the resistance measures < 2250 ohms. Cycling the power off for a minimum of 3 seconds will manually reset the compressor module. The internal compressor resistance must measure < 2250 ohms for the compressor module to reset.
8. The internal winding of the compressor motor may be grounded to the compressor shell. If so, replace the compressor.
9. The compressor winding may be open or shorted. Disconnect power. Check continuity with ohm meter. If the winding is open, replace the compressor.

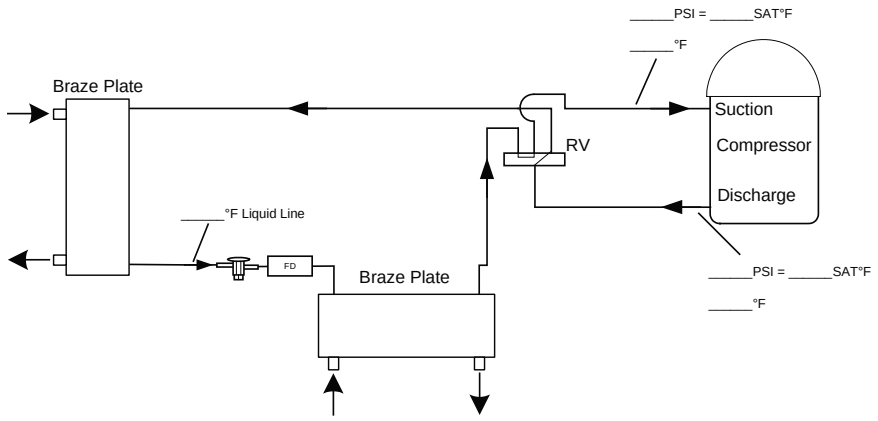
If sufficient cooling or heating is not obtained:

1. Check control for improper location or setting.
2. Check for restriction in water flow.
3. Check refrigerant subcooling and superheat for proper refrigerant charge and expansion valve operation.
4. The reversing valve may be defective and creating a bypass of refrigerant. If the unit will not heat, check the reversing valve coil.

If the unit operation is noisy:

1. Check compressor for loosened mounting bolts. Make sure compressor is floating free on its isolator mounts. Check for tubing contact with the compressor or other surfaces. Readjust it by bending slightly.
2. Check screws on all panels.
3. Check for chattering or humming in the contactor or relays due to low voltage or a defective holding coil. Replace the component.
4. Check for proper installation of vibration absorbing material under the unit.
5. Check for abnormally high discharge pressures.
6. Compressor rotation incorrect

Heating Cycle Analysis



Unit Amp Draw _____

Line Voltage _____

Loop:_____ Open _____ Closed

Subcooling _____

Superheat _____

Entering Source Water _____°F

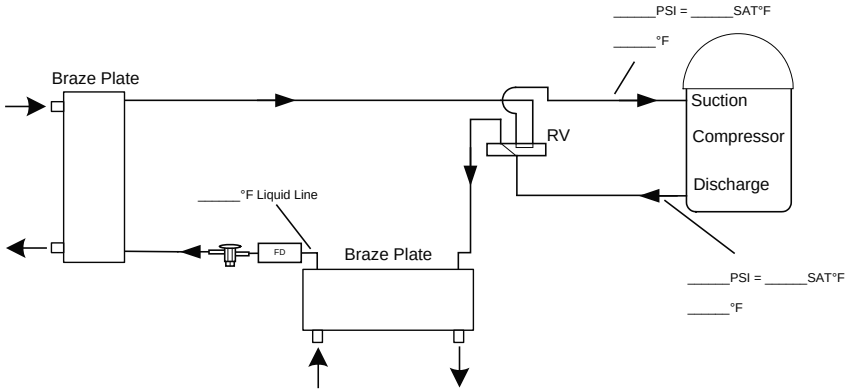
Entering Water Pressure Drop _____ PSI

Leaving Source Water _____°F

Leaving Water Pressure Drop _____ PSI

NOTE: Do not attach refrigerant gauges unless a problem is suspected!

Cooling Cycle Analysis



Unit Amp Draw _____

Line Voltage _____

Loop:_____ Open _____ Closed

Subcooling _____

Superheat _____

Entering Source Water _____°F

Entering Water Pressure Drop _____ PSI

Leaving Source Water _____°F

Leaving Water Pressure Drop _____ PSI

NOTE: Do not attach refrigerant gauges unless a problem is suspected!

Envision NXW Troubleshooting Form

Company Name: _____ Company Phone No: _____
Technician Name: _____ Date: _____
Model No: _____ Serial No: _____
Owner's Name: _____ Open or Closed Loop: _____
Installation Address: _____ Installation Date: _____

Check One

❑ Start up/Check-out for new installation ❑ Troubleshooting Problem: _____

1. FLOW RATE IN GPM (SOURCE SIDE HEAT EXCHANGER)

Water In Pressure:	a._____	PSI
Water Out Pressure:	b._____	PSI
Pressure Drop = a - b	c._____	PSI
Convert Pressure Drop to Flow Rate (refer to *Pressure Drop* table)	d._____	GPM

2. TEMPERATURE RISE OR DROP ACROSS SOURCE SIDE HEAT EXCHANGER

	COOLING		HEATING	
Water In Temperature:	e._____	°F	e._____	°F
Water Out Temperature:	f. _____	°F	f. _____	°F
Temperature Difference:	g._____	°F	g._____	°F

3. TEMPERATURE RISE OR DROP ACROSS LOAD SIDE HEAT EXCHANGER

	COOLING		HEATING	
Water In Temperature:	h._____	°F	h._____	°F
Water Out Temperature:	i. _____	°F	i. _____	°F
Temperature Difference:	j. _____	°F	j. _____	°F

4. HEAT OF REJECTION (HR) / HEAT OF EXTRACTION (HE) CALCULATION

HR or HE = Flow Rate x Temperature Difference x Brine Factor*
d. (above) x g. (above) x 485 for Methanol or Environol, 500 for water*
Heat of Extraction (Heating Mode) = _____ btu/hr
Heat of Rejection (Cooling Mode) = _____ btu/hr
Compare results to Capacity Data Tables

Note: Steps 5 through 8 need only be completed if a problem is suspected

5. WATTS

	COOLING		HEATING		HYDRONIC	
Volts:	m._____	VOLTS	m._____	VOLTS	m. _____	VOLTS
Total Amps (Comp. + Fan):	n. _____	AMPS	n. _____	AMPS	n. _____	AMPS
Watts = m. x n. x 0.85	o. _____	WATTS	o. _____	WATTS	o. _____	WATTS

6. CAPACITY

Cooling Capacity = HR. - (o. x 3.413)	p. _____	btu/hr
Heating Capacity= HE. + (o. x 3.413)	p. _____	btu/hr

7. EFFICIENCY

Cooling EER = p. / o.	q. _____	EER
Heating COP = p. / (o. x 3.413)	q. _____	COP

8. SUPERHEAT (S.H.) / SUBCOOLING (S.C.)

COOLING	COOLING		HEATING		HYDRONIC	
Suction Pressure:	r. _____	PSI	r. _____	PSI	r. _____	PSI
Suction Saturation Temperature:	s. _____	°F	s. _____	°F	s. _____	°F
Suction Line Temperature:	t. _____	°F	t. _____	°F	t. _____	°F
Superheat = t. - s.	u. _____	°F	u. _____	°F	u. _____	°F
Head Pressure:	v. _____	PSI	v. _____	PSI	v. _____	PSI
High Pressure Saturation Temp.:	w. _____	°F	w. _____	°F	w. _____	°F
Liquid Line Temperature*:	x. _____	°F	x. _____	°F	x. _____	°F
Subcooling = w. - x.	y. _____	°F	y. _____	°F	y. _____	°F

* Note: Liquid line is between the source heat exchanger and the expansion valve in the cooling mode; between the load heat exchanger and the expansion valve in the heating mode.

NXW Startup

Job Site Recording Process

1. Complete the top of the NXW Start-Up Form for each unit.

   *Be sure to note the mode (Heat/Cool) you will be testing the unit in as well as freeze protection details of type and concentration (Test to Verify). If starting-up in both heating and cooling modes, a start-up form for each mode will need to be completed.

   *The unit must be tested in both heating and cooling modes.

2. Take the unit offline (disconnect the aqua stat or BAS system) to obtain full control of the compressors from the MUI (Controls contractor must disable all external controls).
   a. Place load/source pumps in “Hand” position so they can be manually controlled. (Mechanical contractor must enable pumps).
   b. Check the incoming power supply voltage and record it.
   c. On 208V-230V and 380-420V units verify that the transformer is set correctly prior to testing.
3. Energize line power to the unit and record Thermistor Checks prior to energizing the compressors or water flow.
4. Start Pumps and verify flow through the heat exchangers by recording the pressure drop in the Evaporator/ Condenser Flow Analysis section.
5. Locate the maintenance menu in the MUI and enable Y1, compressor 1. If lead/lag is enabled, compressor 1 might not always be the first compressor to start.
6. Allow the unit to run for a minimum of 10 minutes so that the refrigeration circuit can balance itself out before recording any of the data. Ideally the unit should be operating at anticipated operating conditions. In other words if the unit is spec’d to run with a entering water temperature of 90° on the load side, we would like to see the start-up data recorded with the unit operating at these conditions, however this may not be possible.
7. Once the unit reaches desired load conditions, record the amp draw on the compressor that is running.
8. Record the entering and leaving water temps on the load and source side and record the load and source freeze temps for the circuit that is running.
9. Disable Y1 and enable the Y2 call and repeat steps 6, 7, and 8 for compressor 2.

NXW Pre-Start-Up Checklist

CHILLER PRE-START-UP CHECKLIST Date: _____

Project Name:		Mechanical Contractor:	
Address:		Contact Name:	
City/State/Zip:		Telephone:	
WaterFurnace Order #:		Purchase Order #:	

Prior to starting the chiller(s), the mechanical contractor is responsible for reviewing all of the installation and operational information supplied by the manufacturer to ensure that the system is ready to be started. Failure to do so may result in additional delays and expenses charged back to the mechanical contractor. The contractor is to provide necessary equipment to gain access to all units and have a service technician on site with the factory technician at all times.

		Complete (X)
A. Installation/Serviceability		
1.	Building completely enclosed with a consistent indoor space temperature of between 50˚ and 90˚ F	☐
2.	Minimum 2-feet of service clearance around chiller(s) to allow proper access from all sides	☐
3.	Chiller mounting and vibration isolation complete	☐
4.	Chiller(s) ordered with proper voltage rating for application	☐
B. Water Piping		
1.	Load side water piping installed between unit, pumps, and load supply/return	☐
2.	Source side water piping installed between unit, pumps, and source supply/return	☐
3.	Flow switch installed	☐
4.	All specialty components including water strainer(s) and isolation/control/balance valve(s) installed	☐
C. Electrical Wiring		
1.	Wiring completed from chiller to main power supply	☐
2.	Wiring completed for disconnects and circuit overload protection	☐
3.	Wiring completed for load and source water pumps and proper rotation of each verified	☐
D. Controls		
1.	Building automation control network installed and functional	☐

2.	Brand/Model	Comm. (BacNet, Open N2, LON)

E. Preparation		
1.	Arrangements made for service technician to be onsite with factory technician at all times	☐
2.	Arrangements made for controls contractor to be onsite and available during normal working hours	☐

The undersigned, and the entity he or she represents, hereby accepts responsibility for the accuracy of the information provided herein, and thus agrees to compensate WaterFurnace International, Inc. in full for all expenses incurred by WaterFurnace International, Inc. and its representatives that are directly related to the accuracy of said information.

Signature (Hand Written) _____ Date _____

Name and Title (Please Print)

NXW Start-Up Form

Start-up Date		**Unit Model #**		**Size:**	
Unit Tag #		**Unit Serial #**			
Start-up Company				**Start-Up Mode**	
Employee Name				**Cooling / Heating**	
Job Name					
Electrical Data	**Voltage across L1-L2**				
	Voltage across L2-L3			**Water Side Balance Complete**	
	Voltage across L1-L3			**YES / NO**	
		Circuit 1	**Circuit 2**	**208/230V Transformer Configuration**	
	Compressor Amps (Red Wire)			**208**	**230**
	Compressor Amps (White Wire)			**380/420V Transformer Configuration**	
	Compressor Amps (Black Wire)			**380**	**420**
		Circuit 1	**Circuit 2**	**Antifreeze Installed (Select)**	
Thermistor Checks, Prior to Starting Compressors	**Entering Load Water Temperature with no Compressors running**			**Load**	**Source**
	Leaving Load Water Temperature with no Compressors Running			**None Prop. Glycol Methanol Ethanol**	**None Prop. Glycol Methanol Ethanol**
	Entering Source Water Temperature with no Compressors running				
	Leaving Source Water Temperature with no Compressors running			**Freeze Protection Setpoint in The MUI.**	
	Source Freeze Temperature Water Flowing thru unit only (No compressors on)			**LOAD**	**SOURCE**
	Load Freeze Temperature Water Flowing thru unit only (No compressors on)			**33° / 15°**	**33° / 15°**
Compressors Energized	**Entering Load Water Temperature**			**Fluid Samples Taken**	
	Leaving Load Water Temperature			**LOAD NO / YES**	**SOURCE NO / YES**
	Entering Source Water Temperature			**Antifreeze Concentration (%)**	
	Leaving Source Water Temperature			**LOAD**	**SOURCE**
Evaporator/ Condenser Flow Analysis	**Entering Water Pressure on Source Heat Exchanger**		**Source Flow Rate (GPM)**		
	Leaving Water Pressure on Source Heat Exchanger				
	Entering Water Pressure on Load Heat Exchanger		**Load Flow Rate (GPM)**		
	Leaving Water Pressure on Load Heat Exchanger				
		Circuit 1	**Circuit 2**		
Refrigerant Thermistors, Compressors Running	**Source Freeze Temperature**				
	Load Freeze Temperature				
General Notes					

Preventive Maintenance

Unit Heat Exchanger Maintenance

1. Keep all air out of the water or antifreeze solution.
2. Keep the system under pressure at all times. Closed loop systems must have positive static pressure or air vents may draw air into the system.

NOTES: If the installation is in an area with a known high mineral content in the water, it is best to establish with the owner a periodic maintenance schedule for checking the water-to-refrigerant heat exchanger on a regular basis. Should periodic cleaning be necessary, use standard cleaning procedures. Generally, the more water flowing through the unit, the less chance there is for scaling. Low GPM flow rates produce higher temperatures through the heat exchanger. To avoid excessive pressure drop and the possibility of metal erosion, do not exceed GPM flow rate as shown on the specification sheets for each unit.

Replacement Procedures

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

In-Warranty Material Return

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

Replacement Fuse Chart

Model Size	Line Voltage/ Frequency/ Phase	Disconnect Fuse (if applicable)			Branch Circuit Fuse			Transformer Primary Fuse		
		Size (A)	Type	Part #	Size (A)	Type	Part #	Size (A)	Type	Part #
120	208-230/60/3	60	Class J, Round	19P605-06	30	Cube*	19P602-04	1.3	Class CC	19P600-07
	380/60/3	30	Class J, Round	19P605-03	20	Cube*	19P602-02	0.8	Class CC	19P600-03
	460/60/3	30	Class J, Round	19P605-03	20	Cube*	19P602-02	0.6	Class CC	19P600-01
	575/60/3	20	Class J, Round	19P605-01	15	Cube*	19P602-01	0.5	Class CC	19P600-13
180	208-230/60/3	70	Class J, Blade	19P605-07	40	Cube*	19P602-06	1.3	Class CC	19P600-07
	380/60/3									
	460/60/3	30	Class J, Round	19P605-03	20	Cube*	19P602-02	0.6	Class CC	19P600-01
	575/60/3	25	Class J, Round	19P605-02	15	Cube*	19P602-01	0.5	Class CC	19P600-13
240	208-230/60/3	80	Class J, Blade	19P605-08	45	Cube*	19P602-07	1.3	Class CC	19P600-07
	380/60/3									
	460/60/3	45	Class J, Round	19P605-05	25	Cube*	19P602-03	0.6	Class CC	19P600-01
	575/60/3	35	Class J, Round	19P605-04	20	Cube*	19P602-02	0.5	Class CC	19P600-13
360	208-230/60/3	110	Class J, Blade	19P605-10	60	Cube*	19P602-09	1.3	Class CC	19P600-07
	380/60/3	80	Class J, Blade	19P605-08	45	Cube*	19P602-07	0.8	Class CC	19P600-03
	460/60/3	60	Class J, Round	19P605-06	35	Cube*	19P602-05	0.6	Class CC	19P600-01
	575/60/3	60	Class J, Round	19P605-06	30	Cube*	19P602-04	0.5	Class CC	19P600-13
600	208-230/60/3									
	380/60/3	110	Class J, Blade	19P605-10	60	Cube*	19P602-09	0.8	Class CC	19P600-03
	460/60/3	100	Class J, Blade	19P605-09	50	Cube*	19P602-08	0.6	Class CC	19P600-01
	575/60/3	70	Class J, Blade	19P605-07	40	Cube*	19P602-06	0.5	Class CC	19P600-13

* Meets Class J requirements

Service Parts List

Part Description		120				180		
		208-230/60/3	380/60/3	460/60/3	575/60/3	208-230/60/3	460/60/3	575/60/3
Refrigeration Components	Compressor	34P658-06	34P658-03	34P658-04	34P658-05	34P617-03	34P617-04	34P617-05
	Compressor Sound Jacket	92P519-04				92P519-03		
	Thermal Expansion Valve	33P620-05				33P620-04		
	TXV's per circuit	1				1		
	Filter Dryer	36P500B04				36P500B04		
	Filter Dryers per circuit	1				1		
	Reversing Valve with Coil	33P526-05				33P077-06		
	Vibration Absorber (suction)	32P508-06				32P508-05		
	Vibration Absorber (discharge)	32P508-05				32P508-04		
	Brazed Plate Heat Exchanger	62P563-11				62P564-11		
	Brazed Plate Heat Exchanger Insulation Kit	92P520-11				92P520-12		
Switches / Sensors	High Pressure Switch	35P506B02				35P506B02		
	Low Pressure Switch	35P506B01				35P506B01		
	Emergency Stop Switch	13P709-01				13P709-01		
	Water Temperature Sensor	12P529-05				12P529-05		
	Refrigerant Temp (Freeze) Sensor	12P529-06				12P529-06		
Electrical	Compressor Contactor	13P537B03	13P537B03	13P537B03	13P537B03	13P537B04	13P537B03	13P537B03
	Transformer	15P501B01	15P511-02	15P505B01	15P506B01	15P501B01	15P505B01	15P506B01
	Connection Block - Low Voltage	12P503-06				12P503-06		
	Grounding Lug	12P004A				12P004A		
	Non-Fused Disconnect	13P708-01-02				13P708-01-02		
	Fused Disconnect	13P710-01-04				13P710-01-04		
	Disconnect Fuses	19P605-01-10				19P605-01-10		
	Branch Circuit Fuse Holder	19P603-01-03				19P603-01-03		
	Branch Circuit Fuses	19P602-01-09				19P602-01-09		
	Transformer Fuse Holder	19P601-01				19P601-01		
	Transformer Fuse	19P600-01-13				19P600-01-13		
	Emergency Stop Switch	13P709-01				13P709-01		
	Phase Guard Monitor	19P541A06				19P541A06		
Control	FX10 Main Board - no communications	17X51606NXW-05				17X51606NXW-05		
	FX10 Main Board & N2 Open Com Card	17X51606NXW-06				17X51606NXW-06		
	FX10 Main Board & Lonworks Com Card	17X51606NXW-07				17X51606NXW-07		
	FX10 Main Board & BACnet Com Card	17X51606NXW-08				17X51606NXW-08		
	FX10 Expansion Board	17P516-07				17P516-07		
	Display	19P563-01				19P563-01		
	FX10 Display Interface Board	17P516-11				17P516-11		
Enclosure	Frame Assembly (1)	47P410-03				47P410-03		
	Compressor Shipping Bracket (4)	47P707-03				47P707-03		
	Heat Exchanger Mounting Brkt (2)	47P698-12				47P698-12		
	Water Line Corner Post (Right) (1)	43P443-04				43P443-04		
	Water Line Corner Post (Left) (1)	43P443-03				43P443-03		
	Control Box Corner Post (Right) (1)	43P443-02				43P443-02		
	Control Box Corner Post (Left) (1)	43P443-01				43P443-01		
	Top Panel (1)	42P400-03				42P400-03		
	Right Side Water Line Access Panel (1)	40P409-06				40P409-06		
	Left Side Water Line Access Panel (1)	40P409-05				40P409-05		
	Front Bottom Access Panel (1)	40P406-03				40P406-03		
	Center Panel (2)	43P443-05				43P443-05		
	Control Box Assembly Non-Fused Option (1)	45P404-01				45P404-01		
	Control Box Assembly Fused Option (1)	45P404-11				45P404-11		
	Control Box Base (1)	46P808-02				46P808-02		
	Control Box Fx-10 Bracket (1)	46P808-05				46P808-05		
	Control Box Terminal Strip Bracket (1)	46P808-06				46P808-06		
	Rv Assembly Bracket (2)	N/A				N/A		
	Copper Vibration Reducer Bracket (4)	N/A				N/A		
	Left Side Access Panel (2)	40P408-05				40P408-05		
	Right Side Access Panel (2)	40P408-06				40P408-06		
	Top Panel Ko Bracket (1)	42P400-11				42P400-11		
	Water Line Access Panel Support Bracket (3)	46P808-03				46P808-03		
	Korean Pressure Gauge Bracket (1)	46P808-04				46P808-04		
Misc.	Door Latches	91P570-01				91P570-01		
	Keyed Door Lock	99P532-01				99P532-01		

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Service Parts List, cont.

Part Description		240			360			
		208-230/60/3	460/60/3	575/60/3	208-230/60/3	380/60/3	460/60/3	575/60/3
Refrigeration Components	Compressor	34P619-06	34P619-04	34P619-05	34P655-06	34P655-03	34P655-04	34P655-05
	Compressor Sound Jacket	92P519-03			92P519-05			
	Thermal Expansion Valve	33P620-03			33P620-02			
	TXV's per circuit	1			1			
	Filter Dryer	36P500B04			36P500B06			
	Filter Dryers per circuit	1			1			
	Reversing Valve with Coil	33P546-04			33P546-04			
	Vibration Absorber (suction)	32P508-04			32P508-04			
	Vibration Absorber (discharge)	32P508-03			32P508-03			
	Brazed Plate Heat Exchanger	62P550-11			62P551-11			
	Brazed Plate Heat Exchanger Insulation Kit	92P520-13			92P516-11			
Switches / Sensors	High Pressure Switch	35P506B02			35P506B02			
	Low Pressure Switch	35P506B01			35P506B01			
	Emergency Stop Switch	13P709-01			13P709-01			
	Water Temperature Sensor	12P529-05			12P529-05			
	Refrigerant Temp (Freeze) Sensor	12P529-06			12P529-06			
Electrical	Compressor Contactor	13P537B05	13P537B03	13P537B03	13P537B05	13P537B05	13P537B04	13P537B04
	Transformer	15P501B01	15P505B01	15P506B01	15P501B01	15P511-02	15P505B01	15P506B01
	Connection Block - Low Voltage	12P503-06			12P503-06			
	Grounding Lug	12P004A			12P004A			
	Non-Fused Disconnect	13P708-01-02			13P708-01-02			
	Fused Disconnect	13P710-01-04			13P710-01-04			
	Disconnect Fuses	19P605-01-10			19P605-01-10			
	Branch Circuit Fuse Holder	19P603-01-03			19P603-01-03			
	Branch Circuit Fuses	19P602-01-09			19P602-01-09			
	Transformer Fuse Holder	19P601-01			19P601-01			
	Transformer Fuse	19P600-01-13			19P600-01-13			
	Emergency Stop Switch	13P709-01			13P709-01			
	Phase Guard Monitor	19P541A06			19P541A06			
Control	FX10 Main Board - no communications	17X51606NXW-05			17X51606NXW-05			
	FX10 Main Board & N2 Open Com Card	17X51606NXW-06			17X51606NXW-06			
	FX10 Main Board & Lonworks Com Card	17X51606NXW-07			17X51606NXW-07			
	FX10 Main Board & BACnet Com Card	17X51606NXW-08			17X51606NXW-08			
	FX10 Expansion Board	17P516-07			17P516-07			
	Display	19P563-01			19P563-01			
	FX10 Display Interface Board	17P516-11			17P516-11			
Enclosure	Frame Assembly (1)	47P410-02			47P410-02			
	Compressor Shipping Bracket (4)	47P707-03			47P707-04			
	Heat Exchanger Mounting Brkt (2)	47P698-11			47P698-11			
	Water Line Corner Post (Right) (1)	43P442-04			43P442-04			
	Water Line Corner Post (Left) (1)	43P442-03			43P442-03			
	Control Box Corner Post (Right) (1)	43P442-02			43P442-02			
	Control Box Corner Post (Left) (1)	43P442-01			43P442-01			
	Top Panel (1)	42P400-02			42P400-02			
	Right Side Water Line Access Panel (1)	40P409-04			40P409-04			
	Left Side Water Line Access Panel (1)	40P409-03			40P409-03			
	Front Bottom Access Panel (1)	40P406-02			40P406-02			
	Center Panel (2)	43P442-05			43P442-05			
	Control Box Assembly Non-Fused Option (1)	45P404-01			45P404-01			
	Control Box Assembly Fused Option (1)	45P404-11			45P404-11			
	Control Box Base (1)	46P808-02			46P808-02			
	Control Box Fx-10 Bracket (1)	46P808-05			46P808-05			
	Control Box Terminal Strip Bracket (1)	46P808-06			46P808-06			
	Rv Assembly Bracket (2)	N/A			N/A			
	Copper Vibration Reducer Bracket (4)	N/A			N/A			
	Left Side Access Panel (2)	40P408-03			40P408-03			
	Right Side Access Panel (2)	40P408-04			40P408-04			
	Top Panel Ko Bracket (1)	42P400-11			42P400-11			
	Water Line Access Panel Support Bracket (3)	46P808-03			46P808-03			
	Korean Pressure Gauge Bracket (1)	46P808-04			46P808-04			
Misc.	Door Latches	91P570-01			91P570-01			
	Keyed Door Lock	99P532-01			99P532-01			

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Service Parts List, cont.

Part Description		600		
		380/60/3	460/60/3	575/60/3
Refrigeration Components	Compressor	34P654-03	34P654-04	34P654-05
	Compressor Sound Jacket	92P519-06		
	Thermal Expansion Valve	33P620-01		
	TXV's per circuit	1		
	Filter Dryer	36P500B06		
	Filter Dryers per circuit	2		
	Reversing Valve with Coil	33P607-02		
	Vibration Absorber (suction)	32P508-03		
	Vibration Absorber (discharge)	32P508-01		
	Brazed Plate Heat Exchanger	62P595-11		
	Brazed Plate Heat Exchanger Insulation Kit	92P516-12		
Switches / Sensors	High Pressure Switch	35P506B02		
	Low Pressure Switch	35P506B01		
	Emergency Stop Switch	13P709-01		
	Water Temperature Sensor	12P529-05		
	Refrigerant Temp (Freeze) Sensor	12P529-06		
Electrical	Compressor Contactor	13P537B05	13P537B05	13P537B05
	Transformer	15P511-02	15P505B01	15P506B01
	Connection Block - Low Voltage	12P503-06		
	Grounding Lug	12P004A		
	Non-Fused Disconnect	13P708-01-02		
	Fused Disconnect	13P710-01-04		
	Disconnect Fuses	19P605-01-10		
	Branch Circuit Fuse Holder	19P603-01-03		
	Branch Circuit Fuses	19P602-01-09		
	Transformer Fuse Holder	19P601-01		
	Transformer Fuse	19P600-01-13		
	Emergency Stop Switch	13P709-01		
	Phase Guard Monitor	19P541A06		
Control	FX10 Main Board - no communications	17X51606NXW-05		
	FX10 Main Board & N2 Open Com Card	17X51606NXW-06		
	FX10 Main Board & Lonworks Com Card	17X51606NXW-07		
	FX10 Main Board & BACnet Com Card	17X51606NXW-08		
	FX10 Expansion Board	17P516-07		
	Display	19P563-01		
	FX10 Display Interface Board	17P516-11		
Enclosure	Frame Assembly (1)	47P410-01		
	Compressor Shipping Bracket (4)	47P707-05		
	Heat Exchanger Mounting Brkt (2)	N/A		
	Water Line Corner Post (Right) (1)	43P441-04		
	Water Line Corner Post (Left) (1)	43P441-03		
	Control Box Corner Post (Right) (1)	43P441-02		
	Control Box Corner Post (Left) (1)	43P441-01		
	Top Panel (1)	42P400-01		
	Right Side Water Line Access Panel (1)	40P409-02		
	Left Side Water Line Access Panel (1)	40P409-01		
	Front Bottom Access Panel (1)	40P406-01		
	Center Panel (2)	43P441-05		
	Control Box Assembly Non-Fused Option (1)	45P404-01		
	Control Box Assembly Fused Option (1)	45P404-11		
	Control Box Base (1)	46P808-02		
	Control Box Fx-10 Bracket (1)	46P808-05		
	Control Box Terminal Strip Bracket (1)	46P808-06		
	Rv Assembly Bracket (2)	47P712-01		
	Copper Vibration Reducer Bracket (4)	46P835-05		
	Left Side Access Panel (2)	40P408-01		
	Right Side Access Panel (2)	40P408-02		
	Top Panel Ko Bracket (1)	42P400-11		
	Water Line Access Panel Support Bracket (3)	46P808-03		
	Korean Pressure Gauge Bracket (1)	46P808-04		
Misc.	Door Latches	91P570-01		
	Keyed Door Lock	99P532-01		

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Manufactured by
WaterFurnace International, Inc.
9000 Conservation Way
Fort Wayne, IN 46809
www.waterfurnace.com

Product:	**Envision² NXW**
Type:	Reversible Chiller - 60 Hz
Size:	10-50 Tons
Document:	Installation Manual

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