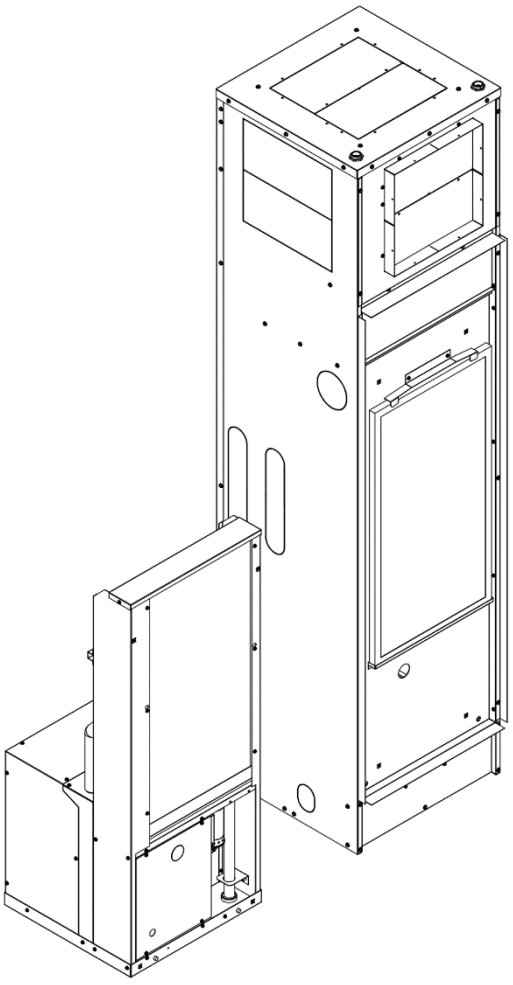
Installation, Operation, & Maintenance Manual

IOM 787703
Rev. A 1/25

HRCX High Rise Series
Water Source Heat Pump



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First Co. works to continuously improve its products and as a result, it reserves the right to change design and specifications without notice.

The warranty may be void unless the Startup & Performance Checklist is completed and returned to the warrantor. If the HVAC unit is not installed properly, the warranty will be void, as the manufacturer cannot be held accountable for problems that stem from improper installation.

WARNING

Altering the product or replacing parts with non-authorized factory parts voids all warranty or implied warranty and may result in adverse operational performance and/or a possible hazardous condition to service personnel and occupants. Company employees and/or contractors are not authorized to waive this warning.

WARNING

Only personnel trained and qualified in the installation, adjustment, servicing, maintenance, or repair of the equipment described in this manual should perform service. The manufacturer is not responsible for any injury or property damage arising from improper service or procedures. In jurisdictions where licensing is required to service this equipment, only licensed personnel should perform the service.

Improper installation, adjustment, servicing, maintenance, or repair—or attempting to perform these tasks without proper training—may result in product damage, property damage, personal injury, or death. Service personnel assume responsibility for any injury or property damage resulting from improper procedures.

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SAFETY CONSIDERATIONS

1. READ THE ENTIRE MANUAL BEFORE STARTING THE INSTALLATION.
2. These instructions are intended as a general guide and do not supersede national, state, or local codes in any way.
3. Altering the product, improper installation, or the use of unauthorized factory parts voids all warranty or implied warranty and may result in adverse operation and/or performance or may result in hazardous conditions to service personnel and occupants. Company employees or contractors are not authorized to waive this warning.
4. This product should only be installed and serviced by a qualified, licensed, and factory authorized installer or service agency.
5. All "kits" and "accessories" used must be factory authorized when modifying this product. Refer and follow instructions packaged with the kits or accessories when installing.

RECOGNIZE THE FOLLOWING SAFETY NOTATIONS THROUGHOUT THIS MANUAL AND POSTED ON THE EQUIPMENT:

WARNING

Indicates a potentially hazardous situation or unsafe practices that could result in severe personal injury or death and/or damage to property.

WARNING

ELECTRIC SHOCK HAZARD

This warning signifies potential electrical shock hazards that could result in personal injury or death.

CAUTION

The CAUTION symbol indicates a potentially hazardous situation that may result in minor or moderate injury.

IMPORTANT

Suggests important procedure steps to insure proper installation, reliability, or operation.

NOTE

Used to highlight suggestions, which may result in enhanced installation, reliability or operation.

	Service indicator; read technical manual
	Operator's manual; operating instructions
	Read the instructions
	Warning; flammable materials
	UN GHS flame symbol

SAFETY INFORMATION

WARNING

Risk of fire. Flammable refrigerant used. To be repaired only by trained service personnel. Do not puncture refrigerant tubing.
Auxiliary devices which may be ignition sources shall not be installed in the ductwork, other than auxiliary devices listed for use with the specific appliance. See Instructions.
Dispose of refrigerant properly in accordance with federal or local regulations.

WARNING

When a Refrigerant Leak Detection System is installed. The unit must be powered on at all times except for serving.

Installer must verify that the refrigerant sensor is properly installed and functioning or else the warranty will be voided. Failure to do so may result in fire, property damage or death.

WARNING

Work with extreme caution to minimize the risk of refrigerant ignition while installing and servicing a system containing a flammable refrigerant. Control the work environment as much as possible while potentially flammable vapors are present. Inform all persons on site about the risks of the nature of the work underway and the necessary safety precautions. Do not work in confined spaces. Test the work area for refrigerant in the air using an intrinsically safe A2L refrigerant leak detector before beginning work. Have a dry powder or CO2 fire extinguisher available. Use proper tools designed for A2L class refrigerants. While working near A2L refrigerants, use only non-sparking tools. Open flames and other ignition sources must not be present except during brazing. Brazing must only take place on evacuated and nitrogen purged refrigerant lines and components that are open to the atmosphere.

WARNING

These instructions are intended to aid qualified, licensed, service personnel in proper installation, adjustment and operation of this unit. Read these instructions thoroughly before attempting installation or operation. Failure to follow these instructions may result in improper installation, adjustment, service or maintenance possibly resulting in fire, electrical shock, property damage, personal injury or death.

WARNING

ELECTRIC SHOCK HAZARD

Before performing service or maintenance on the system, turn OFF the main power to the unit. Electrical shock will cause personal injury or death.

WARNING

Electrical work associated with the installation of this appliance must comply with the National Electrical Code (NEC). Other local or regional electrical and building code requirements may apply.
In Canada electrical work associated with the installation of this appliance must comply with CE CSA C22.1

IMPORTANT

This appliance must be installed in a location which is not accessible to the general public.

This appliance is for INDOOR USE ONLY.

WARNING

Auxiliary devices that may serve as potential ignition sources must not be installed in the ductwork. Potential ignition sources include hot surfaces exceeding 700°C and electrical switching devices.

CABINET MODEL NOMENCLATURE

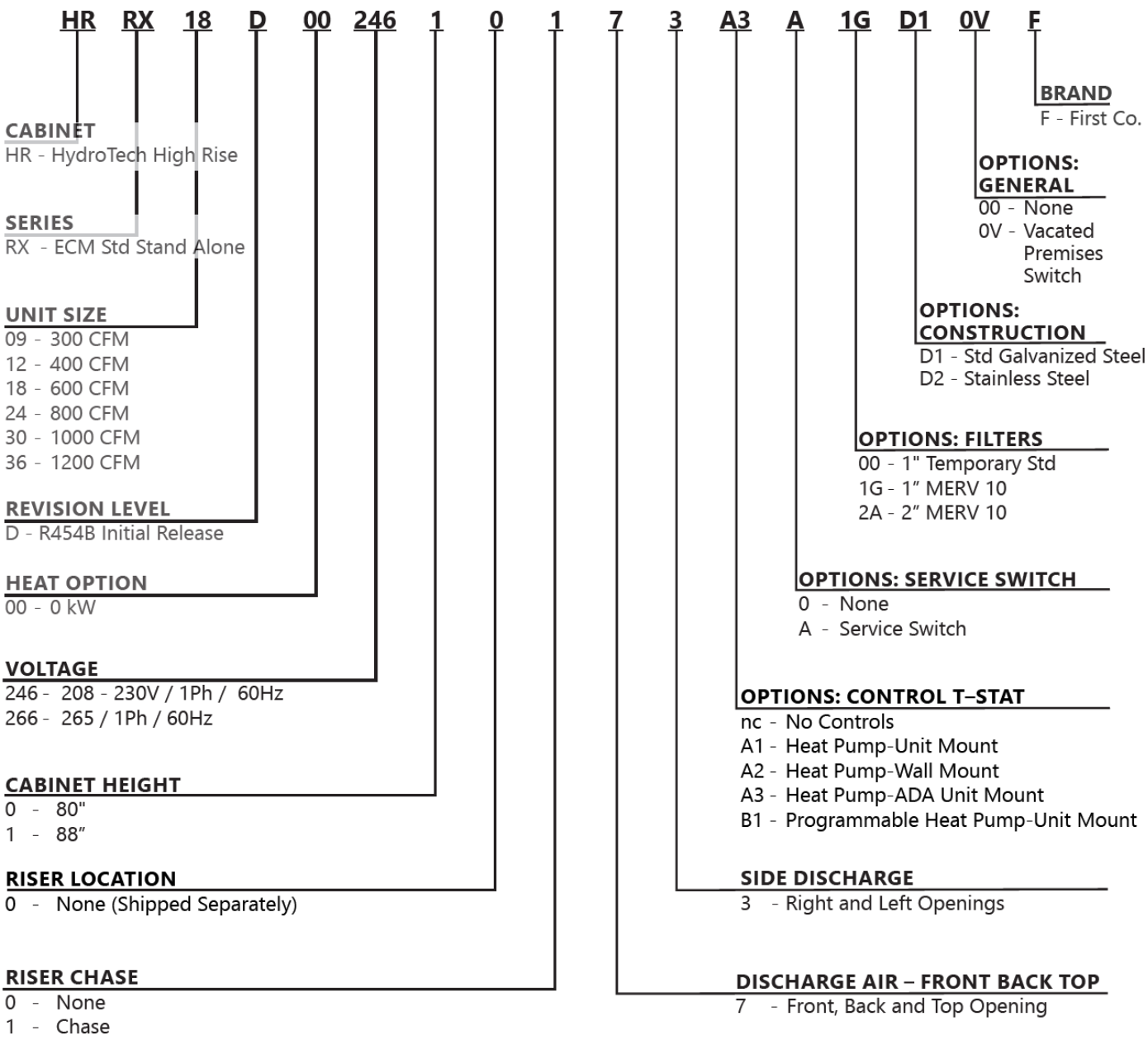


FIGURE 1 – Cabinet Model Nomenclature

CHASSIS MODEL NOMENCLATURE

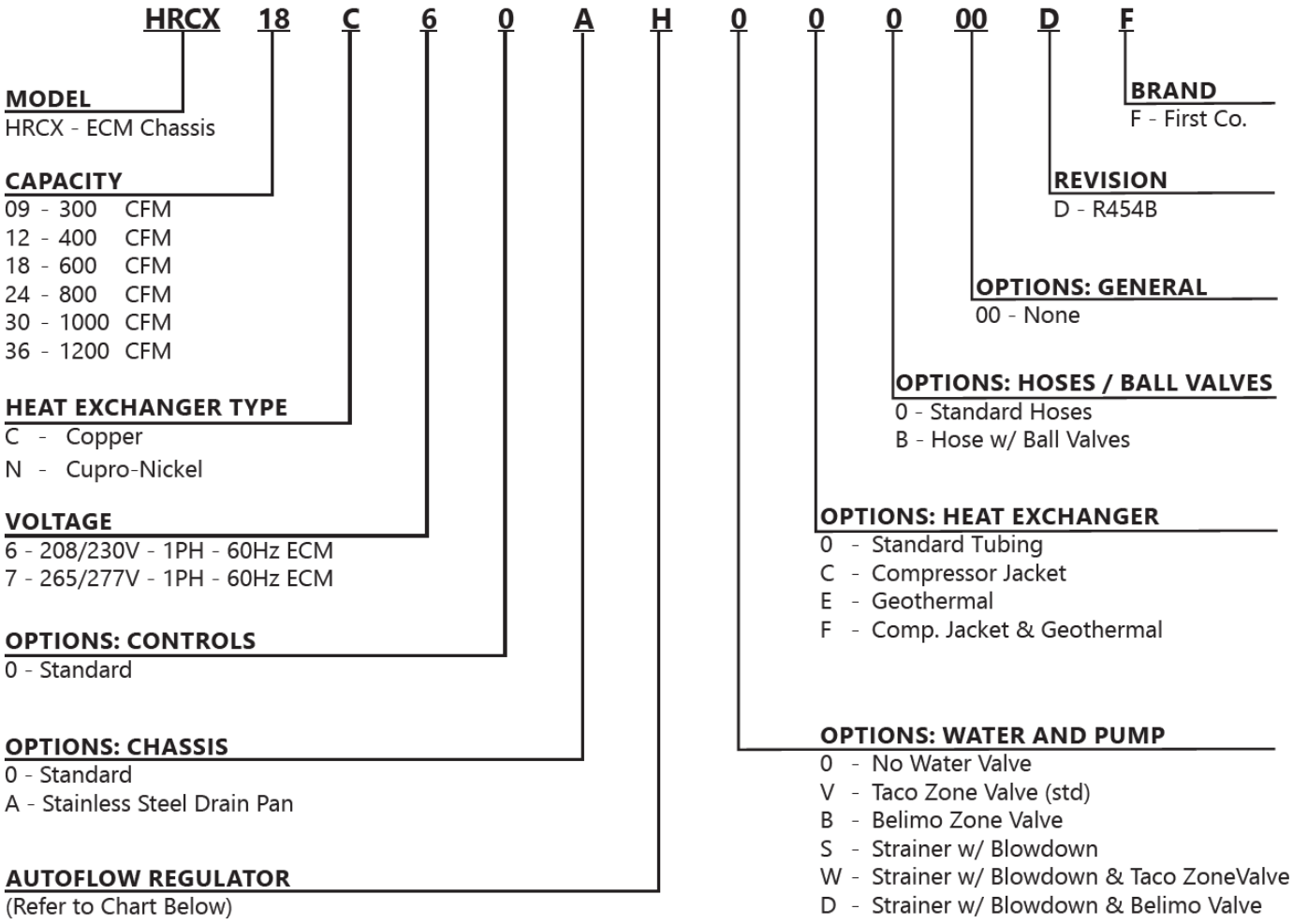


FIGURE 2 – Chassis Model Nomenclature

AUTO-FLOW REGULATOR (GPM) CODE							
TUBE		5/8" SWEAT		7/8" SWEAT			
UNIT		9	12	18	24	30	36
0	0	No Flow Regulator					
C	1.5	1.5					
D	2.0	2.0	2.0				
E	2.5	2.5	2.5				
F	3.0	3.0	3.0	3.0			
G	3.5		3.5	3.5			
H	4.0			4.0	4.0		
I	4.5			4.5	4.5		
J	5.0			5.0	5.0	5.0	
K	5.5				5.5	5.5	
L	6.0				6.0	6.0	6.0
M	6.5				6.5	6.5	6.5
N	7.0				7.0	7.0	7.0
P	7.5					7.5	7.5
Q	8.0					8.0	8.0
T	9.0						9.0
V	10.0						10.0

INTRODUCTION

The HydroTech HRCX series water to air heat pump provide the best combination of performance, efficiency and reliability in a compact form factor. The HRCX series comes standard with PSC blower motors. It is also available with ECM blower motors for high efficiency and comfort. The heat pump features double compressor vibration isolation for quiet operation, easy to remove blower housing for quick service

All HRCX models are certified to AHRI ISO Standard 13256-1. The HRCX models are designed to operate with fluid temperatures between 50°F to 110°F in cooling mode and 50°F to 90°F in heating mode for continuous operation. For operation below 50°F or above 90°F entering water temperature, extended range (insulated tubing) option is needed, and sufficient water flow is required to prevent freezing. Antifreeze solution is required for any application with entering water below 50 degree F.

Cooling Tower/Boiler and Geo Thermal applications should have sufficient antifreeze solution when required to protect against extreme conditions and equipment failure. Frozen water coils are not covered under warranty.

These installation instructions are intended as a general guide only, for use by an experienced, qualified contractor.

CAUTION

Do not use this water source heat pump during any phase of construction.

CAUTION

DO NOT use these units as a source of heating or cooling during the construction process. Mechanical components and filters can become clogged with dirt and debris, which can cause damage to the system.

The manufacture does not warrant equipment subjected to abuse.

INSTALLATION

REQUIREMENTS

Follow manufacturer's installation instructions, as well as local and municipal building codes.

installation precautions

CAUTION

Always wear all appropriate personal protection Equipment when installing and servicing these units.

WARNING

Use multiple people when moving and installing these units. Failure to do so could result in injury or death.

CAUTION

Contact with metal edges and corners can result injury. Protective gloves should be worn when handling. Exercise caution when installing and servicing unit.

Observe the following precautions for typical installation:

- Always use proper tools and equipment.
- No wiring or any work should be attempted without first ensuring the unit is completely disconnected from the power source and locked out. Also, verify that a proper permanent and uninterrupted, ground connection exists prior to energizing power to the unit.
- Review unit nameplate and wiring diagram for proper voltage and control configurations. This information may vary from unit to unit.

CAUTION

When the unit is in operation components are rotating at high speeds and caution should be taken.

WARNING

When soldering and brazing, it is recommended to have a fire extinguisher readily available. When soldering and brazing close to valves or sensitive components, heat shields or wet rags are required to prevent damage to the valves or components.

NOTE

Insulation is installed in the unit to provide a barrier between varying atmospheres outside and within the unit. If insulation is damaged condensation can occur and can lead to corrosion, component failure, and possible property damage. Damaged insulation must be repaired prior to the operation of the unit. Insulation will lose its effectiveness and value when wet, torn, separated, and/or damaged.

CAUTION

When servicing this equipment, because of high pressures, make sure the reversing valve, expansion device, filter drier and other components are specifically designed for R-454B refrigerant.

ONLY USE service equipment specifically designated for use with R-454B.

WARNING

R-454B can become combustible if mixed with air at elevated temperature and/or pressure. Failure to follow this warning could result in property damage and personal injury or death.

CAUTION

Do not operate this equipment without an air filter.

INSTALLATION CONTINUED

RISER & CABINET INSTALLATION

Risers can be ordered loose, not attached to the cabinet, and shipped in bulk. Entire riser stacks can be assembled, pressure tested, flushed, and filled before setting cabinets. Insulate all drain risers and insulate all tubing for extended range applications (operation below 60 degrees F) or if condensation will occur on riser tubes. Do not construct walls until cabinets are installed and set.

Supply and return risers can be straight, transition up, transition down, bottom capped, or top capped. Drain risers can be straight, transition up, or top capped. All drain risers and extended range (operation below 50 ºF entering water temperature) supply and return risers need insulation. See FIGURE 4 – Riser Identification

CAUTION

If filled risers are in unconditioned space, care must be taken to prevent freezing or condensation to avoid damage to risers and building.

NOTE

Risers can be in 4 positions. Supply (S) riser will always be closest to a corner. FIGURE 3 – Cabinet

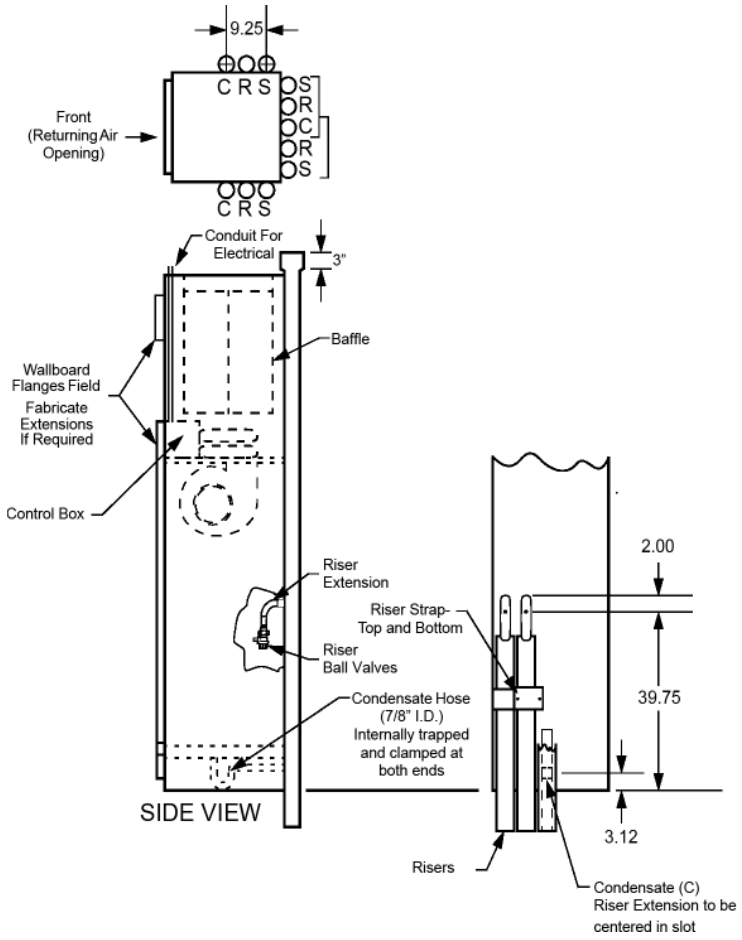
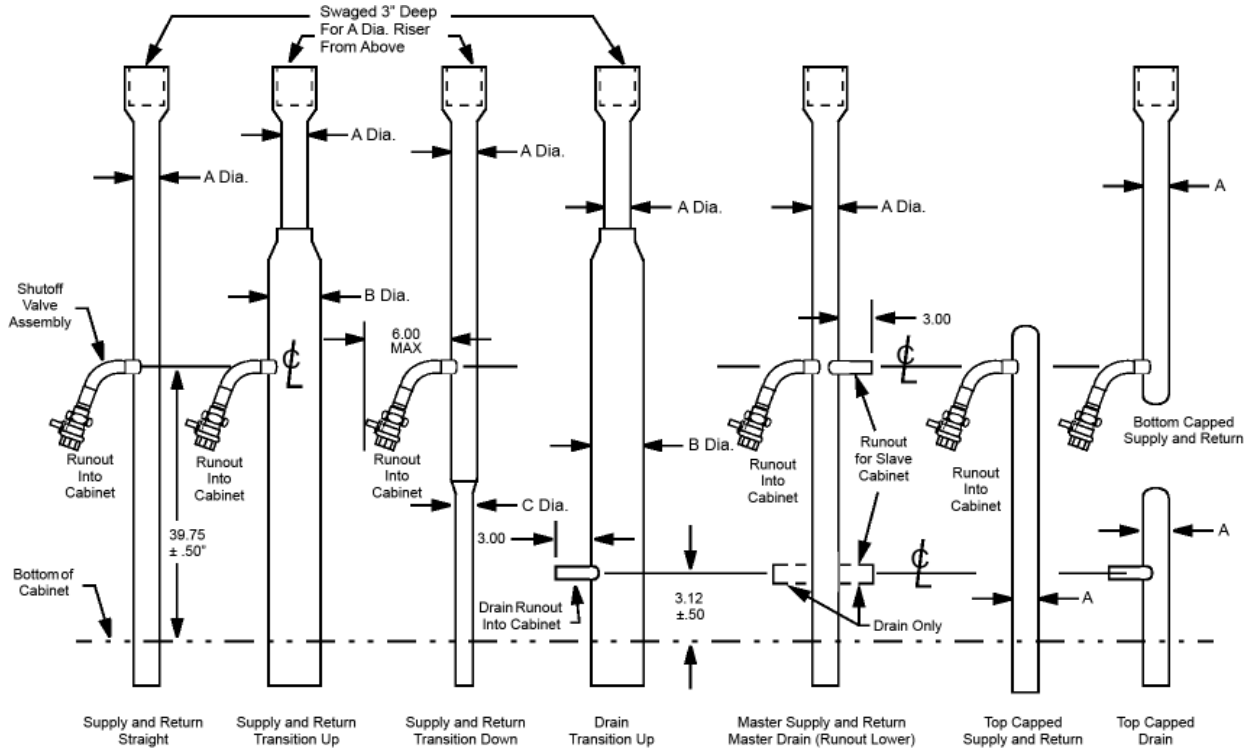


FIGURE 3 – Cabinet

INSTALLATION CONTINUED

RISER & CABINET INSTALLATION



Riser Transition Diameters

A	1.00	1.25	1.50	2.00	2.50	3.00
B	1.25	1.50	2.00	2.50	3.00	-
C	-	1.00	1.25	1.50	2.00	2.50

FIGURE 4 – Riser Identification

These units are for indoor installation ONLY!

Do not locate unit in areas subject to freezing temperatures or where high humidity levels could cause cabinet condensation. Locate the unit in an area that provides minimum clearance accesses.

Refer to Table 2 – Unit Dimensional Data for detailed information on unit dimensional sizes. Consider all additional clearances needed for water connections, electrical connections, duct connections and sufficient return airflow.

WARNING

Do not use soft, low temperature solders like 50-50, 60-40 or 85-15. With copper expansion and contraction, this type of bond will fail.

NOTE

Expansion loop design and placement is a function of and best prescribed by consulting and design engineers.

NOTE

Riser tubes can also come without swaged ends to use Pro-Press connections.

INSTALLATION CONTINUED

CABINET WITH RISERS ATTACHED

Each riser has a 3" flared opening at the top to accommodate the riser of the unit on the next floor. Check that riser is 3" above the top of the cabinet (See **FIGURE 4 – Riser Identification**). Begin on the lowest floor and progress upward floor by floor to the top. Remove bottom protective caps and top caps from unit below. Remove chassis if shipped with cabinet. Tip unit over riser chase hole in the building floor. As the unit is righted, align the risers with the unit below. If required, install an isolator pad, field supplied, beneath the cabinet now. An insertion of 2" is normal. Bottoming would create a form of preloading which is undesirable. If, due to building characteristics, an extension is required to mate to the previous unit, or the next, then install it now. Level unit to ensure proper condensate drainage. Make plumb in 2 directions and then anchor to the building using lag screws or bolts.

Do not over tighten the pipe connections. Flexible hoses should be used between the unit and rigid piping to avoid vibration transmission into the structure.

Ball After all units in a vertical column are anchored, make unit-to-unit riser connections. First, center each riser on the cabinet opening. Get as vertical a placement as the riser chase will allow. A minimum insertion depth of 1" is required into each flare of previous unit riser. Now solder to seal union using Sil-Fos or appropriate high temperature alloy.

ANCHOR RISERS AS REQUIRED

Risers are not to be rigidly attached to each cabinet. They need to be free to expand and contract as temperatures vary within the pipe and riser chase. They do however need to be fastened to the building at strategic points along the column length. Building code will describe frequency and type. Reference ASME B31.9 or similar.

The units are designed to allow movement of +/- 1.5" (3" total) under normal circumstances. **Expansion loops will be required in each riser if the calculated movement is in excess of 3"**. Expansion loops are described and formulated by the ASHRAE HVAC Systems and Equipment handbook and copper.org

PERFORM HYDRISTATIC TESTING

After all solder joints are made and all risers appropriately anchored perform hydrostatic testing for leaks. Install air vents at the highest assessable point of the piping loop and bleed the system of air that was accumulated during installation.

Once testing is complete, continue to insulate all unions just brazed so that insulation is now covering all riser surfaces. If required by fire code seal riser chase openings using correct fire rated materials now.

CABINET WITHOUT RISERS ATTACHED

Verify that the cabinet is in the correct location and that it is configured for the riser positions. Slide cabinet up to riser and allow 1/4" to 1" clearance. If required, install an isolator pad, field supplied, beneath the cabinet now.
Attach cabinet assembly to the floor on at least two sides using sheet metal angles, lag screws, or bolts. DO NOT fasten risers rigidly within the unit.

Remove the inner panel and save screws. Verify p-trap hose is connected correctly by lifting the drain pan. If the condensate hose must be rotated, loosen clamp on pan, rotate, and re-clamp. Check condensate drain by slowing pouring water into pan. Water should drain freely. Check for water in cabinet and floor and repair if needed. For slave cabinets, make sure p-trap is connected and clamped to riser stub. Lengthen copper stub into slave cabinet for future access.

INSTALLATION CONTINUED

RISER & CABINET INSTALLATION

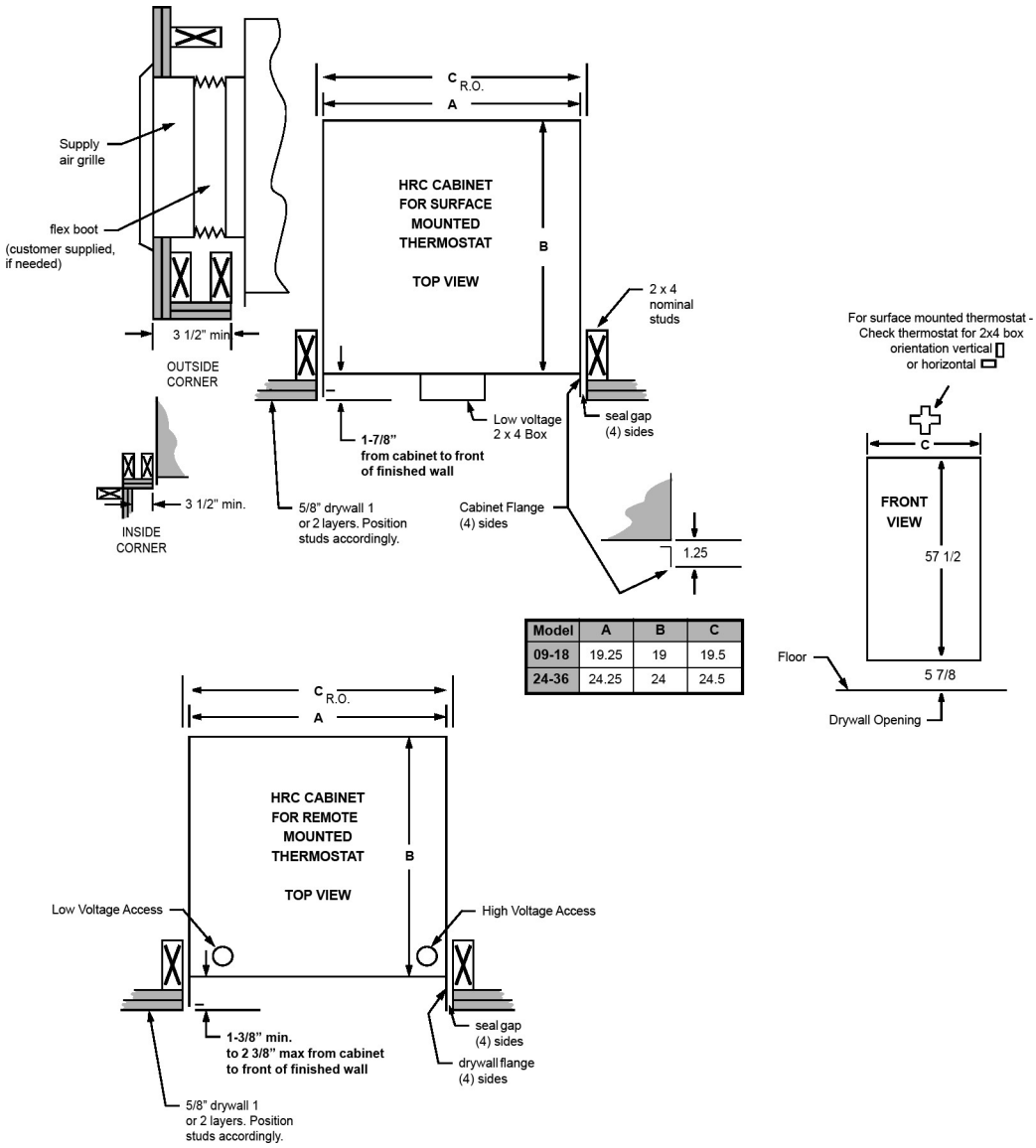


FIGURE 5 – Typical Panel with "G" Panel Installation

Position studs in front of cabinet and install frame in opening. Seal the gap between the cabinet and the frame. If a field installed fresh air motorized damper assembly is used, field fabricate and install duct from outside to frame opening. Assembly is installed later. See instructions with assembly.

When return air is required to enter the unit through openings in a stud wall, supply and field install an optional duct. Seal duct against the return air opening with foam. Ensure that all air entering the unit passes through the filter and refrigerant-to-air coil. Note: Chassis must be removable for service. If you have the surface mounted thermostat option (cabinet model digit 17 & 18 = A1 or B1), make sure before you install the drywall that the 2x4 junction box is in the correct orientation. Turn if needed. Check your thermostat.

NOTE

Allow for drywall thickness under frame front flange. Must use damper motor assembly if fresh air is needed.

INSTALLATION CONTINUED

RISER & CABINET INSTALLATION

For best sound attenuation, it is recommended not to attach drywall to cabinet. Install studs and drywall using conventional construction methods. Secure drywall to studs with low profile, pan-head sheet metal screws. Drywall can be attached directly to cabinet (figure 5 – typical panel with "g" panel installation), front of cabinet requires double thickness. Must not be fastened to drain pan edges or control box enclosure. Do not attach studs to cabinet. Do not install drywall using adhesive alone. See typical construction figures to determine stud layouts and dimension from cabinet to finished wall.

Vacuum all drywall dust and construction debris from cabinet insulation, drain pans and blower discharge plenum after cutting out supply. Insulation should be placed between the drywall and the cabinet for sound attenuation.

When drywall installation is complete, cover all cabinet openings and exposed sheet metal. (cardboard from unit shipping cartons can be used). Do not allow paint or wall texture over-spray to contact insulation, sheet metal, coil, fan or other unit components. Warranties are void if paint or other foreign debris is allowed to contaminate internal unit components.

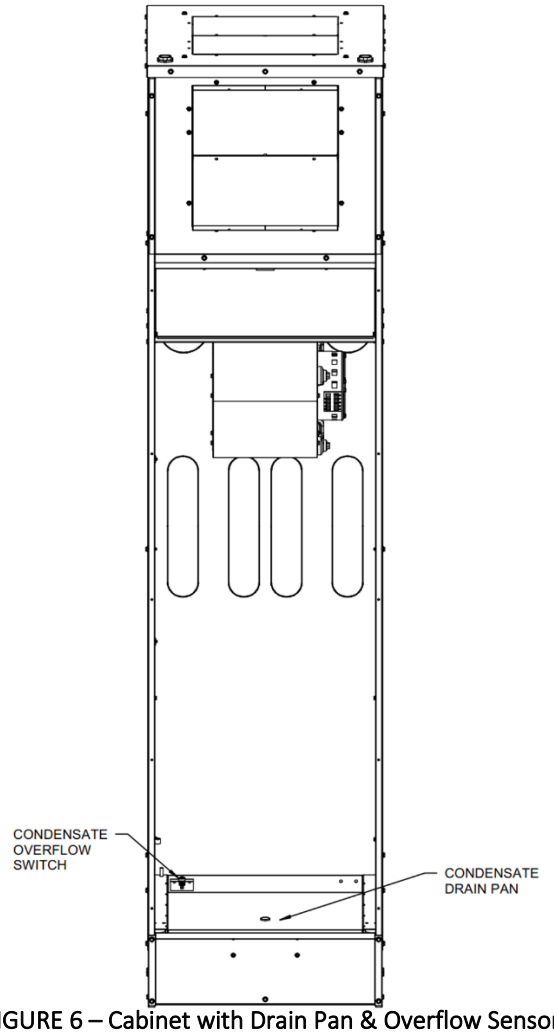


FIGURE 6 – Cabinet with Drain Pan & Overflow Sensor

INSTALLATION CONTINUED

CONDENSATE DRAIN

The condensate drain must be in conformance with all plumbing codes. For standard and master cabinets, the condensate drain between the drain pan assembly and condensate riser is factory installed, clamped, and trapped in the cabinet. For the slave cabinets. The installer must remove drain knockout, cut drain hose to length, connect to riser stub, and clamp both ends. Cabinet must be level to ensure proper condensate drainage.

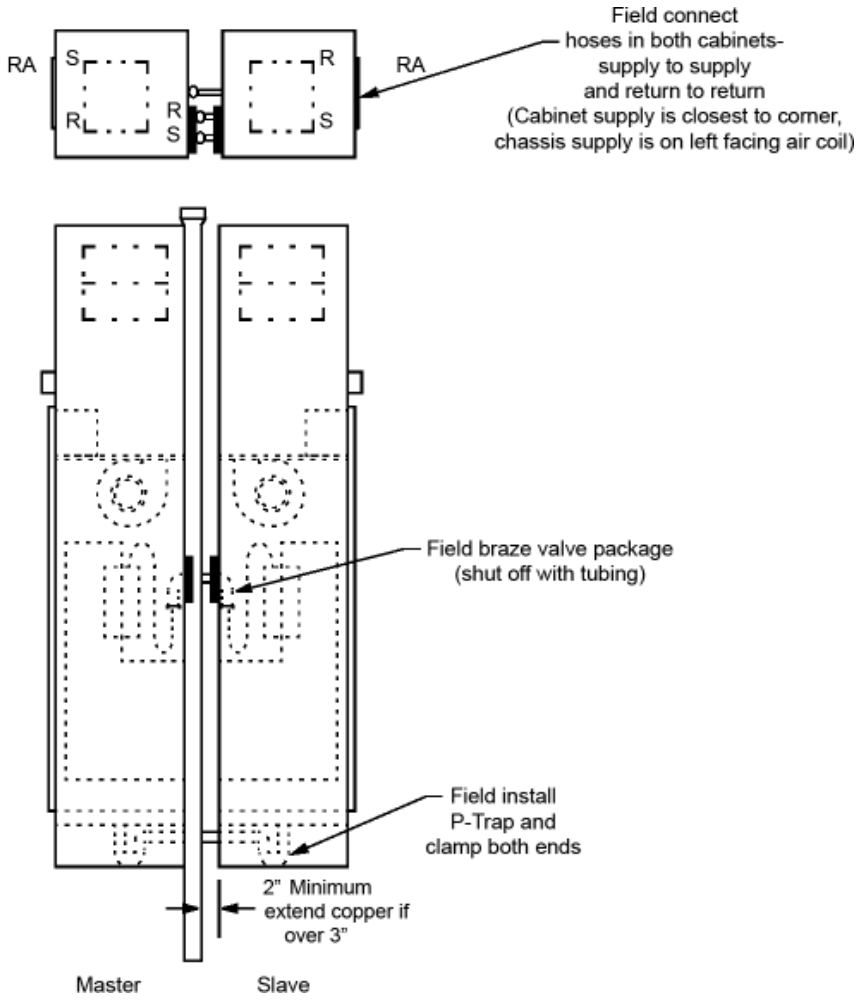


FIGURE 7 – Master/Slave Installation

CAUTION

Condensate drain pan is equipped with a condensate overflow safety device. Check condensate overflow sensor for proper operation and adjust position if required. Final adjustment of this sensor must be made in the field. Failure to follow this warning could result in equipment and property damage.

INSTALLATION CONTINUED

CHASSIS INSTALLATION

After cabinets are installed and walls finished, remove the filter and inner panel of the cabinet, then remove plastic bag covering the inner panel.

Never use flexible hoses of a smaller diameter than the water connections on the unit. Apply Teflon tape to the male ends of the hoses where necessary. Use a compatible Teflon tape or pipe joint compound when antifreeze is used.
Attach the flexible hoses to the shutoffs in the cabinet and the chassis. Water supply (water in) will always be nearest the rear/back corner of the cabinet. Attach hoses to the valves using two wrenches. Ensure that the valve handles are in a position than can be fully opened and closed without obstruction. Make sure hoses are matched correctly, water in (supply) hose to water in tube and water out (return) hose to water out tube.

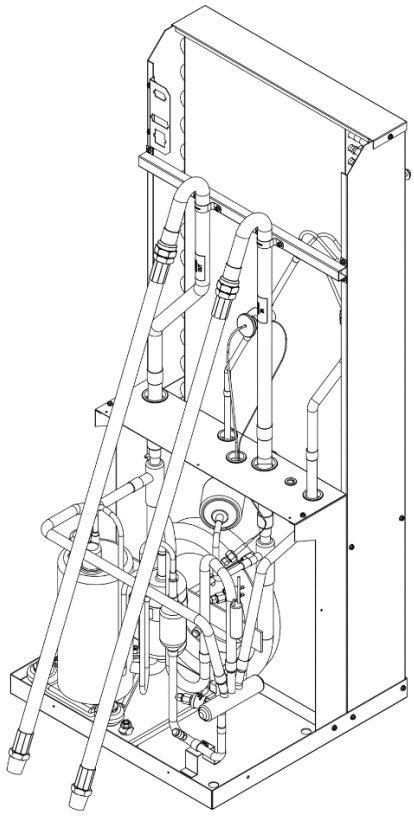


FIGURE 8 – Chassis

Check that the condensate pan in the cabinet is free and on 4 rubber grommets. Align chassis on condensate pan guides and slide fully into cabinet. Check hoses for kinks and that they do not exceed the minimum bend radius (See **Table 5 – Hose Diameter & Minimum Bend Radius**). Pull out chassis part way, loosen hoses, and adjust hose position if needed. Make sure that shut off valves are closed.

WARNING

Do NOT open shutoff valves to chassis until system has been flushed and purged of air.

INSTALLATION CONTINUED

PIPING INSTALLATION

All piping must be adequately sized to meet the designed water flow as specified for the specific application, and must adhere to all applicable codes. Piping connections on the equipment are not necessarily indicative of the proper supply and return line sizes. Refer to the project drawings and specifications for sizing.

On units with plastic drain pans the drain connection must be made hand tight only.

Chilled water piping must be properly insulated to prevent condensation and potential property damage. It is also recommended that all piping be insulated to prevent freezing in unconditioned spaces.

CAUTION

Do not bend or kink supply lines or hoses. For all supply lines or hoses of 1-1/2" OD or greater, use proper sized fitting is recommended to prevent piping damage and potential restrictions in water flow.

NOTE

For all applications, 50°F minimum entering water temperature and rated water flow is required to prevent freezing. Antifreeze solution is required for any application with entering water below 50°F. Frozen water coils are not covered under warranty.

The HRC(C,X) high rise water source heat pump are designed to operate with the entering liquid temperature between 50°F and 110°F. With the extended range option, the heat pump model can operate with entering liquid temperatures between 50-110°F. Below 50°F. antifreeze solution must be used to prevent freezing. Frozen water coils are not covered under warranty.

CONDENSATE DRAINAGE

Condensate drain lines must be properly installed with adequate slope away from unit to ensure proper drainage. A minimum trap of 1.5 inches must be installed to isolate the negative pressures of the drain pan from the drain line. Refer to Figure 15 – Maste/Slave Installation for schematic information on the condensate drain lines.

CAUTION

Check the condensate overflow sensor for proper operation and adjust if necessary. Final field adjustments ensures proper operation to avoid property damage.

CAUTION

On units with plastic drain pans, the drain connection must be made hand tight only.

CAUTION

Both the supply and return water lines will sweat if subjected to low water temperature. These lines should be insulated to prevent water damage to the property.

Insulation is not required on loop water piping except where the piping runs through unconditioned areas, outside the building or when the loop water temperature is below the minimum expected dew point of the pipe ambient conditions. Insulation is required if loop water temperature drops below the dew point.

Units are supplied with either a copper or optional cupro-nickel water to refrigerant heat exchangers. Copper is adequate for ground water that is not high in mineral content. Should your well driller express concern regarding the quality of the water or should any known hazards exist in your area then we recommend proper testing to assure the well water quality is suitable for use with water source equipment. In conditions anticipating moderate scale formation or in brackish water a cupro-nickel heat exchanger is recommended.

CONDENSATE DRAINAGE	
HOSE DIAMETER	MINIMUM BEND RADIUS
1/2"	5"
3/4"	7"
1"	7"

Table 1 – Hose Diameter & Minimum Bend Radius

INSTALLATION CONTINUED

PIPING INSTALLATION

NOTE

All manual flow valves used in the system must be ball valves. Globe and gate valves must not be used due to high pressure drop and poor throttling characteristics. Never exceed the recommended water flow rates. Serious erosion or damage of the water to refrigerant heat exchanger could occur.

NOTE

When anti-freeze is used in the loop, insure that it is compatible with the Teflon tape that is applied.

NOTE

Do not allow hoses to rest against structural building components. Compressor vibration may be transmitted through the hoses to the structure, causing unnecessary noise complaints.

Always check carefully for water leaks and repair appropriately. Units are equipped with female pipe thread fittings. Consult the specification sheets for sizes. Teflon tape should be used when connecting water piping connections to the units to insure against leaks and possible heat exchanger fouling.

Do not over tighten the pipe connections. Flexible hoses should be used between the unit and rigid piping to avoid vibration transmission into the structure.

Ball valves should be installed in the supply and return lines for unit isolation and unit water flow balancing. Pressure / temperature ports are recommended in both the supply and return lines for system flow balancing. Water flow can be accurately set by measuring the water side pressure drop of the water to refrigerant heat exchanger.

CAUTION

Water piping exposed to extreme low ambient temperatures is subject to freezing and possible rupture. Proper prevention should be taken to prevent pipe freezing or equipment damage or failure may occur. Failure to follow this warning could result in property damage.

CAUTION

Ground loop applications require extended range equipment and optional refrigerant/water circuit Insulation.

NOTE

Geothermal Closed Loop Systems Operation of a HRCX High Rise Water Source Heat Pump unit on a closed loop application requires the extended range option.

ANTIFREEZE

Anti-freeze solutions must be utilized when low loop temperatures are expected to occur. In areas where entering loop temperatures drop below 50°F or where piping will be routed through areas subject to freezing, antifreeze is needed. Alcohols and glycols are commonly used as antifreeze agents. Freeze protection should be maintained to 15°F below the lowest expected entering loop temperature. For example, if the lowest expected entering loop temperature if 30°F, the leaving loop temperature would be 22°F to 25°F. Therefore, the freeze protection should be at 15°F (30°F-15°F=15°F).

INSTALLATION CONTINUED

LOW WATER TEMPERATURE CUTOUT SELECTION

The Digital Control Module allows the field selection of low water (or water-antifreeze solution) temperature limit by clipping jumper JW1 and JW2, which changes the sensing temperature associated with thermistor CO1 and CO2 respectively. Note that the CO1 thermistor is located on the refrigerant line between the coaxial heat exchanger and expansion device (TXV). Therefore, CO1 is sensing refrigerant temperature, not water temperature, which is a better indication of how water rate/temperature is affection the refrigeration circuit. The factory setting for CO1 is for systems using water (30°F [-1.1°C] refrigerant temperature). In low water temperature (extended range) applications with antifreeze (most ground loops), jumper JW1 should be clipped to change the setting to10°F [-12.2°C] refrigerant temperature, a more suitable temperature when using an antifreeze solution. All units operating with entering water temperatures below 50°F [10°C] must include the optional water/refrigerant circuit insulation package to prevent internal condensation.

⚠ CAUTION ⚠

Disconnect power BEFORE the jumper wires are clipped. Failure to do so could result in equipment and/or property damage.

⚠ WARNING ⚠

For all applications, 50°F minimum entering water temperature and sufficient water flow is required to prevent freezing. Antifreeze solution is required for any application with an entering water temperature below 50°F or, if either JW1 or JW2 cut-out limits are set to 10°F (clipped). Failure to follow this waring could result in heat exchanger, equipment, or property damage.

GENERAL INFORMATION

CAUTION

DO NOT use these units as a source of heating or cooling during the construction process. Mechanical components and filters can become clogged with dirt and debris, which can cause damage to the system.

The manufacture does not warrant equipment subjected to abuse.

WARNING

ELECTRIC SHOCK HAZARD

Before servicing equipment, ALWAYS turn off all power to the unit. There may be more than one disconnect switch. Electrical shock can cause injury or death.

Clear surrounding area of all tools, equipment, and debris before operating this unit.

These instructions are provided for the installation of the HRCX high rise water source heat pump specifically. For any other related equipment, refer to the appropriate manufacturer's instructions.

CAUTION

This water source heat pump must never be operated under any circumstances without an air filter in place.

NOTE

Material in this shipment has been inspected at the factory and released to the transportation agency in good condition. When received, a visual inspection of all cartons should be made immediately. Any evidence of rough handling or apparent damage should be noted on the delivery receipt in the presence of the carrier's representative. If damage is found, a claim should be immediately filed against the carrier.

The HRCX high rise water source heat pump is designed for indoor installation only. Installation of this equipment, wiring, ducts, and any related components must conform to current agency codes, state laws, and local codes. Such regulations take precedence over general instructions contained in this manual

CAUTION

Extreme caution must be taken that no internal damage will result from screws that are drilled into the cabinet.

STORAGE

Equipment should be stored in a clean dry, conditioned area with maximum temperatures up to 120°F [48.89°C] and minimum temperatures to 32°F [0°C]. Units should be stored upright and in an indoor environment. It is recommended to leave packaging on the unit until the installation is to begin. Store or move chassis in an upright position at all times. If stacking of chassis is required, do not stack more than **two** units high.

WARNING

Store cabinets how they are shipped (horizontal or vertical), keeping them crated and on their pallets for protection. Cabinets with risers should not be stacked more than **three** units high. Failure to follow these instructions may result in improper installation, adjustment, service or maintenance, property damage, personal injury or death.

DO NOT operate these units during the construction process. Mechanical components and filters could become clogged with dirt and debris, which can cause damage to the system.

The manufacturer does not warrant equipment subjected to abuse.

WARNING

REFRIGERANT UNDER PRESSURE

Units are factory charged with refrigerant. Store units in a location that will minimize the potential for damage. Do not store the unit where sources of ignition are continuously present.

Do not use means to accelerate the defrosting process, or to clean the unit, other than those recommended by the manufacturer.

Be aware that refrigerants may not contain an odour.

Do not pierce or burn.

SHIPPING & PACKAGE LIST

NOTE

Material in this shipment has been inspected at the factory and released to the transportation agency in good condition. When received, a visual inspection of all cartons should be made immediately. Any evidence of rough handling or apparent damage should be noted on the delivery receipt in the presence of the carrier's representative. If damage is found, a claim should be immediately filed against the carrier.

shipping instructions

HRCX chassis must remain in the upright position as seen in **FIGURE 9 – Standard Packaging** throughout the shipping and handling process to maintain a proper level of oil in the compressor. HRCX cabinets are shipped in the horizontal or vertical position.

NOTE

Shrink-wrap is located around the unit for protection. Remove before installation.

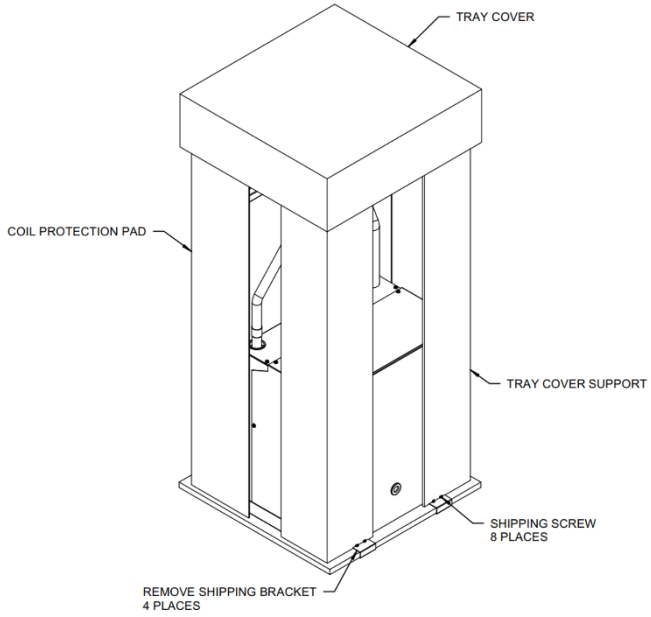


FIGURE 9 – Standard Packaging

package list

The units will be shipped with the following items:

1- HRCX high rise unit:
   A- Shipping brackets
      a. Screws

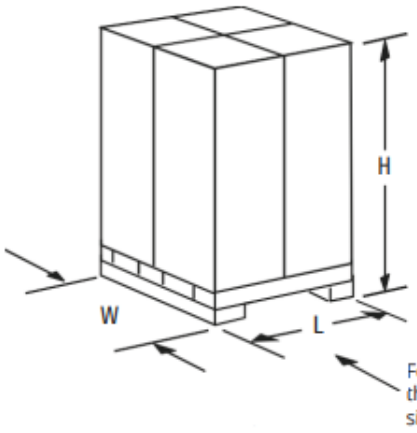
2- Literature package
   A- IOM - Installation & Operations Manual

Check the unit for shipping damage; if found, immediately contact the last carrier.

SHIPPING & PACKAGE LIST CONTINUED

Units Are Shipped FOB Factory
Chassis can be shipped 2 ways.

1. Upright in carton 4 per pallet, see FIGURE 10 – Shipping Options.
2. Upright inside cabinet (risers shipped separate or customer supplied) 4 per pallet, see FIGURE 10 – Shipping Options

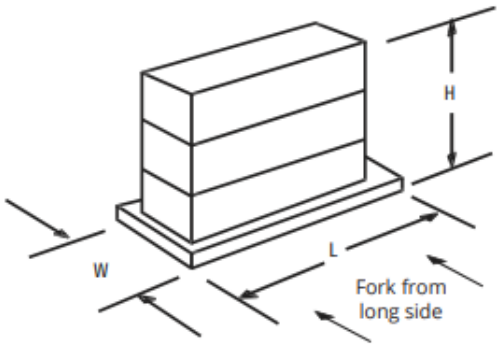


Vertical Shipping					
Description	Per 4 pack on pallet			Approx. Quantity Per 53 foot Box Trailer	Approximate Weight per Pallet
	Length	Width	Height		
Chassis 09-18	40	40	50	120 single stacked	500 lbs
Chassis 24-36	50	48	52	96 single stacked	750 lbs
Chassis 09-18	40	40	100	240 single stacked	500 lbs
Chassis 24-36	50	48	104	192 single stacked	750 lbs
Secondary Cabinet 09-18	43	43	85/93	112 single stacked	450 lbs
Secondary Cabinet 24-36	53	53	85/93	72 single stacked	700 lbs

Shipping Height 93" for 88" cabinet small and large
Cabinets can be mixed on some loads
88" Cabinets cannot have stands factory assembled, must ship loose or units must ship horizontal.

Horizontal Shipping							
Description	Number of Cabinets per Pallet	Pallet			Up to 110" Long Riser Approx. Quality per 48 foot open Flatbed Trailer	111" to 120" Long Riser Approx. Quality per 48 foot open Flatbed Trailer	Approximate Weight per Pallet
		Length	Width	Height			
Cabinet 09-18	4	*	26	88	60	48	800 lbs
	8	*	50	88	60	48	1600 lbs
Cabinet 24-36	3	*	30	87	45	36	800 lbs
	6	*	59	87	45	36	1600 lbs

*- For length of pallet add 5" to riser length



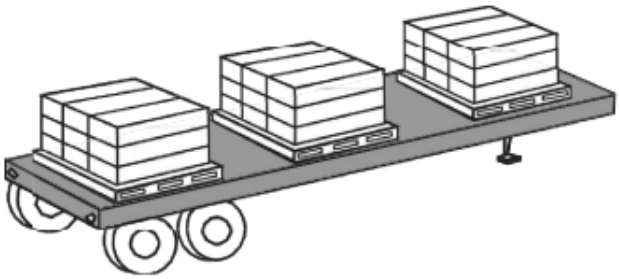


FIGURE 10 – Shipping Options

UNIT INSPECTION CHECKLIST

Complete the inspection procedures below before preparing unit for installation:

1) Visually inspect unit for any shipping damage. Damage must be reported immediately to the shipping company to make a claim.
2) Ensure that the carrier makes proper notation of any shortages or damage on all copies of the freight bill and completes a common carrier inspection report.
3) Verify that unit nameplates on the data label match the sales order or bill of lading (including, unit configuration, size and voltage).
4) Immediately before installation, remove unit front panel and verify that all electrical connections are tight and that there are no loose wires.
5) Check to make sure that the refrigerant piping is free from any kinks and there is no interference between unit piping and sheet metal or electrical wires.
6) Check that the blower spins freely within the housing and that there are no obstructions between the wheel and housing. The wheel can sometimes come loose in shipping.
7) Ensure that the evaporator distributor tubes are not touching one in another and that they are over the drain pan.
8) Check the air-coil fins for any damage during shipping.
9) Ensure that the shipping screws are removed from the unit. Refer to **FIGURE 11 – Standard Packaging with Brackets - Chassis** for more information.

NOTE

Check the unit nameplate for correct voltage with the plans before installing the equipment. Also, make sure all electrical ground connections are made in accordance with local code.

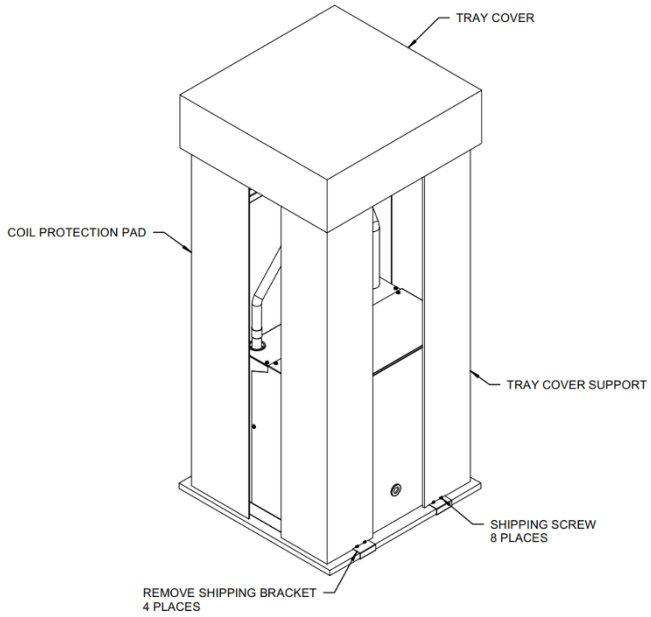


FIGURE 11– Standard Packaging with Brackets – Chassis

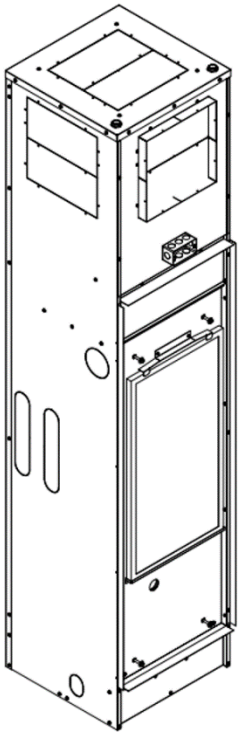


FIGURE 12 – Standard Cabinet

UNIT DIMENSIONAL DATA

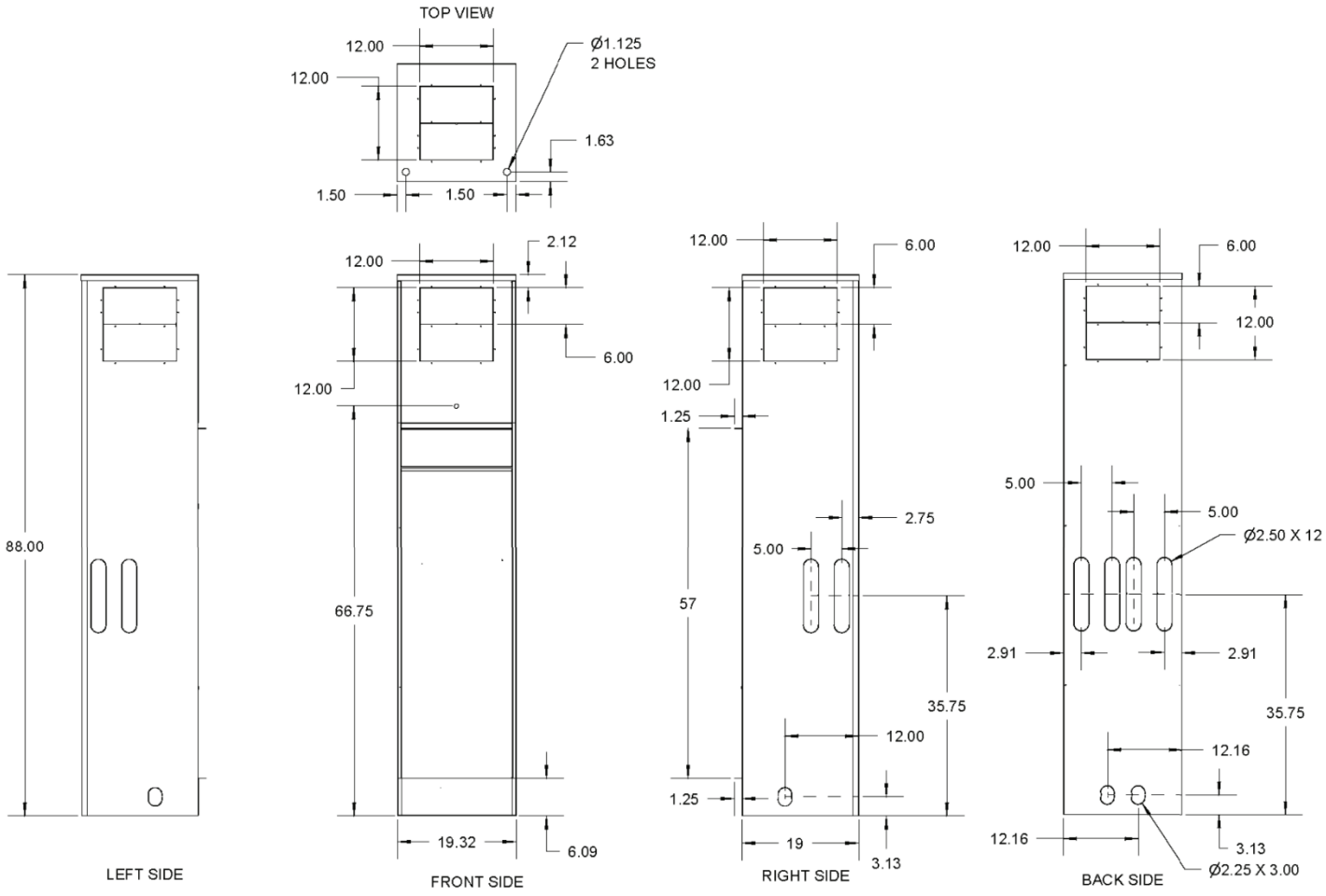


FIGURE 13 –88” Unit Dimensions

UNIT DIMENSIONAL DATA CONTINUED

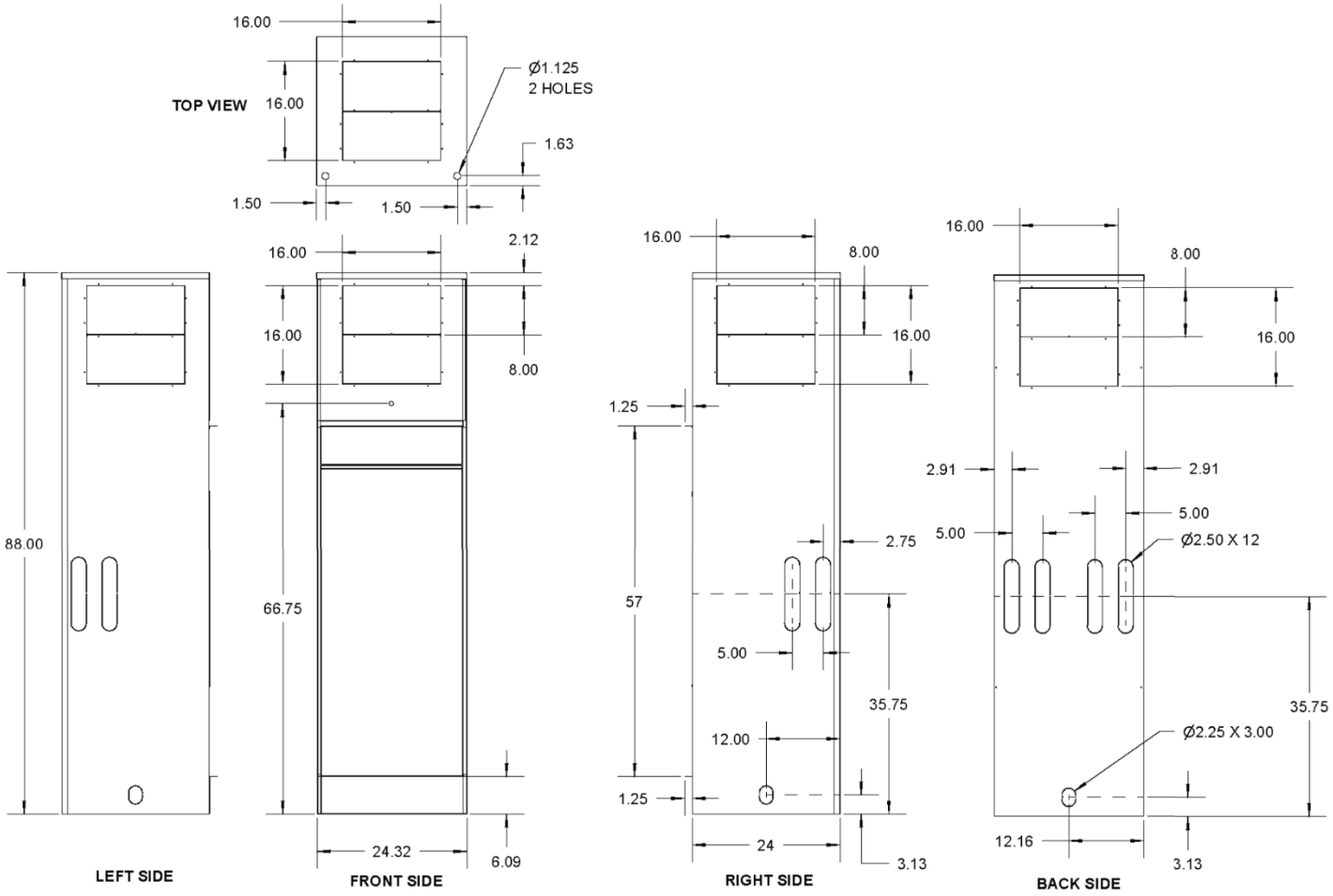


FIGURE 14 –88” Unit Dimensions

UNIT DIMENSIONAL DATA CONTINUED

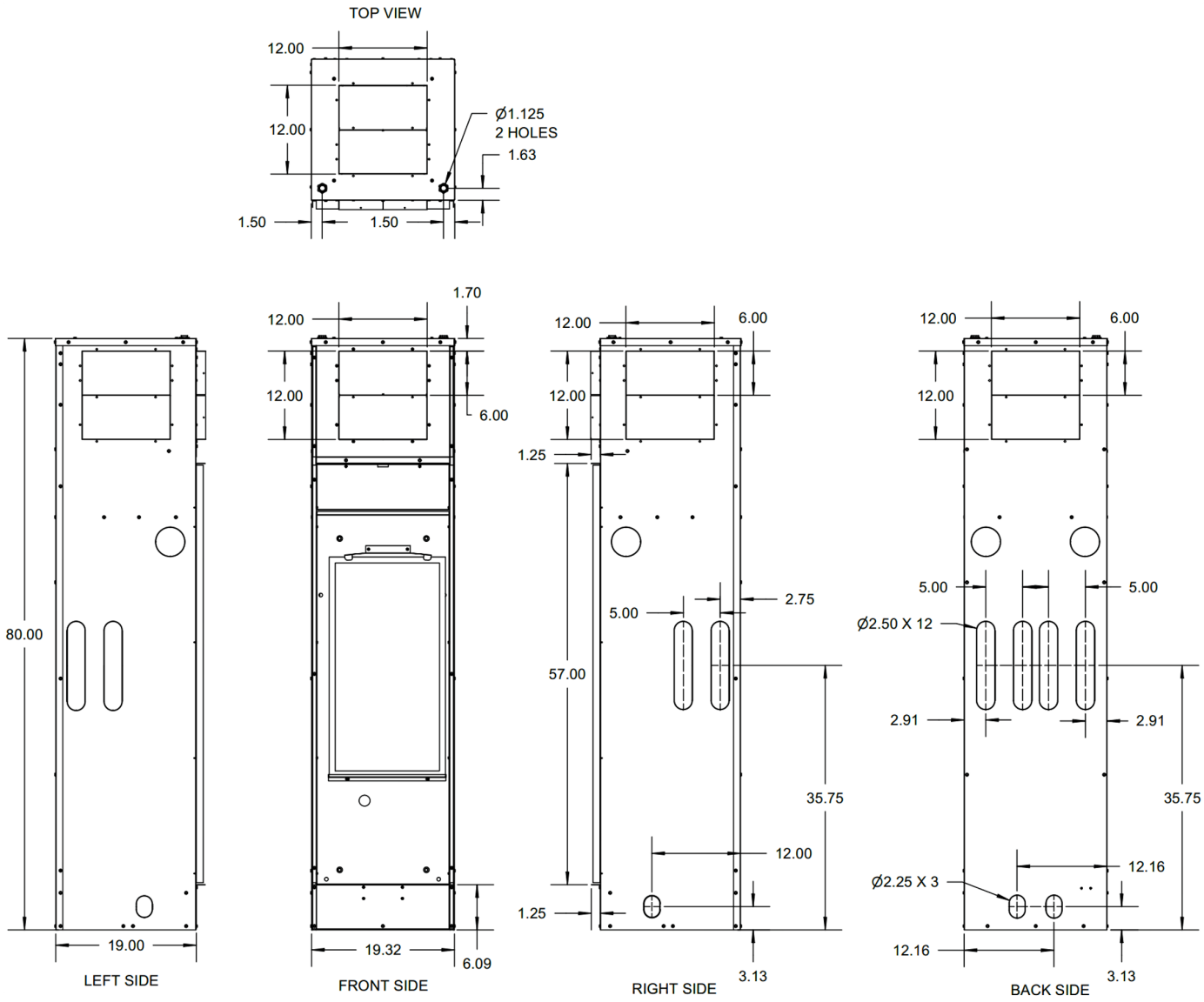


FIGURE 15 – 80" Unit Dimensions

UNIT DIMENSIONAL DATA CONTINUED

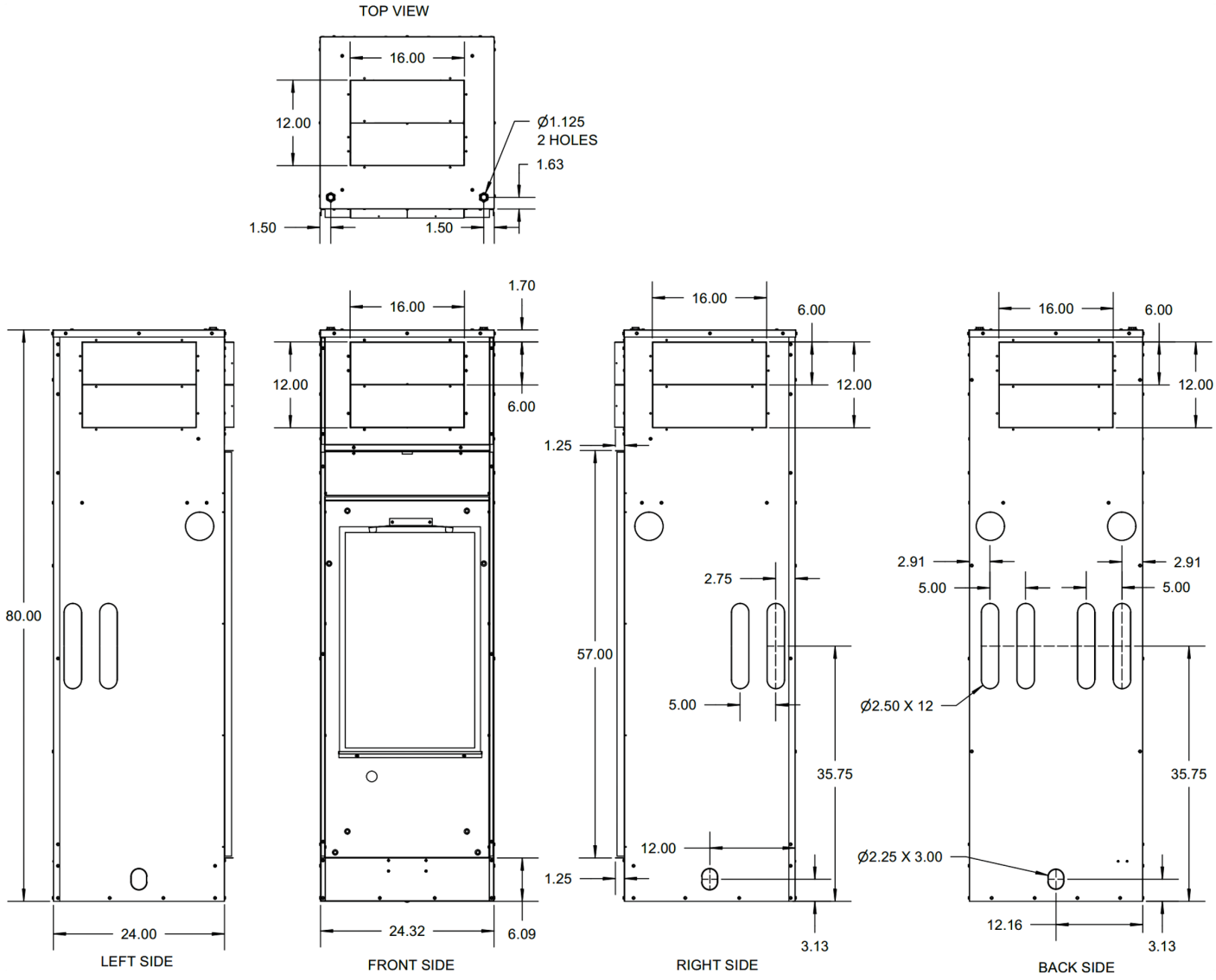


FIGURE 16 – 80" Unit Dimensions

UNIT PHYSICAL DATA

PHYSICAL DATA						
HRCX MODELS	HRCX09	HRCX12	HRCX18	HRCX24	HRCX30	HRCX36
UNIT INFORMATION						
Compressor Type (Qty)	Rotary (1)			Scroll (1)		
Factory Charge (R454B) lbs. [kg]	TBD	TBD	2.39 [1.08]	3.2 [1.45]	3.1 [1.4]	3.12 [1.41]
A2L Sensor and Mitigation (YES/NO)	NO	NO	NO	NO	NO	NO
Minimum Room Area Ft^2(m^2)	NA	NA	NA	NA	NA	NA
Minimum Air Flow CFM (M^3/hr)	NA	NA	NA	NA	NA	NA
Motor (Qty)	1					
Fan Motor Type	ECM					
Fan Motor HP [kW]	1/4 [.18]		1/3 [.25]	1/3 [.25]	1/2 [.37]	
Blower (Qty)	1					
Blower Wheel Size (D x W) in. [cm]	6.75 x 7 [17.15 x 17.78]		9 x 7 [22.86 x 17.78]			10 x 8 [25.4 x 20.32]
Hose Size (in)	1/2	1/2	3/4	1	1	1
COAX Volume (US Gallons)	0.116	0.116	0.144	.544	.544	.544
Condensate Connection OD (in)	1-1/8					
Air Coil Dimension (H x W) in. [cm]	28 x 14 [11.0 x 5.5]			30 x 18 [11.8 x 7.1]		
Filter Size (H x W) in. [cm]	30 x 16 [11.8 x 6.3]			32 x 20 [12.6 x 7.9]		
Filter (Qty)	1					
Operating Weight	Weight					
Chassis lb. [kg]	125[57]	128[58]	131[59]	182[83]	185[84]	188[85]
80" Cabinet lb. [kg]	128[58]			173[78]		175[79]
88" Cabinet lb. [kg]	143[65]			188[85]		190[86]

Table 2 –Physical Data ECM

ALTITUDE CORRECTION FACTOR													
Altitude in Ft [m]	2625 [800]	3281 [1000]	39.7 [1200]	4693 [1400]	5349 [1600]	5906 [1800]	6562 [2000]	7218 [2200]	7874 [2400]	8530 [2600]	9186 [2800]	9843 [3000]	10499 [3200]
Adj Factor (AF)	1.02	1.05	1.07	1.1	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.4

Table 3– Altitude Correction Factor

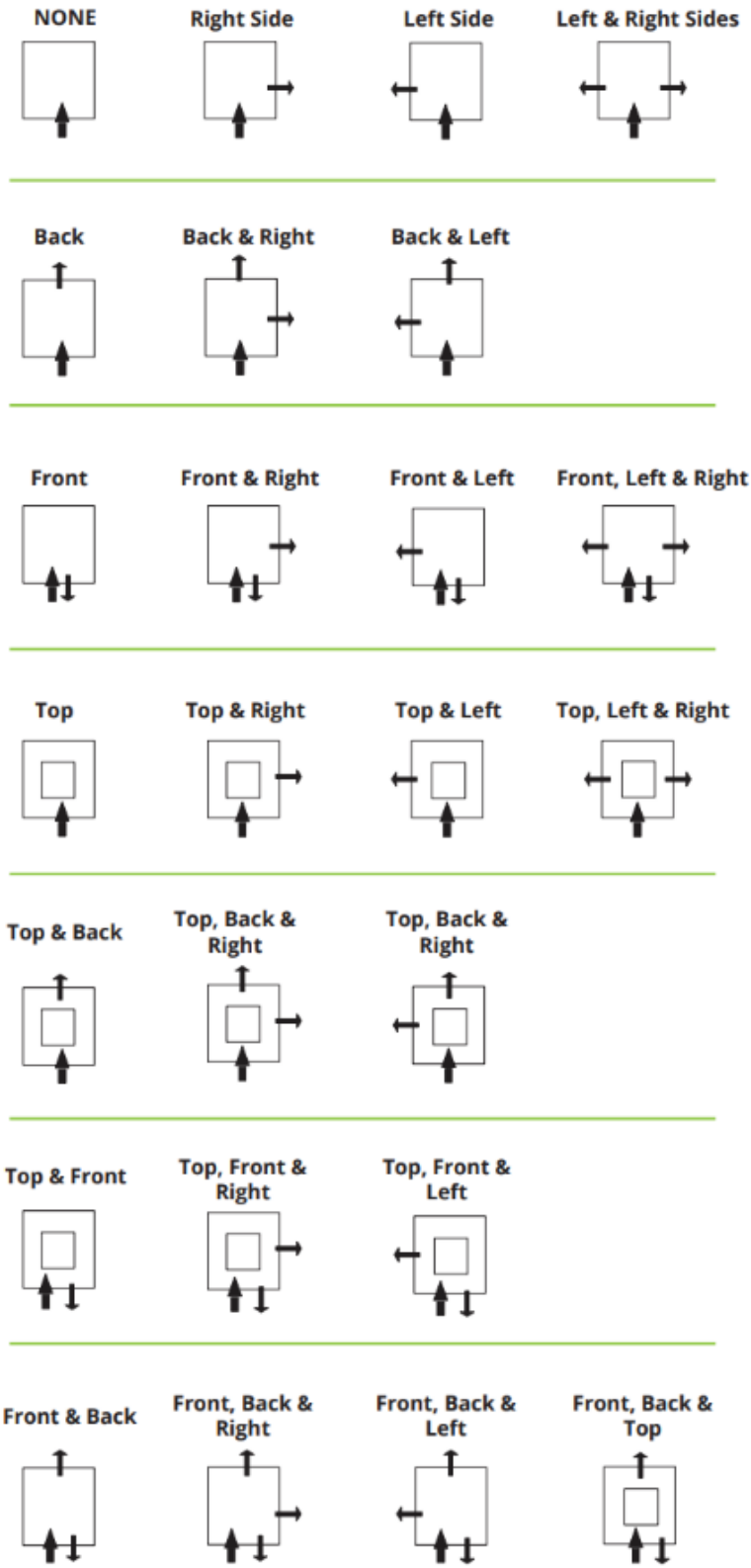
ELECTRICAL DATA

ELECTRICAL DATA ECM							
MODEL NUMBER	VOLTAGE-PH-HZ	COMPRESSOR		BLOWER MOTOR		MIN. CIRCUIT AMPACITY	MAX. CIRCUIT PROTECTION
		RLA	LRA	FLA	HP		
HRCX09	208/230V-1-60	3.97	22	2.3	1/4(0.18)	7	15
	265V-1-60	3.97	23	2.3	1/4(0.18)	7	15
HRCX12	208/230V-1-60	4.7	25	2.3	1/4(0.18)	9	15
	265V-1-60	3.91	21	2.3	1/4(0.18)	8	15
HRCX18	208/230V-1-60	6.6	36	2.8	1/3(0.25)	12	15
	265V-1-60	5.45	36	2.6	1/3(0.25)	11	15
HRCX24	208/230V-1-60	11.3	63	2.8	1/3(0.25)	17	25
	265V-1-60	8.09	45	2.6	1/3(0.25)	14	20
HRCX30	208/230V-1-60	12.8	71	4.1	1/2(0.37)	21	30
	265V-1-60	10.4	68	3.6	1/2(0.37)	18	25
HRCX36	208/230V-1-60	15.5	86	4.1	1/2(0.37)	24	35
	265V-1-60	10.26	55	3.6	1/2(0.37)	19	30

Table 4– Electrical Data ECM

CABINET CONFIGURATION

AIRFLOW CONFIGURATION



NOTES:
1. Front is return air side and control box location.
2. Risers can be on any side without return or supply air openings.
3. All sides and top have KO's.

FIGURE 17 – Airflow Configuration

CABINET CONFIGURATION

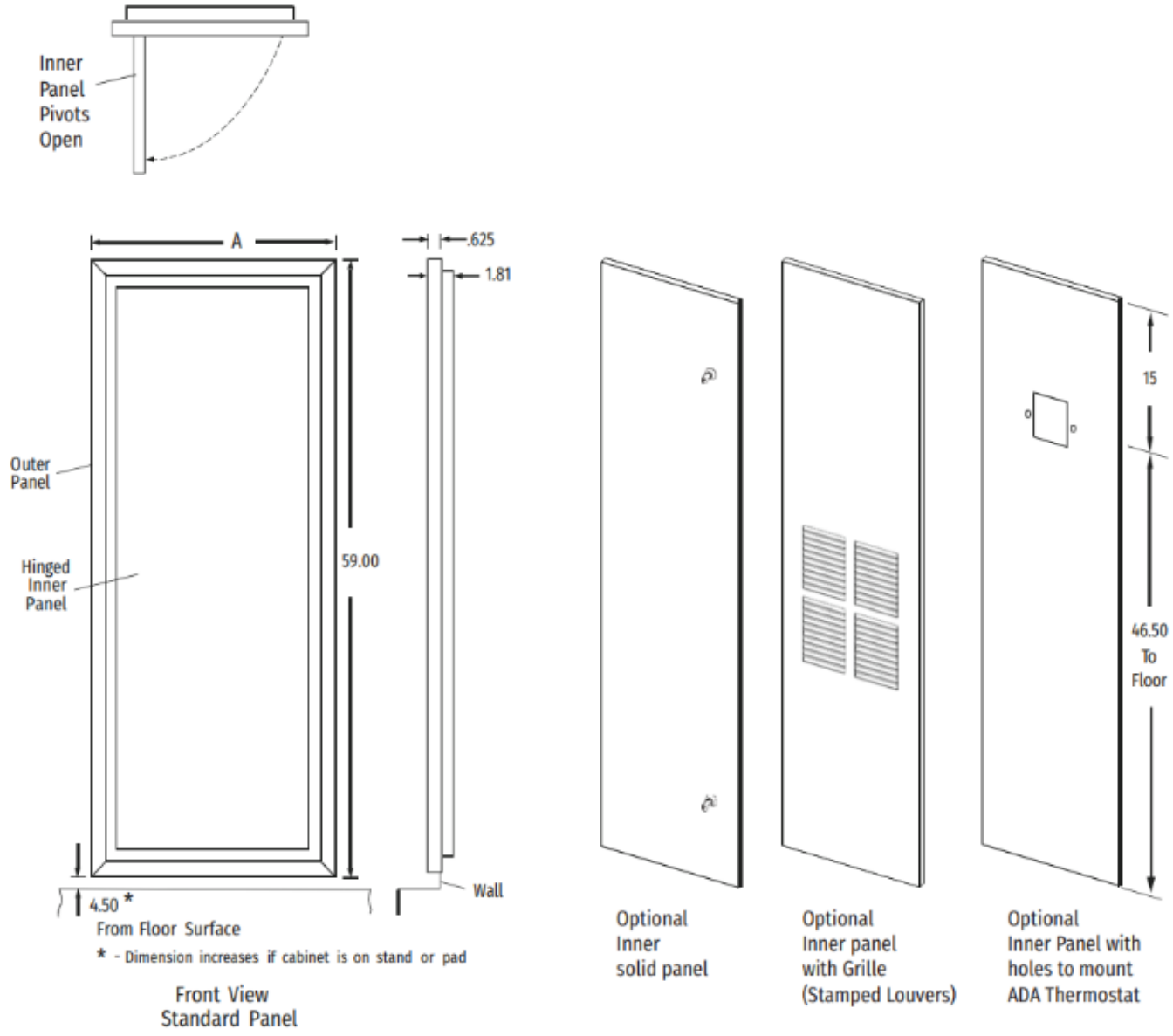


FIGURE 18 – Access Return Panel

Unit	A
09-18	21.50
24-36	25.50

Panel Part Numbers		
Item	**Description**	**Description 2**
9PWHR01	Wall Panel HR09-18	Hinged - Solid
9PWHR02	Wall Panel HR24-36	Hinged - Solid
9PWHR03	Wall Panel HR09-18	Hinged - Louvered
9PWHR04	Wall Panel HR24-36	Hinged - Louvered
9PWHR05	Wall Panel HR09-18	Hinged - ADA Mount Access
9PWHR06	Wall Panel HR24-36	Hinged - ADA Mount Access
9PWHR07	Wall Panel HR09-18	Hinged - Cam Lock
9PWHR08	Wall Panel HR24-36	Hinged - Cam Lock

Notes:
1. Dimensions are in inches.
2. Panel powder coated ceiling white.
3. Inner panel pivots open 90°, for filter replacement without removing panel.
4. Shipped as left-hand pivot.

CABINET CONFIGURATION

HOSE SPECIFICATION

STAINLESS STEEL HOSE

- Designed for water-source heat pump applications.
- Kevlar® reinforced EPDM core with ANSI 302/304 stainless steel outer braid.
- Fire rated materials per ASTM E 84-00 (NFPA 255, ANSI/UL 723 & UBC 8-1).
- MPT (External Pipe Thread) fitting at one end; swivel with NPSH thread connector (Internal Thread) at the other end (seals via fiber or EPDM washer, shipped inside connection).
- Swivel connection provides union between chassis and risers.
- Brass fittings, stainless steel ferrules.
- Temperature range of 15°F [9°C] to 180°F [82°C]. (Operation below 32°F requires antifreeze)
- Max. working pressure of 400 psi [2756 kPa].
- Min. burst pressure of four times working pressure

PHYSICAL DATA						
Unit	**Part #**	**Inside Diameter inches**	**Length feet (cm)**	**Working Pressure psi (kPa)**	**Min. Burst Pressure psi (kPa)**	**Min. Bend Radius inches (mm)**
09, 12		0.50	3 (91)	400 (2756)	1600 (11024)	2.5 (63.5)
15, 18		0.75	3 (91)	400 (2756)	1600 (11024)	4.5 (114.3)
24-36		1.00	3 (91)	400 (2756)	1600 (11024)	5.5 (139.7)

CABINET PLATFORMS SPECIFICATIONS

- 12" tall
- 16 Gauge galvanized steel
- Attached to cabinet with 4 screws
- Field installed

Unit	A	B	C
09-18	18.86	18.25	12
24-36	23.86	23.25	

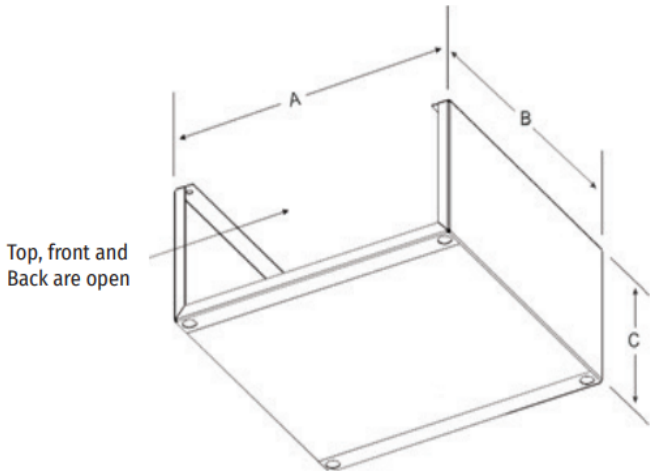


Figure 19 - Hose Specifications

CABINET CONFIGURATION

DISCHARGE AIR OPENING

DISCHARGE AIR OPENINGS (Any Combination, Top and Sides, Grilles or Ductwork)				
Unit Size	**1 Opening**	**2 Openings**	**3 Openings**	**4 or more Openings**
9FHR,12FHR	12" x 12"	12" x 6"		
18FHR		12" x 12"	12" x 6"	
24FHR		16" x *	16" x **	
30FHR		16" x *	16" x **	
36FHR		16" x *	16" x **	

* - 88" CABINET = 16"
** - 88" CABINET = 8"

Standard cabinet openings and grille sizes. (W x H)

88" cabinet models 09-18

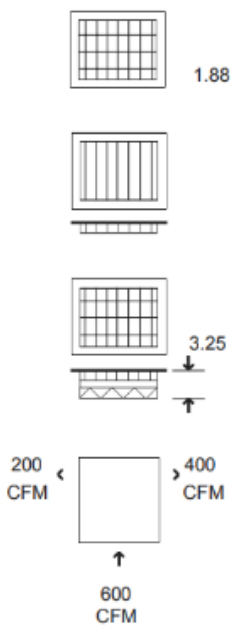
front, back, or sides 12 x 12 or 12 x 6 and top 12 x 12.

88" cabinet models 24-36

front, back, or sides 16 x 16 or 16 x 8 and top 16 x 16.

NOTES:
1. When selecting supply air openings/grilles consider CFM, velocity (throw), added static pressure and sound.
2. If custom grille sizes are used - area should be greater or equal to above.
3. If using more than recommended number of opening, total CFM may be reduced or be unstable (PSC or ECM Motor).

Grilles are shipped loose for field installation after drywall has been finished.
Grilles are brushed aluminum or painted (White).
Overall dimensions - add 1.25 to nominal dimensions.



Single Deflection- Adjustable vertical blades for controlling horizontal path of discharge air (Left/Right).

Double Deflection- Adjustable vertical and horizontal blades for controlling horizontal and vertical path of discharge air. (Left/Right and Up/Down) Recommended for all standard applications.

Double Deflection with Opposed Blade Damper- Addition of opposed blade damper to grille allows control of air volume (CFM) and path of discharge air. Recommended for applications requiring unequal air flow or side discharge grille(s) with additional top discharge air opening.

Unequal Air Flow - Air discharges requiring different air volumes (CFM).Use double deflecton with opposed blade damper grills.

Nominal Grille Size	Double Deflection Free Area (Sq. Ft)		
	Deflection 0°	Deflection 22 1/2°	Deflection 45°
12 x 6	0.30	0.28	0.22
12 x 12	0.65	0.59	0.48
16 x 8	0.61	0.55	0.44
16 x 12	0.93	0.85	0.68
16 x 16	1.25	1.12	0.90

CAUTION

Top air discharge units will require turning vanes and/or a volume damper for proper airflow and balancing, to minimize turbulence. These components must be field furnished and installed in accordance with SMACNA guidelines.

FIGURE 20 – Discharge Air Opening

ELECTRICAL

HIGH VOLTAGE

WARNING

ELECTRIC SHOCK HAZARD

Disconnect all power supplies before servicing. Lock out/tag out to prevent accidental electrical shock. NOTE: There may be multiple power sources supplying the unit.

WARNING

Use copper conductors only. Install all parts and panels before operation of unit. Failure to follow these warnings can result in injury or death.

All wiring must comply with local and national code requirements. Units are provided with wiring diagrams and nameplate data to provide information required for necessary field wiring.

The HRCX high rise water source heat pumps are provided with a class 2 transformer for 24VAC control circuits. Should any add-on accessory or component also have a class 2 transformer furnished, care must be taken to prevent interconnecting outputs of the two transformers by using a thermostat with isolating contacts.

WARNING

Connect ground wire to ground terminal marked “GND”. Failure to do so can result in injury or death.

CAUTION

Any device that has been furnished by the factory for field installation must be wired in strict accordance with the associated wiring diagram. Failure to do so could damage components and void warranties.

208-230 VOLT OPERATION

All 208-230 Volt units are factory wired for 230 Volt operation. For 208 Volt operation, moving/changing/rewiring the line voltage tap on the 24 Volt control transformer is required. See note 3 on the wiring diagram for instruction.

LOW VOLTAGE

THERMOSTAT

A standard 24 VAC Heat Pump thermostat is required that will operate the reversing valve in the cooling mode. Thermostat connections and their functions are below in FIGURE 21 – Thermostat Connections as follows:

C – Transformer 24VAC Common
O – Reversing Valve (energized in cooling)
Y – Compressor Contactor
R – Transformer 24VAC Hot
G – Evaporator Blower

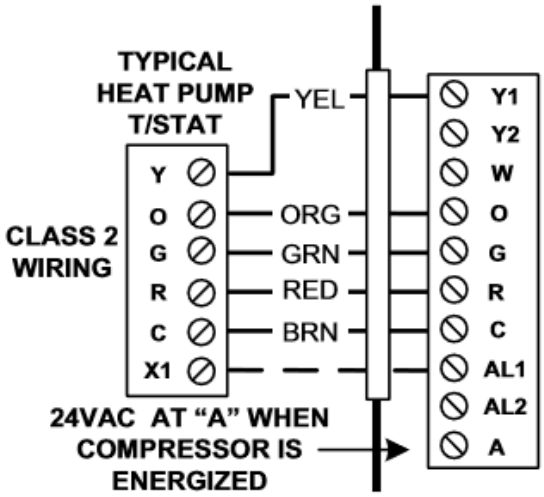


FIGURE 21 – Thermostat Connections

THERMOSTAT INSTALLATION

The Thermostat should be located on an interior wall in a larger room, away from supply duct draft. Position the thermostat back plate against the wall so that it appears level and so the thermostat wires protrude through the middle of the back plate mounting holes and drill holes with a 3/16” (5mm) bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWC wire.

WARNING

ELECTRIC SHOCK HAZARD

Means of disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.

APPLICATION

COOLING TOWER/BOILER APPLICATION

To ensure optimum cooling and heating performance, the cooling tower and boiler loop temperature should be maintained between 55-75°f in the heating mode and 60-95°f in the cooling mode. In the cooling mode, heat is rejected from the heat pump's refrigerant into the water loop. A cooling tower and/or boiler may be required to maintain proper water temperature within the water loop. In an open cooling tower, chemical water treatment is mandatory to ensure water is free of corrosive materials

In heating mode, heat is absorbed from the water loop into the heat pump's refrigerant. A boiler may be utilized to maintain the proper water temperature within the loop.

CAUTION

A boiler may be required in the water loop to maintain the loop water temperature between 55-75°F. Failure to maintain proper water loop temperatures could result in equipment failure and property damage, and void warranties.

A secondary heat exchanger (plate frame between the unit and the open cooling tower) may also be used. It is imperative that all air is eliminated from the closed loop side of the heat exchanger to prevent condenser fouling.

WARNING

Use copper conductors only. Install all parts and panels before operation of unit. Failure to follow these warnings can result in injury or death.

CAUTION

The manufacturer does **NOT WARRANT** equipment subjected to abuse. Dirt, piping chips or other foreign material can cause damage or failure to the water or to refrigerant heat exchanger.

No unit should be connected to the supply or return piping until the water system has been completely cleaned and flushed to remove dirt, piping chips or other foreign material. Supply and return hoses should be connected together during this process to ensure the entire system is properly flushed. After the cleaning and flushing has taken place the unit may be connected to the water loop and should have all valves adjusted to supply the proper flow rate for the unit. Nominal flow rate is 3 GPM per 12,000 BTUH of cooling.

Extended range operation

Piping systems expected to utilize water temperature below 50°f require the extended range option, which includes closed cell installation on all piping surfaces to eliminate condensation. This application requires sufficient antifreeze solution to prevent the water loop against extreme temperature conditions and condenser coil
Freezing. Frozen condenser coil are not covered under warranty. A boiler may be required to maintain the minimum water temperature within the loop.

WARNING

Connect ground wire to ground terminal marked "GND". Failure to do so can result in injury or death.

CAUTION

Any device that has been furnished by the factory for field installation must be wired in strict accordance with the associated wiring diagram. Failure to do so could damage components and void warranties.

Closed loops
Failure to maintain proper water loop temperatures could result in equipment failure and property damage, and void warranties. Consult the factory when running entering water temperatures below 50°f as additional pipe insulation may be required to avoid excessive sweating inside the unit. For applications below 50°f it is imperative that the system be operated with antifreeze solution.
When a secondary heat exchanger is used (i.e. Plate to plate; closed loop system) it is imperative that all air is purged from the system to prevent condenser fouling.

CAUTION

The entire water loop must be completely cleaned and flushed of all debris prior to final connections and unit operation.

Valves should be adjusted to supply proper water flow rated for the unit.

Failure to do so will **VOID ALL FACTORY WARRANTY.**

APPLICATION CONTINUED

water well application
REQUIREMENTS:

- 50° Minimum Entering Water Temperature
- Cupronickel Refrigerant Heat Exchanger

When a water well is used exclusively for supplying water to the heat pump, a cupronickel refrigerant heat exchanger is required and the well pump should operate only when the heat pump operate. A 24 Volt contactor can be wired to the ACC1 terminal on the Control Module which can be selected to be energize prior to or at compressor start-up, which would in turn energize the water pump to operate with the heat pump.

WELL WATER APPLICATION			
Potential Failure Mode	Water Chemistry Parameter	Copper	CuNi
Corrosion and Scaling	pH Level	7-9	7-9
	Hardness (Calcium or Magnesium Carbonate)	< 350 ppm	<350 ppm
	Langelier Saturation Index (LSI)	-0.5 to 0	-0.5 to 0
	Ryznar Stability Index (RSI)	6.2 – 6.8	6.2 – 6.8
	Hydrogen Sulfide	< 0.5 ppm	< 0.5 ppm
	Sulfates	< 125 ppm	< 125 ppm
	Chlorine	< 0.5 ppm	< 0.5 ppm
	Chlorides	< 20 ppm	< 150 ppm
	Carbon Dioxide	< 5 ppm	< 5 ppm
	Ammonia	< 2 ppm	< 2 ppm
	Ammonia Chloride, Nitrate, Hydroxide, Sulfate	< 0.5 ppm	< 0.5 ppm
	Total Dissolved Solids (TDS)	< 1000 ppm	< 1500 ppm
Iron Fouling	Iron, Iron Bacteria	< 0.2 ppm	< 0.2 ppm
	Iron Oxide	< 1 ppm	< 1 ppm
Erosion	Suspend Solids	< 10 ppm, < 600 Micron or 30 mesh filter size	< 10 ppm, < 600 Micron or 30 mesh filter size
	Design Water Velocity	3 GPM/TON	3 GPM/TON

Table 5 – Well Water Application Data

CAUTION

Minimum entering water temperature is 50°F. Failure to follow this warning could result in equipment failure and property damage.
The discharge water from the heat pump is not contaminated in any manner and can be disposed of in various way depending upon local codes.

CAUTION

Close loop and pond applications require specialized design knowledge. Do not attempt at these installations without the licensed installer the received specialized training.

CONTROLS

SEQUENCE OF OPERATION

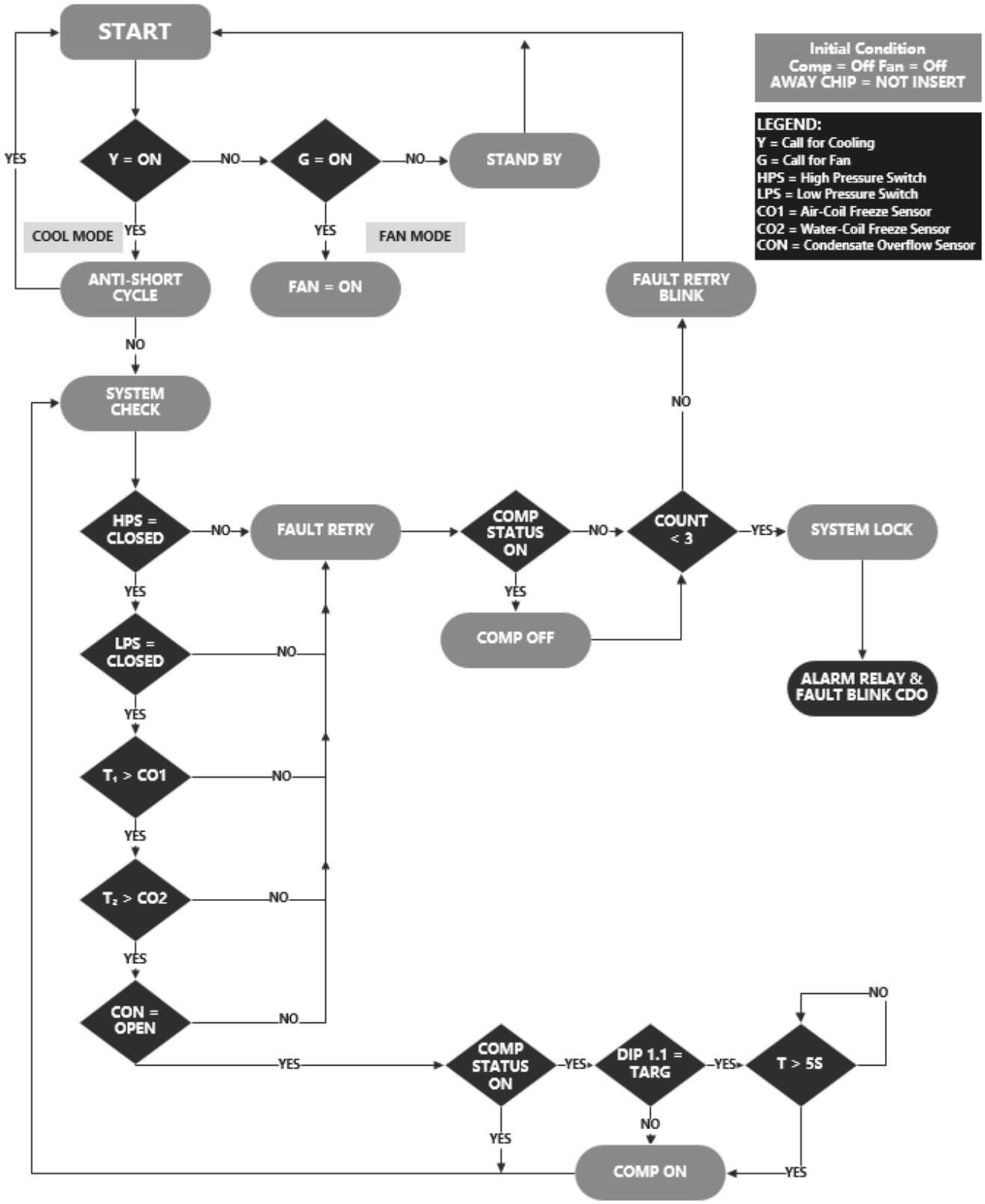


FIGURE 22 – Sequence of Operations

CONTROLS CONTINUED

WSCM CONTROL MODULE

CONTROL FEATURES

- Anti-short Cycle Protection
- Random Start
- High and low Pressure Cut-out
- Water Coil Low Temperature Cut-out
- Over/Under Voltage Protection
- Fault Retry
- Lockout with Soft and Hard Reset
- Condensate Overflow Sensor
- Diagnostic LED Display
- Test Mode
- Alarm Relay
- Accessory Relays
- Vacated Mode
- Extended Compressor Operating Monitoring

MOTOR SPEED OPERATION

An ECM blower can be driven directly from the WSCM control module. The control of the motor is based off the input signals of G, Y1, and O. The blower speed is automatically controlled via the WSCM module.

MOTOR SPEED OPERATION	
Unit Call	Fan Speed
G	G1
Y1, O	G1, G2, G3
Y1	G1, G2, G3

Table 6 – Motor Speed Operation ECM

A secondary heat exchanger (plate frame between the unit and the open cooling tower) may also be used. It is imperative that all air is eliminated from the closed loop side of the heat exchanger to prevent condenser fouling.

FIELD CONTROLLABLE FUNCTIONS

TEST MODE

The unit can be placed into test mode by shorting the test pins on the WSCM module. Once the pins are shorted, the WSCM module will enter a test mode period in which all time delays are sped up 15 times. While in test mode the yellow LED2 will light up yellow. Faults stored in memory can be cleared by entering into test mode and exiting the test mode, or by a hard reset. Test mode can be exited by shorting the test pins for approximately 3 seconds.

NOTE

Test mode will be automatically exited after a 10 minute period.

NOTE

During test mode, the control will monitor to see if CO1 and CO2 freeze thermistors are present and correctly. The controls will indicate fault code 19 if CO1 or CO2 are open, or if there is a jumper connecting across the free sensors terminals.

VACATED PREMISES CONTROL

NOTE

Optional Vacated Premise Kit option must be installed to operate in this mode.

The vacated premises operation is designed for extended periods of un-occupancy when the occupant wants the heat pump to operate in cooling mode for a predetermined cycle time to help control indoor air conditions. See Dip 1.7 for time selection (1 or 2 hours).

Additionally, the mode will store all faults seen over 24 hours in memory. If the same fault occurs for 4 consecutive days, the unit will go into a hard lockout.

The control kit consist of a rocker switch, wiring and a programmed chip that is installed on the WSCM module by a licensed contractor.

CONTROLS CONTINUED

FIELD CONTROLLABLE FUNCTIONS

HOME SELECTION

If the switch is in the HOME position the heat pump will operate in its normal mode.

AWAY SELECTION

If the switch is in the AWAY position the heat pump and thermostat are set to "COOL" mode the heat pump will operate in accordance to the thermostat setting. Additionally, the heat pump will cycle on in cooling mode for 15 minute run times either 4 or 8 times per day depending on the Dip 1.7 selection. Thermostat still has priority and will cycle the unit as needed.

NOTE

If the LED display is flashing "Ay" the thermostat is not set in cooling mode.

BOILERLESS CONTROL

The system can operate in boilerless mode by switching Dip 1.5. If CO1 goes below the setting of Dip 1.6 the compressor will be de-energized and control goes into emergency heat mode staging on "W1". The compressor will be locked out for 60 minutes to prevent nuisance cycling.

The set point for boiler less changeover temperature can be adjusted by switching Dip 1.6.

WATER-COIL LOW TEMPERATURE CUT-OUT LIMIT

Jumpers JW1-CO1 provide field selection of the temperature limit settings for CO1.

Not Clipped = 30°F Clipped = 10°F

CAUTION

For all applications below 50°F entering water temperature, anti-freeze solution is required. Failure to follow this warning could result in heat exchanger, equipment or property damage.

ALARM RELAY SETTING

Jumper 3 (JW3 Alarm) provides field selection of alarm relay terminal AL2 to be jumpered to 24VAC or to be dry. The alarm relay is activated during lockout mode.

Not Clipped = AL2 Connected to "R"

Clipped = AL2 dry contacts (No connection)

DEHUMIDIFICATION MODE

The system can operate in Dehumidification mode by switching Dip 1.4 on the WSCM module. In this mode, the unit will run continuously in fan speed G2 when Y,O, G calls are given to the board. Dehumidification mode will not run in heating mode.

WSCM SAFETY FEATURES

ANTI-SHORT CYCLE PROTECTION

The WSCM module incorporates a 5 minute anti-short cycle protection for the compressor.

RANDOM START

The WSCM module features a 5-80s random start upon receiving a call to operate.

FAULT RETRY

While in Fault Retry Mode the LED will display a code representing retry and the fault code. The unit will initiate the Anti-short cycle timer and try to restart after the delay. If 3 consecutive faults occur without satisfying the thermostat the unit will go into hard lockout. The last fault causing the lockout will be stored in memory and displayed on the two digit LED display.

WATER-COIL LOW TEMPERATURE CUT-OUT (CO1)

The control module will recognize a CO1 fault during a compressor run cycle if:

a) Thermistor temperature is below the selected set point limit.
b) The thermistor temperature is rising at a rate less than 2°F per 30s time period. The CO1 input is bypassed for the first 120s of a compressor run cycle. On the second and third retry CO1 is bypassed for the initial 90s and 60s of run-time respectively.

AIR COIL LOW TEMPERATURE CUT-OUT (CO2)

The control module will recognize a CO2 fault during a compressor run cycle if:

a) Thermistor temperature is below the selected set point limit.
b) The thermistor temperature is rising at a rate less than 2°F per 30s time period. The CO2 input is bypassed for the first 120s of a compressor run cycle.

CONTROLS CONTINUED

WSCM SAFETY FEATURES

CONDENSATE OVERFLOW SENSOR

The condensate overflow sensor must sense overflow levels for 30 continuous second to initiate a COF fault. The condensate overflow sensor will be monitored during the compressor run cycle.

LOW PRESSURE

The low pressure switch must be open and remain open for 30 continuous seconds during the “on” cycle to be recognized as a low pressure fault. The low pressure switch input is bypassed for the initial 120s of compressor run-time.

HIGH PRESSURE

If the high-pressure switch opens at any time, the compressor relay is de-energized immediately.

LOCKOUT MODE

While in Lockout Mode the LED Display will display a code representing the lockout fault code. During this lockout the compressor relay is not energized and the alarm relay is activated.

The lockout mode can be cleared by either going into test mode or a hard reset via the power disconnect

Caution: Do not restart units in lockout mode without inspection and correction of the fault condition. Failure to do so many result in equipment damage.

EXTENDED COMPRESSOR OPERATION MONITORING

If the compressor relay has been energized for four continuous hours, control module will automatically turn off the compressor relay and the compressor will enter anti-short cycle delay before restarting. During this off period, all appropriate safety will be monitored and if the compressor demand is present, the control module will energize the compressor relay.

OVER/UNDER VOLTAGE SHUTDOWN

Should an Over/Under Voltage Condition be detected the control module will shut down. Over/Under Voltage faults cause a soft lockout and the unit will return to normal operation once normal voltage has been restored. The nominal voltage run is 18.5VAC to 31VAC. If the WSCM module is in Over/Under Voltage fault for 15 minutes, the alarm relay will activate.

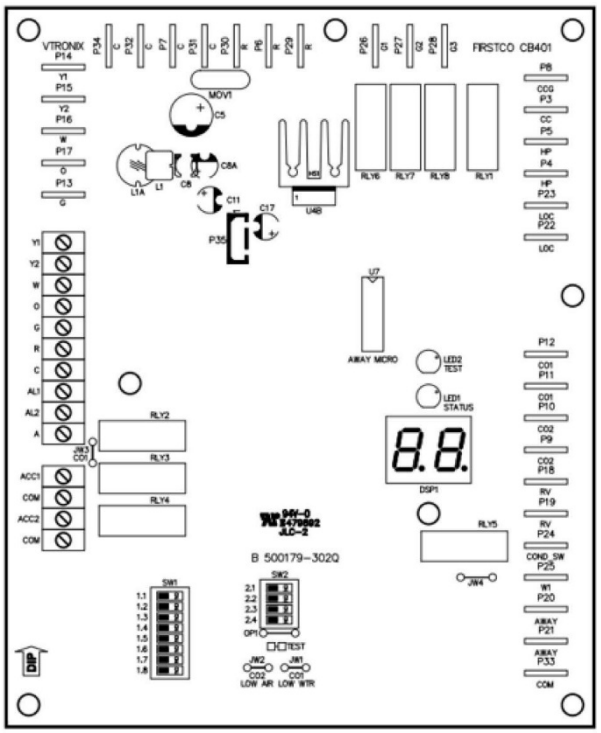


FIGURE 23 – Control Board Layout

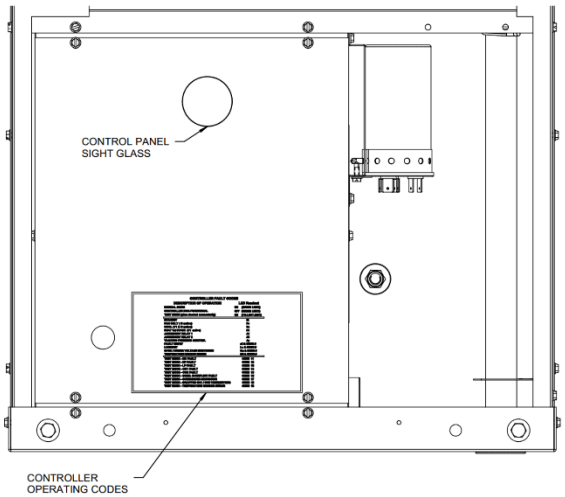


FIGURE 24 – Sight Glass Location

CONTROLS CONTINUED

WSCM SAFETY FEATURES

CONTROL BOARD LAYOUT LEGEND		
CONNECTION	INPUT OR OUTPUT	DESCRIPTION
R	--	24 VAC
C	--	24 VAC (Grounded Common)
Y1	I	Input Call for Compressor
W	I	Input Call for Heating or Emergency Heat
O	I	Input Call for Reversing Valve in Cooling
G	I	Input Call for Fan Operation
AL1	O	Connect to Thermostat Fault Light – 24VAC or Dry Contact Alarm
AL2	O	Alarm Relay 24VAC or Dry Contact
A	O	Output for Water Solenoid Valve – Paralleled with Compressor Contactor
ACC1	O	ACC1 Output for Accessory Relay 1 – 24VAC between ACC1 and COM
ACC2	O	ACC2 Output for Accessory Relay 2 – 24VAC between ACC2 and COM
G1	O	Connection for Fan Relay – Low Speed Operation
G2	O	Connection for Fan Relay – Medium Speed Operation
G3	O	Connection for Fan Relay – Large Speed Operation
CC	O	Connection for Compressor Contactor
CCG	O	Compressor Contactor Common Connections
HP	I	High Pressure Switch Input Terminals
LOC	I	Low Pressure Switch Input Terminals
CO1	I	Water Coil Low Temperature Thermistor Output
CO2	I	Air Coil Low Temperature Thermistor Output
RV	O	Reversing Valve Output Terminals – Direct Connect from "O"
COND_SW	I	Condensate Overflow Input Terminal
W1	O	Output Terminal for Electric Heat
COM	--	Grounded Common

Table 8 – Control Board Layout Legend

CONTROLLER OPERATION CODES	
DESCRIPTION OF OPERATION	LED READOUT
Normal Mode	**ON** (Green Light)
Controller Non Functional	**OFF** (Green Light)
Test Mode (pins shorted momentarily)	**ON** (Yellow Light)
DESCRIPTION OF OPERATION	CODE
Standby	**ST**
Fan Only(G active)	**Fo**
Cool (Y1 & O active)	**Co**
Heat 1st Stage (Y1 active)	**H1**
Accessory Relay 1	**A1**
Accessory Relay 2	**A2**
Vacated Premises Control	**Ay**
Fault Retry	**rE** & CODE #
Lockout	**Lo** & CODE #
Over/Under Voltage Shutdown	**Ou** & CODE #
Temperature Sensor Error	**SE** & CODE #
DESCRIPTION OF OPERATION	CODE
Test Mode – No Fault	**11**
Test Mode – HP Fault	**12**
Test Mode – LP Fault	**13**
Test Mode – CO1 Fault	**14**
Test Mode – CO2 Fault	**15**
Test Mode – Cond. Overflow Fault	**16**
Test Mode – Over/Under Shutdown	**17**
Test Mode – Swapped CO1/CO2 Thermistors	**18**

Table 9 – Control Operating Codes

CONTROLS CONTINUED

WSCM SAFETY FEATURES

WSCM DIP SWITCH FUNCTIONS			
	FUNCTION	OFF	ON
	DIP SWITCH 1		
1.1	Compressor Delay	No Delay	5s Delay
1.2	Motor Type	PSC Motor	ECM Motor
1.3	Blower Time Delay	None	45s
1.4	Dehumidification	None	Dehum
1.5	Boilerless	Off	On
1.6	Boilerless Setpoint	40°F	50°F
1.7	Vacated Premises	1hr	2hr
	DIP SWITCH 2		
2.1	Accessory Relay Control	With Fan	With Comp
2.2	Compressor Delay	None	60s
2.3	Accessory Relay 2 Control	With Fan	With Comp
2.4	Fan Delay	None	30s

Table 10 – WSCM DIP Switch Functions

CONTROL BOX DETAIL

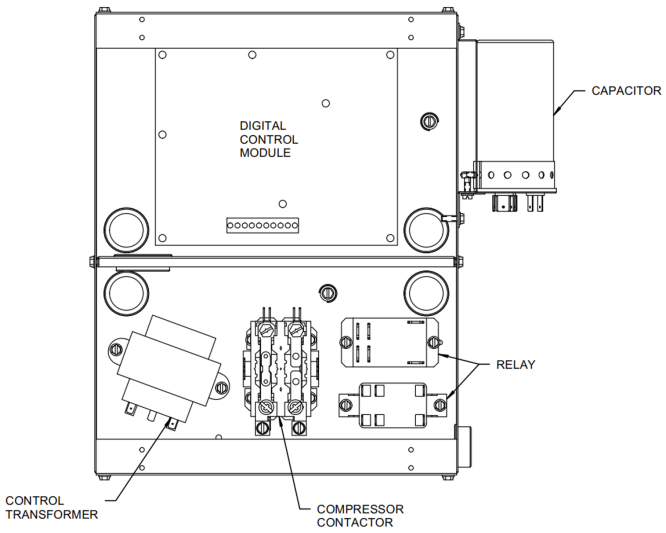


FIGURE 25 – Control Box Layout - Chassis

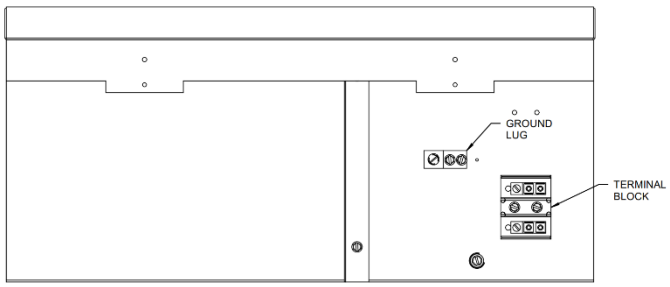


FIGURE 26 – Control Box Layout - Cabinet

ASSEMBLY

Once box is removed completely, line up the control panel back in place of the unit and tighten screws on the base plate and on the front panel. Plug back any harnesses previously removed.

REMOVAL

1) Ensure that all electrical power is removed from the unit and that the local disconnect is locked out.
2) Remove the screws on the front electrical panel with a ¼" hex head driver.
3) Remove the electrical front panel and access the electrical box
4) Disconnect the electrical harnesses located on the top of the ebox.
5) Remove the two ¼" hex header screws holding the electrical box in place on the bottom and side.

Remove electrical box from unit.

WARNING

ELECTRIC SHOCK HAZARD

Disconnect all power supplies before servicing. Lock out/tag out to prevent accidental electrical shock.

NOTE

There may be multiple power sources supplying the unit.

PERFORMANCE DATA

BLOWER DATA ECM									
BLOWER DATA								FACTORY BLOWER SETTINGS	
MODEL NUMBER	FAN SPEED	RATED AIRFLOW	CFM VS. STATIC PRESSURE (in. w.g.)					COOLING	HEATING
			0.1	0.2	0.3	0.4	0.5	10+ MIN	
HRCX09	T3	350	430	410	380	360	340	X	X
	T2		360	330	300	280	250		
	T1		290	260	230				
HRCX12	T3	400	490	460	440	420	410	X	X
	T2		390	360	340	310	290		
	T1		310	280					
HRCX18	T3	600	770	740	700	660	610	X	X
	T2		650	620	590	560	530		
	T1		550	520	490	450			
HRCX24	T3	800	940	910	870	840	800	X	X
	T2		840	810	770	740	700		
	T1		720	690	650	610			
HRCX30	T3	900	1260	1210	1140	1060	990	X	X
	T2		1080	1050	1020	980	940		
	T1		990	960	930	900	870		
HRCX36	T3	1125	1300	1230	1150	1080	990	X	X
	T2		1260	1210	1140	1060	970		
	T1		1080	1050	1020	980	940		
Airflow data shown is with a dry coil at 70°F DB EAT and with standard 1" filter.									

Table 11 – HRCX Blower Data

PERFORMANCE DATA CONTINUED

HRCX09 PRESSURE & TEMPERATURE DATA									
Entering Water Temp	Water Flow Rate	COOLING				HEATING			
		Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise	Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise
°F	GPM	psig	psig	°F	°F	psig	psig	°F	°F
20	1.1	Operation Not Recommended				Operation Not Recommended			
	1.7								
	2.3								
30	1.1					61-71	237-247	14-20	7-11
	1.7					62-72	240-250	15-21	5-9
	2.3					63-73	243-253	15-21	3-7
50	1.1	137-147	219-229	21-27	21-25	82-92	258-268	17-23	8-12
	1.7	136-146	196-206	21-27	13-17	88-98	262-272	18-24	6-10
	2.3	135-145	185-195	22-28	9-13	91-101	264-274	18-24	4-8
70	1.1	140-150	288-298	20-26	20-24	116-126	282-292	22-28	12-16
	1.7	139-149	263-273	21-27	13-17	122-132	286-296	23-29	7-11
	2.3	138-148	251-261	21-27	9-13	131-141	292-302	24-30	6-10
90	1.1	146-156	372-382	19-25	19-23	157-167	311-321	27-33	16-20
	1.7	144-154	345-355	19-25	12-16	165-175	313-323	28-34	7-11
	2.3	143-153	332-342	20-26	9-13	174-184	321-331	28-34	6-10
110	1.1	150-160	470-480	18-24	18-22	Operation Not Recommended			
	1.7	149-159	443-453	18-24	12-16				
	2.3	148-158	429-439	19-25	8-12				

Table 12 – HRCX09 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

HRCX12 PRESSURE & TEMPERATURE DATA									
Entering Water Temp	Water Flow Rate	COOLING				HEATING			
		Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise	Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise
°F	GPM	psig	psig	°F	°F	psig	psig	°F	°F
20	1.5	Operation Not Recommended				Operation Not Recommended			
	2.3								
	3								
30	1.5					56-66	227-237	15-21	5-9
	2.3					60-70	232-242	16-22	3-7
	3					64-74	236-246	17-23	2-6
50	1.5	127-137	219-229	20-26	20-24	78-88	263-273	18-24	7-11
	2.3	126-136	199-209	21-27	13-17	83-93	268-278	19-25	4-8
	3	125-130	190-200	21-27	9-13	86-96	270-280	20-26	3-7
70	1.5	130-140	293-303	19-25	19-23	112-122	291-301	24-30	10-14
	2.3	129-139	271-281	20-26	12-16	120-130	298-308	25-31	7-11
	3	128-138	261-271	20-26	9-13	125-135	302-312	26-32	5-9
90	1.5	135-145	380-390	18-24	18-22	152-162	325-335	30-36	14-18
	2.3	134-144	357-367	18-24	11-15	165-175	336-346	32-38	10-14
	3	133-143	348-358	19-25	8-12	173-183	343-353	34-40	7-11
110	1.5	141-151	485-495	17-23	17-21	Operation Not Recommended			
	2.3	140-150	463-473	17-23	11-15				
	3	139-149	454-464	18-24	8-12				

Table 13 – HRCX12 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

HRCX18 PRESSURE & TEMPERATURE DATA									
Entering Water Temp	Water Flow Rate	COOLING				HEATING			
		Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise	Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise
°F	GPM	psig	psig	°F	°F	psig	psig	°F	°F
20	2.3	Operation Not Recommended				Operation Not Recommended			
	3.4								
	4.5								
30	2.3					62-72	248-258	16-22	7-11
	3.4					65-75	254-264	17-23	5-9
	4.5					70-80	258-268	18-24	3-7
50	2.3	131-141	244-254	23-29	20-24	84-94	276-286	20-26	9-13
	3.4	130-140	220-230	23-29	13-17	90-100	282-292	21-27	6-10
	4.5	129-139	211-221	24-30	9-13	94-104	283-293	21-27	4-8
70	2.3	135-145	315-325	22-28	20-24	118-128	305-315	26-32	12-16
	3.4	134-144	292-302	22-28	13-17	129-139	314-324	28-34	8-12
	4.5	133-143	283-293	23-29	9-13	135-145	319-329	29-35	6-10
90	2.3	140-150	404-414	21-27	19-23	159-169	338-348	33-39	16-20
	3.4	138-148	380-390	21-27	12-16	175-185	351-361	36-42	11-15
	4.5	137-147	372-382	22-28	9-13	185-195	358-368	37-43	8-12
110	2.3	144-154	515-525	19-25	18-22	Operation Not Recommended			
	3.4	143-153	492-502	20-26	12-16				
	4.5	142-152	485-495	20-26	8-12				

Table 14 – HRCX18 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

HRCX24 PRESSURE & TEMPERATURE DATA									
Entering Water Temp	Water Flow Rate	COOLING				HEATING			
		Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise	Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise
°F	GPM	psig	psig	°F	°F	psig	psig	°F	°F
20	3	Operation Not Recommended				Operation Not Recommended			
	4.5								
	6								
30	3					56-66	249-259	17-23	7-11
	4.5					61-71	254-264	18-24	5-9
	6					66-76	259-269	19-25	3-7
50	3	129-139	219-229	23-29	20-24	88-98	283-293	21-27	9-13
	4.5	128-138	199-209	23-29	13-17	94-104	288-298	22-28	6-10
	6	127-137	190-200	24-30	9-13	98-108	291-301	23-29	4-8
70	3	133-143	290-300	22-28	19-23	123-133	314-324	27-33	13-17
	4.5	132-142	268-278	22-28	12-16	133-143	324-334	29-35	9-13
	6	131-141	258-268	23-29	9-13	139-149	329-339	30-36	6-10
90	3	138-148	377-387	21-27	19-23	164-174	353-363	35-41	17-21
	4.5	137-147	354-365	21-27	12-16	180-190	367-377	37-43	12-16
	6	136-146	343-353	22-28	9-13	190-200	376-386	39-45	9-13
110	3	142-152	481-491	19-25	19-23	Operation Not Recommended			
	4.5	141-151	457-467	20-26	12-16				
	6	141-151	448-458	20-26	8-12				

Table 15 – HRCX24 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

HRCX30 PRESSURE & TEMPERATURE DATA									
Entering Water Temp	Water Flow Rate	COOLING				HEATING			
		Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise	Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise
°F	GPM	psig	psig	°F	°F	psig	psig	°F	°F
20	3.8	Operation Not Recommended				Operation Not Recommended			
	5.6								
	7.5								
30	3.8					53-73	263-273	17-23	7-11
	5.6					67-77	267-277	18-24	4-8
	7.5					71-81	271-281	19-25	3-7
50	3.8	127-137	220-230	23-29	19-23	91-101	291-301	23-29	9-13
	5.6	126-136	202-212	24-30	12-16	97-107	297-307	24-30	5-9
	7.5	126-136	194-204	24-30	9-13	101-111	300-310	24-30	4-8
70	3.8	132-142	292-302	22-28	18-22	127-137	327-337	29-35	12-16
	5.6	130-140	272-282	23-29	12-16	137-147	337-347	31-37	8-12
	7.5	130-140	264-274	23-29	8-12	143-153	342-352	32-38	6-10
90	3.8	136-146	383-393	21-27	18-22	170-180	370-380	37-43	16-20
	5.6	135-145	359-369	22-28	11-15	186-196	385-395	40-46	11-15
	7.5	135-145	351-361	22-28	8-12	195-205	395-405	41-47	8-12
110	3.8	141-151	486-496	20-26	18-22	Operation Not Recommended			
	5.6	140-150	466-476	20-26	11-15				
	7.5	139-149	458-468	21-27	8-12				

Table 16 – HRCX30 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

HRCX36 PRESSURE & TEMPERATURE DATA									
Entering Water Temp	Water Flow Rate	COOLING				HEATING			
		Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise	Suction Pressure	Discharge Pressure	Air Temp Drop	Water Temp Rise
°F	GPM	psig	psig	°F	°F	psig	psig	°F	°F
20	4.5	Operation Not Recommended				Operation Not Recommended			
	6.8								
	9								
30	4.5					58-68	246-256	13-19	5-9
	6.8					62-72	251-261	15-19	3-7
	9					64-74	256-266	16-20	2-6
50	4.5	123-133	223-233	22-28	19-23	82-92	275-285	19-25	7-11
	6.8	121-131	203-213	23-29	12-16	87-97	281-291	20-26	4-8
	9	121-131	194-204	23-29	9-13	90-100	283-293	20-26	3-7
70	4.5	127-137	294-304	21-27	19-23	117-127	308-318	25-31	10-14
	6.8	126-136	272-282	22-28	12-16	125-135	316-326	26-32	7-11
	9	125-135	261-271	22-28	8-12	130-140	320-330	27-33	5-9
90	4.5	132-142	381-391	20-26	18-22	158-168	346-356	32-38	14-18
	6.8	130-140	357-367	21-27	11-15	172-182	359-369	34-40	9-13
	9	130-140	346-356	21-27	8-12	180-190	366-376	35-41	7-11
110	4.5	137-147	485-495	19-25	18-22	Operation Not Recommended			
	6.8	135-145	461-471	19-25	11-15				
	9	135-145	450-460	19-25	8-12				

Table 17 – HRCX36 Pressure & Temperature Data

WIRING DIAGRAM MATRIX

WIRING DIAGRAM MATRIX					
Series	Base Unit Model	Voltage/Phase/Frequence			
		208-230/1/60	265/1/60	208-230/3/60	460/3/60
HRCX	HRCX09*	WD78X001	WD78X003	-	-
	HRCX12*			-	-
	HRCX18*	WD78X002	WD78X004	-	-
	HRCX24*			-	-
	HRCX30*			-	-
	HRCX36*			-	-

Table 18

WIRING DIAGRAMS

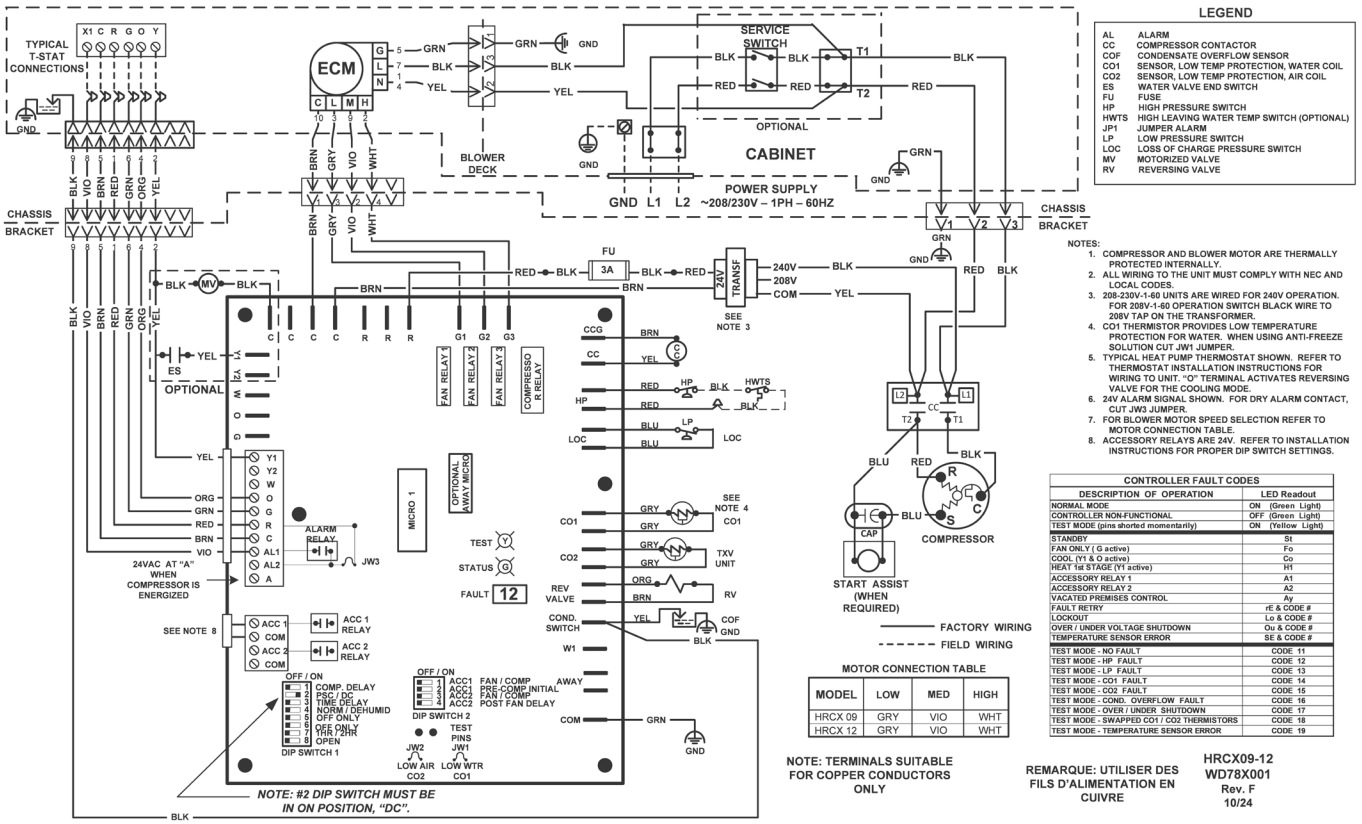


Figure 27 - HRCX, 9-12 CTM 208/230V - 1Ph - 60Hz

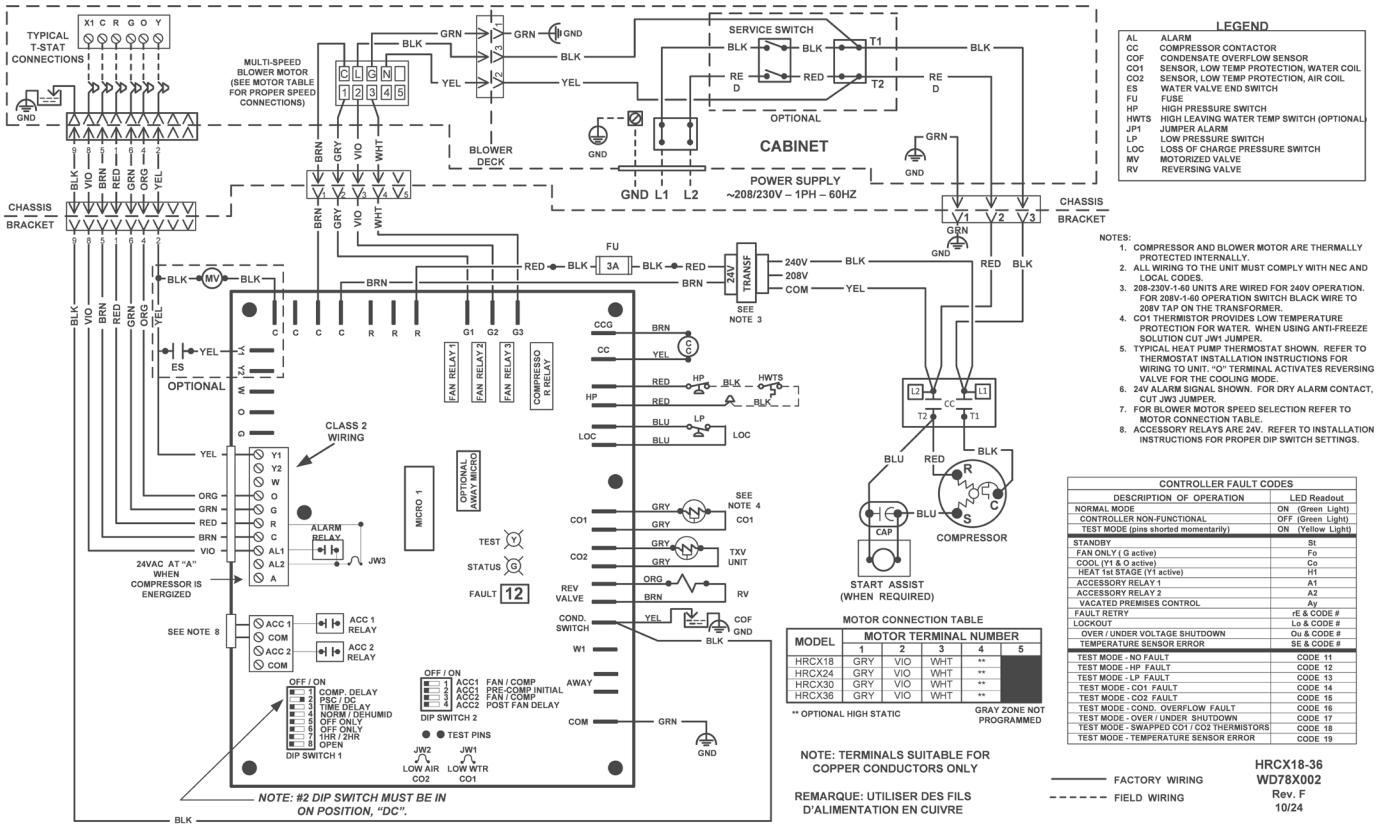


Figure 28 - HRCX, 18-36 CTM 208/230V - 1Ph - 60Hz

WIRING DIAGRAMS CONTINUED

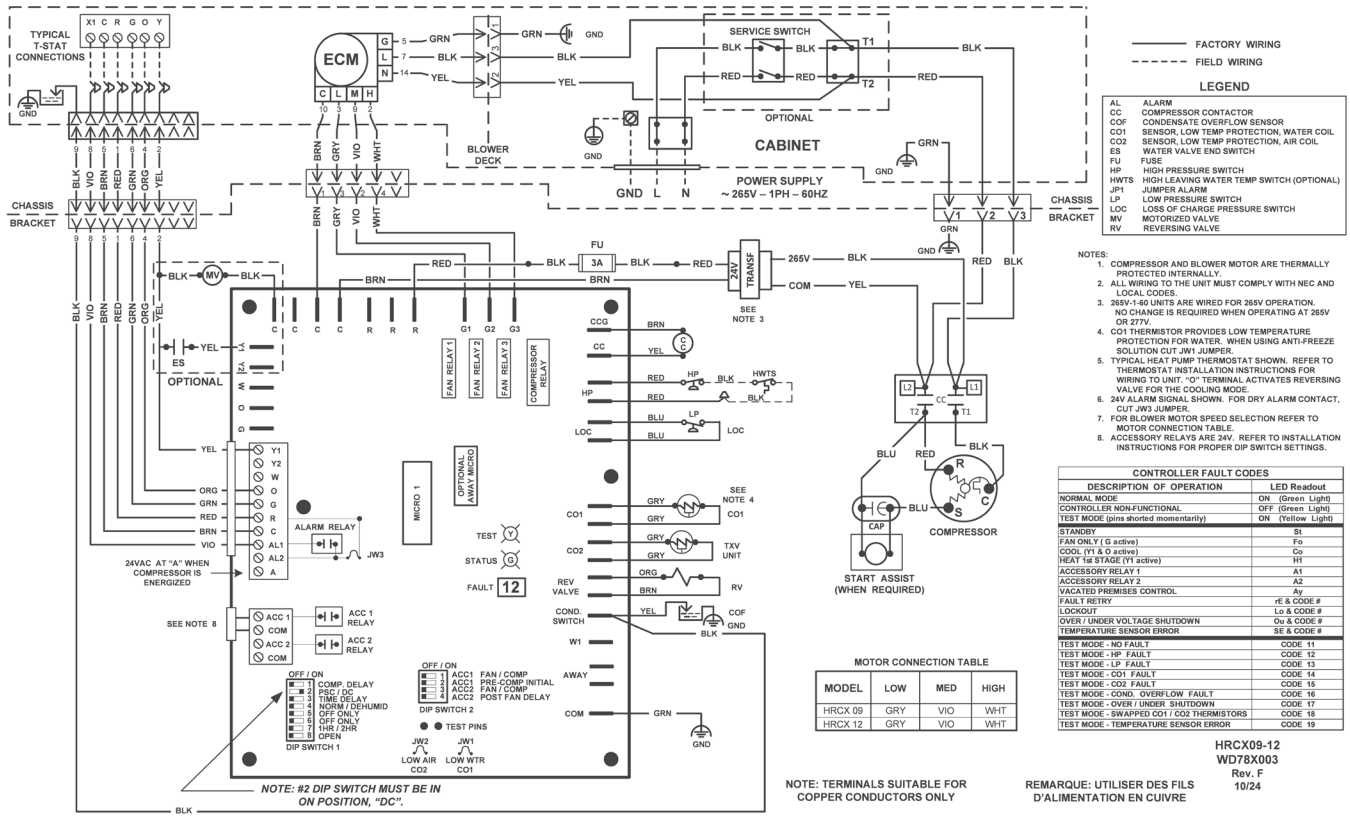


Figure 29 - HRCX, 9-12 CTM 265V - 1Ph - 60Hz

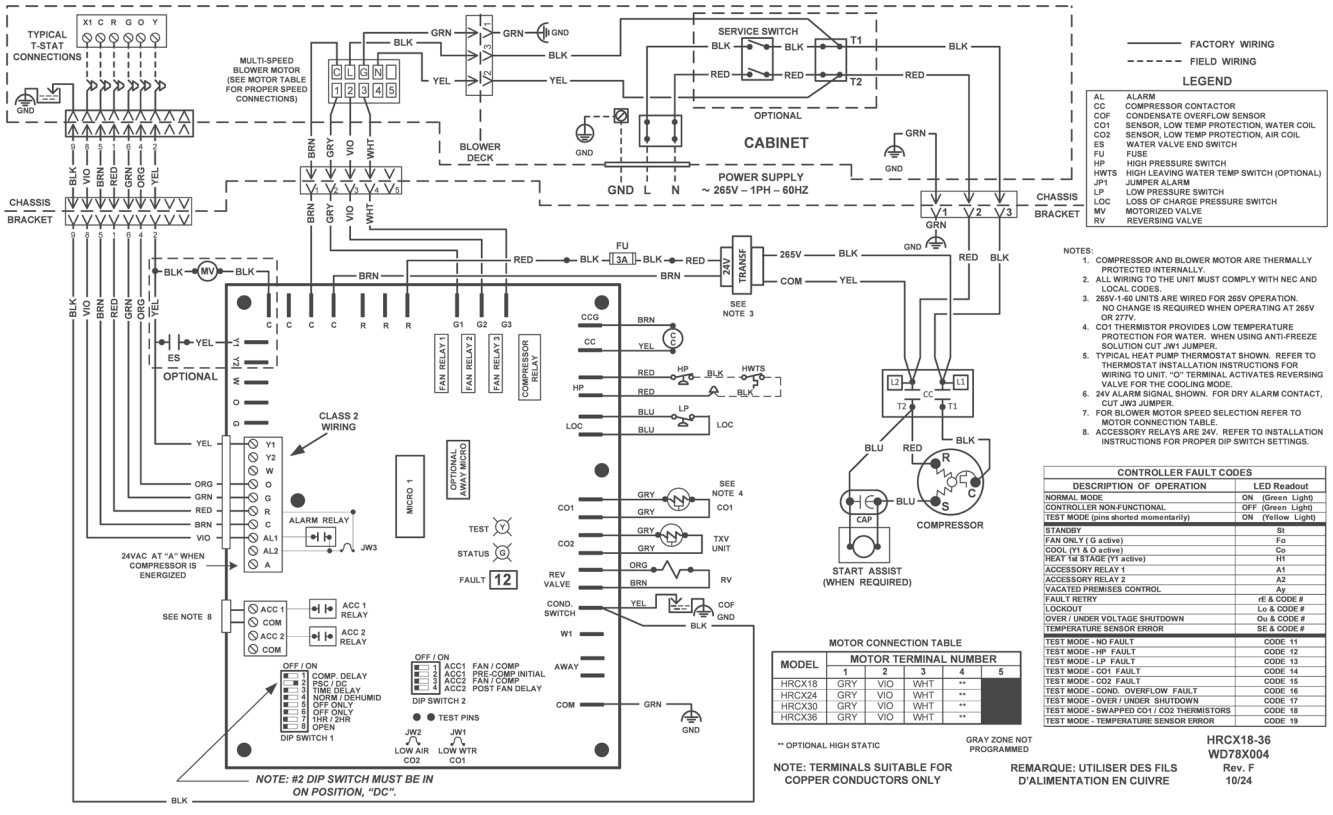


Figure 30 - HRCX, 18-36 CTM 265V - 1Ph - 60Hz

CIRCUIT SCHEMATIC

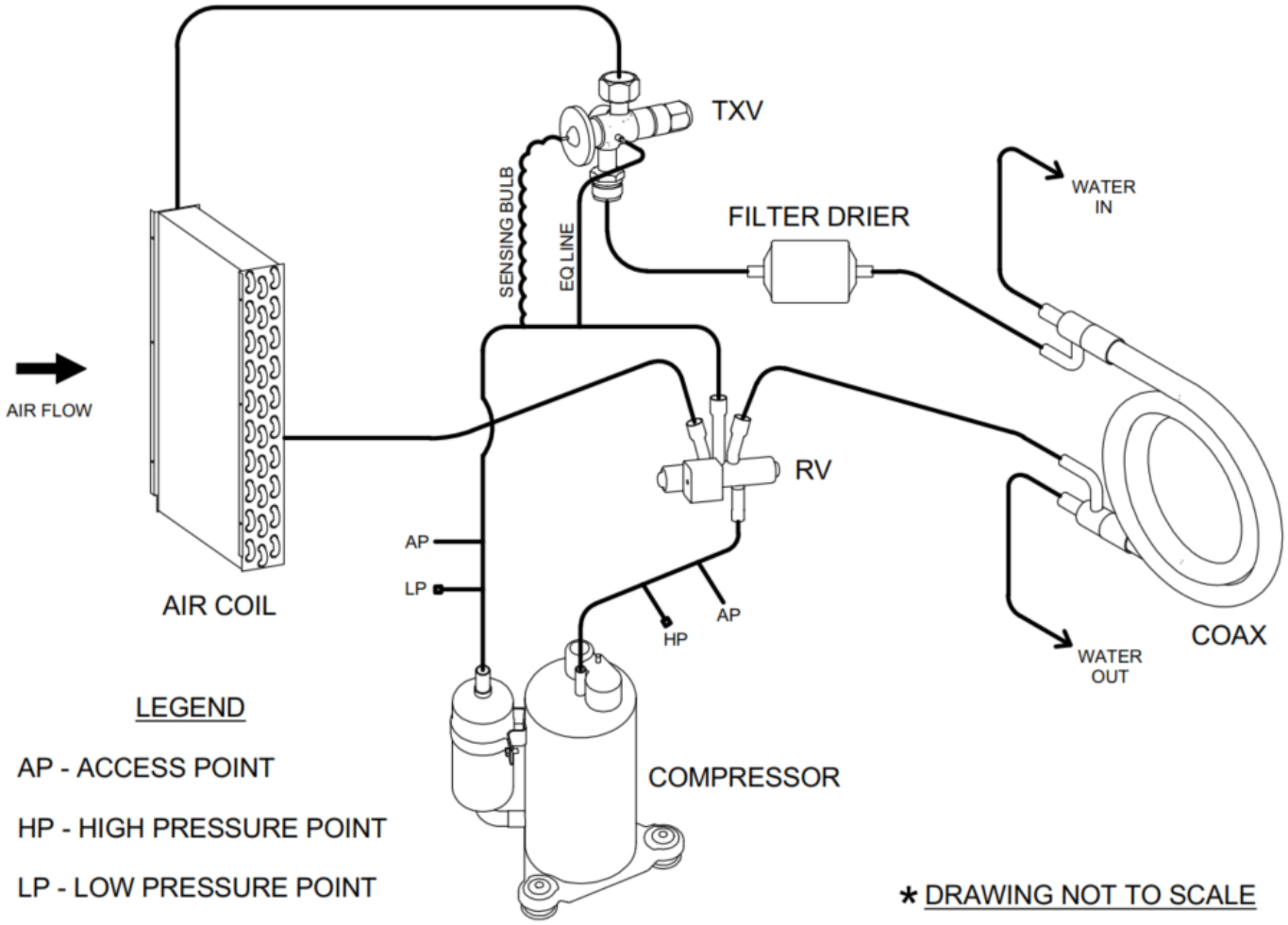


FIGURE 31 - Circuit Diagram

STARTUP INSTRUCTIONS

PRE-STARTUP CHECKS:

WARNING

Electrically ground the unit. Connect ground wire to ground lug. Failure to do so can result in injury or death.

CAUTION

Wire any field installed device such as a fan switch or thermostat furnished by the factory in strict accordance with the wiring diagram supplied with the unit. Failure to do so could result in damage to components and will void all warranties.

Before start-up, thoroughly check all the components. Optimal operation of equipment requires cleanliness. Often after installation of the equipment, additional construction activities occur. Protect the equipment from debris during these construction phases.

PRIOR TO THE STARTUP OF THE UNIT:

1. Ensure supply voltage matches nameplate data.
2. Ensure the unit is properly grounded
3. With the power off, check blower wheel set screws for proper tightness and that the blower wheel rotates freely.
4. Ensure unit will be accessible for servicing.
5. Ensure condensate line is properly sized, run, trapped, pitched and tested.
6. Ensure all cabinet openings and wiring connections have been sealed.
7. Ensure clean filters are in place.
8. Ensure all access panels are in place and secured.

STARTUP INSTRUCTIONS CONTINUED

PRIOR TO THE STARTUP OF THE UNIT:

9. Check that the water coil and piping had been leak checked and insulated as required.
10. Ensure that all air has been vented from the water coil.
11. Make sure that all electrical connections are tight and secure.
12. Check the electrical overcurrent protection and wiring for the correct size.
13. Verify that the low voltage wiring between the thermostat and the unit matches the wiring diagram.
14. Verify that the water piping is complete and correct.
15. Check condensate overflow sensor for proper operation and adjust position if required. Ensure that power is connected to the unit and the local disconnect is switched to ON position.

UNIT STARTUP:

1. Turn the disconnect switch to ON position.
2. Check for 24 volt from control transformer. Controller module LED should light up. If not, the power supply lines are out of phase. Turn of the main power disconnect to the unit off and change the phase.by switching any two incoming wires.
3. Set the thermostat to the lowest position. Turn the system switch to “COOL” and the fan switch to “AUTO” position. The reversing valve should energize.
4. After 5 minutes (anti-short cycle protect delay), the fan start at low speed and the compressor is running.
5. Make sure that compressor rotation is correct. If not, turn the power off and make the correction. This is 3-phase unit. Switching compressor rotation could be done by switching any two of compressor wires.
6. Turn the thermostat system to “OFF” position. The unit should stop running and the reversing valve de-energizes.
7. Leave the unit off for approximately 5 minutes to allow the system pressures to equalize. Anti-short cycle feature built in the system will keep the compressor off for 5 minutes.
8. Set the thermostat to the highest setting. Turn the system switch to “HEAT” position.
9. Verify that the unit is operating to the heating mode.
10. Set the thermostat to maintain the desired space temperature.
11. Check for vibrations, leaks, etc.
12. Verify water flow rate is correct according to specification. Adjust if necessary. If specification is not available, the nominal flow rate for this unit is 25 GPM.
13. Instruct the owner on the unit and thermostat operation.

STARTUP & PERFORMANCE CHECKLIST INSTRUCTIONS

The warranty may be void unless the FIGURE 31 – Startup & Performance Checklist is completed and returned to the warrantor. If the FPG unit is not installed properly the warranty will be void as the manufacturer can’t be held accountable for problems that stem from improper installation.

OPERATION & MAINTENANCE

PREVENTIVE MAINTENANCE

To achieve maximum performance and service life of equipment, a formal schedule of regular maintenance should be established and adhered to.

CAUTION

All appropriate personal protection equipment should be worn when servicing or maintaining this unit.
Personal injury can result from sharp metal edges, moving parts, and hot or cold surfaces.

FAN

The fan should be inspected and cleaned annually in conjunction with maintenance of the motor and bearings. It is important to keep the fan section and motor clean and free from obstruction to prevent imbalance, vibration, and improper operation.

WARNING

ELECTRIC SHOCK HAZARD

Check motor connections to ensure they are secure and in accordance with the unit wiring diagram.
ECM motors have line voltage power applied at all times. MAKE SURE POWER IS DISCONNECTED BEFORE SERVICING.

FILTER

The air filter should be cleaned or replaced every 30 days or more frequently if severe operating conditions exist. Always replace the filter with the same type and size as originally furnished.

COIL

Clean all heat transfer surfaces and remove all dirt, dust, and contaminates that potentially impairs air flow using industry accepted practices. Care should be taken not to bend coil fin material.

CONDENSATE DRAIN PAN AND PIPE

Check and clean all dirt and debris from pan. Ensure drain line is free flowing and unobstructed.

MAINTENANCE UPDATES

Check regularly for a current copy of the maintenance program log, which can be found at under “product information”.

CLEANING/FLUSHING

Before the unit is connected to the supply water, the water circulating system must be cleaned and flushed to remove any dirt or debris for the system.

1. Connect the supply and return water lines together in order to bypass the unit. This will prevent dirt or debris from getting into the system during the flushing process.
2. Start the main water circulating pump and allow for water to circulate in the system. Open drains at the lowest point in the system and drain out the water while simultaneously filling the loop with city water. Continue to exchange the loop water with the city water for a minimum of two hours, or until drain water is clear. During this time, check to make sure there are no leaks within the system.
3. Open all drains and vents to drain water system and refill with clean water. Test the system water quality and treat as necessary in order to bring water quality to within requirements for the system. Water PH level should be 7.5 to 8.5. Antifreeze may be added if required.
4. Connect the water-source heat pump supply and return lines, following proper installation procedures outlined in the piping installation section. After the installation has been checked for leaks, bring the water-loop to the desired set point and vent any air within the loop.

UNIT PERFORMANCE

Record performance measurements of volts, amps and water temperature differences (both heating and cooling). A comparison of logged data with start-up and other annual data is useful as an indicator of general equipment condition.

UNIT LOCKOUT

Air or water problem could cause periodic lockouts. The lockout (shutdown) of the units is a normal protective result. Check for dirt in the water system, water flow rates, water temperatures, airflow rates (may be caused by dirty filter) and air temperatures.

LABORATORY TESTING

When the unit has less than 100 operational hours and the coils have not had sufficient time to be “seasoned”, it is necessary to clean the coils with a mild surfactant such as Calgon to remove the oils left by manufacturing processes.

OPERATION & MAINTENANCE CONTINUED

Compressor bearing products designed for A2L refrigerants may come equipped with a factory installed refrigerant leak detection system. If the sensor is faulty, or disconnected, the appliance will not properly function.
False ceilings or drop ceilings may be used as a return air plenum if a refrigerant detection system is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint.

QUALIFICATION OF WORKERS

Service shall only be performed by qualified technicians, certified by national training organizations or manufacturers that are accredited to teach the relevant national competency standards that may be set in legislation.
Competence to properly service the appliance should be documented by a certificate.

CHECKS TO THE WORK AREA

Prior to beginning work on the appliance, safety checks are necessary to ensure that the risk of ignition of released gasses is minimized. Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

CHECKING FOR PRESENCE OF REFRIGERANT

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres.
Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.
If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any such a pipe work shall use any sources of ignition in manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “NO SMOKING” signs shall be displayed.

VENTILATED AREA

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

CHECKS TO THE REFREIGERATING EQUIPMENT

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.
The following checks shall be applied to installations using FLAMMANLE REFRIGERANTS:

- The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;
- The ventilation machinery and outlets are operating adequately and are not obstructed;
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

OPERATION & MAINTENANCE CONTINUED

CHECKS TO ELECTRICAL DEVICES AND SEALED ELECTRICAL COMPONENTS

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.
Initial Safety Checks shall include:

- That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- That no live electrical components and wiring are exposed while charging, recovering or purging the system;
- That there is continuity of earth bonding.

Sealed electrical components shall be replaced in the event of damage or malfunction.

CABLING

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

DETECTION OF FLAMMABLE REFRIGERANTS

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.
Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

Leak detection fluids (such as the bubble method or fluorescent method agents) are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

REMOVAL AND EVACUATION OF FLAMMABLE REFRIGERANTS

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for FLAMMABLE REFRIGERANTS it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:

- Remove refrigerant charge following local and national regulations
- Purge the circuit with inert gas (optional for A2L);
- Evacuate (optional for A2L)
- If using flame to open circuit, continuously flush system with an inert gas
- Open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.
For appliances containing flammable refrigerants, refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing until the working pressure is achieved, then venting to the atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

OPERATION & MAINTENANCE CONTINUED

CHARGING PROCEDURES

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

DECOMISSIONING

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

A. Become familiar with the equipment and its operation.
B. Isolate system electrically.
C. Before attempting the procedure, ensure that:
    a. mechanical handling equipment is available, if required, for handling refrigerant cylinders;
    b. all personal protective equipment is available and being used correctly;
    c. the recovery process is supervised at all times by a competent person;
    d. recovery equipment and cylinders conform to the appropriate standards.
D. Pump down refrigerant system, if possible.
E. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
F. Make sure that cylinder is situated on the scales before recovery takes place.
G. Start the recovery machine and operate in accordance with instructions.
H. Do not overfill cylinders (no more than 80 % volume liquid charge).
I. Do not exceed the maximum working pressure of the cylinder, even temporarily.
J. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
K. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

LABELING

Equipment Shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating that the equipment contains FLAMMABLE REFRIGERANT.

RECOVERY

When removing refrigerant from a system, either for servicing order commissioning, it is recommended good practice that all refrigerants are removed safely.
When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

OPERATION & MAINTENANCE CONTINUED

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak- free disconnect couplings and in good condition

The recovered refrigerant shall be processed according to local Legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely

REFRIGERANT DETECTION SENSOR (RDS) INFORMATION

Refer to the appliance IOM for information regarding the minimum conditioned room requirements, and instructions for the RDS operation, installation, and wiring. Any field installed wiring connected to the RDS must be at least 18AWG and have minimum insulation thickness of 1.58mm or be protected from damage.
The RDS is not intended for service or repair. In the event of a sensor failure, the mitigation mode will engage and the sensor shall be replaced by removing the sensor and replacing it with a new sensor.

DUCTING

If the appliance is connected via an air duct system to one or more rooms with A2L refrigerants is installed in a room with an area of less than the minimum as noted on the unit physical data table, or a minimum effective dispersal volume less than $18m^3$($636\ ft^3$), the room shall be without continuously operating open flames (e.g. an operating gas appliance), or other potential ignition sources (such as an operating electric heater/ hot surface). A flame producing device may be installed in the same space if the device is provided with an effective flame arrest.

Auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Potential ignition sources include hot surfaces with a temperature exceeding 430°C (806°F) and electric switching devices.

PIPING

Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as AHRAE 15, ASHRAE 15.2, IAPMO uniform mechanical code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	CHECKS & CORRECTIONS
ENTIRE UNIT DOES NOT RUN	Power supply off	Apply power; close disconnect.
	Blown Fuse	Replace fuse or reset circuit breaker. Check for correct fuses.
	Voltage supply low	If voltage is below minimum voltage specified on unit data plate, contact lower power company. (Fault Code – Ou & 17).
	Thermostat	Set the fan to "ON", the fan should run. Set thermostat to "COOL" and lowest temperature setting, the unit should run in the cooling mode (reversing valve energized). Set unit to "HEAT" and the highest temperature setting, the unit should run in the heating mode. If neither the blower nor compressor run in all three cases, the thermostat could be mis-wired or faulty. To ensure mis-wired or faulty thermostat verify 24 volts is available on the condenser section low voltage terminal strip between "R" and "C", "Y" and "C", and "O" and "C". If blower does not operate, verify 24 colts between terminals "G" and "C" in the air handler. Replace the thermostat if defective.
BLOWER OPERATES BUT COMPRESSOR DOES NOT RUN	Thermostat	Check setting, calibration and wiring.
	Wiring	Check for loose or broken wires at compressor, capacitor or contractor.
	Safety Controls	Check control board fault LED for fault code.
	Compressor overload open	If the compressor is cool and the overload will not reset, replace the compressor.
	Compressor motor grounded	Internal wiring grounded to the compressor shell. Replace compressor. If compressor burnout, install new filter dryer.
	Compressor windings open	After compressor has cooled, check continually of compressor windings. If the windings are open, replace the compressor.
UNIT OFF ON HIGH PRESSURE CONTROL FAULT CODE 12	Discharge pressure too high	In "COOLING" mode: Lack of or inadequate water flow. Entering water temperature too warm. Scaled or restricted water to refrigerant heat exchanger. In "HEATING" mode: Lack of or inadequate water flow. Entering water temperature too cold. Scaled or restricted water to refrigerant heat exchanger.
	Refrigerant charge	The unit is overcharged with refrigerant. Reclaim refrigerant, evacuate and recharge with factory recommended charge.
	High pressure switch	Check for defective or improperly calibrated high pressure switch.
UNIT OFF ON LOW PRESSURE CONTROL FAULT CODE 13	Suction Pressure too low	In "COOLING" mode: Lack of or inadequate airflow. Entering air temperature too cold. Blower inoperative, clogged filter or restriction in ductwork. In "HEATING" mode: Lack of or inadequate water flow. Entering water temperature too cold. Scaled or restricted water to refrigerant heat exchanger.
	Refrigerant charge	The unit is low on refrigerant. Check for refrigerant leak, repair, evacuate and recharge with factor recommended charge.
	Low pressure switch	Check for defective or improperly calibrated low pressure switch.

Table 19 – Troubleshooting Table

TROUBLESHOOTING CONTINUED

PROBLEM	POSSIBLE CAUSE	CHECKS & CORRECTIONS
UNIT SHORT CYCLES	Unit oversized	Recalculate heating and cooling loads.
	Thermostat	Thermostat installed near a supply air register, relocate thermostat. Check heat anticipator.
	Wiring and controls	Loose connections in the wiring or a defective compressor contactor.
INSUFFICIENT COOLING OR HEATING	Unit undersized	Recalculate heating and cooling loads. If not excessive, possibly adding insulation will rectify the situation.
	Loss of conditioned air by leaks	Check for leaks in ductwork or introduction of ambient air through doors or windows.
	Airflow	Lack of adequate airflow or improper distribution of air. Replace dirty air filter.
	Refrigerant charge	Low on refrigerant charge causing inefficient operation.
	Compressor	Check for defective compressor. If discharge is too low and suction pressure is too high, compressor is not pumping properly. Replace compressor.
	Reversing valve	Defective reversing valve creating bypass of refrigerant from discharge to suction side of compressor. Discharge is too low and suction is too high. Replace reversing valve.
	Operating pressures	Compare unit operating pressures to the pressure / temperature chart for the unit.
	Refrigerant metering device	Check for possible restriction or defect. Replace is necessary.
	Moisture, non-condensables	The refrigerant system may be contaminated with moisture or non-condensables. Reclaim refrigerant, evacuate and recharge with factory recommended charge. Replace filter dryer.

Table 20 – Troubleshooting Table Continued

SUPPORT/REFERENCE MATERIAL

REFERENCE CALCULATIONS

HEATING

$$LDB = EDB + \frac{QH}{GPM \times 500}$$

$$LWT = EAT + \frac{QA}{cfm \times 1.08}$$

COOLING

$$LDB = EDB - \frac{SC}{cfm \times 1.08}$$

$$LWT = EWT + \frac{QR}{GPM \times 500}$$

$$LC = QC - SC$$

$$SHR = \frac{SC}{QC}$$

ABBREVIATIONS & DEFINITIONS

- **LDB** = Leaving air temperature dry bulb °F
- **EDB** = Entering air temperature dry bulb °F
- **GPM** = Water flow rate gallons per minute
- **CFM** = Airflow rate cubic feet per minute
- **QH** = Heating capacity Btuh
- **QA** = Heat of absorption Btuh
- **SC** = Sensible cooling capacity Btuh
- **QR** = Heat of rejection Btuh
- **LC** = Latent cooling capacity Btuh
- **SHR** = Sensible heat ratio

COMMON CONVERSIONS

Air Flow	l/s = CFM x .47
Water Flow	l/s = GPM x .06
Static Pressure	Pa = IWC x 249
Water Pressure Drop	FOH = PSI x 2.3
Temperature	°C = (°F – 32) x 5/9
Power	kW = Btuh / 3412
Weight	oz = lb x 16
Weight	kg = lb / 2.2
EER	COP x 3.413
COP	EER / 3.413

STARTUP & PERFORMANCE CHECKLIST

First Co.

HydroTech
R-410A Water Source Heat Pump

CUSTOMER _____ DATE _____ STARTUP DATE _____

ADDRESS _____ PHONE # _____ JOB NUMBER _____

SERVICING COMPANY _____

HYDROTECH MODEL _____ TECHNICIAN _____

SERIAL # _____ SERIAL # EXAMPLE (1 Letter) – (2 #s) – (1 letter) – (6 #s)

VISUAL INSPECTION

- ☐ Air Filter Condition
- ☐ Evaporate Coil Condition
- ☐ Blower Wheel
- ☐ Signs of sweating on plenum / cabinet
- ☐ Signs of condensate outside pan
- ☐ Condensate Drain Clear

ACCESSORIES INSTALLED

- ☐ Hard Start Kit
  Type/Brand: _____
- ☐ Compressor Cover
- ☐ Vacated Premises Switch

CONTROL MODULE SWITCH POSITION

Dip Switch #1			Dip Switch #2	
Off	*On*		*Off*	*On*
☐	☐	Switch #1	☐	☐
☐	☐	Switch #2	☐	☐
☐	☐	Switch #3	☐	☐
☐	☐	Switch #4	☐	☐
☐	☐	Switch #5		
☐	☐	Switch #6		
☐	☐	Switch #7		
☐	☐	Switch #8		

Unit in Lock Out? _____

Fault Code Displayed in Test Mode? _____

UNIT OPERATION

Primary Voltage to the Heat Pump: _____

Transformer Secondary Voltage: _____

Unit Grounded? _____

Low Side PSIG: _____ Vapor Line Temp: _____ Saturated Temp: _____

[Vapor Line Temp – Saturated Temp = ***Superheat***]*

High Side PSIG: _____ Saturated Temp: _____ Liquid Line Temp: _____

[Saturated Temp – Liquid Line Temp = ***Sub Cooling***]*

DUCT SYSTEM STATIC PRESSURE

Supply Static Pressure: _____

Return Static Pressure: _____

Total External Static Pressure: _____

EVAPORATOR COIL TEMPERATURES:

Evaporator Coil EAT Dry Bulb: _____

Evaporator Coil LAT Dry Bulb: _____

Delta: _____

Evaporator Coil EAT Dry Bulb: _____

Evaporator Coil EAT Dry Bulb: _____

Delta: _____

HEAT EXCHANGER TEMPERATURE

Cond Entering Water Temp: _____

Cond Leaving Water Temp: _____

Cond Temp Rise: _____

PROBLEM SUMMARY

_____

_____

_____

_____

CORRECTIVE ACTIONS TAKEN

_____

_____

_____

_____

The warranty may be void unless the Startup & Performance Checklist is completed and returned to the warrantor. If the HVAC unit is not installed properly the warranty will be void as the manufacturer can't be held accountable for problems that stem from improper installation.

FIGURE 31 – Startup and Performance Checklist

NOTES

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