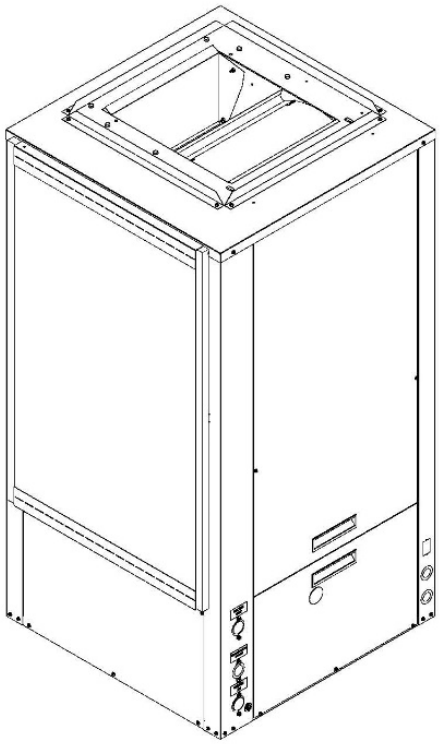
Installation, Operation, & Maintenance Manual

IOM 8004
Rev. A 1/25

WSV6 009-072 Vertical Series
Water Source Heat Pump



HydroTech™

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

COPYRIGHT

First Co. / AE-Air 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.

TABLE OF CONTENTS

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.

MODEL NOMENCLATURE

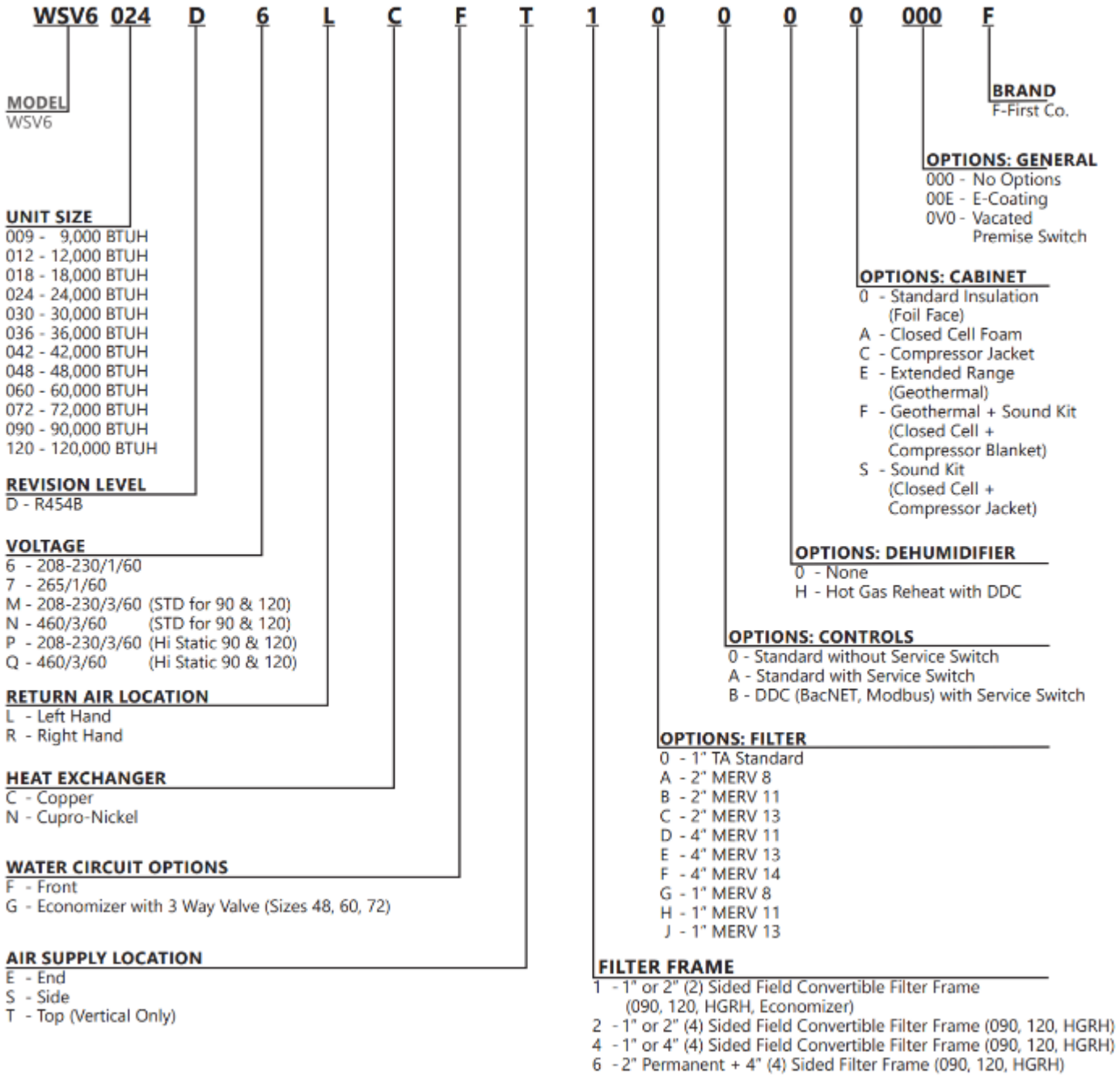


Figure 1 - Model Nomenclature

INTRODUCTION

The HydroTech WSV6 series water to air heat pump provide the best combination of performance, efficiency and reliability in a compact form factor. The WSV6 series comes standard with ECM blower motors for high efficiency and comfort. All WSV6 models feature double compressor vibration isolation for quiet operation, easy to remove blower housing for quick service, as well as a single compressor designs to lower system complexity and improve serviceability.

All WSV6 models are certified to AHRI ISO Standard 13256-1. The WSV6 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.

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

UNIT CLEARANCE REQUIREMENTS

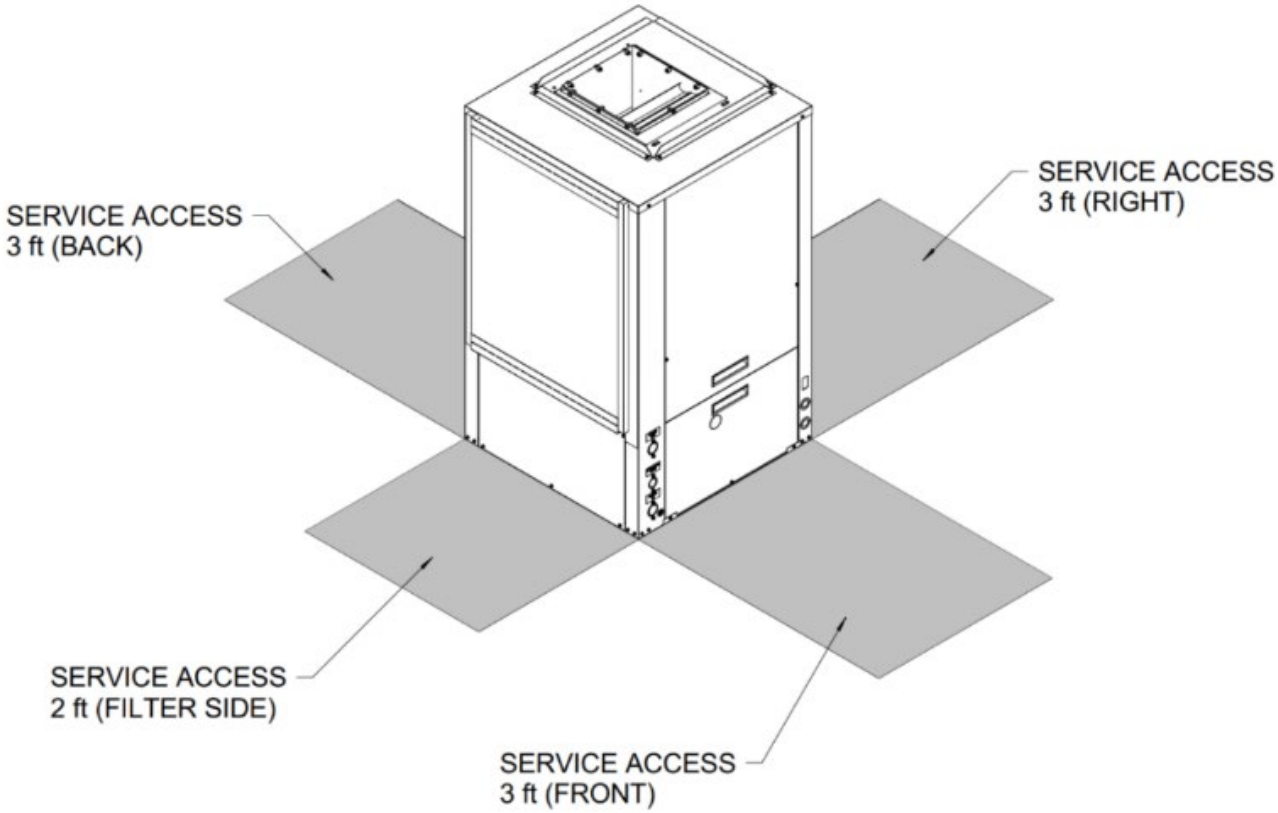


Figure 2 - Unit Clearance Requirements

MOUNTING DETAILS

Locate the unit in an area that provides minimum clearance accesses as specified by FIGURE 7 – Unit Clearance Requirements. Also, refer to this figure for detailed information on unit dimensional sizes. Consider all additional clearances needed for water connections, electrical connections, duct connections and sufficient return airflow.

UNITS ARE ONLY INTENDED FOR INDOOR INSTALLATION

DO NOT locate unit in areas subject to freezing temperatures or where high humidity levels could cause cabinet condensation. WSV6 units are available in right- and left-hand configurations. Units should be mounted level with a proper drain pan pitch toward the condensate drain as seen in FIGURE 8 – Mounting Installation. 3/8”-1/2” vibration isolation pads must be used to minimize vibration transmission.

NOTE

It is important to ensure the unit is securely mounted and that the mounting structure is sufficient to support the operating weight of the equipment. Place and size all anchors to ensure a safe and durable installation.

INSTALLATION CONTINUED

MOUNTING DETAILS CONTINUED

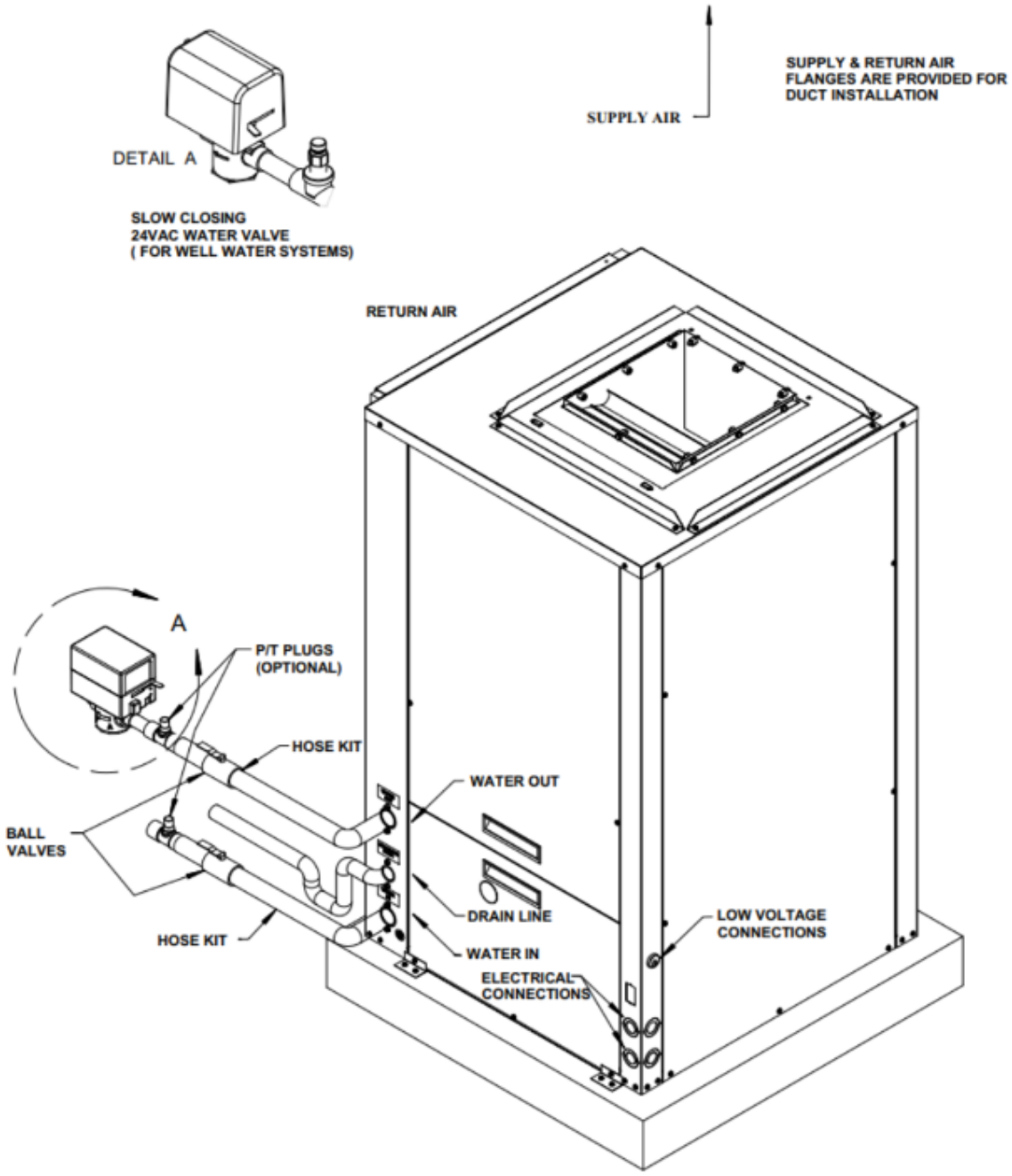


Figure 3 - Mounting Installation

INSTALLATION CONTINUED

Filter Brackets

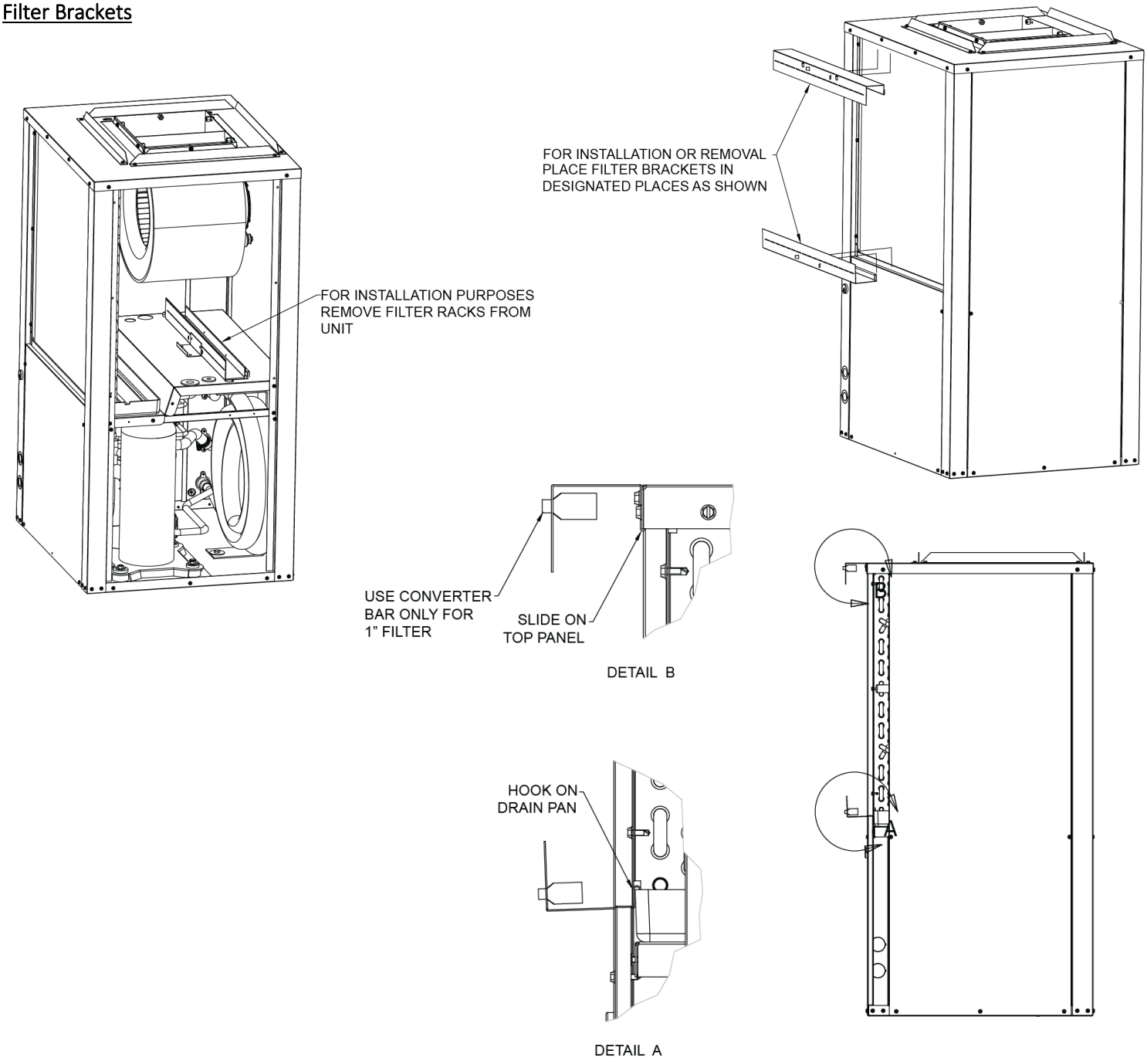


Figure 4 - Filter Bracket Detail

NOTE

Filter brackets are shipped within the unit, they are located within the blower compartment and must be mounted to the external cabinet prior to mounting/installing the unit. Refer to **Figure 9 – Filter Bracket Detail.**

WARNING

Remove shipping blocks from under blower housing before installing the unit.

INSTALLATION CONTINUED

PIPING NOTES

CAUTION

Prior to making piping connections, contractor must clean and flush water loop system. Failure to clean/flush system may result in excessive noise, tripping, and premature component failure.

1. Flush all field piping prior to connection to clear all debris.
2. Open all valves (mid-way for hand valves, manually open motorized valves) prior to soldering and brazing. Use proper heat shields to protect valve bodies.
3. When soldering or brazing to the unit, it is recommended to have a fire extinguisher readily available.
4. Use proper soldering and brazing techniques to protect valve bodies and unit components.
5. Avoid rapid quenching of soldered joints to prevent weakening.
6. Make provisions for expansion and contraction of piping systems to provide movement with temperature changes. Failure to make proper provisions will result in damage and failure of piping, fittings, and valves throughout the system.
7. DO NOT insulate the heads or motorized portion of control valves. Excessive heat build-up can cause damage and affect proper operation of the system.
8. Consider electrical routing when installing field piping.
9. Observe all regulations and codes governing installation of piping.
10. When all connections are complete, pressure test the system, and repair any leaks or faulty joints. Hydronic systems are not designed to hold pressurized air and should only be tested with water. Failure to observe this note could damage the system.

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.

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.

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, ensure that it is compatible with the Teflon tape that is applied.

The WSV6 water source heat pump is 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.

INSTALLATION CONTINUED

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 WSV6 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).

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.

INSTALLATION CONTINUED

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 10 – Condensate Drainage** 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.

CAUTION

Units equipped with the economizer option must have a separate externally trapped drain line for condensate removal.

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.

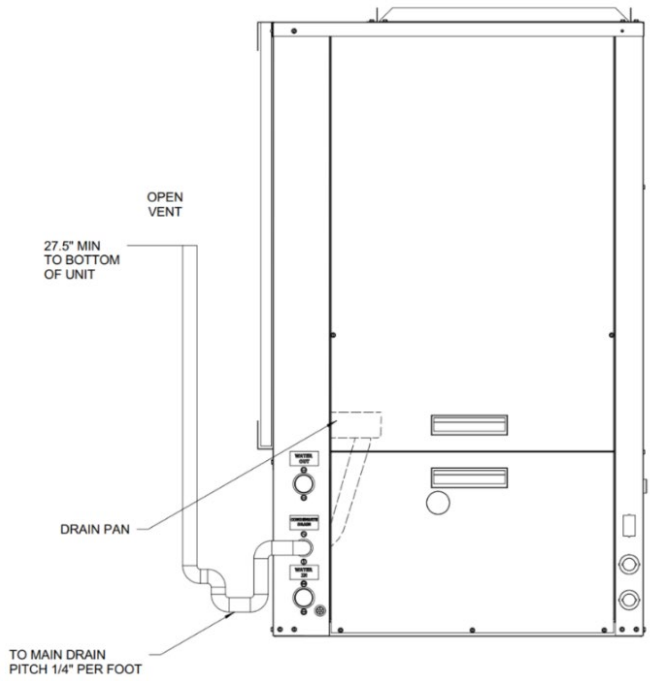


Figure 5 - Condensate Drainage

DUCTWORK

Discharge ductwork is normally used with these units. When return air ductwork is required, the unit is supplied with 1-inch filter rack/duct collar for connection of return air ductwork. All ductwork must be installed in accordance with National Fire Protection Assoc. Codes 90A and 90B. Supply and Return ducts must be sized properly as to not exceed static pressure capabilities Ducts should be adequately insulated to prevent condensation and to minimize heat loss. A flexible connector is recommended for supply air connections on metal duct systems.

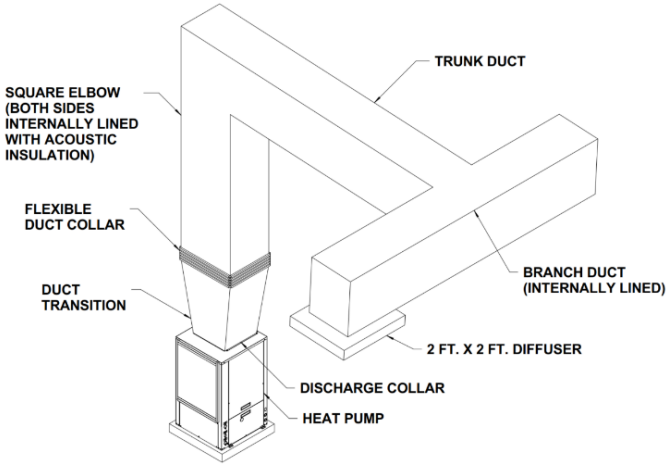


Figure 6 - Discharge Ducting

INSTALLATION CONTINUED

DISCHARGE DUCTING

All ductwork should conform to industry standards of good practice as described in ASHRAE System Guide. A field supplied discharge duct system will normally consist of flexible connector at the unit, a non-insulated transition piece to the full duct size, a short run of duct, an elbow without vanes and a trunk duct teeing into a branch circuit with discharge diffusers as shown in FIGURE 11 – Discharge Ducting. The transition piece must not have an angle greater than 30° or severe loss of air performance may result.

DO NOT connect the full duct size to the unit discharge collar without using a transition piece down to the size of the unit discharge collar. With metal material, the sides of the elbow and entire branch duct should be internally lined with acoustic insulation for sound attenuation. Glass Fiber duct board material is more absorbing and may permit omission of the flexible connector. The ductwork should be laid out so that there is no line of sight between the unit discharge and the distribution diffusers.

RETURN AIR DUCTING

Return air duct can be brought in through a wall grille and then to the unit. The return duct system will normally consist of flexible connector at the unit and a trunk duct to the return air grille. With metal duct material, the return air duct should be internally lined with acoustic insulation for sound attenuation. Glass Fiber duct board material is more absorbing and may permit omission of the flexible connector. A 1-inch air duct collar flange is included on the filter rack for ducted return air application. A flexible duct collar can then be attached between a duct transition and the return air ductwork. The return air duct transition must be the same size as the return air coil face area. See FIGURE 12 – Return Air Ducting.

CAUTION

Follow the filter rack kit installation instructions & recommendations carefully.

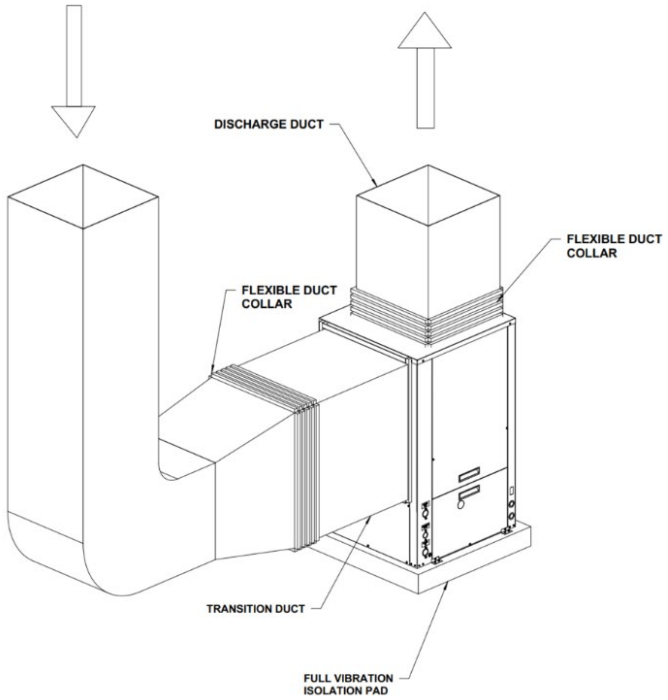


Figure 7 - Return Air Ducting

GENERAL INFORMATION

WARNING

FIRE OR EXPLOSION HAZARD

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.

Failure to follow proper A2L refrigerant mitigation system installation instructions can result in property damage, personal injury, or death. If any fault indicators are present, please troubleshoot to prevent system malfunction

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.

The manufacturer assumes no responsibility for equipment installed in violation of any code requirement.

These instructions give information relative to the installation of these heat pump units only. For other related equipment refer to the proper instruction.

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 and the material inspected in the presence of the carrier's representative. If damage is found, a claim should be filed against the carrier immediately.

If the equipment is not needed for immediate installation upon arrival at the job site then it should be left in its shipping carton and stored in a clean, dry location. Units must be stored or moved in the normal upright position at all times. If stacking of units is required, do not stack more than two units high.

Installation and servicing of this equipment can be hazardous due to the system pressure and electrical components. Only a qualified licensed installer or service agency should install, repair or service the equipment. Untrained personnel can perform basic functions of maintenance such as replacing filters.

Do not mix R-454B with air for leak testing or other purposes. Instead use a mixture of R-454B and nitrogen for leak testing.

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

In keeping with its policy of continuous progress and product improvement, the manufacturer reserves the right to discontinue or change without notice any or all specifications or designs without incurring obligations.

WARNING

This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.

Children should be supervised to ensure that they do not play with the appliance

Use adequate personal protection equipment when installing and performing maintenance. After switching off and locking-out an electrical disconnect, verify a safe condition with an electrical tester. Discharge a capacitor before handling any PSC motor and wiring. Use eye protection, cut resistant gloves and sleeves to protect against metal edges and screws.

GENERAL INFORMATION (CONT.)

IMPORTANT

DO NOT operate this unit in any mode during the construction process. Mechanical components and filters may clog 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.

This unit may be installed at altitudes up to 10,000 ft. (3,048 m)

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 manufacturer 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 WSV6 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 WSV6 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.

A2L SENSING AND MITIGATION

Units charged with more than 4 lb. (1.81 kg) of R454B refrigerant are shipped with factory installed refrigerant leak detector (A2L Sensor). In the event that a refrigerant leak is detected, the controls will disable the compressor operation and energize the evaporator fan to disperse the leaked refrigerant. The unit will operate in this mitigation state until the sensor no longer detects a refrigerant leak, for a minimum of 5 minutes. Once the mitigation period has ended, the unit will return to its normal operation based on the current thermostat inputs. An LED status light is provided with the sensor for diagnostic purposes, the description of the LED status light signals can be found in the troubleshooting section.

A2L Sensing & Mitigation					
System Charge		Minimum Room Area		Min. Mitigation Airflow	
(lb)	(kg)	(sq ft)	(sq m)	(CFM)	(cum/hr)
4	1.81	60	5.57	108	184
5	2.27	75	6.96	135	230
6	2.72	90	8.36	162	276
7	3.17	105	9.75	189	322
8	3.63	120	11.14	216	368
9	4.08	135	12.54	243	414
10	4.54	150	13.93	271	460
11	4.99	165	15.32	298	506
12	5.44	180	16.71	325	552
13	5.9	195	18.11	352	598
14	6.35	210	19.5	379	644
15	6.8	225	20.89	406	689
16	7.26	240	22.29	433	735
17	7.71	255	23.68	460	781
18	8.16	270	25.07	487	827
19	8.62	285	26.46	514	873
20	9.07	300	27.86	541	919
21	9.52	315	29.25	568	965
22	9.98	330	30.64	595	1011
23	10.43	345	32.04	622	1057
24	10.88	360	33.43	649	1103
25	11.34	375	34.82	676	1149

Table 1 – A2L Sensing & Mitigation

Altitude Correction Factor												
Altitude (m)	800	1000	1200	1400	1600	1800	2000	2200	2400	2800	3000	3200
Altitude (ft)	2625	3281	39.7	4693	5349	5906	6562	7218	7874	9186	9843	10499
Adj Factor (AF)	1.02	1.05	1.07	1.1	1.12	1.15	1.18	1.21	1.25	1.32	1.36	1.4

Table 2 – Altitude Correction Factor

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.

WARNING

Store cabinets how they are shipped (vertical), keeping them crated and on their pallets for protection. 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.

CAUTION

Stacking of the WSV6 Systems is strictly prohibited. Stacking units may result in system and/or property damage.

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

WSV6 units must remain in the upright position as seen in **FIGURE 2 – Standard Packaging** throughout the shipping and handling process to maintain a proper level of oil in the compressor.

NOTE

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

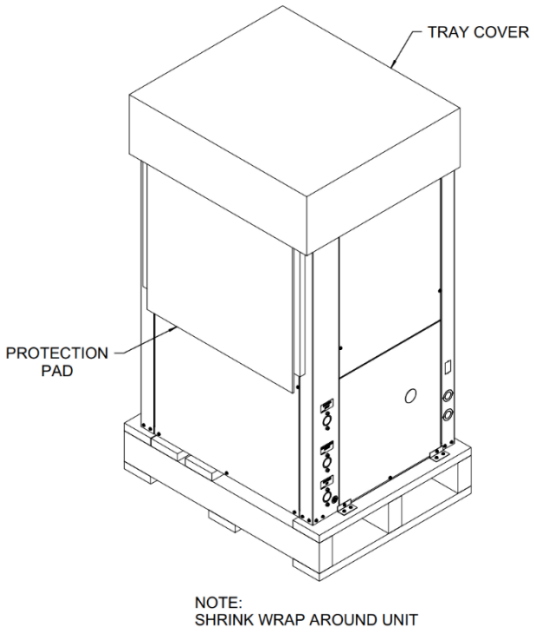


Figure 8 - Standard Packaging

PACKAGE LIST

The units will be shipped with the following items:

1- WSV6 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.

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 3 – Standard Packaging with Brackets 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.

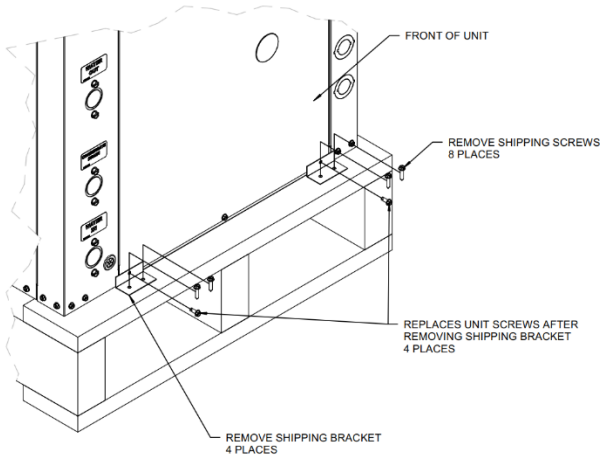


Figure 9 - Standard Packaging with Brackets

UNIT DIMENSIONAL DATA

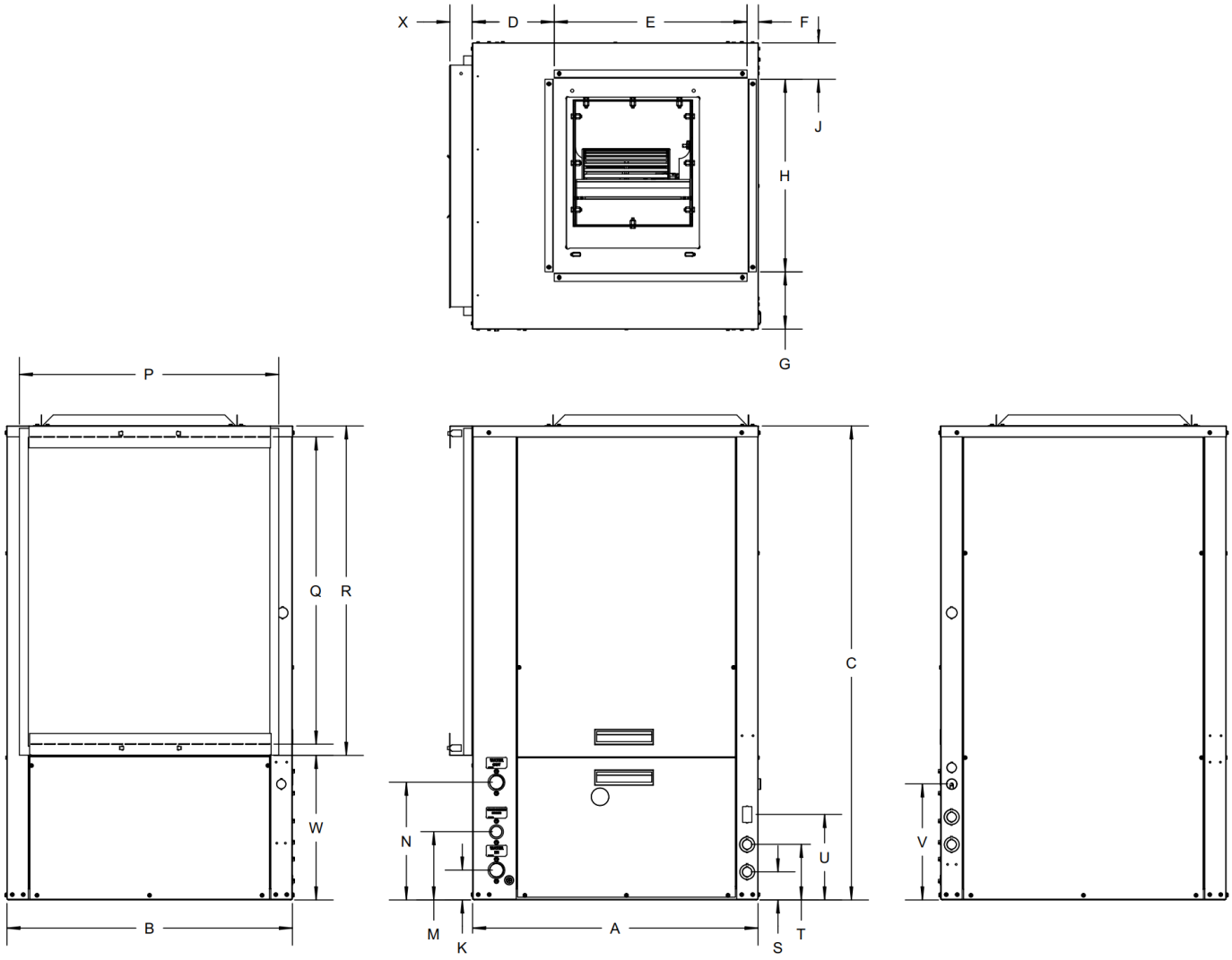


Figure 10 - Unit Dimensions

UNIT DIMENSIONAL DATA CONTINUED

DIMENSIONAL DATA									
MODEL	OVERALL CABINET			SUPPLY CONNECTIONS					
	A	B	C	D	E	F	G	H	J
WSV6009	21.50	21.50	36.25	9.50	7.75	4.25	4.50	12.75	4.25
WSV6012	21.50	21.50	36.25	9.50	7.75	4.25	4.50	12.75	4.25
WSV6018	21.50	21.50	36.25	5.50	13.75	2.25	3.50	16.25	1.75
WSV6024	21.50	21.50	36.25	5.50	13.75	2.25	3.50	16.25	1.75
WSV6030	21.50	21.50	39.25	5.50	13.75	2.25	3.50	16.25	1.75
WSV6036	21.50	26.00	43.25	5.00	15.75	0.75	5.00	16.25	4.75
WSV6042	26.00	26.00	43.25	7.25	17.75	1.00	5.00	17.75	3.25
WSV6048	26.00	26.00	43.25	7.25	17.75	1.00	5.00	17.75	3.25
WSV6060	26.00	26.00	51.25	5.25	19.00	1.75	4.75	19.00	2.25
WSV6072	26.00	26.00	51.25	5.25	19.00	1.75	4.75	19.00	2.25

Table 3 – Unit Dimensional Data

DIMENSIONAL DATA CONTINUED												
MODEL	WATER CONNECTION			RETURN AIR CONNECTION			ELECTRICAL CONNECTION				W	X
	K	M	N	P	Q	R	S	T	U	V		
WSV6009	2.75	7.25	13.25	17.50	16.00	18.00	4.25	6.75	10.50	15.00	18.25	2.00
WSV6012	2.75	7.25	13.25	17.50	16.00	18.00	4.25	6.75	10.50	15.00	18.25	2.00
WSV6018	2.75	7.25	13.25	17.50	16.00	18.00	4.25	6.75	10.50	15.00	18.25	2.00
WSV6024	2.75	7.25	12.75	17.50	16.00	18.00	4.25	6.75	10.50	15.00	18.25	2.00
WSV6030	2.75	7.25	12.75	17.50	18.00	20.00	4.25	6.75	10.50	15.00	19.25	2.00
WSV6036	2.75	7.25	12.75	17.50	22.00	24.00	4.25	6.75	10.50	15.00	19.25	2.00
WSV6042	2.75	6.25	10.75 LH 16.75 RH	22.00	28.00	30.00	2.50	5.00	7.75	10.50	13.25	2.00
WSV6048	2.75	6.25	10.75	22.00	28.00	30.00	2.50	5.00	7.75	10.50	13.25	2.00
WSV6060	2.75	6.25	10.75	22.00	28.00	38.00	2.50	5.00	7.75	10.50	13.25	2.00
WSV6072	2.75	6.25	10.75	22.00	28.00	38.00	2.50	5.00	7.75	10.50	13.25	2.00

Table 4 – Unit Dimensional Data Continued

UNIT DIMENSIONAL DATA - ECONOMIZER

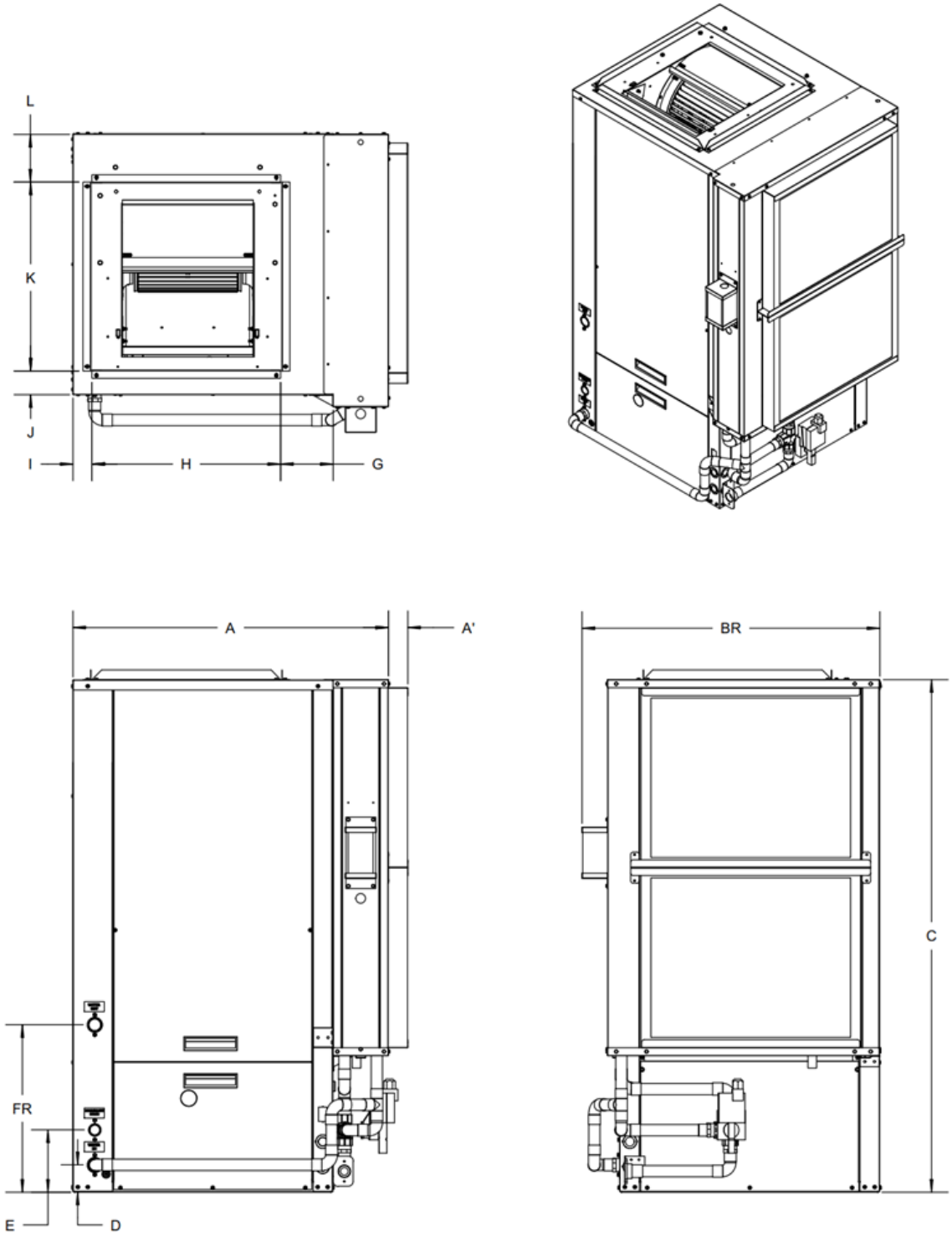


Figure 11 - Unit Dimensions Economizer RH

UNIT DIMENSIONAL DATA - ECONOMIZER CONTINUED

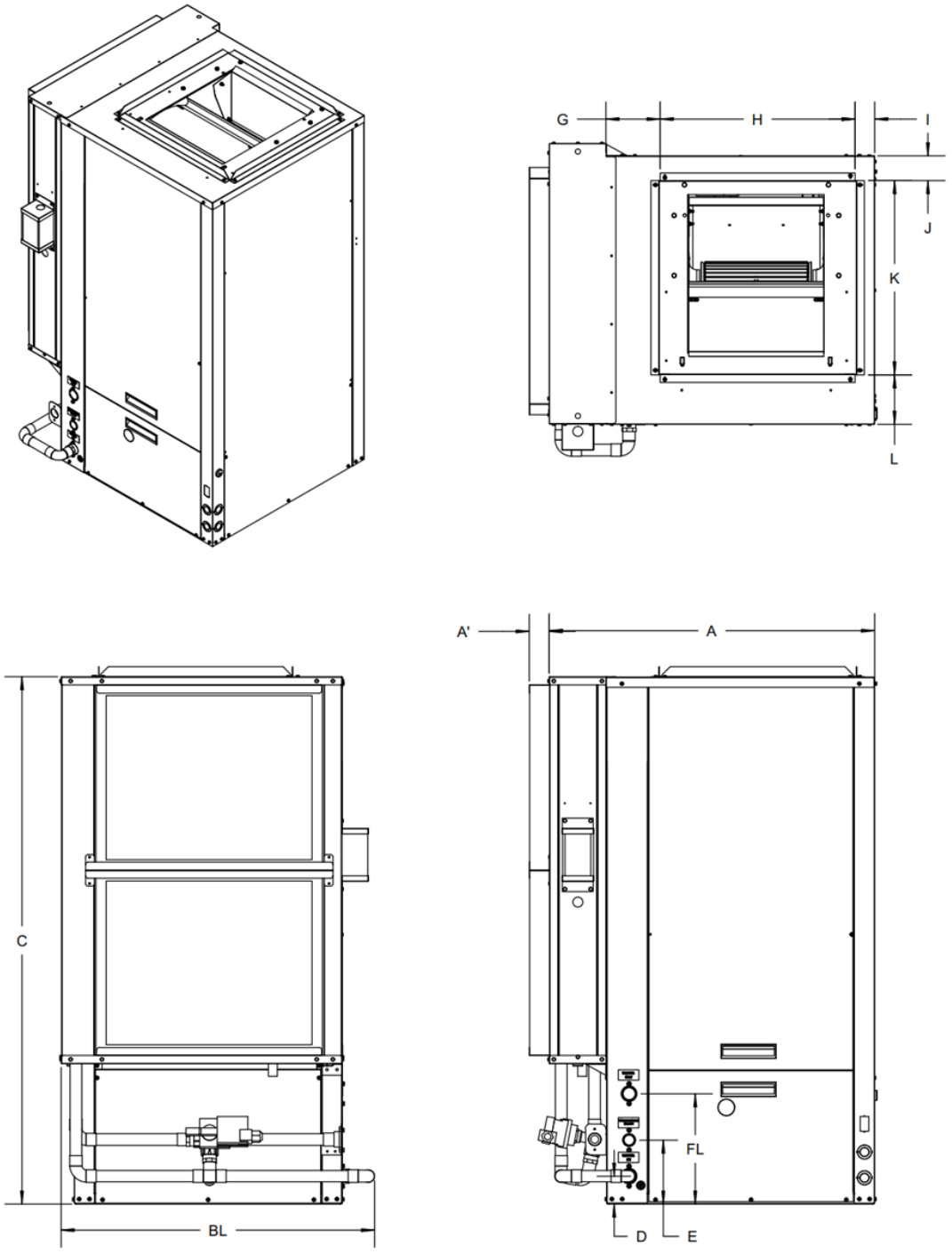


Figure 12 - Unit Dimensions Economizer LH

DIMENSIONAL DATA - ECONOMIZER																
MODEL	A	A'		B		C	D	E	F		G	H	I	J	K	L
		1"	2"	L	R				L	R						
WSV6048	31.59	0.91	1.91	30.39	29.82	43.16	2.72	6.22	10.72	16.72	5.25	18.88	1.92	2.38	18.88	4.77
WSV6060	31.59	0.91	1.91	30.39	29.82	51.20	2.72	6.22	10.72	16.72	5.25	18.88	1.92	2.38	18.88	4.77
WSV6072	31.59	0.91	1.91	30.39	29.82	51.20	2.72	6.22	10.72	16.72	5.25	18.88	1.92	2.38	18.88	4.77

Table 5 – Unit Dimensional Data - Economizer

UNIT PHYSICAL DATA

PHYSICAL DATA										
WSV6 MODELS	009	012	018	024	030	036	042	048	060	072
UNIT INFORMATION										
Compressor Type (Qty)	Rotary (1)		Scroll (1)							
Factory Charge (R-454B) lbs (kg)	1.5 (0.68)	1.62 (0.73)	1.93 (0.88)	2.22 (1.00)	2.8 (1.27)	3.1 (1.41)	4.14 (1.88)	4.3 (1.95)	6.01 (2.77)	5.02 (2.28)
A2L Sensor and Mitigation YES/NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
Minimum Room Area Ft^2 (m^2)	NA	NA	NA	NA	NA	NA	62 (6)	68 (6)	75 (7)	114 (11)
Minimum Air Flow CFM (m^3/hr)	NA	NA	NA	NA	NA	NA	111 (189)	123 (210)	135 (230)	205 (348)
Fan Motor Type (Qty)	ECM (1)	ECM (1)	ECM (1)	ECM (1)	ECM (1)	ECM (1)	ECM (1)	ECM (1)	ECM (1)	ECM (1)
Fan Motor HP	1/4	1/4	1/3	1/2	1/2	1/2	3/4	1	1	1
Blower Wheel Size (D x W) in.	6.75 x 7	6.75 x 7	9 x 7	9 x 7	10 x 8	10 x 8	10 x 8	10 x 8	11 x 10	11 x 10
Water Connection FPT (in)	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1	1
COAX Volume (US Gallons)	0.12	0.14	0.14	0.36	0.43	0.53	0.62	0.91	0.91	1.08
Condensate Connection FPT (in)	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Air Coil Dimension (H x W) in.	18 x 16.375	18 x 16.375	18 x 16.375	18 x 16.375	20 x 16.25	24 x 20.875	28 x 20.875	28 x 20.875	36 x 20.875	36 x 20.875
Filter Size (H x W) in.	18 x 20	18 x 20	18 x 20	18 x 20	20 x 20	24 x 24	24 x 30	24 x 30	18 x 24 20 x 24	18 x 24 20 x 24
Filter (Qty)	1	1	1	1	1	1	1	1	2	2
Operating Weight lb.	155	160	190	205	215	250	290	315	360	365
Shipping Weight lb.	164	166	195	208	221	254	295	320	365	370

Table 6 – Physical Data

Altitude Correction Factor													
Altitude 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 7 – Altitude Correction Factor

ELECTRICAL DATA

ELECTRICAL DATA							
MODEL	VOLTAGE-PH-HZ	COMPRESSOR		BLOWER MOTOR		MIN. CIRCUIT AMPACITY	MAX. CIRCUIT PROTECTION
		RLA	LRA	FLA	HP		
WSV6009	208/230V-1-60	3.97	22	2.3	1/4	8	15
	265V-1-60	3.97	23	2.3	1/4	8	15
WSV6012	208/230V-1-60	4.7	25	2.3	1/4	9	15
	265V-1-60	3.91	21	2.3	1/4	8	15
WSV6018	208/230V-1-60	7.18	47	2.8	1/3	12	15
	265V-1-60	5.45	36	2.6	1/3	10	15
WSV6024	208/230V-1-60	11.3	63	4.6	1/2	19	30
	265-1-60	8.09	45	3.6	1/2	14	20
	208/230V-3-60	7.7	59.9	4.6	1/2	15	20
	460V-3-60	3.8	32.4	2.1	1/2	7	15
WSV6030	208/230V-1-60	12.8	71	4.6	1/2	21	30
	265V-1-60	10.4	68	3.6	1/2	17	25
	208/230V-3-60	8.3	67.7	4.6	1/2	15	20
	460V-3-60	5.1	38.1	2.1	1/2	9	15
WSV6036	208/230V-1-60	15.5	86	4.6	1/2	24	35
	265V-1-60	10.26	55	3.6	1/2	17	25
	208/230V-3-60	21.84	70	4.6	1/2	32	50
	460V-3-60	7.1	39	2.1	1/2	11	15
WSV6042	208/230V-1-60	17.3	96	6.3	3/4	28	45
	208/230V-3-60	23.2	90	6.3	3/4	36	50
	460V-3-60	6.5	36	3.2	3/4	12	15
WSV6048	208/230V-1-60	19.3	102	7.6	1	32	50
	208/230V-3-60	22.1	123	7.6	1	36	50
	460V-3-60	10.7	60	4.0	1	18	25
WSV6060	208/230V-1-60	26.6	148	7.6	1	41	60
	208/230V-3-60	16.7	93	7.6	1	29	45
	460V-3-60	6.6	60	4.0	1	13	15
WSV6072	208/230V-1-60	30.1	170	7.6	1	46	70
	208/230V-3-60	21.2	156.5	7.6	1	35	50
	460V-3-60	9.1	74.8	4.0	1	16	20

Table 8 – Electrical Data

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 WSV6 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.

WARNING

ELECTRIC SHOCK HAZARD

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

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 13 – Thermostat Connections as follows:

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

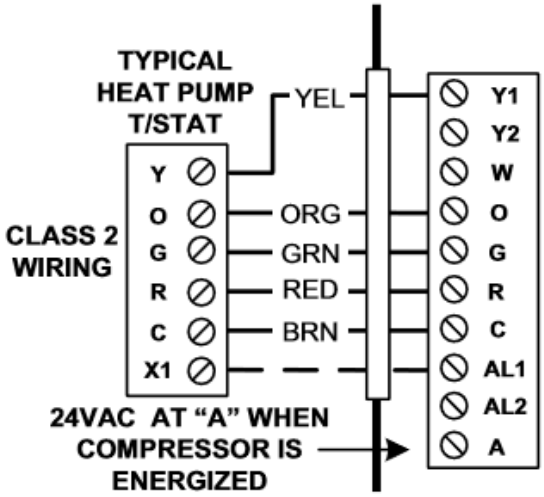


Figure 13 - Thermostat Connections

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

Transformers are multi-voltage; it is crucial to refer to unit wiring diagram as well as unit voltage to ensure proper connections and operation safety.

LEAK CHECK

After pipe installation perform a leak check to ensure that no leakage of refrigerants will occur. Use nitrogen to pressure test at a minimum of 200 psig. Pressure must not decrease within 1 hour. Care must be taken to not use any leak detectors which may cause corrosion on the copper tubing.

Evacuate the suction and liquid lines at the outdoor unit service valves to 500 microns. Isolate the vacuum pump from the piping. The vacuum must not exceed 1500 microns in 10 minutes.

REFRIGERANT CHARGING

WARNING

FIRE OR EXPLOSION HAZARD

Failure to following this warning could result in personal injury, death and/or property damage.

Do not use flames or any potential ignition sources to leak check refrigerant tubing or components.

IMPORTANT

Any metering device installed in the refrigerant circuit must be compatible with the refrigerant used.

Use adequate personal protection equipment when handling refrigerant including, but not limited to eye and hand protection. Consult the outdoor unit manufacturer's instructions for refrigerant charging and consider all pertinent factors when determining the method of charging and the amount of refrigerant required; indoor and outdoor temperatures and humidity, the factory charge amount of the outdoor unit, the length and diameter of tubing between the indoor and outdoor units, the type of metering device installed.

WARNING

It is illegal to discharge refrigerant into the atmosphere. Use proper reclaiming methods and equipment when installing or servicing this unit. A QUALIFIED service agency should perform this service.

WARNING

IMPROPER HANDLING OF REFRIGERANTS CAN CAUSE INJURY, EXPLOSION AND DEATH

- It is illegal to release refrigerant into the atmosphere. Refrigerant released into an enclosed space will displace oxygen causing unconsciousness and death.
- If an indoor refrigerant leak is suspected, thoroughly ventilate the area before beginning any work
- DO NOT purge or allow refrigerant to be released into an interior space
- Contact with liquid refrigerant can cause frostbite and blindness. Avoid skin contact with liquid refrigerant, wear goggles and gloves when working with refrigerants. Seek medical help immediately if any refrigerant contact with skin or eyes occurs
- Never burn refrigerant as highly toxic gas will be produced
- Only EPA certified technicians should handle refrigerants.
- In Canada technicians must be ODP / ODS certified to handle refrigerants
- Follow all EPA regulations

WARNING

It is illegal to discharge refrigerant into the atmosphere. Use proper reclaiming methods and equipment when installing or servicing this unit. A QUALIFIED service agency should perform this service.

Follow the outdoor unit manufacturer's instructions for adding refrigerant to a partially charged system.

FLAMMABLE REFRIGERANT LEAK DETECTION

Under no circumstances should potential sources of ignition be used for detecting refrigerant leaks. Devices such as halide torches (or other detectors using a naked flame) are strictly prohibited. Acceptable methods for refrigerant leak detection include:

REFRIGERANT CHARGING CONT.

- Electronic Leak Detectors: These may be used to detect refrigerant leaks; however, for flammable refrigerants, ensure the sensitivity is adequate and the equipment is recalibrated as necessary. Calibration must occur in a refrigerant-free area. The detector must not pose an ignition risk and should be specifically suited for the refrigerant used. Set the detection equipment to a percentage of the refrigerant's Lower Flammability Limit (LFL), with a maximum setting of 25%. Ensure calibration corresponds to the refrigerant employed.
- Leak Detection Fluids: Fluids such as the bubble method or fluorescent agents are suitable. Avoid detergents containing chlorine, as these may react with the refrigerant and corrode copper pipework.

Important Note: If a refrigerant leak is suspected, all open flames must be extinguished. For leaks requiring brazing, recover all refrigerant from the system or isolate it using shut-off valves in a remote part of the system. Removal of refrigerant must follow the removal and evacuation procedures.

REFRIGERANT CHARGING INSTRUCTIONS

When charging the system in cooling mode, ensure the outdoor temperature is 60°F or higher. Operate the system for a minimum of 15 minutes between adjustments to allow the pressures to stabilize. Systems equipped with micro-channel outdoor coils require small adjustments of 1 ounce or less, as they are highly sensitive to refrigerant charge.

TXV Charging

1. Refer to the instructions provided with the outdoor unit.
2. Alternatively, for AC units, charge to achieve 12°F sub-cooling. For heat pump units, charge to 10°F sub-cooling.
3. If the system is equipped with an adjustable valve, adjust to achieve 10°F superheat.

Fixed Orifice Charging

1. Use the superheat value recommended in the outdoor unit instructions for A1 (R-410) and A2L (R-454B & R-32) refrigerants.
2. Heat pump units initially charged in cooling mode may require final charge adjustments in heating mode, if necessary. For units requiring charging in heating mode, refer to the outdoor unit instructions.

If the system is undercharged after the initial charge, add refrigerant until the sight glass is clear and the recommended pressures, temperatures, sub-cooling, and superheat are achieved. If the system is overcharged, recover refrigerant until these values are within recommended limits.

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 9 – 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.

APPLICATION CONTINUED (ECONOMIZER)

OVERVIEW

In large commercial buildings, it is common for simultaneous heating and cooling loads to be required during the winter and shoulder seasons. In order to balance the need for different heating and cooling loads, an economizer can be used to provide "free" cooling to spaces that require it. The water-source heat pumps nearer to the exterior of the building will heat the space by extracting heat from the building's fluid supply. The chilled fluid supply can then be used to provide cooling, by passing the fluid through the economizer coil.

FEATURES AND BENEFITS

The Hydrotech WSV6 waterside economizer option is a modular hydronic cooling coil that uses the buildings water loop to provide "free" cooling to the space. The economizer works by sensing the entering fluid temperature into the water-source heat pump and when the temperature falls below a specified set point, the system will turn off the compressor and divert the incoming chilled fluid into the economizer coil.

The ASHRAE 90.1 Energy Standard for Buildings, requires that water-source heat pumps over 54,000 BTUH of capacity be equipped with a water-side economizer. For the jurisdictions in which the ASHRAE 90.1 2019 standard is fully ratified, the Hydrotech WSV6 waterside economizer option satisfies all ASHRAE 90.1 requirements for the inclusion of an economizer on water-source heat pump units.

ECONOMIZER PERFORMANCE DATA

ECONOMIZER PERFORMANCE TABLE				
Unit	Airflow	Flowrate	Pressure Drop	Coil Pressure Drop
	SCFM	GPM	FOH	IWC
WSV6048	1200	6	1.5	0.18
	1400	9	3.3	0.22
	1600	12	5.7	0.28
WSV6060	1500	7.5	1.8	0.15
	1750	11.3	3.8	0.19
	2000	15	6.5	0.23
WSV6072	1200	9	2.5	0.21
	1400	13.5	5.3	0.27
	1600	18	9.2	0.32
NOTE: Pressure drop measured at 45° EWT				

Table 10 – Economizer Performance Data

To ensure optimum performance of the economizer coil, it is recommended that the EWT temperature be between 40°F – 50°F. Temperatures above 50°F will limit effectiveness of the economizer coil. The electronic temperature sensor has a default set point value of 45°F.

The economizer coil adds a substantial amount of additional static pressure to the unit's blower system. To ensure adequate airflow refer to **TABLE 7 – Economizer Performance Data**.

APPLICATION CONTINUED

HOT GAS REHEAT DEHUMIDIFICATION

OVERVIEW

Because ventilation air is introduced into buildings, indoor air quality (IAQ) and relative humidity (RH) are important issues to address in selecting heating and cooling equipment. With the Hydrotech WSV6 hot gas reheat dehumidification option, the return air from space is conditioned by a dedicated air-to-refrigerant coil and then reheated by a reheat coil to control space temperature and reduce space relative humidity. Reduced relative humidity levels also provide an improvement in indoor air quality.

ON/OFF HOT GAS REHEAT

The Hydrotech WSV6 hot gas reheat dehumidification has DDC control so the unit is BMS (BACnet MSTP) ready. See IOM8083D01 for more information on DDC Controller. Besides DDC controller, hot gas reheat dehumidification consists of a reheat coil (mounting of the air leaving side of the indoor air coil), a reheat valve and a bleed off valve. With this hot gas reheat dehumidification option, the return air from the space is conditioned by the air-to-refrigerant indoor air coil, then reheated by the reheat coil to control not only the space temperature, but to also reduce the relative humidity of the space. The hot gas reheat dehumidification functions only during the cooling cycle.

DEHUMIDIFICATION

When the space sensible temperature has been met (thermostat is satisfied) and the space relative humidity is still higher than set point (de-humidistat has not satisfied), the unit will operate in the dehumidification mode. The reheat valve energizes, allowing the high-pressure refrigerant gas to flow from the compressor through the reversing valve. The high pressure and hot refrigerant is diverted in two paths. One goes through the reheat valve then the reheat coil to raise the leaving air temperature. The other goes through the coaxial coil. The 2-phase refrigerant from the reheat coil and the liquid refrigerant from the coaxial are mixed before entering the evaporator for dehumidification. Dehumidification will stop when either de-humidistat has been satisfied or there is demand of space sensible temperature. If there is a demand from space sensible temperature, the unit will operate in cooling mode.

APPLICATION CONTINUED

ANTIFREEZE CORRECTION FACTORS DATA

ANTIFREEZE	ETHYLENE GLYCOL				
	10%	20%	30%	40%	50%
COOLING CAPACITY	0.995	0.992	0.987	0.983	0.979
HEATING CAPACITY	0.991	0.982	0.977	0.969	0.961
PRESSURE DROP	1.070	1.130	1.180	1.260	1.280

Table 11 - Antifreeze Correction Factors Ethylene Gycol

ANTIFREEZE	PROPYLENE GLYCOL				
	10%	20%	30%	40%	50%
COOLING CAPACITY	0.990	0.980	0.970	0.960	0.950
HEATING CAPACITY	0.987	0.975	0.962	0.942	0.930
PRESSURE DROP	1.070	1.150	1.250	1.370	1.420

Table 12 - Antifreeze Correction Factors Propylene Gycol

ANTIFREEZE	METHANOL	
	10%	20%
COOLING CAPACITY	0.980	0.972
HEATING CAPACITY	0.950	0.970
PRESSURE DROP	1.023	1.067

Table 13 - Antifreeze Correction Factors Methanol

ANTIFREEZE	ETHANOL	
	10%	20%
COOLING CAPACITY	0.991	0.951
HEATING CAPACITY	0.995	0.960
PRESSURE DROP	1.035	0.960

Table 14 - Antifreeze Correction Factors Ethanol

CONTROLS

SEQUENCE OF OPERATION

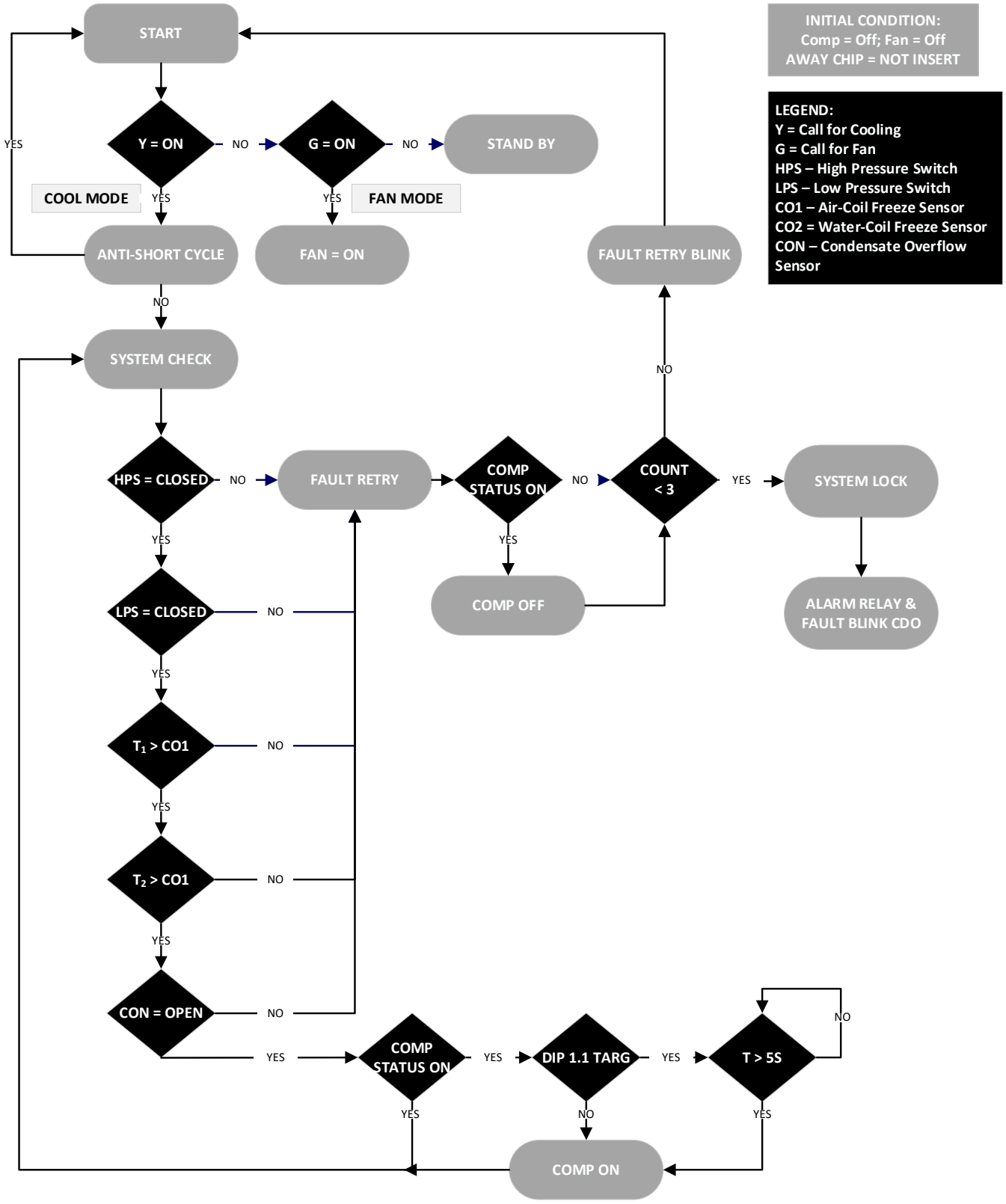


Figure 14 - Sequence of Operations

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	G2
Y	G3
Y,O,G	G2, then G3 after 10min of run time

Table 15 – 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.

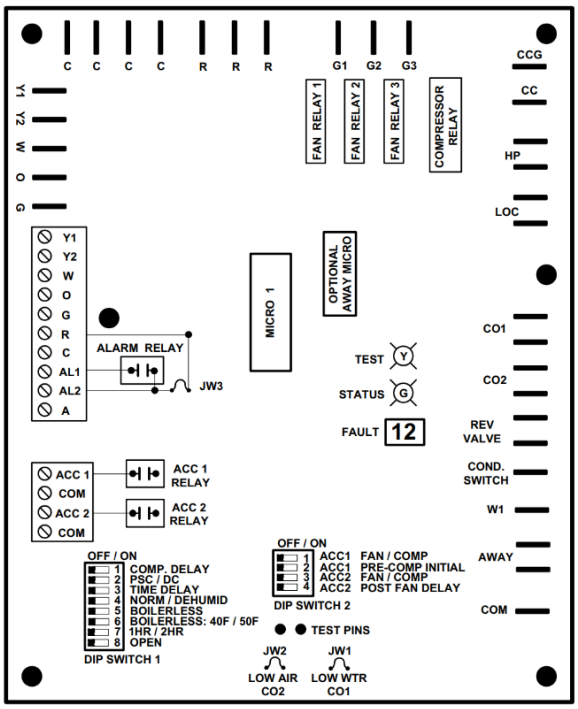


Figure 15 - Control Board Layout

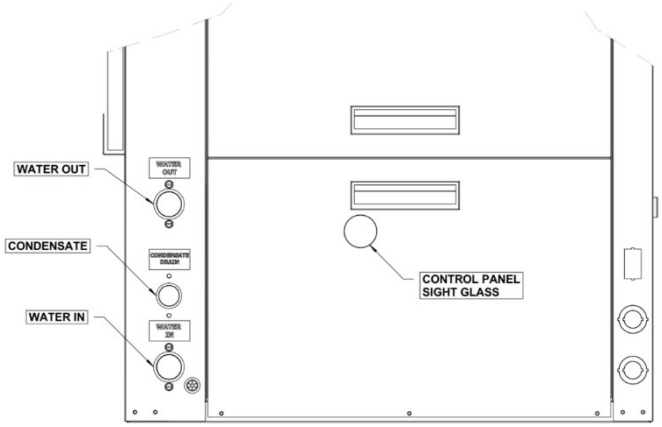


Figure 16 - Sight Glass Location

CONTROLS CONTINUED

ELECTRONIC TEMPERATURE CONTROLLER (ECONOMIZER)

NOTE

The electronic temperature controller must be configured prior to the initial unit start-up in order for the economizer parameters be entered.

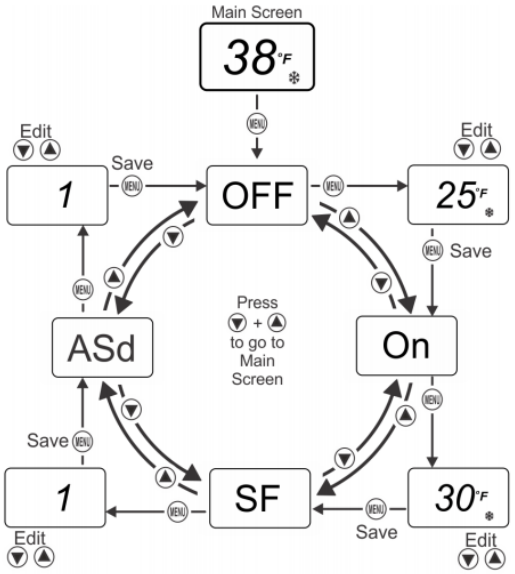


Figure 17 - Electronic Temperature Controller

VIEWING AND CHANGING BASIC MENU VALUES

To access the Basic menu and view and change the Basic parameter values, complete the following steps.

1. On the Main screen, press MENU. The LCD displays OFF, which is the first parameter code screen displayed in the Basic menu.
2. To scroll through all of the basic parameter codes and display the preferred code, press Down or Up.
3. With the preferred parameter code displayed, press MENU to display the current parameter value for the code.
4. With the current parameter value displayed, press Down or Up to scroll through all of the parameter's usable values and display the preferred value.
5. With the preferred parameter value displayed, press MENU to save the displayed value and go to the next parameter code.
6. To exit the Basic menu and go to the Advanced menu, simultaneously press and hold Down or Up for 5 seconds.

ECONOMIZER PARAMETER CODES AND MODES OF OPERATION

RELAY OFF TEMPERATURE (OFF)

Select the temperature in which the 3-way valve de-energizes and the unit returns to cooling mode. Once the controller reaches the relay off temperature, the green LED on the controller will turn off. It is recommended that this temperature be set between 50-55°F.

RELAY ON TEMPERATURE (ON)

Select the temperature in which the 3-way valve energizes and the unit enters into economizer mode. Once the controller reaches the relay on temperature, the green LED on the controller will turn on. It is recommended that this temperature be set between 40-45°F.

ANTI-SHORT CYCLE DELAY (ASD)

Select the minimum time that the output relay remains off (de-energized) before the next on-cycle can begin. Setting an ASD interval overrides the output relay and prevents the 3-way valve from being energized during this time. When the ASD value is greater than 0, the delay interval will begin every time the controller turns on and every time that an off-cycle begins. It is recommended that this be set to 3.

SENSOR FAILURE MODE (SF)

Describes the functionality of the control in the event of a sensor failure. Value must be set to 0.

RECOMMENDED CONTROLLER PARAMETERS		
PARAMETER CODE	PARAMETER DESCRIPTION	RECOMMENDED PARAMETERS
Un	Relay Off Temperature	55
Off	Relay On Temperature	45
On	Anti-Short Cycle Delay	3
SO	Sensor Failure Mode	0

Table 16 – WSCM DIP Switch Functions

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 17 – 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 18 – 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 19 – WSCM DIP Switch Functions

CONTROL BOX DETAIL

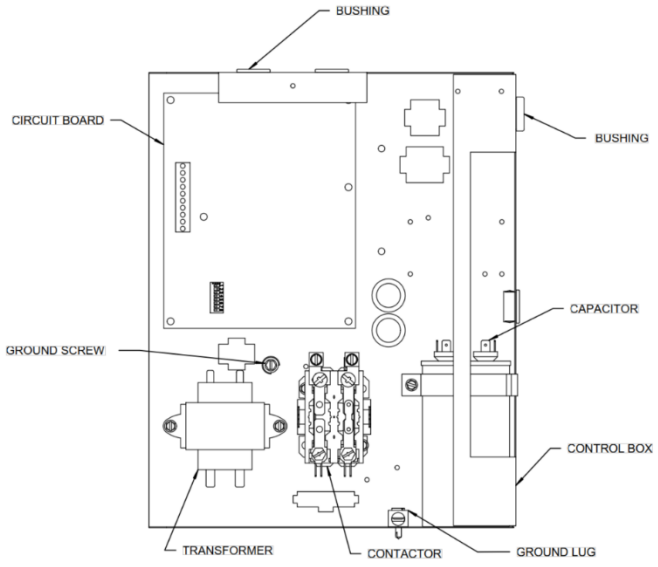


Figure 18 - Control Box Layout

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 electrical harnesses
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.

A2L SENSING AND MITIGATION

Units charged with over 4lbs (1.81kg) of R454B refrigerant are shipped with a factory installed refrigerant leak detector attached to the evaporator coil. In the event that a refrigerant leak is detected, the controls will disable the compressor operation, and energize the evaporator fan to disperse the leaked refrigerant. The unit will operate in this mitigation state until the sensor no longer detects a refrigerant leak, for a minimum time of 5 minutes. Once the mitigation period has ended, the unit will return to its normal operation based on the current thermostat inputs. An LED status light is provided with the sensor for diagnostic purposes, the description of the LED status light signals can be found in the troubleshooting section.

PERFORMANCE DATA

BLOWER DATA

BLOWER DATA														
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	0.6	0.7	0.8	0.9	1.0	1-10 MIN	10+ MIN	
WSV6009	WHT	330	380	360	330	300	270	250						X	X
	VIO		360	330	300	260	230						X		
	GRY		310	290	270	250									
WSV6012	WHT	430	470	450	430	400	370	340	310					X	X
	VIO		440	410	380	350	320	300					X		
	GRY		380	360	340	320	300								
WSV6018	T3	600	730	700	660	630	590	550	520					X	X
	T2		610	580	540	500	460						X		
	T1		540	510	480	450									
WSV6024	T3	800	900	870	840	810	780	750	720					X	X
	T2		760	740	710	650	610						X		
	T1		700	670	630	600									
WSV6030	T3	925	1,160	1,130	1,100	1,070	1,040	1,010	980	950	930	900		X	X
	T2		1,040	1,000	980	940	900	870	840	810			X		
	T1		940	910	870	830	800	760							
WSV6036	T3	1150	1,380	1,350	1,320	1,290	1,270	1,240	1,210	1,180	1,150	1,120		X	X
	T2		1,130	1,090	1,060	1,030	1,000	970					X		
	T1		1,060	1,030	990	960									
WSV6042	T3	1330	1,420	1,400	1,370	1,340	1,320	1,290	1,260	1,230	1,200	1,170		X	X
	T2		1,330	1,300	1,270	1,240	1,220	1,190	1,160	1,130			X		
	T1		1,190	1,160	1,130	1,100									
WSV6048	T3	1500	1,660	1,630	1,620	1,580	1,560	1,520	1,490	1,460	1,430	1,400		X	X
	T2		1,550	1,530	1,510	1,480	1,450	1,420	1,390	1,360	1,330	1,300	X		
	T1		1,370	1,350	1,330	1,290	1,260								
WSV6048 ECON	T3	1500	1,660	1,630	1,620	1,580	1,560	1,520	1,490	1,460	1,430	1,400		X	X
	T2		1,550	1,530	1,510	1,480	1,450	1,420	1,390	1,360	1,330	1,300	X		
	T1		1,370	1,350	1,330	1,290	1,260								
WSV6060	T3	1875	2,290	2,250	2,210	2,160	2,120	2,070	2,020	1,970	1,910	1,840		X	X
	T2		1,920	1,880	1,840	1,790	1,750	1,700	1,650	1,600	1,540	1470	X		
	T1		1,820	1,780	1,730	1,690	1,640	1,590	1,550	1,490	1440	1370			
WSV6060 ECON	T3	1875	2,290	2,250	2,210	2,160	2,120	2,070	2,020	1,970	1,910	1,840		X	X
	T2		1,920	1,880	1,840	1,790	1,750	1,700	1,650	1,600	1,540	1470	X		
	T1		1,820	1,780	1,730	1,690	1,640	1,590	1,550	1,490	1440	1370			
WSV6072	T3	1900	2,290	2,250	2,210	2,160	2,120	2,070	2,020	1,970	1,910	1,840		X	X
	T2		2,140	2,100	2,060	2,010	1,970	1,920	1,870	1820	1760	1690	X		
	T1		1,990	1,950	1,910	1,860	1820	1770	1720	1670	1610	1540			
WSV6072 ECON	T3	1900	2,290	2,250	2,210	2,160	2,120	2,070	2,020	1,970	1,910	1,840		X	X
	T2		2,140	2,100	2,060	2,010	1,970	1,920	1,870	1820	1760	1690	X		
	T1		1,990	1,950	1,910	1,860	1820	1770	1720	1670	1610	1540			

Airflow data shown is with a dry coil at 70°F DB EAT and with standard 1" filter.

Table 20 – WSV6 Blower Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6009 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	258-268	17-23	7-11
	1.7					62-72	262-272	18-24	5-9
	2.3					63-73	264-274	18-24	3-7
50	1.1	128-138	214-224	22-28	21-25	83-93	290-300	22-28	9-13
	1.7	137-147	193-203	22-28	13-17	90-100	296-206	24-30	6-10
	2.3	126-136	183-193	22-28	10-14	93-103	299-309	24-30	4-8
70	1.1	132-142	284-294	21-27	20-24	118-128	324-334	29-35	13-17
	1.7	130-140	260-270	21-27	13-17	120-130	335-345	30-36	9-13
	2.3	130-140	249-259	21-27	9-13	144-154	340-350	32-38	6-10
90	1.1	135-145	367-377	19-25	19-23	159-169	373-383	37-43	17-21
	1.7	134-144	342-352	20-26	12-16	175-185	383-393	39-45	12-16
	2.3	134-144	330-340	20-26	9-13	184-194	392-402	41-47	9-13
110	1.1	142-152	468-478	18-24	18-22	Operation Not Recommended			
	1.7	140-150	442-452	18-24	12-16				
	2.3	139-149	430-440	19-25	8-12				

Table 21 – WSV6009 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6012 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					59-69	263-273	16-22	7-11
	2.3					64-57	268-278	17-23	4-8
	3					68-78	270-280	18-24	3-7
50	1.5	126-136	215-225	20-26	21-25	85-95	296-306	22-28	9-13
	2.3	125-135	194-204	21-27	13-17	92-102	303-313	23-29	6-10
	3	124-134	183-193	21-27	9-13	95-105	306-316	24-30	4-8
70	1.5	130-140	284-294	19-25	20-24	121-131	334-344	29-35	13-17
	2.3	128-138	260-270	20-26	13-17	131-141	345-355	31-37	8-12
	3	128-138	248-258	20-26	9-13	137-147	358-368	32-38	6-10
90	1.5	134-144	366-376	18-24	20-24	163-173	383-393	37-43	16-20
	2.3	133-143	341-351	19-25	13-17	179-189	401-411	40-46	11-15
	3	132-142	328-338	19-25	9-13	188-198	412-422	42-48	8-12
110	1.5	139-149	466-476	17-23	19-23	Operation Not Recommended			
	2.3	138-148	439-449	17-23	12-16				
	3	137-147	426-436	17-23	9-13				

Table 22 – WSV6012 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6018 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	276-286	16-22	7-11
	3.4					65-75	282-292	17-23	5-9
	4.5					70-80	283-293	18-24	3-7
50	2.3	124-134	212-222	19-25	17-21	95-105	334-344	24-30	9-13
	3.4	123-133	194-204	20-26	11-15	103-113	344-354	26-32	6-10
	4.5	122-132	186-196	20-26	8-12	107-117	360-360	27-33	4-8
70	2.3	128-138	282-292	18-24	17-21	132-142	383-393	31-37	12-16
	3.4	127-137	262-272	19-25	10-14	143-153	399-409	33-39	8-12
	4.5	126-136	253-263	19-25	7-11	150-160	408-418	35-41	6-10
90	2.3	132-142	367-377	18-24	16-20	178-188	444-454	39-45	16-20
	3.4	131-141	346-356	18-24	10-14	195-205	466-476	42-48	10-14
	4.5	131-141	338-348	18-24	7-11	205-215	479-489	43-49	8-12
110	2.3	137-147	471-481	16-22	16-20	Operation Not Recommended			
	3.4	136-146	449-459	17-23	10-14				
	4.5	136-146	442-452	17-23	7-11				

Table 23 – WSV6018 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6024 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	253-263	16-22	6-10
	4.5					61-71	256-266	17-23	4-8
	6					66-76	259-269	18-24	2-6
50	3	126-136	202-212	20-26	16-20	93-103	294-204	19-25	7-11
	4.5	125-135	187-197	20-26	10-14	98-108	300-310	20-26	5-9
	6	113-123	180-190	20-26	8-12	102-112	303-313	21-27	3-7
70	3	130-140	271-281	19-25	16-20	130-140	330-340	26-32	11-15
	4.5	129-139	255-265	19-25	10-14	140-150	339-349	27-33	7-11
	6	129-139	247-257	19-25	7-11	145-155	344-354	28-34	5-9
90	3	135-145	357-367	18-24	15-19	176-186	385-395	33-39	14-18
	4.5	134-144	340-350	18-24	10-14	191-201	388-398	35-41	9-13
	6	133-143	331-341	18-24	7-11	199-209	407-417	37-43	7-11
110	3	140-150	461-471	17-23	15-19	Operation Not Recommended			
	4.5	139-149	443-453	17-23	9-13				
	6	139-149	434-444	17-23	7-11				

Table 24 – WSV6024 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6030 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	264-274	19-25	7-11
	5.6					67-77	267-277	20-26	4-8
	7.5					71-81	271-281	21-27	3-7
50	3.8	118-128	218-228	24-30	20-24	93-103	309-319	26-32	9-13
	5.6	116-126	198-208	25-31	13-17	100-110	317-327	27-33	6-10
	7.5	116-126	188-198	25-31	9-13	104-114	321-331	28-34	4-8
70	3.8	123-133	289-299	23-29	20-24	130-140	349-359	33-39	12-16
	5.6	121-131	265-275	23-29	13-17	140-150	361-371	36-42	8-12
	7.5	120-130	254-264	23-29	9-13	147-157	368-378	37-43	6-10
90	3.8	128-138	375-385	22-28	19-23	173-183	398-408	42-48	16-20
	5.6	126-136	349-359	22-28	12-16	189-199	416-426	45-51	11-15
	7.5	126-136	337-347	22-28	9-13	199-209	427-437	46-52	8-12
110	3.8	134-144	478-488	20-26	18-22	Operation Not Recommended			
	5.6	133-143	452-462	20-26	12-16				
	7.5	132-142	439-449	21-27	8-12				

Table 25 – WSV6030 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6036 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					62-72	265-275	19-25	7-11
	6.8					66-76	269-279	20-26	4-8
	9					70-80	275-285	21-27	2-6
50	4.5	122-132	221-231	23-29	19-23	93-103	311-321	25-31	9-13
	6.8	120-130	203-213	23-29	12-16	100-110	319-329	26-32	6-10
	9	120-130	194-204	23-29	9-13	104-114	323-333	27-33	4-8
70	4.5	126-136	294-304	22-28	19-23	130-140	353-363	32-38	13-17
	6.8	125-135	273-283	22-28	12-16	141-151	365-375	34-40	8-12
	9	124-134	264-274	22-28	9-13	148-158	373-383	36-42	6-10
90	4.5	131-141	382-392	21-27	18-22	175-185	403-413	41-47	16-20
	6.8	129-139	360-370	21-27	12-16	192-202	421-431	43-49	11-15
	9	129-139	350-360	21-27	8-12	202-212	432-442	45-61	8-12
110	4.5	136-146	489-499	19-25	18-22	Operation Not Recommended			
	6.8	135-145	466-476	20-26	11-15				
	9	135-145	457-467	20-26	8-12				

Table 26 – WSV6036 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6042 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	5.3	Operation Not Recommended				Operation Not Recommended			
	7.9								
	10.5								
30	5.3					58-68	262-272	19-25	5-9
	7.9					62-72	266-276	20-26	3-7
	10.5					64-74	271-281	21-27	2-6
50	5.3	128-138	226-236	24-30	20-24	89-99	293-303	24-30	8-12
	7.9	127-137	205-215	25-31	13-17	95-105	299-309	25-31	5-9
	10.5	126-136	195-205	25-31	9-13	99-109	302-312	26-32	3-7
70	5.3	133-143	298-308	23-29	19-23	126-136	328-338	31-37	11-15
	7.9	131-141	274-284	24-30	12-16	134-144	336-346	33-39	8-12
	10.5	131-141	263-273	24-30	9-13	141-151	343-353	34-40	5-9
90	5.3	137-147	385-395	22-28	18-22	170-180	372-382	39-45	15-19
	7.9	136-146	359-369	22-28	12-16	185-195	387-397	42-48	10-14
	10.5	135-145	348-358	23-29	8-12	194-204	395-405	43-50	7-11
110	5.3	143-153	489-499	21-27	18-22	Operation Not Recommended			
	7.9	141-151	463-473	21-27	11-15				
	10.5	141-151	451-461	21-27	8-12				

Table 27 – WSV6042 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6048 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	6	Operation Not Recommended				Operation Not Recommended			
	9								
	12								
30	6					65-75	271-281	19-25	7-11
	9					69-79	275-285	20-26	4-8
	12					73-83	280-290	21-27	3-7
50	6	122-132	222-232	24-30	20-24	104-114	310-320	25-31	9-13
	9	120-130	201-211	25-31	13-17	111-121	316-326	26-32	5-9
	12	120-130	191-201	25-31	9-13	115-125	320-330	27-33	4-8
70	6	127-137	293-303	23-29	20-24	144-154	348-358	32-38	12-16
	9	125-135	269-279	23-29	13-17	155-165	359-369	34-40	8-12
	12	124-134	257-267	24-30	9-13	161-171	365-375	35-41	5-9
90	6	132-142	380-390	22-28	19-23	193-203	395-405	40-46	15-19
	9	130-140	354-364	22-28	12-16	209-219	411-421	42-48	10-14
	12	129-139	341-351	22-28	9-13	217-227	420-430	43-50	7-11
110	6	138-148	485-495	21-27	18-22	Operation Not Recommended			
	9	136-146	457-467	21-27	12-16				
	12	135-145	444-454	21-27	8-12				

Table 28 – WSV6048 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6060 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	7.5	Operation Not Recommended				Operation Not Recommended			
	11.3								
	15								
30	7.5					58-68	265-275	25-31	7-11
	11.3					62-72	269-279	26-32	4-8
	15					64-74	274-284	27-33	3-7
50	7.5	125-135	220-230	25-31	19-23	91-101	309-319	28-34	9-13
	11.3	123-133	201-211	25-31	12-16	98-108	316-326	29-35	5-9
	15	123-133	191-201	25-31	9-13	101-111	320-330	30-36	4-8
70	7.5	129-139	290-300	24-30	18-22	128-138	349-359	36-42	12-16
	11.3	128-138	268-278	24-30	12-16	138-148	361-371	38-44	8-12
	15	127-137	257-267	24-30	8-12	144-154	367-377	39-45	5-9
90	7.5	134-144	377-387	23-29	18-22	172-182	398-408	45-51	15-19
	11.3	133-143	352-362	23-29	11-15	187-197	415-425	48-54	10-14
	15	132-142	340-350	23-29	8-12	196-206	424-434	50-56	7-11
110	7.5	140-150	480-490	21-27	17-21	Operation Not Recommended			
	11.3	139-149	455-465	21-27	11-15				
	15	138-148	443-453	22-28	8-12				

Table 29 – WSV6060 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

PRESSURE & TEMPERATURE DATA

WSV6072 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	9	Operation Not Recommended				Operation Not Recommended			
	13.5								
	18								
30	9					56-66	275-285	20-26	5-9
	13.5					59-69	281-291	22-28	3-7
	18					64-74	283-293	23-29	2-6
50	9	122-132	219-229	25-31	18-22	85-95	309-319	28-34	8-12
	13.5	121-131	202-212	26-32	12-16	91-101	316-326	29-35	5-9
	18	120-130	193-203	26-32	8-12	95-105	320-330	30-36	3-7
70	9	126-136	288-298	24-30	18-22	119-129	351-361	36-42	11-15
	13.5	125-135	268-278	24-30	11-15	129-139	363-373	38-44	7-11
	18	125-135	259-269	25-31	8-12	135-145	370-380	40-46	5-9
90	9	132-142	373-383	23-29	17-21	160-170	403-413	46-52	14-18
	13.5	130-140	351-361	23-29	11-15	175-185	422-432	49-55	10-14
	18	130-140	341-351	23-29	8-12	184-194	433-443	51-57	7-11
110	9	137-147	474-484	21-27	17-21	Operation Not Recommended			
	13.5	136-146	451-461	22-28	11-15				
	18	135-145	441-451	22-28	8-12				

Table 30 – WSV6072 Pressure & Temperature Data

PERFORMANCE DATA CONTINUED

WATER PRESSURE DROP DATA

WATER FLOW PRESSURE DROP DATA								
WSV6009	Flow Rate (GPM)	1.0	2.0	3.0	4.0	5.0	6.0	7.0
	Pressure Drop	0.2	0.9	1.9	3.0	4.5	6.3	8.2
WSV6012	Flow Rate (GPM)	2.0	3.0	4.0	5.0	6.0	7.0	8.0
	Pressure Drop	1.0	2.0	3.3	4.8	6.6	8.7	10.9
WSV6018	Flow Rate (GPM)	2.0	3.0	4.0	5.0	6.0	7.0	8.0
	Pressure Drop	1.0	2.0	3.3	4.8	6.6	8.7	10.9
WSV6024	Flow Rate (GPM)	5.0	6.0	7.0	8.0	9.0	10.0	11.0
	Pressure Drop	1.4	2.0	2.6	3.3	4.1	5.0	6.0
WSV6030	Flow Rate (GPM)	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	Pressure Drop	2.3	3.0	3.9	4.8	5.8	6.9	8.0
WSV6036	Flow Rate (GPM)	6.0	8.0	10.0	12.0	14.0	16.0	18.0
	Pressure Drop	1.1	1.9	2.8	4.0	5.2	6.7	8.2
WSV6042	Flow Rate (GPM)	7.0	9.0	11.0	13.0	15.0	17.0	19.0
	Pressure Drop	1.4	2.1	3.0	4.1	5.2	6.6	8.0
WSV6048	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0		
	Pressure Drop	2.6	3.5	4.7	5.9	7.4		
WSV6048 ECONOMIZER	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0		
	Pressure Drop	6.5	8.8	11.8	14.8	18.5		
WSV6060	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0	22.0	24.0
	Pressure Drop	2.6	3.3	4.2	5.1	6.2	7.3	8.5
WSV6060 ECONOMIZER	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0	22.0	24.0
	Pressure Drop	6.0	8.2	10.6	13.4	16.5	19.9	23.7
WSV6072	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0	22.0	24.0
	Pressure Drop	2.6	3.3	4.2	5.1	6.2	7.3	8.5
WSV6072 ECONOMIZER	Flow Rate (GPM)	12.0	14.0	16.0	18.0	20.0	22.0	24.0
	Pressure Drop	6.0	8.2	10.6	13.4	16.5	19.9	23.7

Table 31 – Pressure Drop Data

WIRING DIAGRAM MATRIX

WIRING DIAGRAM MATRIX											
Base Unit Model	STANDARD WIRING DIAGRAM				HGRH WIRING DIAGRAM				ECONOMIZER WIRING DIAGRAM		
	Voltage/Phase/Frequency				Voltage/Phase/Frequency				Voltage/Phase/Frequency		
	208-230V/1/60	265V/1/60	208-230V/1/60	208-230V/3/60	460V/3/60	265V/1/60	208-230V/3/60	460V/3/60	208-230V/1/60	208-230V/3/60	460V/3/60
WSV6009*	WD80X004	WD80X005				WD80X025					
WSV6012*											
WSV6018*	WD80X001	WD80X002				WD80X023					
WSV6024*							WD80X028	WD80X029			
WSV6030*											
WSV6036*											
WSV6042*	WD80X050		WD80X055		WD80X054		WD80X057	WD80X058	WD80X055	WD80X054	
WSV6048*											
WSV6060*											
WSV6072*											

Table 32 – Wiring Diagram Matrix

WIRING DIAGRAMS

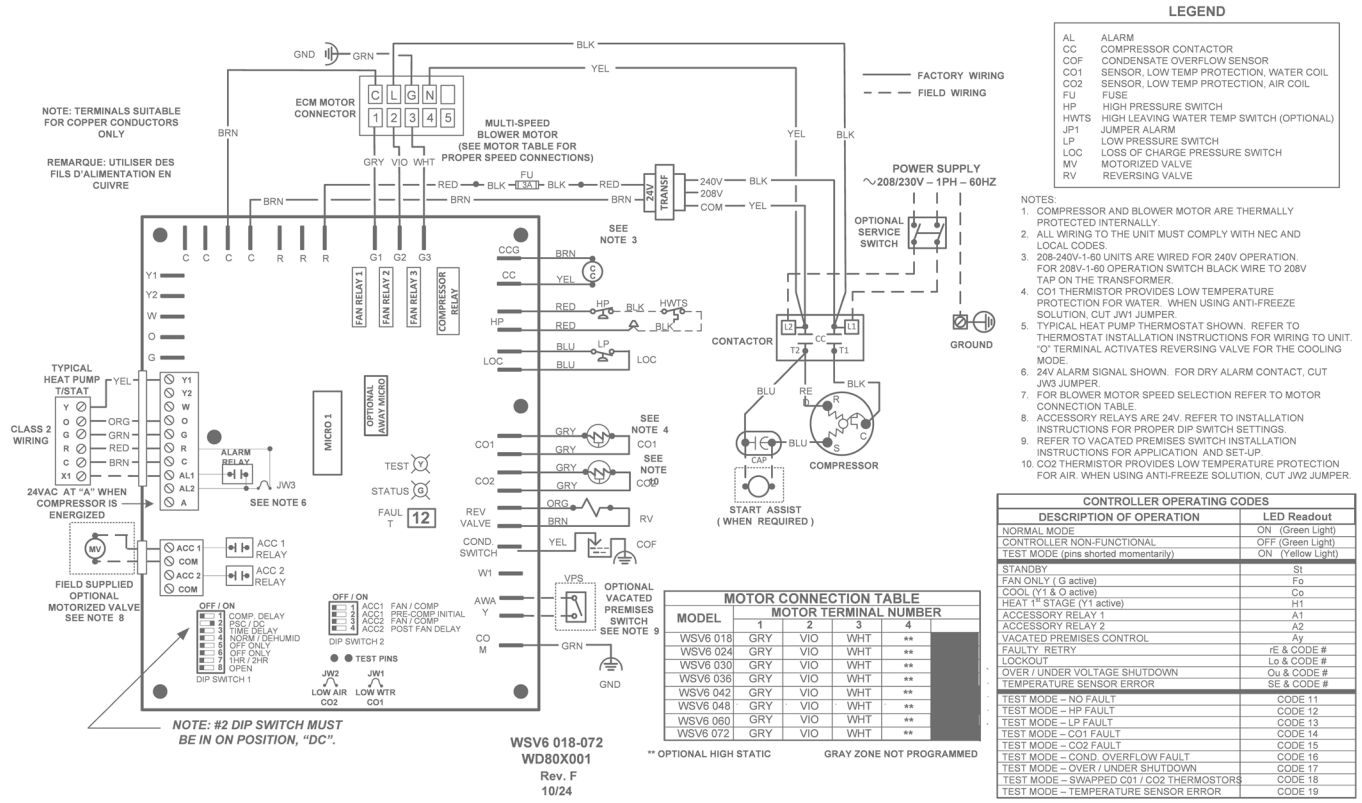


Figure 19 - WD80X001

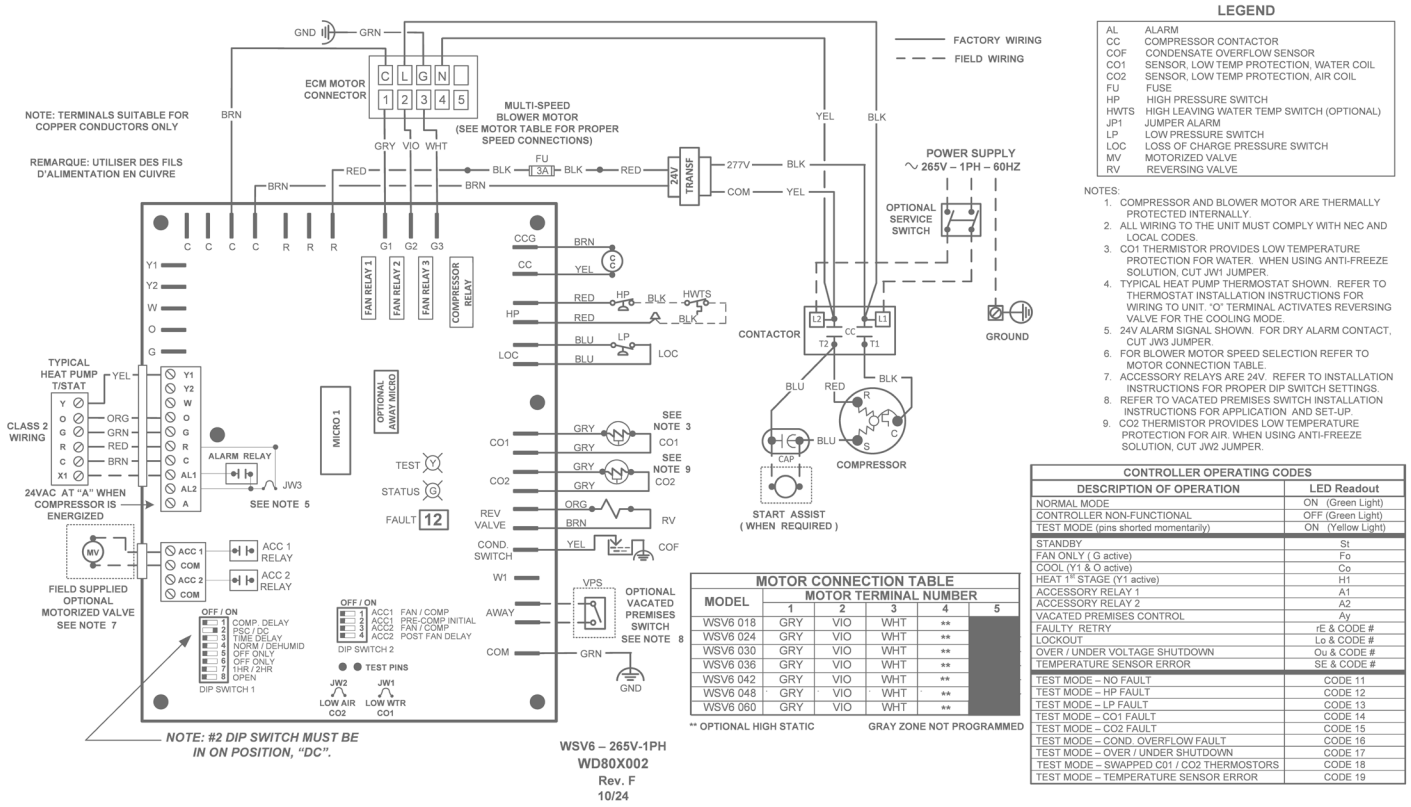


Figure 20 - WD80X002

WIRING DIAGRAMS

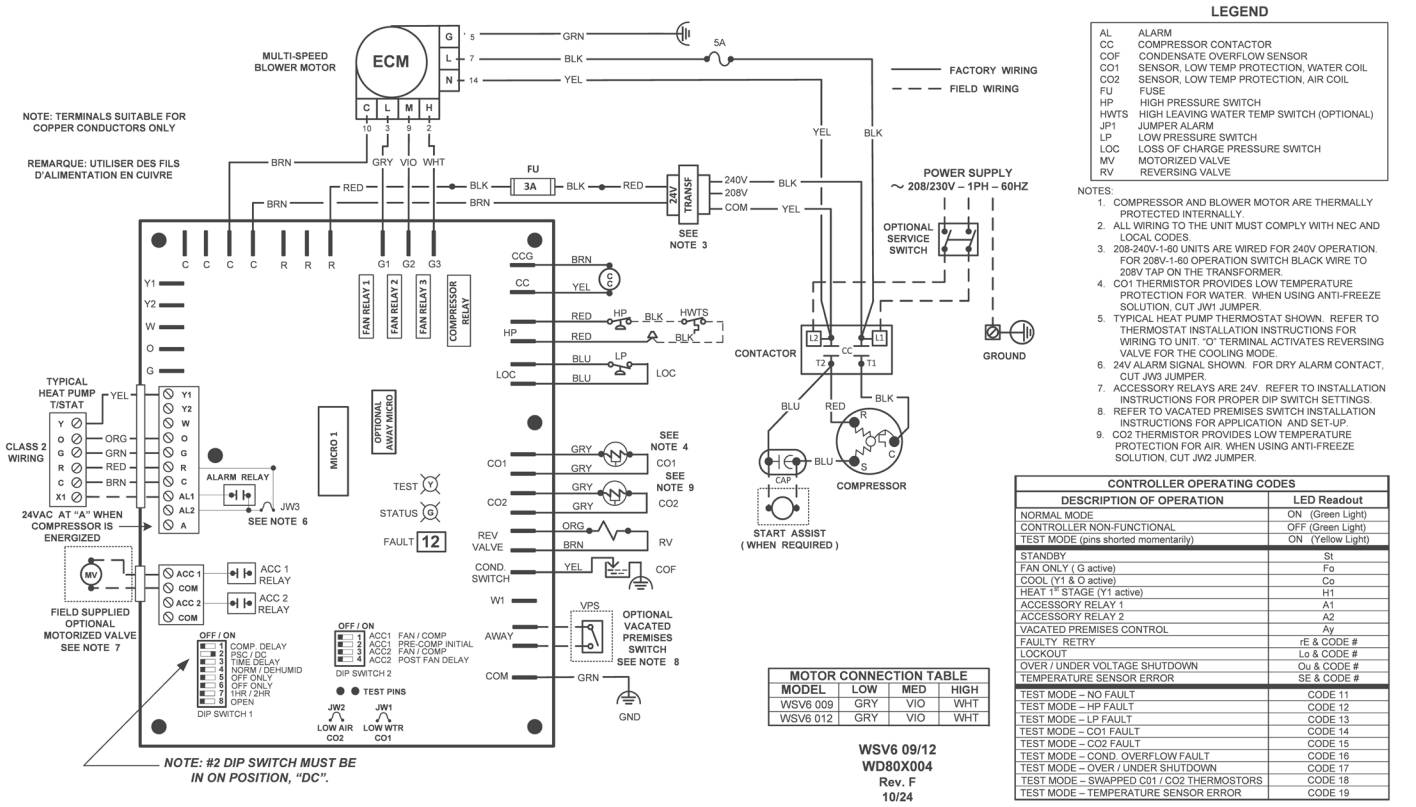


Figure 21 - WD80X004

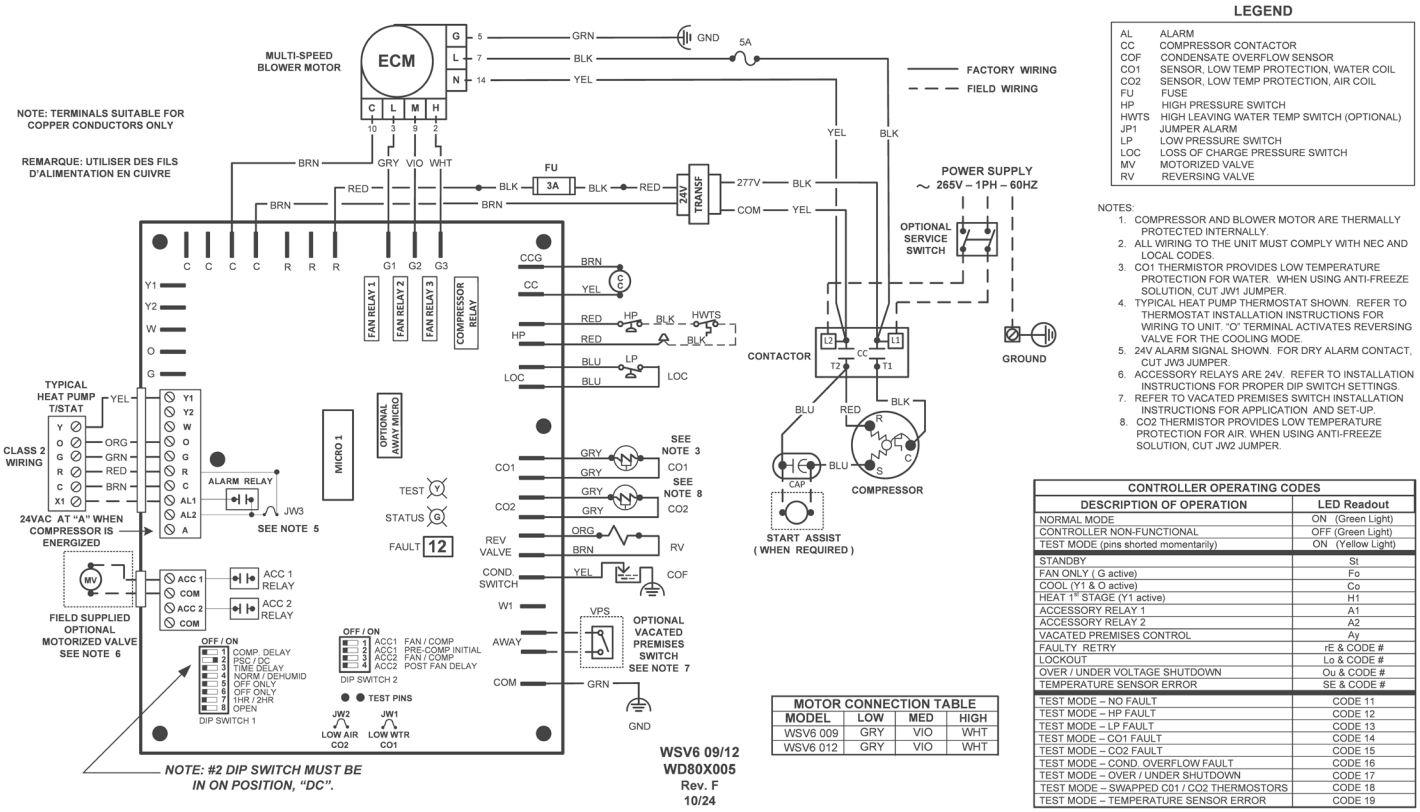


Figure 22 - WD80X005

WIRING DIAGRAMS

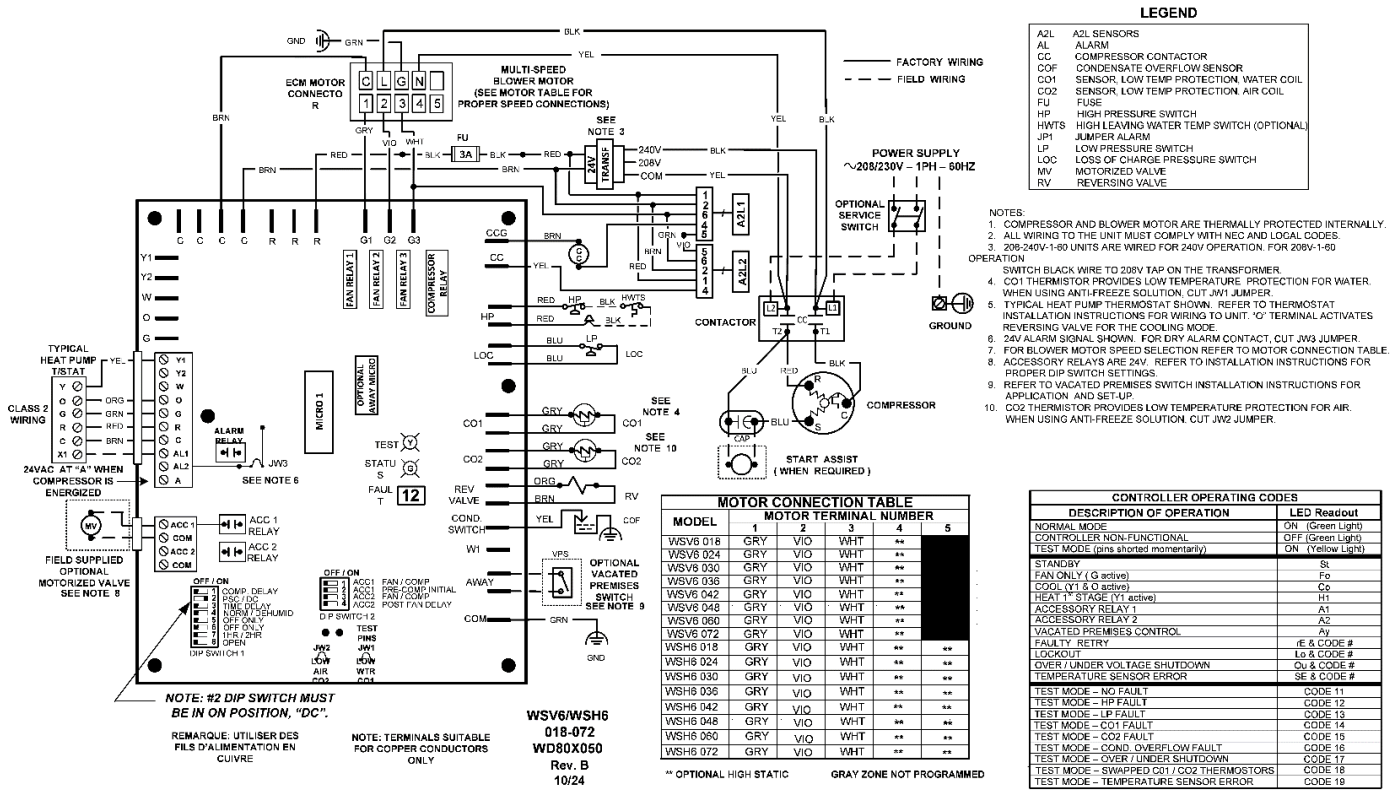


Figure 23 - WD80X050

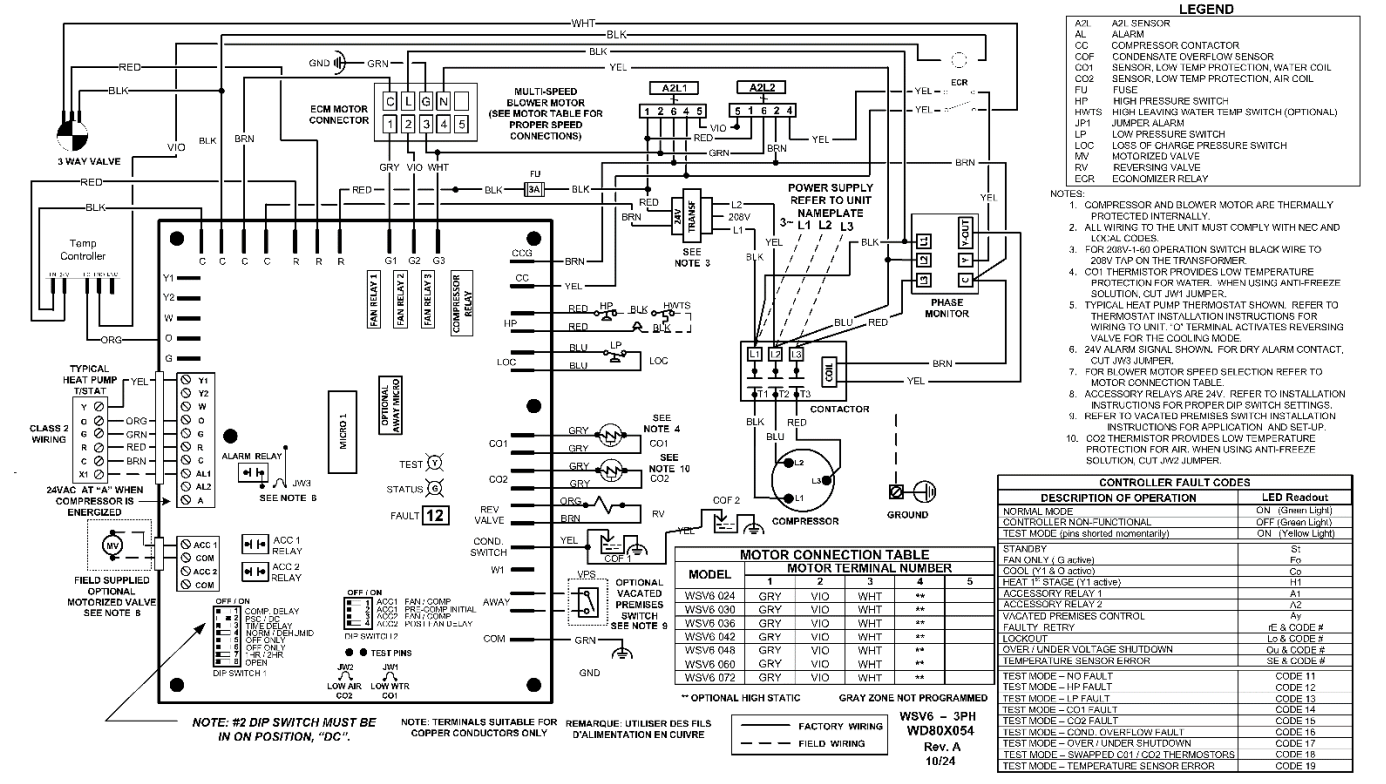


Figure 24 - WD80X054

WIRING DIAGRAMS

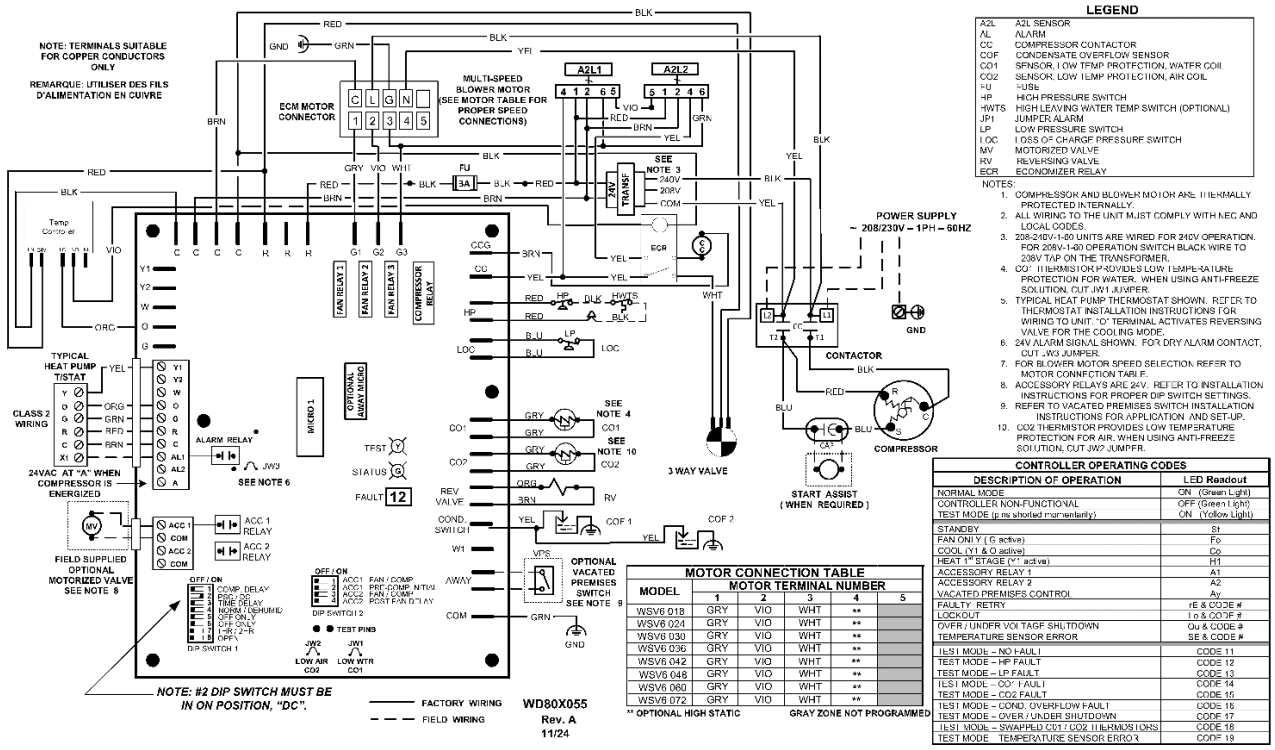


Figure 25 - WD80X055

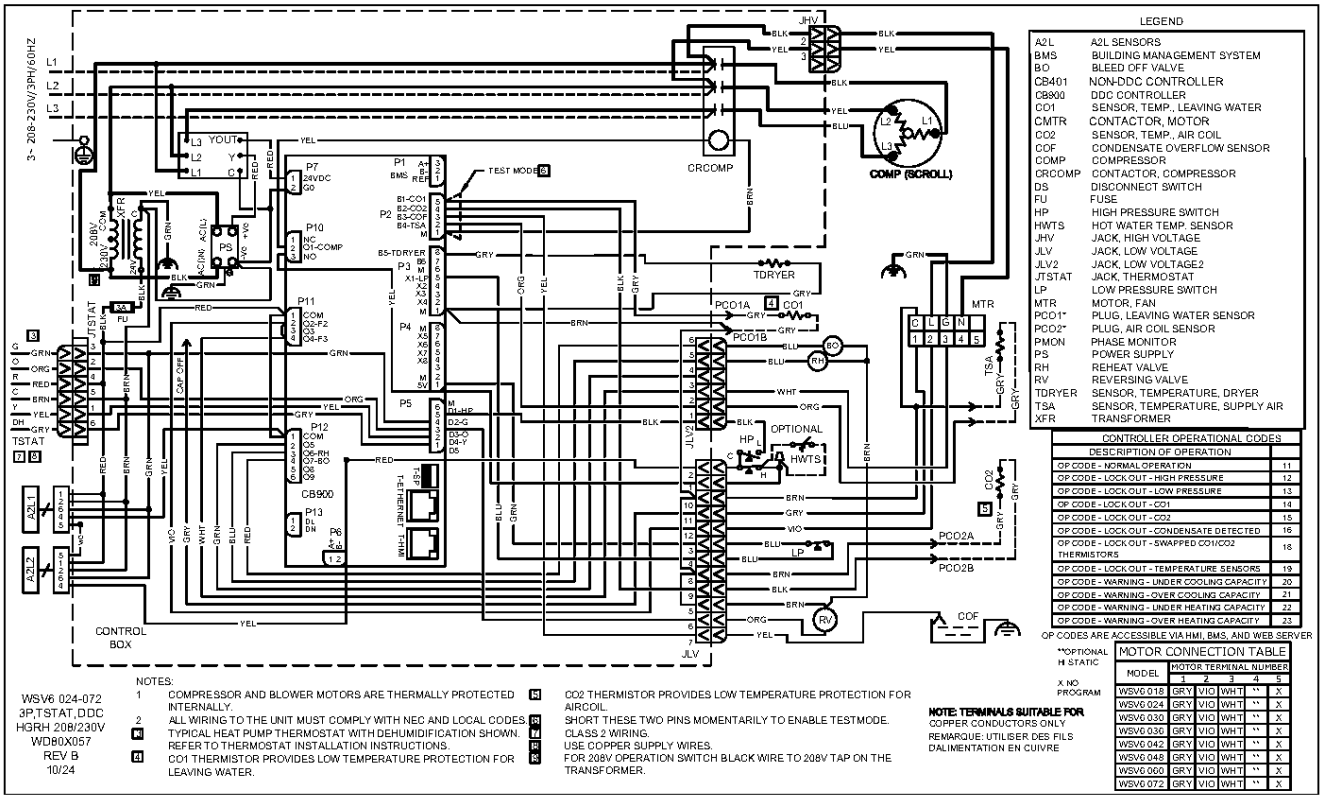


Figure 26 - WD80X057

WIRING DIAGRAMS

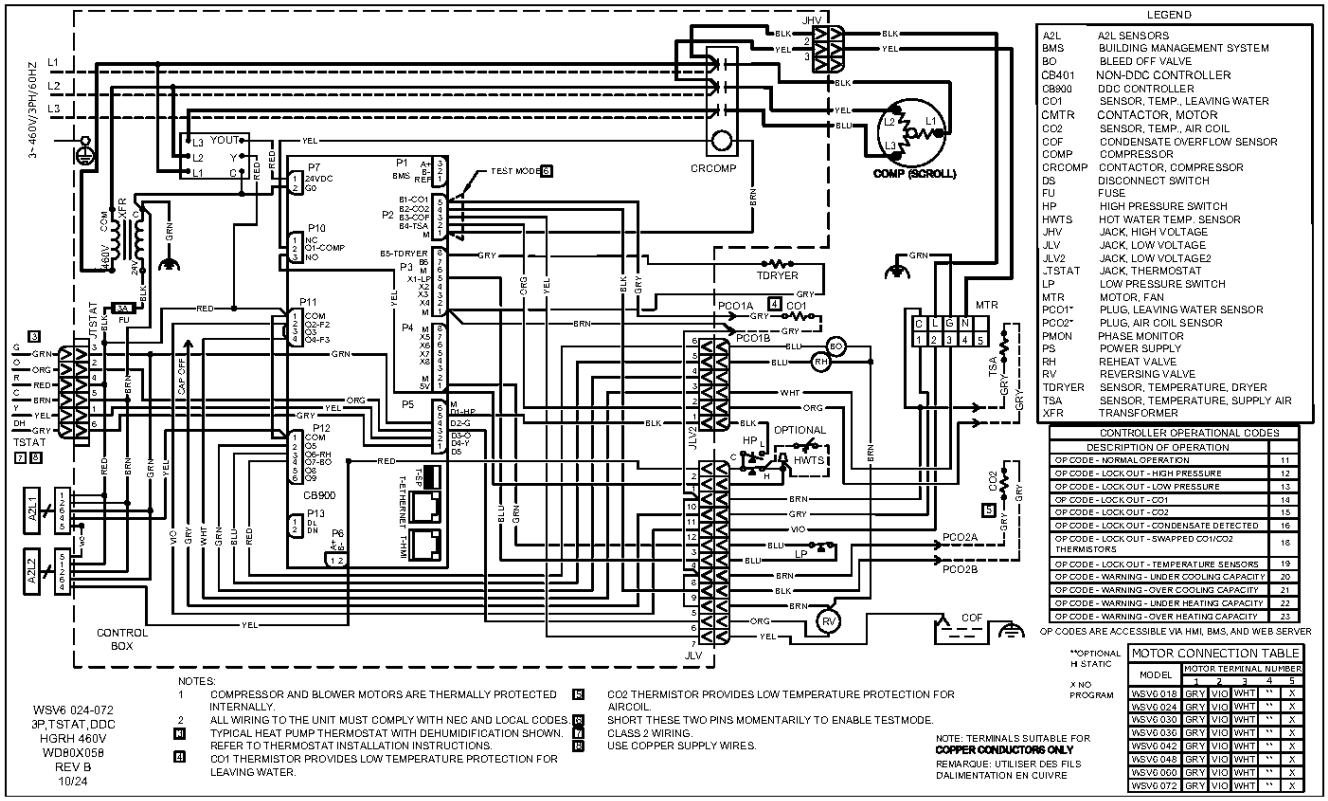


Figure 27 - WD80X058

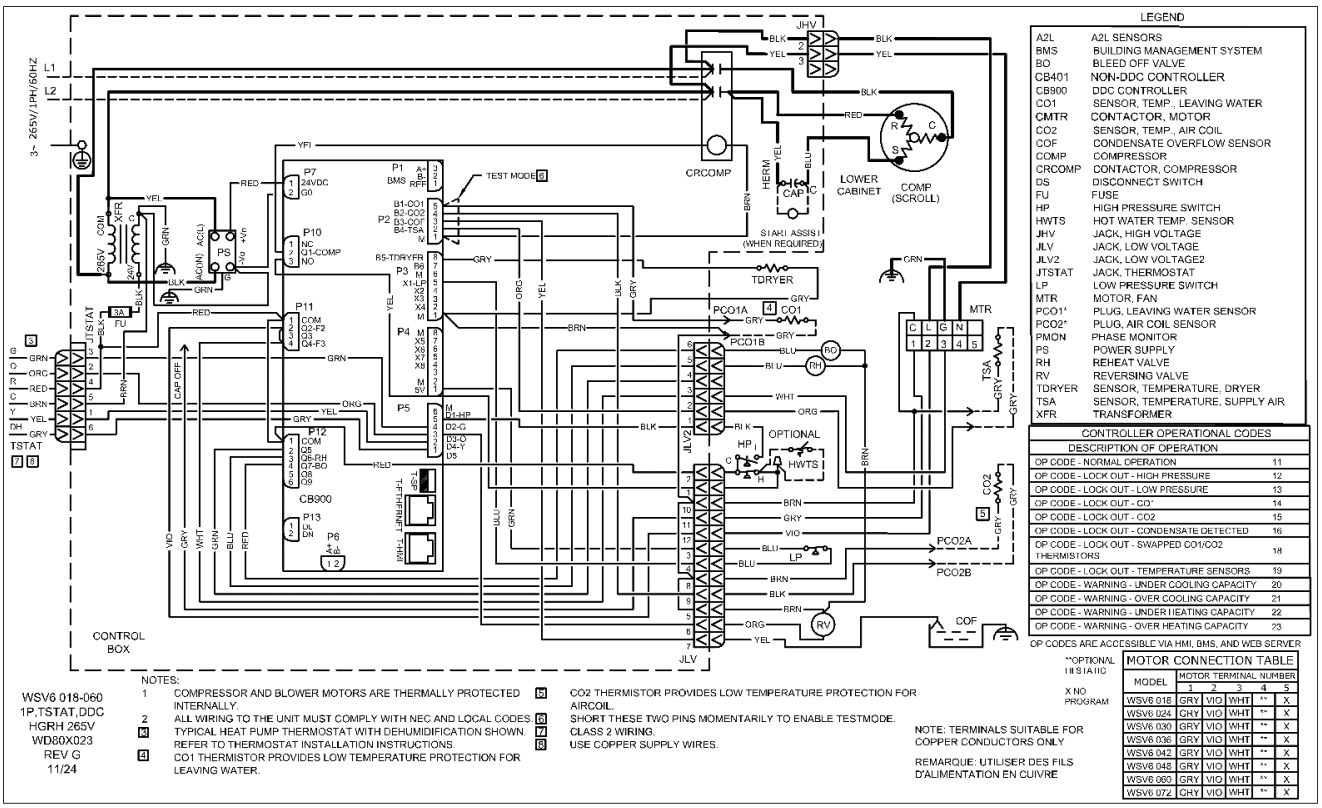


Figure 28 - WD80X023

WIRING DIAGRAMS

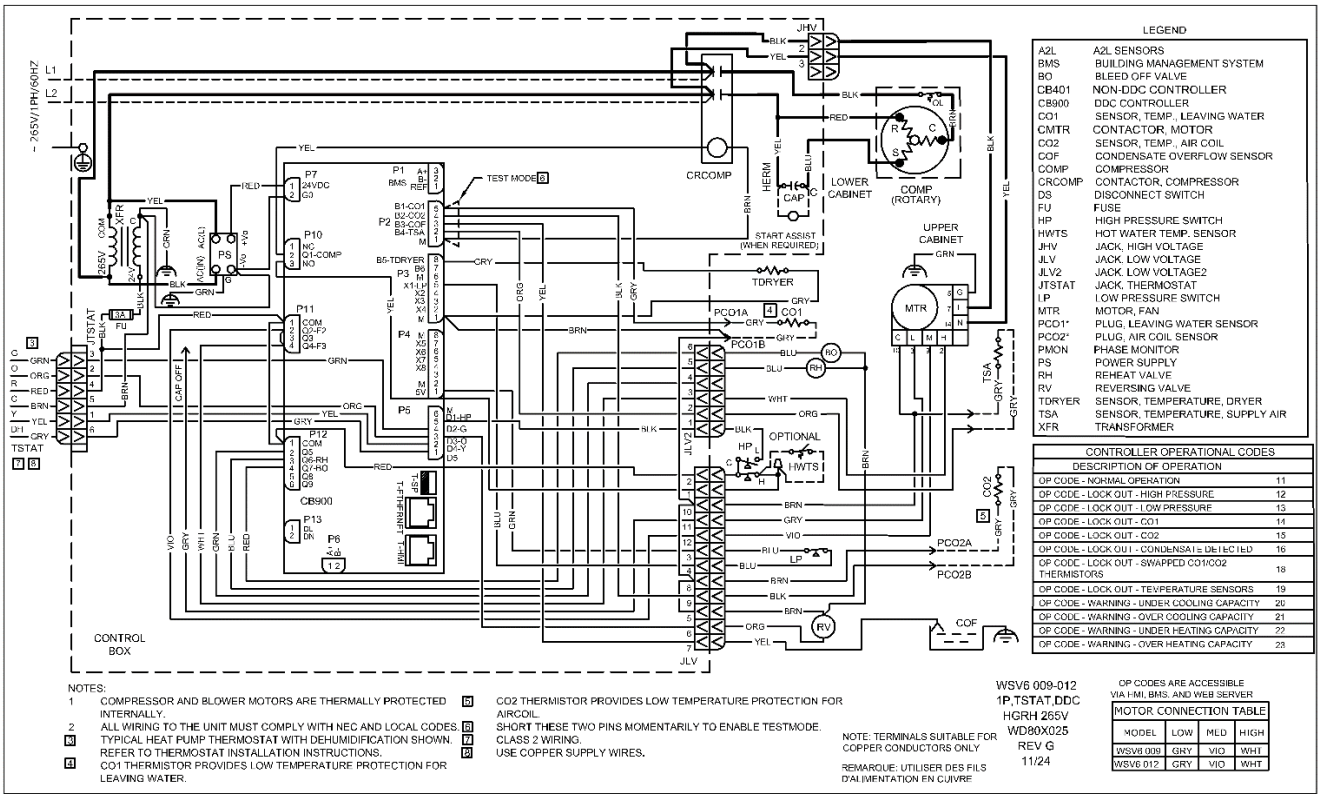


Figure 29 - WD80X025

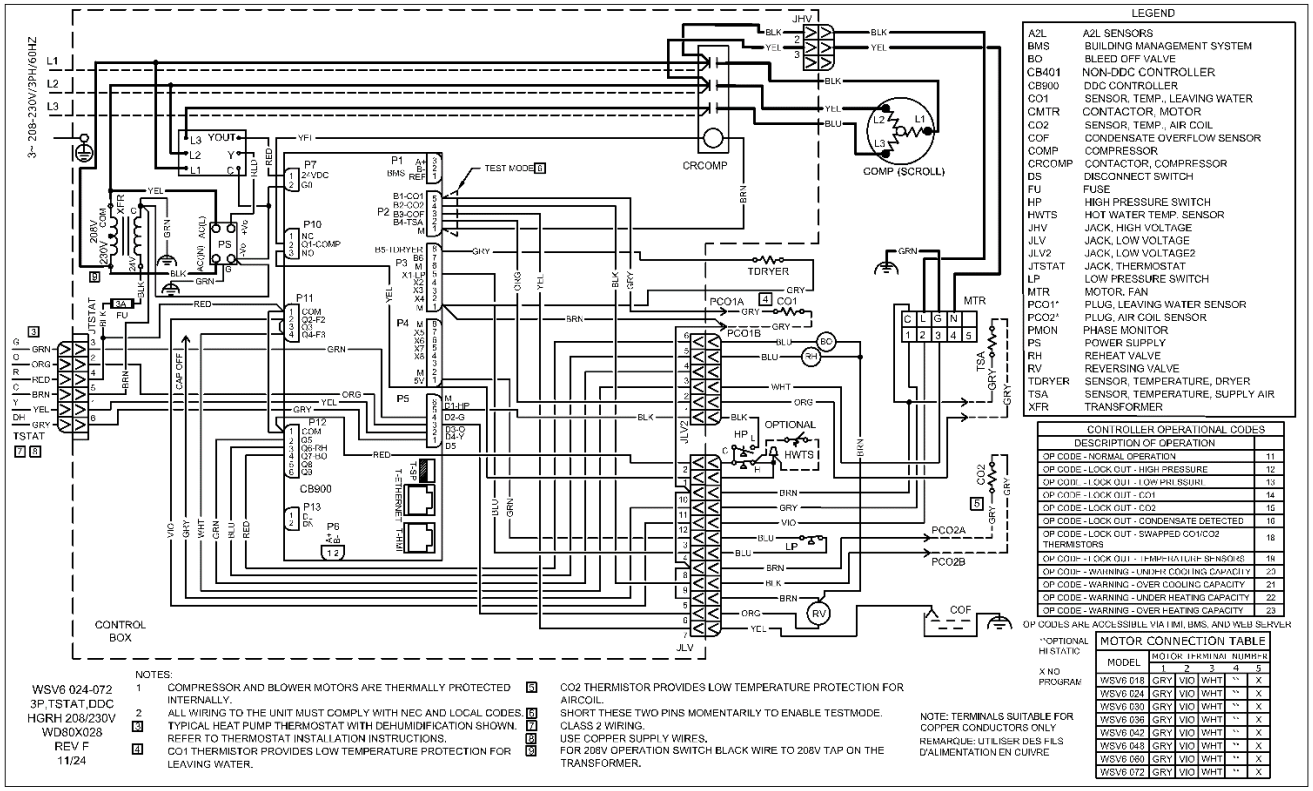


Figure 30 - WD80X028

WIRING DIAGRAMS

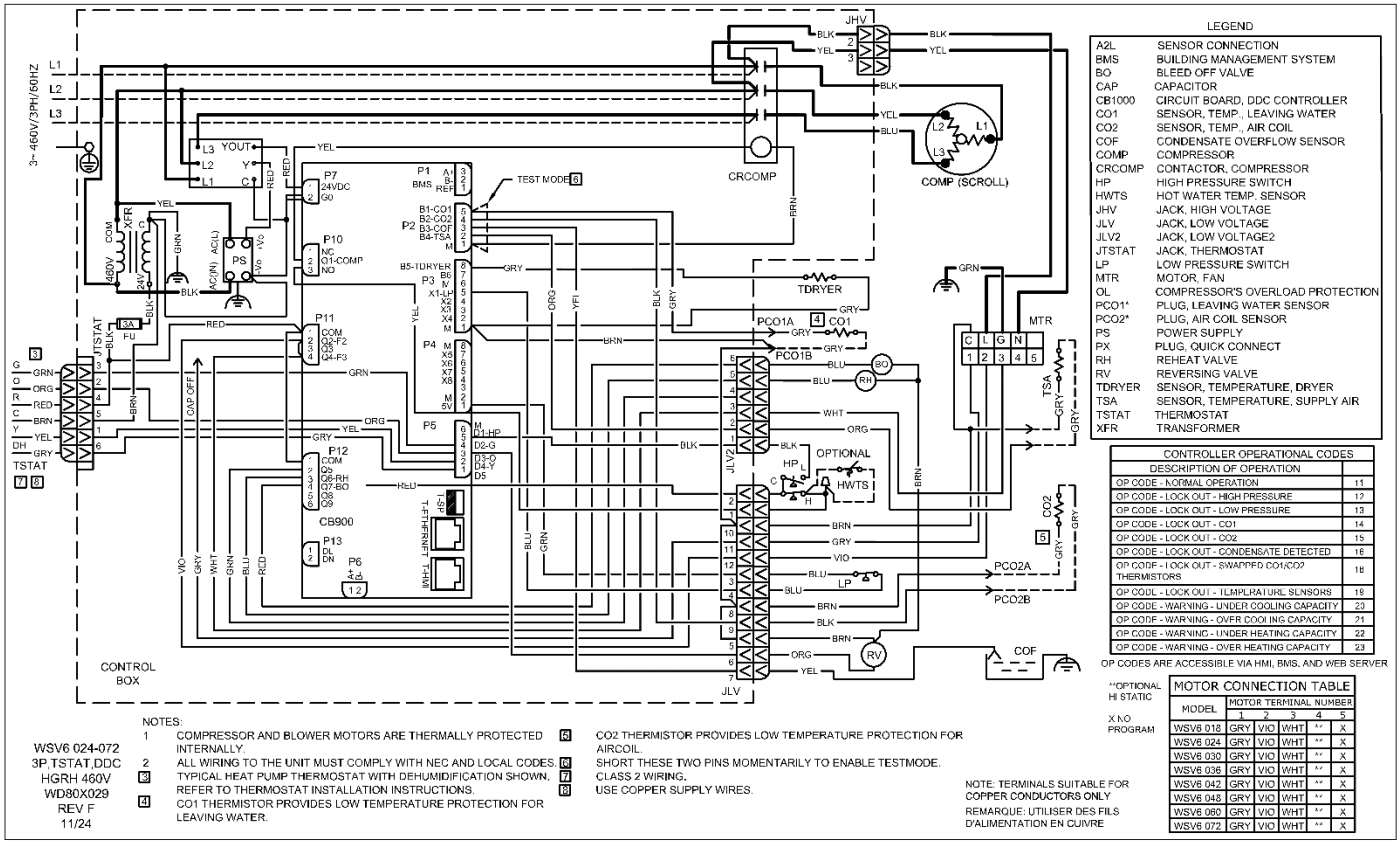


Figure 31 - WD80X029

CIRCUIT SCHEMATIC

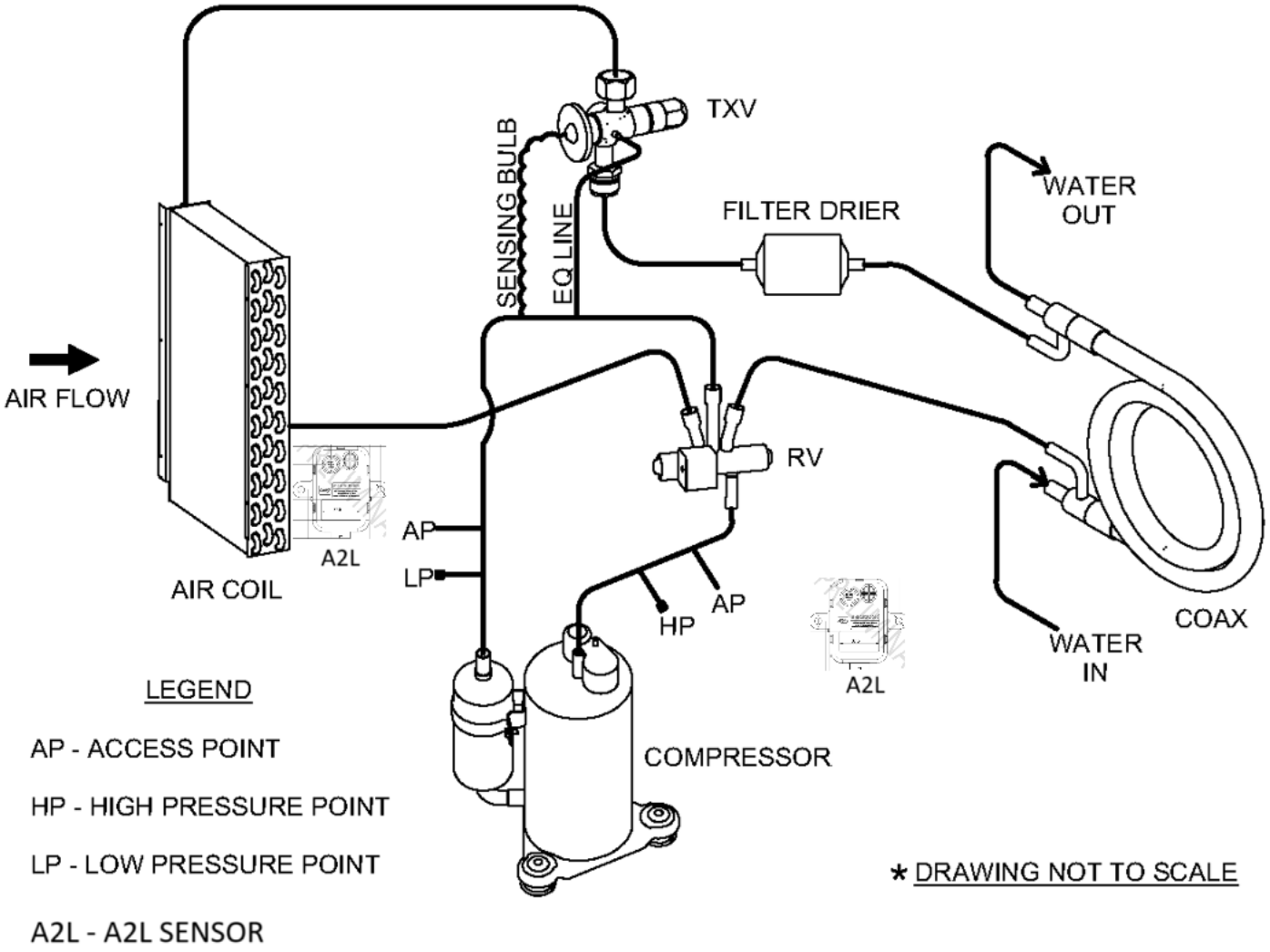


Figure 32 - Circuit Diagram

CIRCUIT SCHEMATIC HGRH

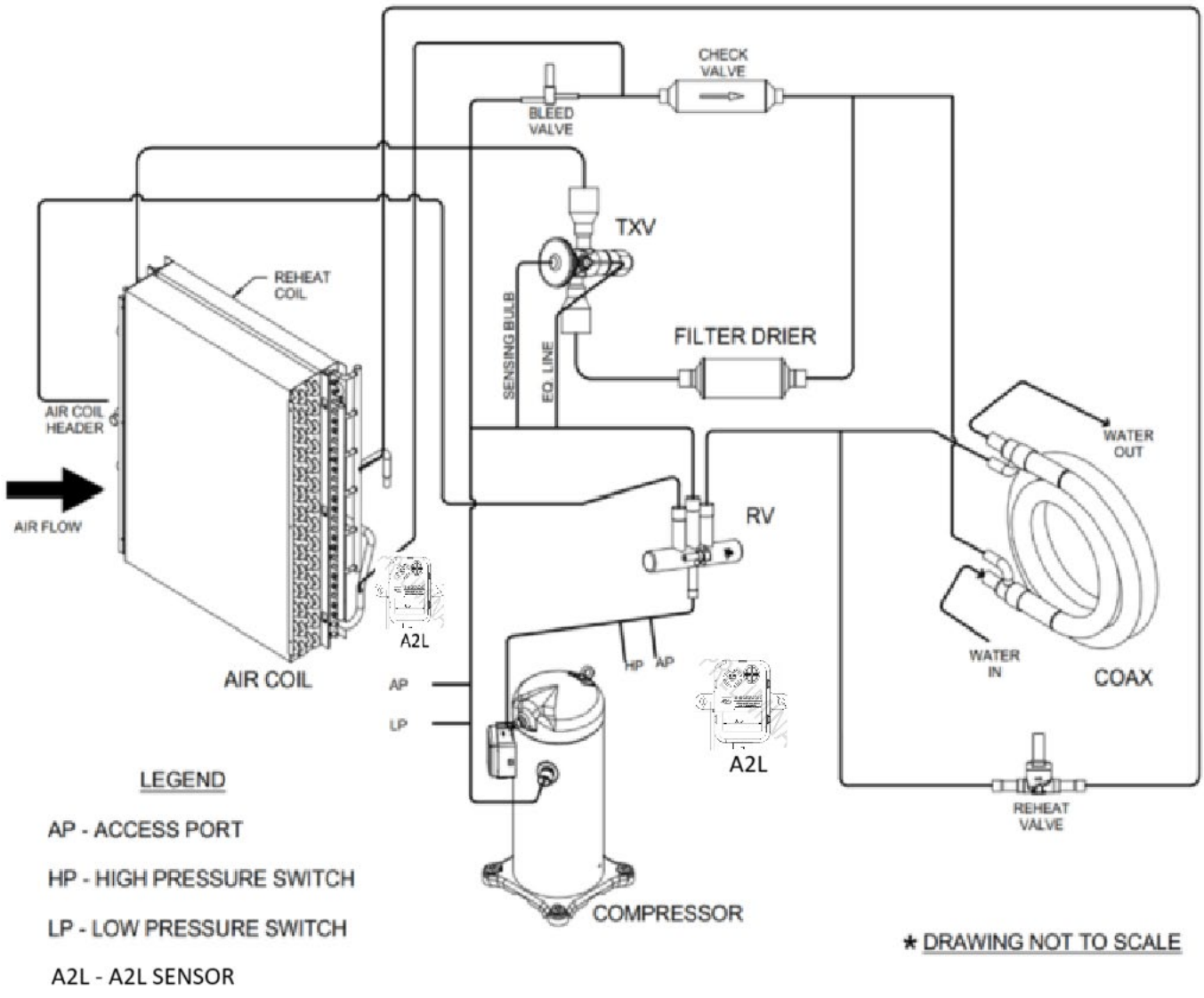


Figure 33 - Circuit Diagram HGRH

OPERATION & MAINTENANCE

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.

WARNING

Transformers are multi-voltage; it is crucial to refer to unit wiring diagram as well as unit voltage to ensure proper connections and operation safety.

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.
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.

START-UP & PERFORMANCE CHECKLIST INSTRUCTIONS:

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.

The warranty may be void unless the **FIGURE 34 – Startup & Performance Checklist**. is completed and returned to the warrantor. If the WSV6 unit is not installed properly, the warranty will be void, as the manufacturer cannot be held accountable for problems that stem from improper installation.

OPERATION & MAINTENANCE CONT.

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 CONT.

PUMP REPLACEMENT

Disconnect electrical power before servicing the unit.

To replace the circulator pump, close the isolation valves and relieve the water pressure within the heating loop. Disconnect the pump's 115 volt power lines within the control box and remove the four hex head screws securing the pump motor to the pump's volute.

Reverse the above steps for reassembling the pump, however make sure that the pump or volute has the rubber O-ring in place before assembling.

CHECK VALVE REPLACEMENT

Disconnect electrical power before servicing the unit.

To replace the internal check valve, close the isolation valves and relieve the water pressure within the heating loop. Remove the four hex head screws securing the pump motor to the pumps volute and remove. The check valve is located in the volute. Rotate the check valve to release and remove from volute.

Reverse the above steps for reinstalling at check valve, however make sure that the pump or volute has the rubber O-ring in place before assembling.

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 mild surfactant such as Calgon to remove the oils left by manufacturing processes.

REFRIGERANT DETECTION SENSOR (RDS) INFORMATION

For equipment utilizing A2L refrigerants, a Refrigerant Detection System (RDS) is installed on this unit to detect any A2L refrigerant leakage in the coil and internal refrigerant containing components and will take action to mitigate any risk of ignition / fire.
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.
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.

OPERATION & MAINTENANCE CONT.

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 REFRIGERATING 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 FLAMMABLE 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.

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.

FLAMMABLE REFRIGERANT LEAK DETECTION

Under no circumstances should potential sources of ignition be used for detecting refrigerant leaks. Devices such as halide torches (or other detectors using a naked flame) are strictly prohibited. Acceptable methods for refrigerant leak detection include:

- Electronic Leak Detectors: These may be used to detect refrigerant leaks; however, for flammable refrigerants, ensure the sensitivity is adequate and the equipment is recalibrated as necessary. Calibration must occur in a refrigerant-free area. The detector must not pose an ignition risk and should be specifically suited for the refrigerant used. Set the detection equipment to a percentage of the refrigerant's Lower Flammability Limit (LFL), with a maximum setting of 25%. Ensure calibration corresponds to the refrigerant employed.
- Leak Detection Fluids: Fluids such as the bubble method or fluorescent agents are suitable. Avoid detergents containing chlorine, as these may react with the refrigerant and corrode copper pipework.

Important Note: If a refrigerant leak is suspected, all open flames must be extinguished. For leaks requiring brazing, recover all refrigerant from the system or isolate it using shut-off valves in a remote part of the system. Removal of refrigerant must follow the removal and evacuation procedures.

OPERATION & MAINTENANCE CONT.

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.

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.

OPERATION & MAINTENANCE CONTINUED

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.

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

OPERATION & MAINTENANCE CONTINUED

Status Light Table for Refrigerant Detection System (RDS)		
Status Light	State / Condition	System Response
Green Blinking	Normal Operation	- The system is actively monitoring refrigerant levels. - No refrigerant detected above the activation threshold. - Outdoor unit compressor and indoor blower operate normally.
Red Continuous	Refrigerant Leak Detected	- Refrigerant concentration exceeds the activation threshold. - The outdoor unit compressor (Y) is turned off to prevent further circulation of refrigerant. - The indoor blower is turned on to recirculate air and mitigate the refrigerant concentration.
Red Blinking	Fault Detected	- A fault in the refrigerant detection system (e.g., calibration issue, end-of-life) has been detected. - The outdoor unit compressor (Y) and indoor blower mitigation mode are deactivated for safety. - System requires inspection or replacement.
No Light	System Off or Malfunction	- The system is not operational. - Check the power supply and all system connections.
Amber Blinking	System Initializing	- The system is warming up after power-up. - The outdoor unit compressor (Y) and indoor blower mitigation mode remain inactive during this phase. - Transitions to green blinking when monitoring begins.

A2L SENSING AND MITIGATION

Units that can be charged with over 4lbs (1.81kg) of R454B refrigerant are shipped with factory installed refrigerant leak detector. In the event that a refrigerant leak is detected, the controls will disable the compressor operation, and energize the evaporator fan to disperse the leaked refrigerant. The unit will operate in this mitigation state until the sensor no longer detects a refrigerant leak, for a minimum time of 5 minutes. Once the mitigation period has ended, the unit will return to its normal operation based on the current thermostat inputs. An LED status light is provided with the sensor for diagnostic purposes, the description of the LED status light signals can be found in the following table.

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.
	Refrigerant sensor	For units over 4lbs of refrigerant, an active refrigerant leak faulty sensor will disable the compressor operation. Verify absence of refrigerant leak and replace sensor.
A2L SENSOR STATUS LIGHT	Solid Green	Sensor is in startup mode.
	Blinking Green	Sensor is in normal operation.
	Solid Red	Sensor has detected a leak and is in mitigation mode
	Blinking Red	Sensor fault, unit compressor will not energize and fan will be continuous.
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 33 – 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-condensable	The refrigerant system may be contaminated with moisture or non-condensable. Reclaim refrigerant, evacuate and recharge with factory recommended charge. Replace filter dryer.

Table 34 – 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

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

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

$$LC = QC - SC$$

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

COMMON CONVERSIONS

Air Flow	I/s = CFM x .47
Water Flow	I/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

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

STARTUP & PERFORMANCE CHECKLIST

CUSTOMER _____ **STARTUP DATE** _____ **JOB #** _____

ADDRESS _____ **SERVICE COMPANY** _____

_____ **TECHNICIAN** _____

MODEL # _____ **SERIAL #** _____ **PHONE #** _____

VISUAL INSPECTION

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

ACCESSORIES INSTALLED

- □ Hart Start Kit

  Typebrand: _____
- □ Compressor Cover
- □ Vacated Premises Switch

CONTROL MODULE SWITCH POSITION

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

Unit in Lock Out? ____

Fault Code Displayed in Test Mode? ____

UNIT OPERATION

Primary Voltage to the Heat Pump: _____

Transformer Secondary Voltage: _____

Unit Grounded (Y/N)? _____

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 STATIS 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 cannot be held accountable for problems that stem from improper installation.

Figure 34 - Startup & Performance Checklist

NOTES

P.O. Box 270969 Dallas, TX 75227
www.firstco.com or www.ae-air.com