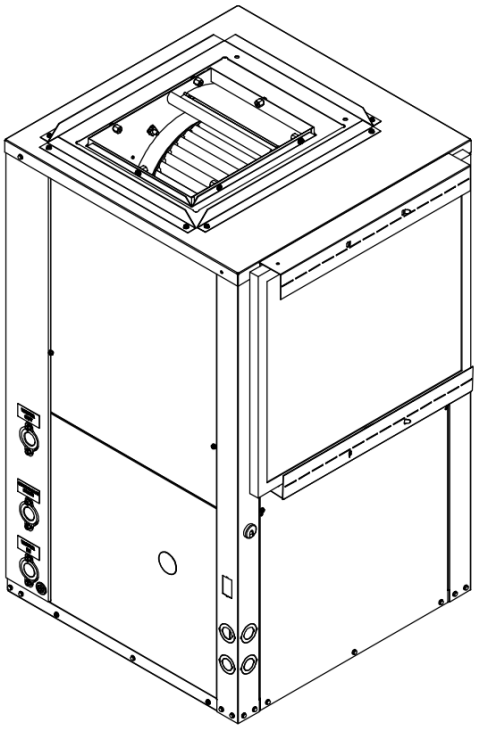
Installation, Operation, & Maintenance

IOM 7902
Rev. A 1/25

*WSVC/*WSVX SERIES
WATER SOURCE HEAT PUMPS

ATTENTION:

Read all instructions thoroughly and retain all manuals for future reference.



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WARNING

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

WARNING

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

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

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SAFETY CONSIDERATIONS

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

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

WARNING

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

WARNING

ELECTRIC SHOCK HAZARD

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

CAUTION

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

IMPORTANT

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

NOTE

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

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

SAFETY INFORMATION

WARNING

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

WARNING

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

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

WARNING

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

WARNING

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

WARNING

ELECTRIC SHOCK HAZARD

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

WARNING

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

IMPORTANT

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

This appliance is for INDOOR USE ONLY.

WARNING

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

INTRODUCTION

Model nomenclature for the Water-to-Air Heat Pumps described in this installation instructions are as follows:
WSVC- Vertical, Single Package Water Source Heat Pump.
WSVX- Same, but with permanent magnet DC motor.
The WSV* Water-to-Air Heat pumps are safety agency listed (see unit label) for zero clearance to combustible materials and are designed for vertical applications with nominal refrigerant capacities of 18,000 through 59,000 BTUH. The WSV* series uses scroll or reciprocating compressors with refrigerant R-454B to achieve high efficiency levels, quiet operation and reliable performance. WSV* units are heat pump only units. No auxiliary electric heat or emergency heat is available with this unit. Safety devices are built into each unit to provide the maximum system protection possible when properly installed and maintained. Unit voltages offered are 230V, 265V and 460V with PSC or permanent magnet DC fan motors. These units are designed to operate with the entering liquid temperature between 50°F (10°C) and 100° F (38°C) With the extended range option, the heat pump can operate with entering liquid temperatures between 30° F (-1° C) and 100° F (38° C
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.

INSTALLATION

Installation of this Water-to-Air Heat Pump should only be performed by a qualified licensed installer or service agency to ensure proper installation. The licensed installer must adhere strictly to all local and national code requirements pertaining to the installation of this equipment.

All WSV* units are agency listed for installation with zero inches clearance to combustible materials. This includes the unit cabinet, supply louvers or connecting ducts if installed.

INSTALLATION PRECAUTIONS

No wiring or other work should be attempted without first ensuring that the heat pump is completely disconnected from the power source and locked out. Always verify that a good ground connection exists prior to energizing any power sources.

Always review the nameplate on each unit for proper voltage and control configurations. This information is

determined from the components and wiring of the unit and may vary from unit to unit.
When soldering or brazing it is recommended to have a fire extinguisher readily available. When soldering close to valve packages or other components, heat shields or wet rags are required to prevent damage.
Units must be installed level to ensure proper drainage and operation.

Be sure that the drain pan is free from foreign construction material prior to start up.
Check filter media installation to ensure that it is installed correctly. Use the directional arrows or other information on the filter to determine the proper flow direction.
Ensure that the air distribution system does not exceed the external static pressure rating of the unit.

CAUTION

As with any mechanical equipment, personal injury can result from sharp metal edges, etc., therefore care should be taken when removing and working metal parts.

CAUTION

Extreme caution must be taken to ensure that no internal damage will result if screws or holes are drilled into the cabinet. Failure to follow this CAUTION could result in product or property damage and minor personal injury.

LOCATION/MOUNTING

Locate the unit in an area that allows easy removal of the filter and access panels and has enough room for service personnel to perform maintenance or repair.

Provide sufficient room to make water, electrical, and duct connections

INSTALLATION (CONTINUED)

If the unit is located in a confined space, then provisions must be made for return air to freely enter the space. These units are not approved for outdoor installation therefore they must be installed inside the structure. **Do not locate in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air).**

WSV* units are available in left and right return air configurations. Units should be mounted level on a 3/8" to 1/2" vibration absorbing pad slightly larger than the base to minimize vibration transmission to the building structure. It is not necessary to anchor the unit to the floor.

CONDENSATE DRAIN

The condensate drain must be in conformance with all plumbing codes. The condensate drain must be connected to the heat pump and pitched away from the unit a minimum 1/8" per foot to allow the condensate to flow away from the unit. Since the drain pan is located on the suction side of the blower, a negative pressure exists at the drain pan and a minimum trap of 1-1/2" must be provided in the drain line to assure proper drainage. (Units are not internally trapped)

CAUTION

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

CAUTION

Remove shipping block from under blower housing and install filter brackets.

INSTALLATION (CONTINUED)

FILTER BRACKETS

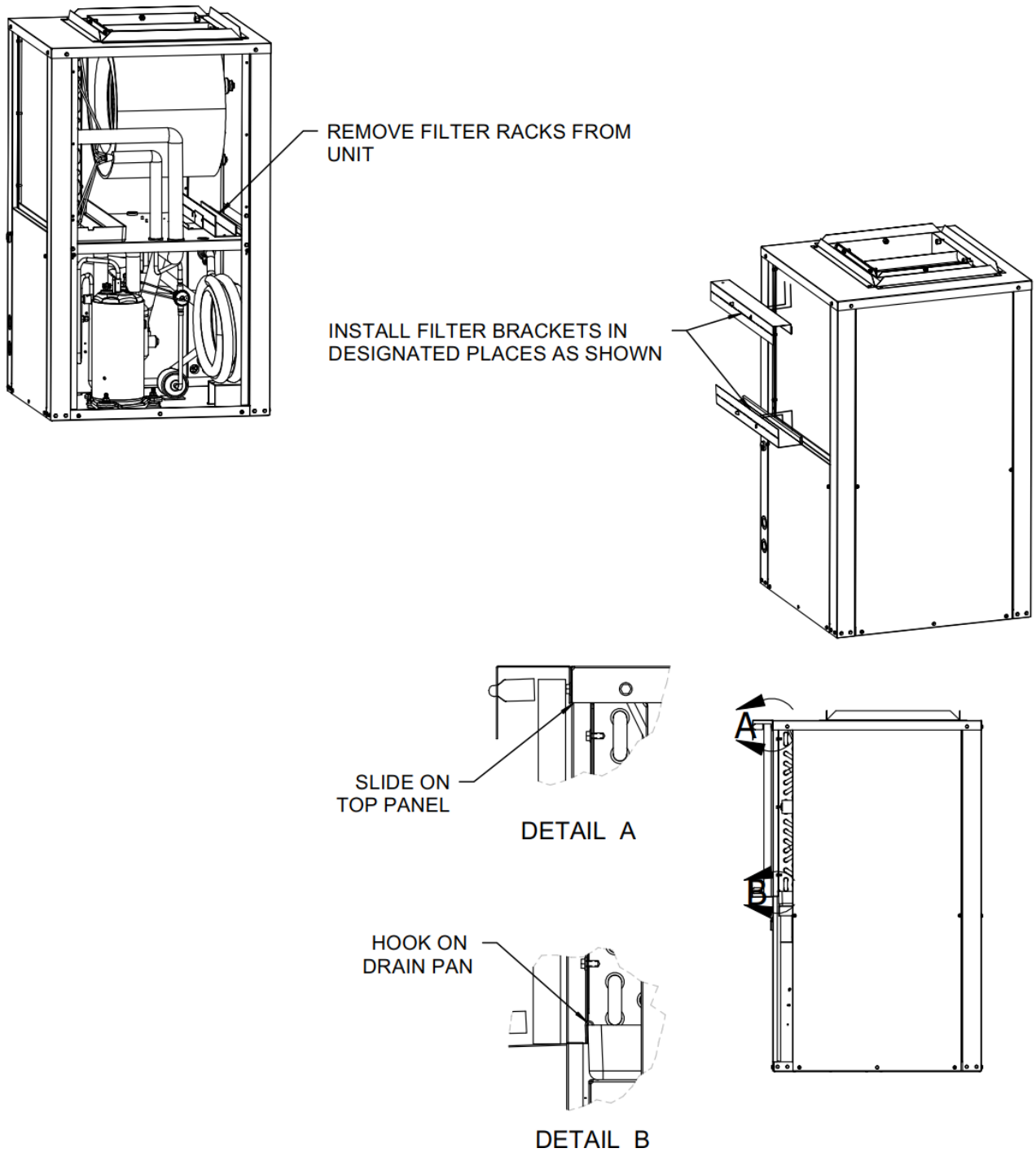

Figure 1- Filter Bracket Detail

WARNING

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 1 – Filter Bracket Detail.

INSTALLATION (CONTINUED)

AIR DISTRIBUTION DUCTS

All duct work must be installed in accordance with National Fire Protection Association Codes 90A and 90B. Ducts should be adequately insulated to prevent condensation during the cooling cycle and to minimize heat loss during the heating cycle. The return air duct should have the same free area as the opening provided on the heat pump unit. If there is no ducted return, applicable installation codes may limit the unit to installation only in a single story residence. In many cases it is acceptable to use ducting of the same size as the discharge connections. However, unique arrangements or long duct runs must be confirmed by a local professional and designed using current ASHRAE procedures for duct sizing. The manufacturer will not be responsible for misapplied equipment.

The WSV* unit provides a supply air outlet collar and a return air duct flange to facilitate duct connections. Refer to Figure 2 for discharge flange set-up. A flexible connector is recommended for supply and return air connections on metal duct systems. All metal ducting should be insulated with a minimum of one inch duct insulation to reduce heat loss or gain.

ELECTRICAL CONNECTIONS

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

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.

WARNING

ELECTRIC SHOCK HAZARD

The unit cabinet must have an uninterrupted / unbroken ground to minimize personal injury if an electrical fault should occur . Failure to do so can cause electrical shock resulting in severe personal injury or death.

WARNING

ELECTRIC SHOCK HAZARD

USE COPPER CONDUCTORS ONLY!

CAUTION

The unit is designed to operate at maximum 0.5 in.w.c external static pressure. Operation at higher E.S.P may cause equipment failure. For applications requiring higher static operation, please contact factory or the manufacture's sales representative.

CAUTION

Any device 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.

Before proceeding with electrical connections, make certain that supply voltage, frequency, and phase are as specified on unit rating plate. Be sure that electrical service provided by the utility is sufficient to handle the additional load imposed by this equipment. All field electrical connections must comply with NEC and any local codes or ordinances. Use copper wire only.

Properly sized fuses or HACR circuit breakers must be installed for branch circuit protection. See equipment nameplate for maximum size. Connect the power leads as indicated on the wiring diagram and be certain to connect the ground lead to the ground lug in the control box. Units are wired for 240V operation, if 208V supply voltage is present refer to the wiring diagram for wiring the transformer for 208V operation.

WARNING

Any accessory items that have been furnished by the factory for field installation must be wired in strict accordance with the wiring diagram supplied with the unit. Failure to do so could result in electrical shock causing personal injury, death, or damage to components and will avoid all warranties.

INSTALLATION (CONTINUED)

WARNING

Three phase units are supplied with phase monitors which restrict power from being applied out of phase, unbalanced or when there is a loss of phase. Even so, ensure proper compressor rotation by checking suction and discharge pressures, FLA's are normal and listen for noisy operation. Oil loss will be the greatest threat. See wiring diagram.

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 as follows:

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

CONTROL MODULE AND SAFETY DEVICES

The WSV* unit comes standard with a control module that controls the units operation and monitors the safety controls that protect the compressor, heat exchanger, wiring and other components from damage caused by operating outside of design conditions.

Safety controls include the following:

- High pressure switch located in the refrigerant discharge line.
- Low pressure switch located in the refrigerant suction line.
- Water Coil Low Temperature Cutout Sensor located on the heat exchanger to prevent unit operation below low temperature setting.
- Condensate overflow protection sensor located in the drain pan.

The Control Module includes the following features:

- Anti-short Cycle timer – 5 minute anti-short cycle protection for the compressor.
  Note: The 5 Minute anti-short cycle also occurs at power up.
- Random Start – the controller features a 5-80 second random start upon power up.

INSTALLATION (CONTINUED)

- Low Pressure Bypass Timer – The low pressure switch input is bypassed for the initial 120 seconds of a compressor run cycle to prevent nuisance low pressure lockouts.
- Over/Under Voltage Shutdown – Should an Over/Under Voltage condition be detected, the module will initiate a shutdown. Over/Under Voltage Shutdown is self-resetting in that if the voltage comes back within range of 18.5VAC to 31VAC, then normal operation will be restored.
- Alarm Relay – The module has a set of contacts for remote fault indication. Contacts can be 24VAC output or converted to a dry contact.
- Test Mode – Test pins can be momentarily jumped to enter into a 10 minute Test Mode period in which all time delays are sped up 15 times. While in the Test Mode the LED Display will display a code representing the last fault in memory.

NOTE

Continued operation of the unit in the test mode can lead to accelerated wear and premature failure of unit.

- Fault Retry – While in the Fault Retry Mode the LED Display 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 delays. If 3 consecutive faults occur without satisfying the thermostat the control will go to Lockout Mode. The last fault causing the lockout will be stored in memory and displayed.
- Lockout – While in Lockout Mode the LED Display will display a code representing lockout and the fault code. The compressor relay is turned off immediately. During a lockout mode the alarm relay is activated. Lockout mode can be soft reset by turning the thermostat to the "OFF" position then back to the "HEAT" or "COOL" mode or hard reset via the power disconnect.
- LED Indication – Two LED indicators are provided as follows:
  Green: Power LED indicates 18.5-31VAC is present at the board.
  Yellow: Test LED indicates that the unit is operating in the test mode.
- LED Display – A two digit display indicates the system mode and fault code, if present.
  See table 1.

CONTROLLER OPERATIONAL CODES	
DESCRIPTION OF OPERATION	LED Readout
NORMAL	ON (Green LED)
CONTROLLER NON-FUNCTIONAL	OFF (Green LED)
TEST MODE (pins momentarily shorted)	ON (Yellow LED)
STAND-BY	St
FAN ONLY	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 #
TEST MODE - NO FAULT	CODE 11
TEST MODE - HP FAULT	CODE 12
TEST MODE - LP FAULT	CODE 13
TEST MODE - CO1 FAULT	CODE 14
TEST MODE - CO2 FAULT	CODE 15
TEST MODE - CONDENSATE OVERFLOW FAULT	CODE 16
TEST MODE - OVER / UNDER SHUTDOWN	CODE 17
TEST MODE - SWAPPED CO1 / CO2 THERMISTORS	CODE 18
TEST MODE - TEMPERATURE SENSOR ERROR	CODE 19

PIPING

Supply and return piping must be as large as the unit connections on the heat pump and larger on long runs. Never use flexible hoses of a smaller diameter than the water connections on the unit. Do not exceed the minimum bend radius for the flexible hose selected. Exceeding the minimum bend radius may cause the hose to collapse, which reduces water flow rate. Install an angle adapter to avoid sharp bends in the hose when the radius falls below the required minimum.

Minimum Metal Hose Bend Radii

3/4" Hose Diameter – 4" Minimum Bend Radii
1" Hose Diameter – 5-1/2" Minimum Bend Radii

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.

INSTALLATION (CONTINUED)

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.

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.

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.

WARNING

ELECTRIC SHOCK HAZARD

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

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

NOTE

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

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.

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.

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 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 avoid pipe freezing where equipment damage or failure may occur. Failure to follow this warning could result in property damage..

GENERAL 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.
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

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

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

A2L SENSING AND MITIGATION

Units charged with more than 4 lb. (1.81 kg) 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 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.

WSVC	Units	WSVC6048	WSVC6060
Minimum Room Area	**Ft² [m²]**	65 [6.05]	70 [6.55]
Minimum Air Flow	**CFM [m³/hr]**	117 [199]	127 [216]
WSVX	**Units**	**WSVX6048**	**WSVX6060**
Minimum Room Area	**Ft² [m²]**	65 [6.05]	70 [6.55]
Minimum Air Flow	**CFM [m³/hr]**	117 [199]	127 [216]

Table XXX. Minimum Room Size and Mitigation Airflow for R454b Systems

System Charge		Minimum Room Area		Min Mitigation Airflow	
(lb)	(kg)	(sq ft)	(sq m)	(CFM)	(cu m/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	5.90	195	18.11	352	598
14	6.35	210	19.50	379	644
15	6.80	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

Altitude Correction Factor

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

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.

SYSTEM APPLICATIONS

COOLING TOWER/BOILER APPLICATION

To assure optimum cooling and heating performance, the cooling tower and boiler water loop temperature should be maintained between 55-75° F (13-24° C) in the heating mode and 60-95° F (16-35° C) in the cooling mode. In the cooling mode, heat is rejected from the heat pump's refrigerant into the water loop. A cooling tower provides evaporative cooling to the loop fluid; thus maintaining a constant supply temperature to the unit. When using an open cooling tower, chemical water treatment is mandatory to ensure the water is free of corrosive materials.

In the 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 in the loop.

CAUTION

A boiler may be required in the water loop to maintain the loop water temperature between 55-70° F (13-21°C). Failure to follow this warning could result in equipment failure and property damage.

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.

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 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.

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 to refrigerant heat exchanger.

UNIT CONNECTIONS

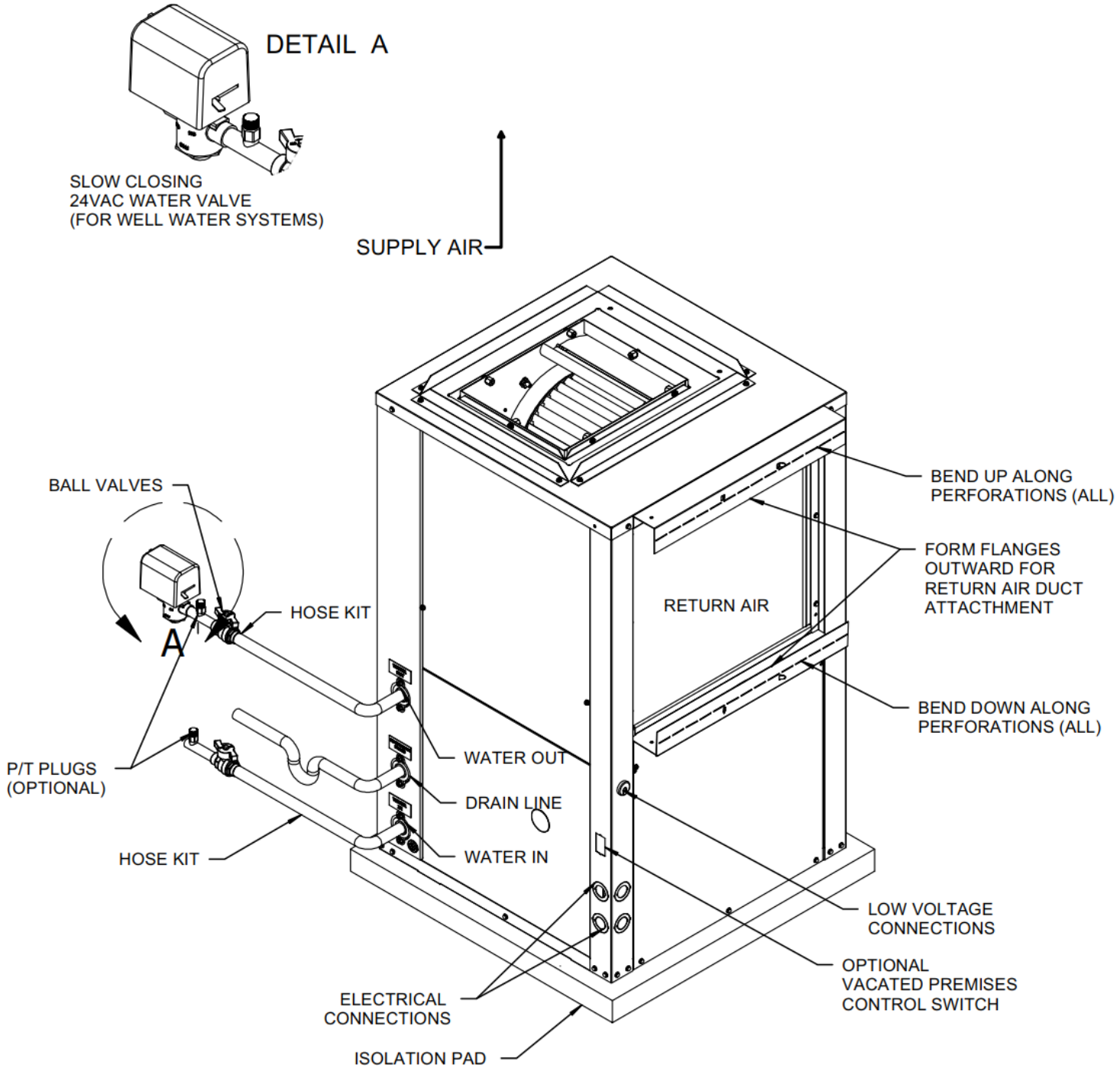

Figure 2- Right Hand Model Shown

UNIT CONNECTIONS

EXTENDED RANGE OPERATION:

Piping systems expected to utilize water temperatures below 50°F (10° C) require the extended range option which includes closed cell insulation on all piping surfaces to eliminate condensation. This application requires sufficient antifreeze solution to protect the water loop against extreme temperature conditions and condenser coil freezing. Frozen condenser coils are not covered under warranty. A boiler may be required to maintain the minimum water temperature within in the loop.

WELL WATER APPLICATIONS

Requirements:

- 50° F (10° C) minimum Entering Water Temperature
- Cupro-Nickel Refrigerant Heat Exchanger

When a water well is used exclusively for supplying water to the heat pump, a cupro-nickel refrigerant heat exchanger is required and the well pump should operate only when the heat pump operates. A 24 volt contactor can be wired to the ACC 1 terminal on the Control Module which can be selected to energize prior to or at compressor start-up which would in turn energize the well pump to operate with the heat pump.

CAUTION

Minimum entering water loop temperature is 50° F (10° C). 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 ways depending upon local codes.

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. A sealed refrigerant system normally requires no maintenance since it is closed and self-contained.

WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in personal injury or death. Recover all refrigerant before attempting a sealed air conditioning system repair. Recover all refrigerant before final unit disposal. Use all service ports and position all refrigerant flow–control devices open, including expansion valves and solenoid valves.

BLOWER SPEED SELECTION

UNITS with PSC MOTOR

All units have a 3 or 4 speed motor so the blower can be field adjusted to a higher speed tab when the system application has higher static requirements. Refer to the unit specification sheet and wiring diagram for speed selections. Motor leads should be changed on the Fan Speed Relay.

UNITS with DC MOTOR

No fan speed relays are used and three motor leads connect directly to the control board. Gray is a 50% speed used when only "fan" is selected. Violet and White are the ramp up speeds used when in normal heating or cooling modes. See wiring diagram for proper speed tap selection.

WARNING

ELECTRIC SHOCK HAZARD

High efficiency brushless DC motors have power applied at all times. Disconnect power before servicing. Low voltage thermostat demand and board algorithms will control its use.

WSCM OPTIONAL FEATURES

VACATED PREMISES CONTROL:

The vacated premises operation is designed for extended periods of un-occupancy when the occupant desires the heat pump to operate in the cooling mode for a predetermined cycle time to help control indoor air conditions. See Dip 1.7 for time selection of 1 or 2 hours per day. The control kit consists of a rocker switch, wiring and a programmed chip that is installed on the WSCM control module by the licensed contractor.

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 and the thermostat is set to the "COOL" mode the heat pump will operate in accordance to the thermostat setting. Additionally, the heat pump will cycle on in the cooling mode for 15 minute run times either 4 or 8 times per day depending on Dip 1.7 selection.

NOTE

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

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.

OPERATING TEMPERATURES & PRESSURES

			OPERATING DATA							
			COOLING				HEATING			
MODEL	ENTERING WATER TEMP, F	WATER FLOW GPM	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	WATER TEMP RISE, F	AIR TEMP DROP, F	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	WATER TEMP DROP, F	AIR TEMP RISE, F
WSVC009	50	1.5	114 - 124	173 - 223	20 - 26	14 - 18	103 - 123	323 -363	20 - 26	7 - 11
		2.5	115 - 125	160 - 210	20 - 26	9 - 13	110 - 130	331 - 371	21 - 27	4 - 8
	60	1.5	116 - 126	205 - 255	19 - 25	14 - 18	123 - 143	345 - 385	23 - 29	8 - 12
		2.5	116 - 126	190 - 240	20 - 26	8 - 12	133 - 153	354 - 394	24 - 30	4 - 8
	70	1.5	118 - 128	240 - 290	19 - 25	14 - 18	145 - 165	367 - 407	26 - 32	10 - 14
		2.5	117 - 127	221 - 271	19 - 25	8 - 12	157 - 177	379 -419	27 - 33	5 - 9
	80	1.5	120 - 130	279 - 329	18 - 24	14 - 18	170 - 190	391 - 431	29 - 35	11 - 15
		2.5	119 - 129	260 - 310	19 - 25	8 - 12	184 - 204	406 - 446	31 - 37	6 - 10
	90	1.5	122 - 132	322 - 372	18 - 24	13 - 17	196 - 216	418 - 458	33 - 39	13 - 17
		2.5	121 - 131	302 - 352	18 - 24	7 - 11	211 - 231	434 - 474	35 - 41	8 - 12
	100	1.5	124 - 134	369 - 419	17 - 23	13 - 17				
		2.5	123 - 133	349 - 399	17 - 23	7 - 11				
WSVC012	50	2.0	114 - 134	181 - 231	20 - 26	13 - 17	91 - 111	285 - 325	18 - 24	6 - 10
		3.0	114 - 134	172 - 222	20 - 26	8 - 12	96 - 116	289 - 329	19 - 25	3 - 7
	60	2.0	115 - 135	216 - 266	20 - 26	13 - 17	109 - 129	301 - 341	21 - 27	7 - 11
		3.0	115 - 135	206 - 256	20 - 26	8 - 12	115 - 135	306 - 346	22 - 28	4 - 8
	70	2.0	117 - 137	254 - 304	20 - 26	13 - 17	128 - 148	318 - 358	24 - 30	9 - 13
		3.0	116 - 136	244 - 294	20 - 26	8 - 12	136 - 156	325 - 365	25 - 31	5 - 9
	80	2.0	119 - 139	296 - 346	19 - 25	13 - 17	150 - 170	338 - 378	27 - 33	10 - 14
		3.0	119 - 139	286 - 336	19 - 25	8 - 12	160 - 180	348 - 388	29 - 35	6 - 10
	90	2.0	122 - 142	342 - 392	19 - 25	13 - 17	173 - 193	362 - 402	31 - 37	12 - 16
		3.0	121 - 141	332 - 382	19 - 25	8 - 12	165 - 185	360 - 396	33 - 40	8 - 12
	100	2.0	125 - 145	393 - 443	18 - 24	13 - 17				
		3.0	124 - 144	384 - 434	18 - 24	8 - 12				

This chart shows approximate temperatures and pressures for a unit in good working condition. The values shown are meant as a guide only and should not be used to determine system change. This chart assumes rated airflow and 80° F (27° C) D.B. / 67° F (19° C) W.B. entering air temperature in cooling, 70° F (21° C) D.B. entering air temperature in heating.

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OPERATING TEMPERATURES & PRESSURES (CONTINUED)

			OPERATING DATA							
			COOLING				HEATING			
MODEL	ENTERING WATER TEMP, F	WATER FLOW GPM	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	WATER TEMP RISE, F	AIR TEMP DROP, F	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	WATER TEMP DROP, F	AIR TEMP RISE, F
WSVC018	50	3.0	112 -152	210 - 258	15 - 17	19 - 23	103 - 123	293 - 363	7 - 9	19 - 24
		5.0	104 -140	193 -241	8 - 9	17 - 21	110 - 132	306 - 376	5 - 6	21 - 26
	60	3.0	122 - 154	241 - 289	15 - 17	18 - 22	120 - 145	332 - 401	8 - 10	25 - 30
		5.0	117 - 142	223 - 274	8 - 9	17 - 21	122 - 147	347 - 417	5 - 6	27 - 32
	70	3.0	128 - 156	276 - 334	15 - 17	18 - 22	135 - 164	374 - 444	9 - 12	29 - 34
		5.0	126 - 155	277 - 315	9 - 10	18 - 22	144 - 174	384 - 453	6 - 7	31 - 37
	80	3.0	128 - 156	317 - 375	14 - 16	18 - 22	150 -181	392 - 462	11 - 13	32 - 38
		5.0	121 - 149	295 - 353	9 - 10	17 - 21	155 - 185	400 - 470	8 - 9	33 - 39
	90	3.0	130 - 156	355 - 402	14 - 16	17 - 21	158 - 195	407 - 477	13 - 15	34 - 40
		5.0	123 - 148	340 - 398	9 - 10	17 - 21	162 - 208	416 - 487	7 - 9	35 - 41
	100	3.0	132 - 156	405 - 465	13 - 15	16 - 20				
		5.0	126 - 150	386 - 444	8 - 9	17 - 21				
WSVC024	50	4.0	105 - 140	190 - 230	13 - 16	18 - 23	105 - 125	302 - 370	7 - 9	23 - 28
		6.0	100 - 135	183 - 220	9 - 12	16 - 21	110 - 132	310 - 380	5 - 6	24 - 29
	60	4.0	116 - 145	225 - 275	13 - 16	19 - 24	120 - 145	352 - 422	8 - 10	28 - 33
		6.0	111 - 136	215 - 260	9 - 11	18 - 23	125 - 150	372 - 442	6 - 7	29 - 34
	70	4.0	122 - 150	260 - 320	14 - 16	18 - 23	137 - 166	400 - 468	9 - 12	33 - 38
		6.0	117 - 143	248 - 305	9 - 11	18 - 23	144 - 174	404 - 474	7 - 8	35 - 40
	80	4.0	126 - 154	298 - 365	13 - 17	19 - 24	152 - 183	426 - 494	11 - 13	36 - 41
		6.0	119 - 147	285 - 345	9 - 11	18 - 23	160 - 190	430 - 499	8 - 9	38 - 43
	90	4.0	130 - 156	338 - 400	13 - 16	18 - 23	163 - 200	444 - 514	12 - 14	38 - 43
		6.0	125 - 148	320 - 385	9 - 11	19 - 24	165 - 210	440 - 512	8 - 10	39 - 44
	100	4.0	133 - 157	380 - 450	13 - 15	17 - 22				
		6.0	127 - 151	352 - 430	9 - 11	17 - 22				
WSVC030	50	5.0	110 - 150	210 - 258	15 - 17	17 - 21	103 - 123	298 - 368	7 - 9	20 - 25
		8.0	104 - 140	193 - 241	8 - 9	16 - 20	110 - 132	308 - 378	5 - 6	22 - 27
	60	5.0	120 - 152	241 - 289	15 - 17	18 - 22	120 - 145	335 - 404	8 - 10	25 - 30
		8.0	115 - 140	223 - 274	8 - 9	17 - 21	122 - 147	347 - 417	6 - 7	26 - 31
	70	5.0	126 -154	276 - 334	15 - 17	18 - 22	135 - 164	378 - 448	9 - 12	29 - 34
		8.0	123 - 152	277 - 315	9 - 10	17 - 21	144 - 174	384 - 453	7 - 8	28 - 34
	80	5.0	126 - 154	312 - 370	14 - 16	18 - 22	152 - 183	398 - 468	11 - 13	32 - 38
		8.0	119 - 147	295 - 353	9 - 10	17 - 21	160 - 190	405 - 475	8 - 9	34 - 40
	90	5.0	132 - 158	355 - 402	14 - 16	18 - 22	165 - 203	422 - 492	12 - 14	35 - 41
		8.0	125 - 150	335 - 394	9 - 10	17 - 21	170 - 215	424 - 495	8 - 10	37 - 43
	100	5.0	135 - 159	400 - 460	13 - 15	17 - 21				
		8.0	129 - 153	381 - 439	8 - 9	16 - 20				

This chart shows approximate temperatures and pressures for a unit in good working condition. The values shown are meant as a guide only and should not be used to determine system change. This chart assumes rated airflow and 80° F (27° C) D.B. / 67° F (19° C) W.B. entering air temperature in cooling, 70° F (21° C) D.B. entering air temperature in heating.

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OPERATING TEMPERATURES & PRESSURES (CONTINUED)

			OPERATING DATA							
			COOLING				HEATING			
MODEL	ENTERING WATER TEMP, F	WATER FLOW GPM	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	WATER TEMP RISE, F	AIR TEMP DROP, F	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	WATER TEMP DROP, F	AIR TEMP RISE, F
WSVC036	50	6	110 - 150	214 - 262	15 - 17	22 - 26	105 -125	312 - 380	6 - 8	26 - 31
		9	104 - 140	199 - 247	9 - 10	20 - 24	110 - 132	320 - 390	4 -6	28 - 33
	60	6	120 - 152	246 - 295	15 - 17	22 - 26	124 - 149	359 - 429	8 - 9	31 - 36
		9	115 - 140	233 - 284	9 - 10	20 - 24	127 - 152	367 - 437	5 - 6	32 - 37
	70	6	126 - 154	286 - 344	15 - 17	22 - 26	135 - 164	390 - 458	9 - 12	38 - 43
		9	123 - 152	287 - 325	9 - 10	21 - 25	144 - 174	404 - 474	7 - 8	38 - 43
	80	6	126 - 154	322 - 380	14 - 16	21 - 25	157 - 188	426 - 494	10 - 12	42 - 47
		9	119 - 147	310 - 368	9 -10	20 - 24	162 - 192	430 - 499	8 - 9	43 - 48
	90	6	132 - 158	360 - 417	14 - 16	20 - 24	165 - 203	444 -514	13 - 15	44 - 50
		9	125 - 150	350 - 409	9 - 10	20 - 24	173 - 218	445 - 517	7 - 9	45 - 51
	100	6	135 - 159	405 - 465	13 -15	19 - 23				
		9	129 - 153	391 - 449	9 - 10	19 - 23				
WSVC040	50	7	111 - 151	215 - 263	15 - 17	22 - 26	105 -125	314 - 382	6 - 8	26 - 31
		10	105 - 141	201 - 249	9 - 10	20 - 24	111 - 132	321 - 392	4 -6	28 - 33
	60	7	121 - 153	249 - 297	15 - 17	22 - 26	126 - 151	361 - 431	8 - 9	31 - 36
		10	117 - 142	234 - 285	9 - 10	20 -24	129 - 154	368 - 439	5 - 6	32 - 37
	70	7	127 - 155	288 - 346	15 - 17	22 - 26	136 - 165	392 - 460	9 - 12	38 - 43
		10	125 - 154	289 - 327	9 - 10	21 - 25	146 - 176	405 - 475	7 - 8	38 -43
	80	7	127 - 155	324 - 382	14 - 16	21 - 25	159 - 190	428 - 496	10 - 12	42 -47
		10	121 - 149	311 - 370	9 - 10	20 - 24	163 - 193	432 - 501	8 - 9	43 - 48
	90	7	133 - 159	362 - 419	14 - 16	20 - 24	167 - 205	445 - 516	13 - 15	44 - 50
		10	127 - 152	352 - 411	9 - 10	20 - 24	175 - 220	447 - 519	7 - 9	45 - 51
	100	7	136 - 160	406 - 466	13 - 15	19 - 23				
		10	131 - 155	393 - 452	9 - 10	19 - 23				
WSVC042	50	8	111 - 151	201 - 249	12 - 14	17 - 21	100 - 120	288 - 358	6 - 8	22 - 26
		11	107 - 143	190 - 238	8 - 9	16 - 20	103 - 123	293 - 363	5 - 6	23 - 27
	60	8	122 - 154	231 - 279	13 - 15	18 - 22	117 - 142	325 - 394	9 - 10	28 - 32
		11	122 - 147	227 - 278	9 - 11	18 - 22	117 - 142	327 - 398	6 - 7	28 - 32
	70	8	128 - 156	270 - 328	13 - 15	18 - 22	129 - 158	348 - 408	9 - 11	32 - 36
		11	126 - 155	272 - 310	9 - 11	18 - 22	136 - 166	354 - 423	7 - 8	32 - 36
	80	8	130 - 158	308 - 366	12 - 14	18 - 22	145 - 176	373 - 443	10 - 12	34 - 38
		11	125 - 153	300 - 360	8 - 10	17 - 21	150 - 180	345 - 445	8 - 9	35 - 39
	90	8	137 - 163	352 - 409	11 - 13	18 - 22	155 - 193	352 - 452	11 - 13	36 - 40
		11	132 - 157	347 - 406	8 - 10	18 - 22	160 - 205	358 - 458	8 - 10	37 - 41
	100	8	139 - 163	398 - 458	11 - 14	17 - 21				
		11	135 - 159	391 - 449	8 - 10	17 - 21				

This chart shows approximate temperatures and pressures for a unit in good working condition. The values shown are meant as a guide only and should not be used to determine system change. This chart assumes rated airflow and 80 deg D.B. / 67 deg W.B. entering air temperature in cooling, 70 deg D.B. entering air temperature in heating.

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OPERATING TEMPERATURES & PRESSURES (CONTINUED)

			OPERATING DATA							
			COOLING				HEATING			
MODEL	ENTERING WATER TEMP, F	WATER FLOW GPM	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	WATER TEMP RISE, F	AIR TEMP DROP, F	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	WATER TEMP DROP, F	AIR TEMP RISE, F
WSVC048	50	9	106 - 146	197 - 245	12 - 14	17 - 21	92 - 115	300 - 370	6 - 8	25 - 29
		12	102 - 142	187 - 235	8 - 10	16 - 20	95 - 117	302 - 372	5 - 7	26 - 30
	60	9	116 = 148	231 - 279	14 - 16	18 - 22	105 - 130	332 - 402	7 - 9	29 - 33
		12	116 - 141	223 - 274	8 - 9	17 - 21	107 - 132	332 - 402	6 - 8	30 - 34
	70	9	124 - 152	268 - 326	13 - 15	19 - 23	115 - 144	349 - 420	9 - 11	32 - 36
		12	121 - 151	277 - 315	9 - 10	18 - 22	116 - 147	354 - 425	6 - 8	33 - 37
	80	9	126 - 154	310 - 368	13 - 15	19 - 23	123 - 154	367 - 438	9 - 11	35 - 39
		12	121 - 149	298 - 356	9 - 11	19 - 23	125 - 156	370 - 440	7 - 9	36 - 40
	90	9	132 - 158	358 - 405	13 - 15	19 - 23	131 - 162	380 - 451	10 - 12	36 - 40
		12	127 - 153	338 - 408	9 - 11	18 - 22	133 - 165	384 - 455	7 - 9	37 - 41
	100	9	131 - 156	394 - 454	12 - 14	19 - 23				
		12	129 - 153	391 - 449	8 - 10	18 - 22				
WSVC060	50	12	109 - 149	201 - 249	12 - 14	17 - 21	97 - 120	298 - 368	6 - 8	22 - 26
		15	105 - 147	191 - 239	8 - 9	16 - 20	100 - 122	300 - 370	5 - 6	23 - 27
	60	12	119 - 152	235 - 283	13 - 15	18 - 22	110 - 135	330 - 400	9 - 10	28 - 32
		15	119 - 148	227 - 278	9 - 11	18 - 22	112 - 137	300 - 400	6 - 7	28 - 32
	70	12	127 - 155	272 - 330	13 - 15	18 - 22	120 - 149	347 - 418	9 - 11	32 - 36
		15	124 - 154	281 - 319	9 - 11	18 - 22	121 - 152	352 - 423	7 - 8	32 - 36
	80	12	129 - 157	314 - 372	12 - 14	18 - 22	128 - 159	365 - 436	10 - 12	34 - 38
		15	124 - 152	302 - 360	8 - 10	17 - 21	130 - 161	370 - 438	8 - 9	35 - 39
	90	12	135 - 161	362 - 409	11 - 13	18 - 22	135 - 167	378 - 449	11 - 13	36 - 40
		15	130 - 156	342 - 412	8 - 10	18 - 22	138 - 170	382 - 453	8 - 10	37 - 41
	100	12	134 - 159	398 - 459	11 - 14	17 - 21				
		15	131 - 156	395 - 453	8 - 10	17 - 21				

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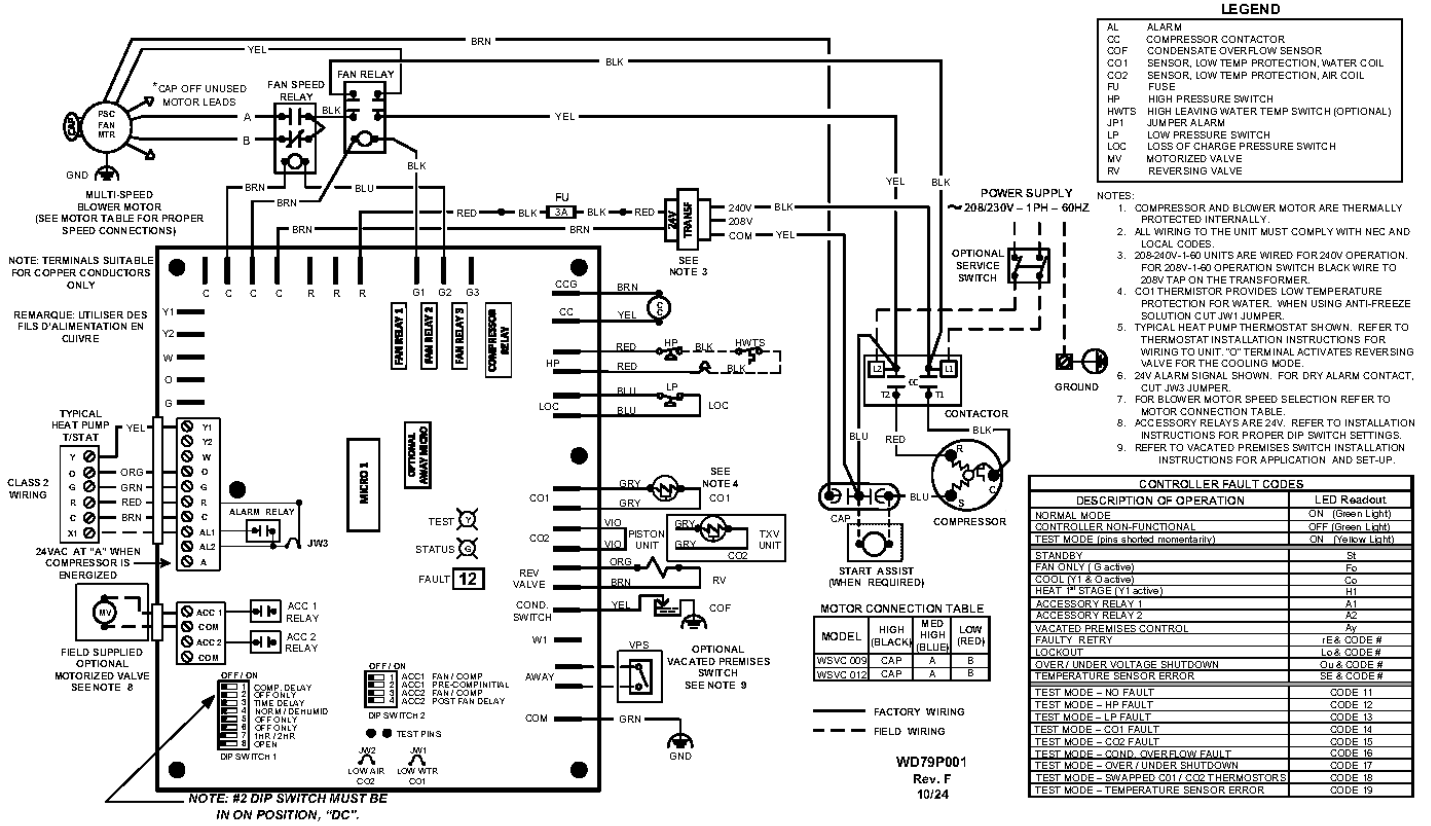
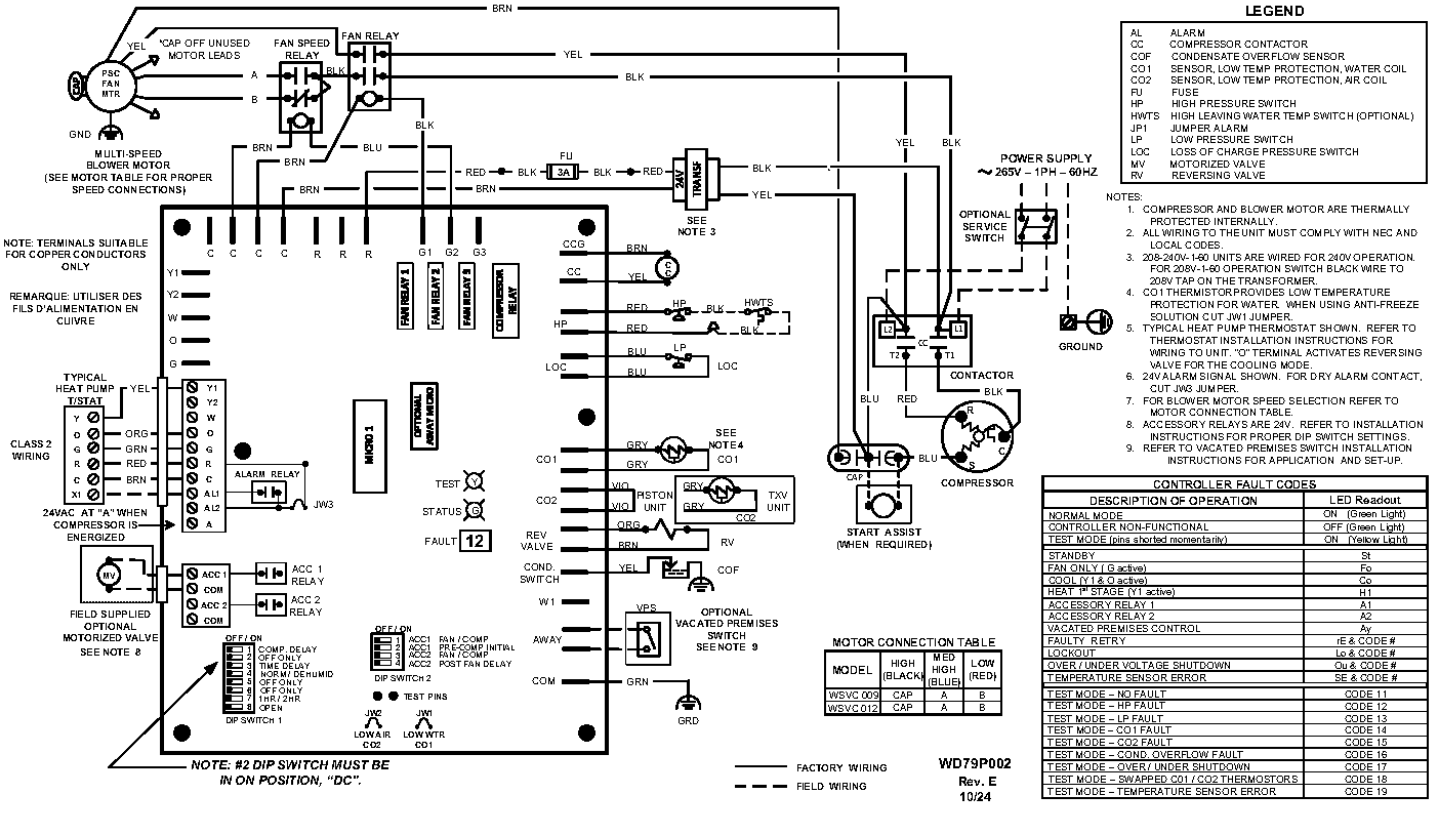
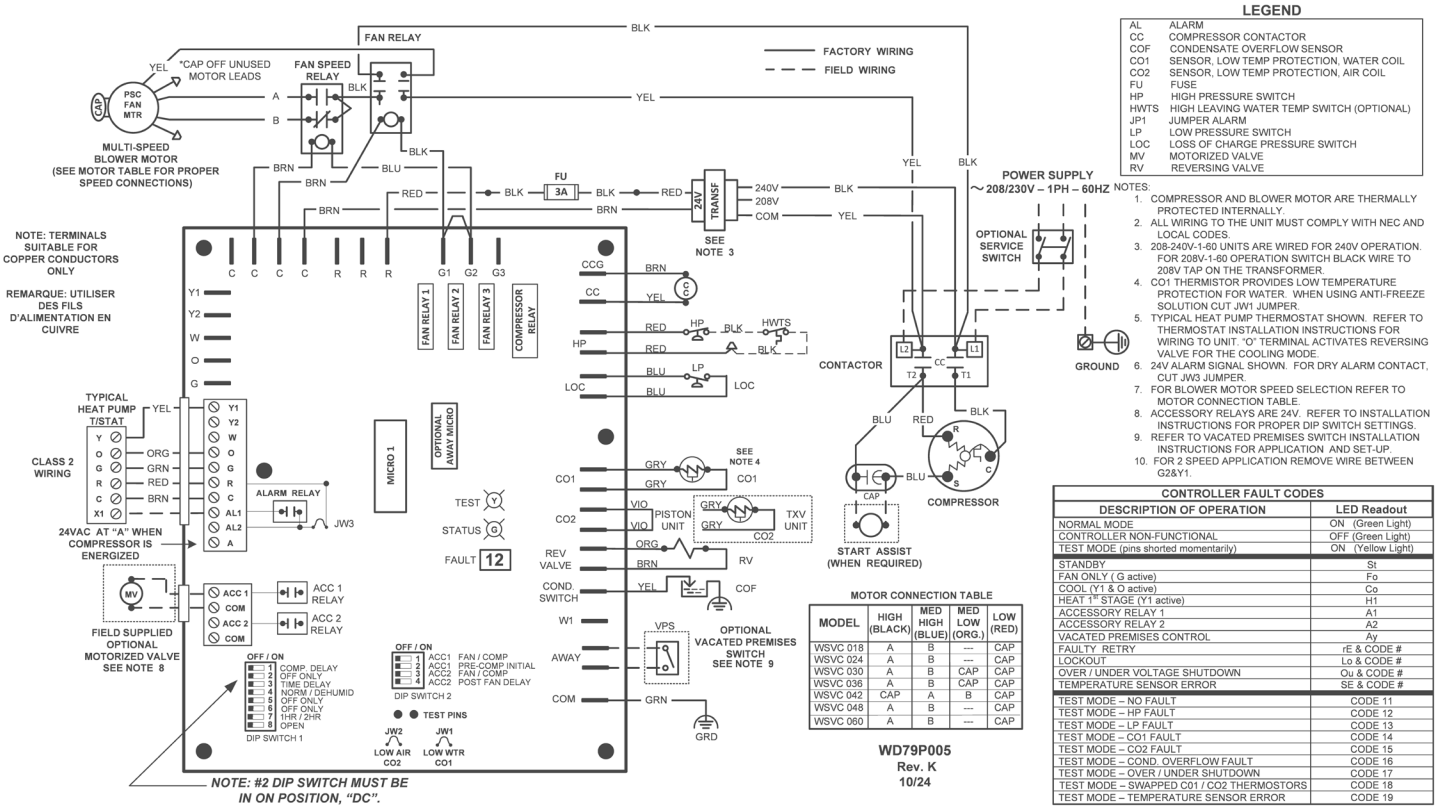
WIIRING DIAGRAMS



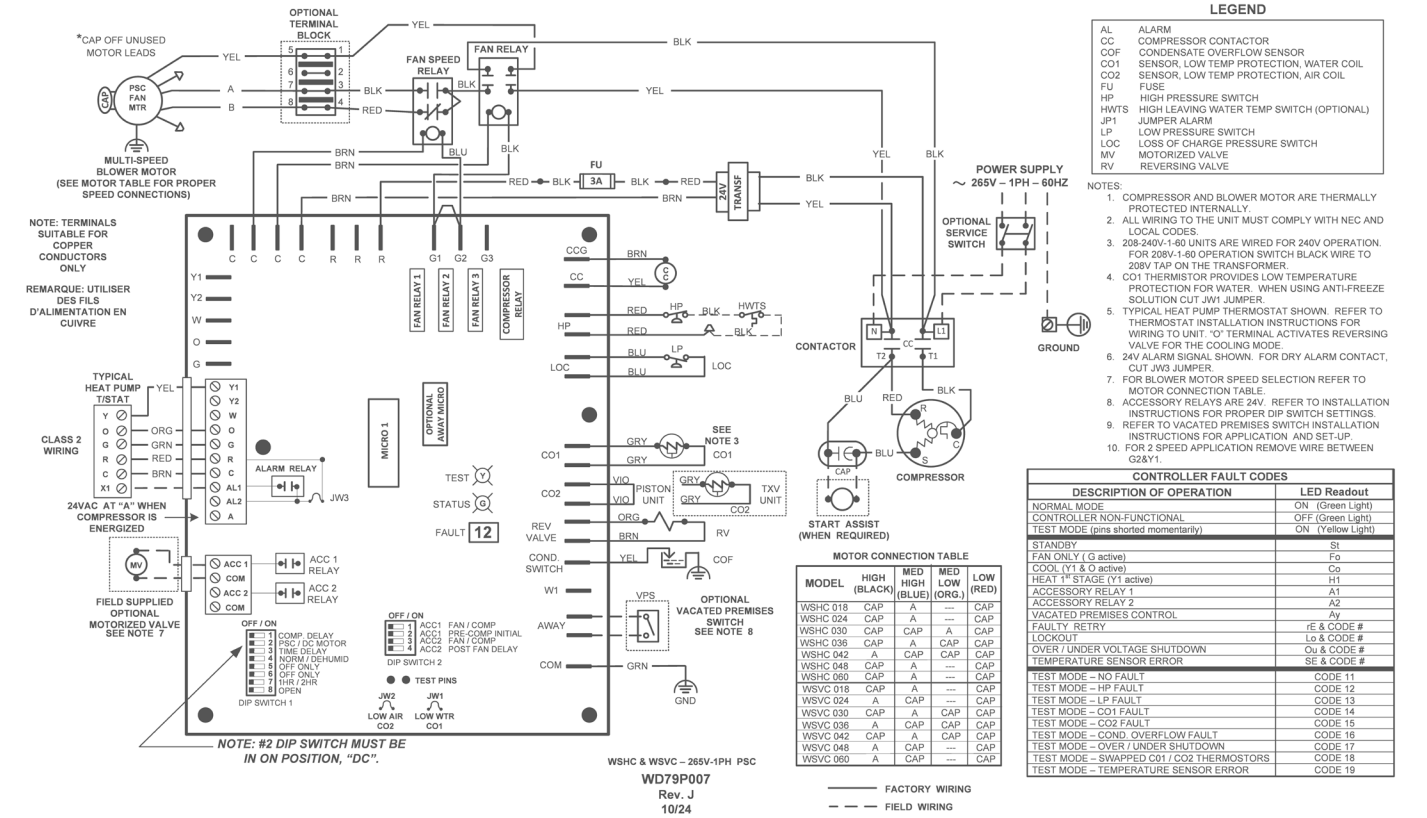


WIIRING DIAGRAMS



MOTOR CONNECTION TABLE				
MODEL	HIGH (BLACK)	MED HIGH (BLUE)	MED LOW (ORG.)	LOW (RED)
WSVC 018	A	B	---	CAP
WSVC 024	A	B	---	CAP
WSVC 030	A	B	CAP	CAP
WSVC 036	A	B	CAP	CAP
WSVC 042	CAP	A	B	CAP
WSVC 048	A	B	---	CAP
WSVC 060	A	B	---	CAP

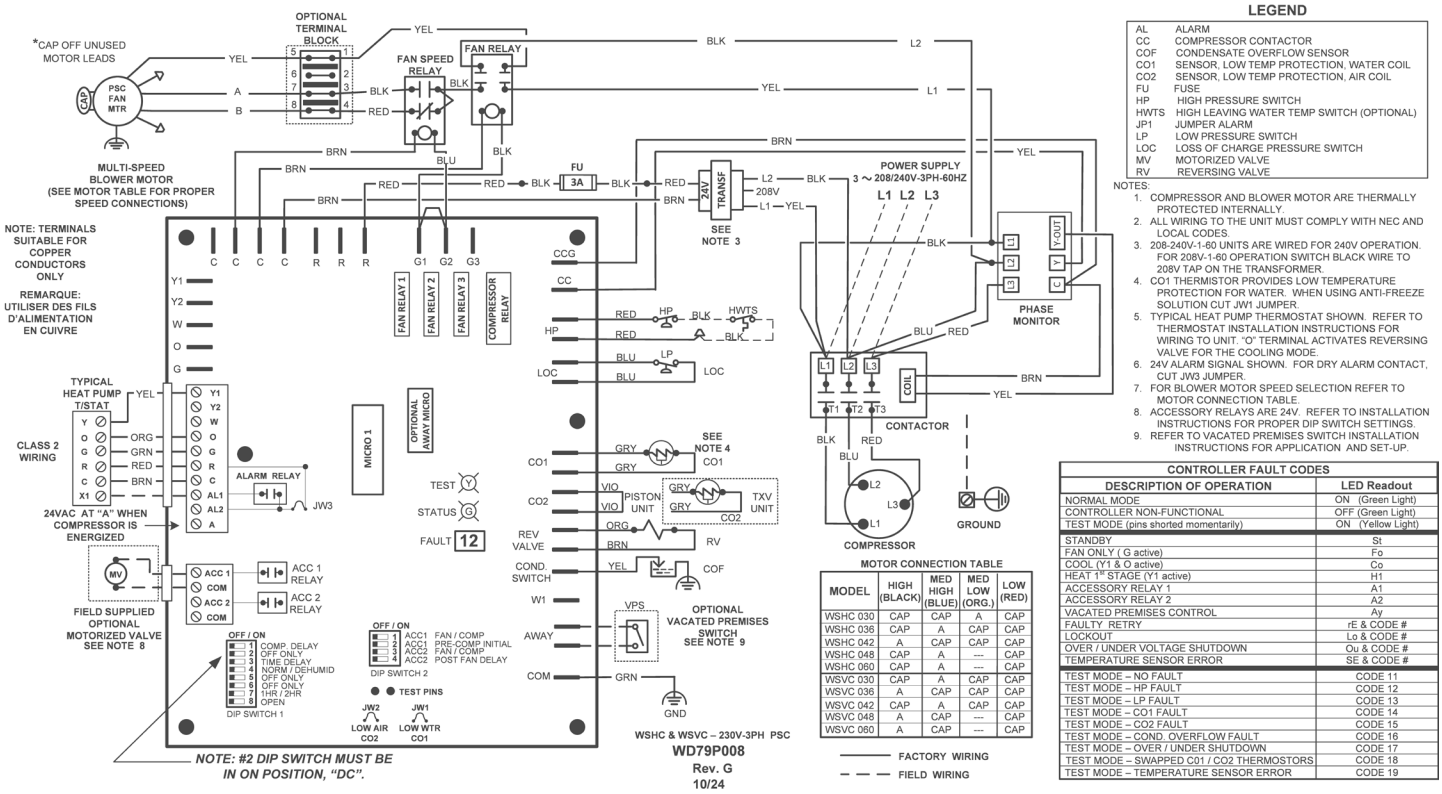
CONTROLLER FAULT CODES	
DESCRIPTION OF OPERATION	LED Readout
NORMAL MODE	ON (Green Light)
CONTROLLER NON-FUNCTIONAL	OFF (Green Light)
TEST MODE (pins shorted momentarily)	ON (Yellow Light)
STANDBY	St
FAN ONLY (G active)	Fo
COOL (Y1 & O active)	Co
HEAT 1ST STAGE (Y1 active)	H1
ACCESSORY RELAY 1	A1
ACCESSORY RELAY 2	A2
VACATED PREMISES CONTROL	Ay
FAULTY RETRY	rE & CODE #
LOCKOUT	Lo & CODE #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & CODE #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE – NO FAULT	CODE 11
TEST MODE – HP FAULT	CODE 12
TEST MODE – LP FAULT	CODE 13
TEST MODE – CO1 FAULT	CODE 14
TEST MODE – CO2 FAULT	CODE 15
TEST MODE – COND. OVERFLOW FAULT	CODE 16
TEST MODE – OVER / UNDER SHUTDOWN	CODE 17
TEST MODE – SWAPPED C01 / CO2 THERMOSTORS	CODE 18
TEST MODE – TEMPERATURE SENSOR ERROR	CODE 19

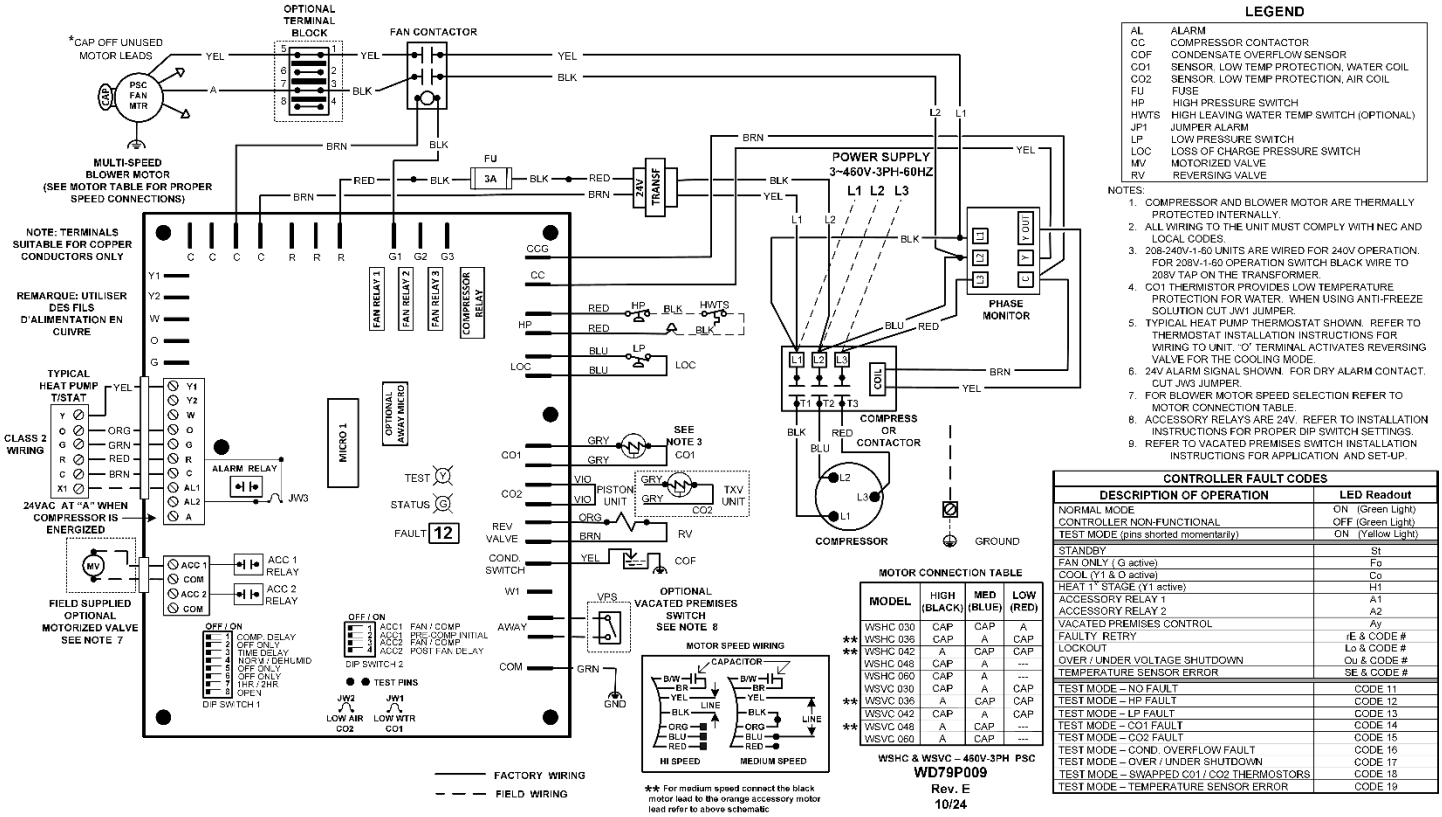


MOTOR CONNECTION TABLE				
MODEL	HIGH (BLACK)	MED HIGH (BLUE)	MED LOW (ORG.)	LOW (RED)
WSHC 018	CAP	A	---	CAP
WSHC 024	CAP	A	---	CAP
WSHC 030	CAP	CAP	A	CAP
WSHC 036	CAP	A	CAP	CAP
WSHC 042	A	CAP	CAP	CAP
WSHC 048	CAP	A	---	CAP
WSHC 060	CAP	A	---	CAP
WSVC 018	CAP	A	---	CAP
WSVC 024	A	CAP	---	CAP
WSVC 030	CAP	A	CAP	CAP
WSVC 036	A	CAP	CAP	CAP
WSVC 042	CAP	A	CAP	CAP
WSVC 048	A	CAP	---	CAP
WSVC 060	A	CAP	---	CAP

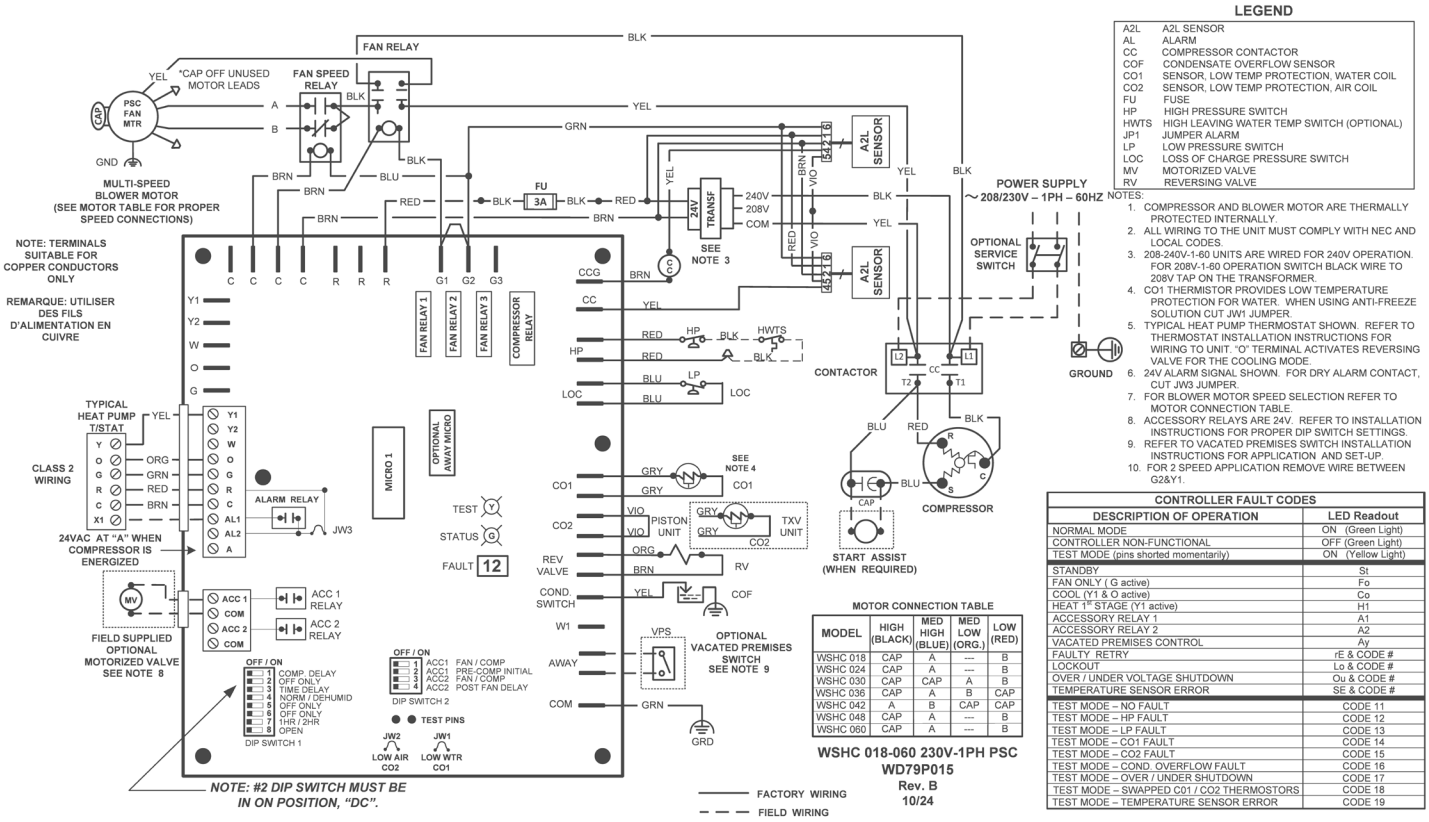
CONTROLLER FAULT CODES	
DESCRIPTION OF OPERATION	LED Readout
NORMAL MODE	ON (Green Light)
CONTROLLER NON-FUNCTIONAL	OFF (Green Light)
TEST MODE (pins shorted momentarily)	ON (Yellow Light)
STANDBY	St
FAN ONLY (G active)	Fo
COOL (Y1 & O active)	Co
HEAT 1ST STAGE (Y1 active)	H1
ACCESSORY RELAY 1	A1
ACCESSORY RELAY 2	A2
VACATED PREMISES CONTROL	Ay
FAULTY RETRY	rE & CODE #
LOCKOUT	Lo & CODE #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & CODE #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE – NO FAULT	CODE 11
TEST MODE – HP FAULT	CODE 12
TEST MODE – LP FAULT	CODE 13
TEST MODE – CO1 FAULT	CODE 14
TEST MODE – CO2 FAULT	CODE 15
TEST MODE – COND. OVERFLOW FAULT	CODE 16
TEST MODE – OVER / UNDER SHUTDOWN	CODE 17
TEST MODE – SWAPPED C01 / CO2 THERMOSTORS	CODE 18
TEST MODE – TEMPERATURE SENSOR ERROR	CODE 19

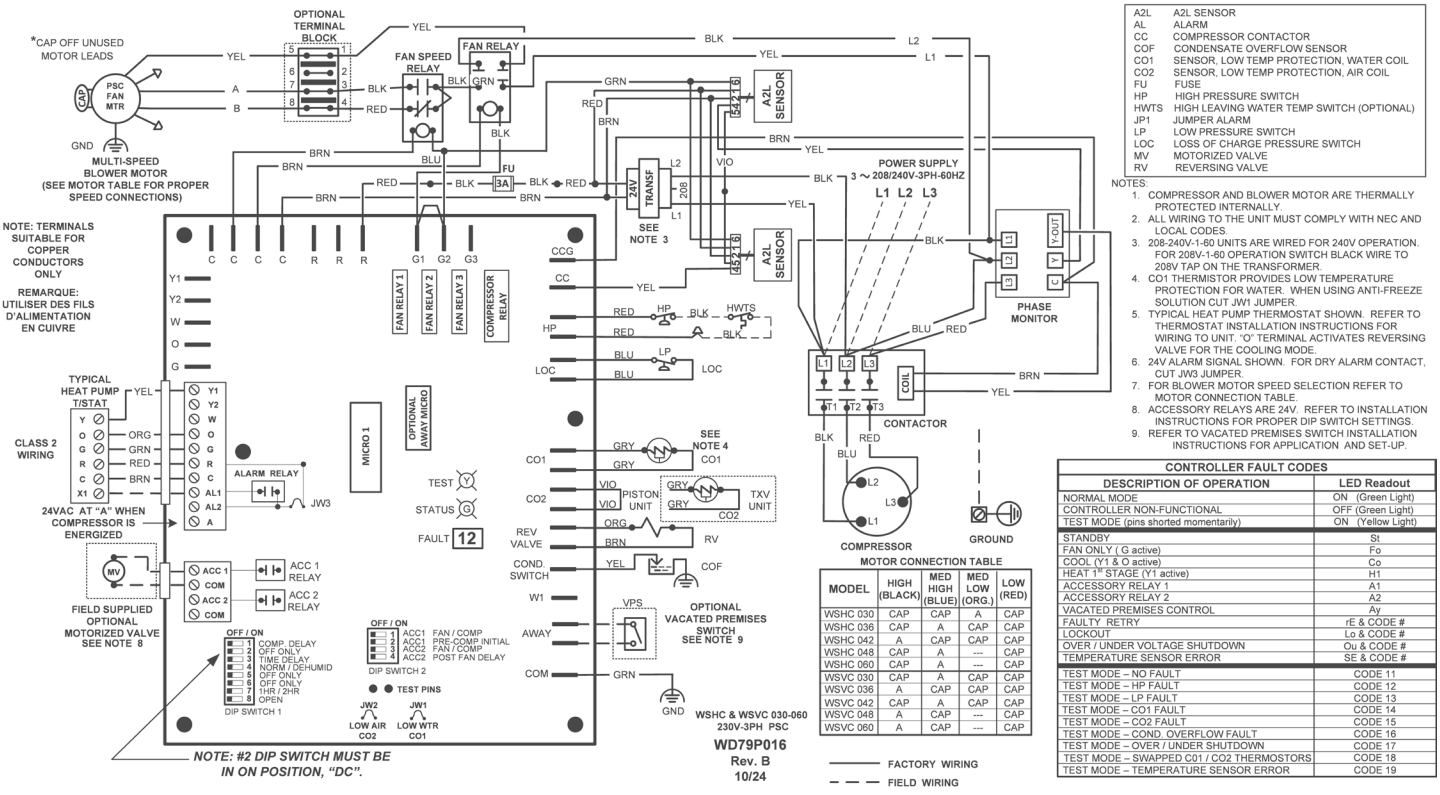
WIIRING DIAGRAMS



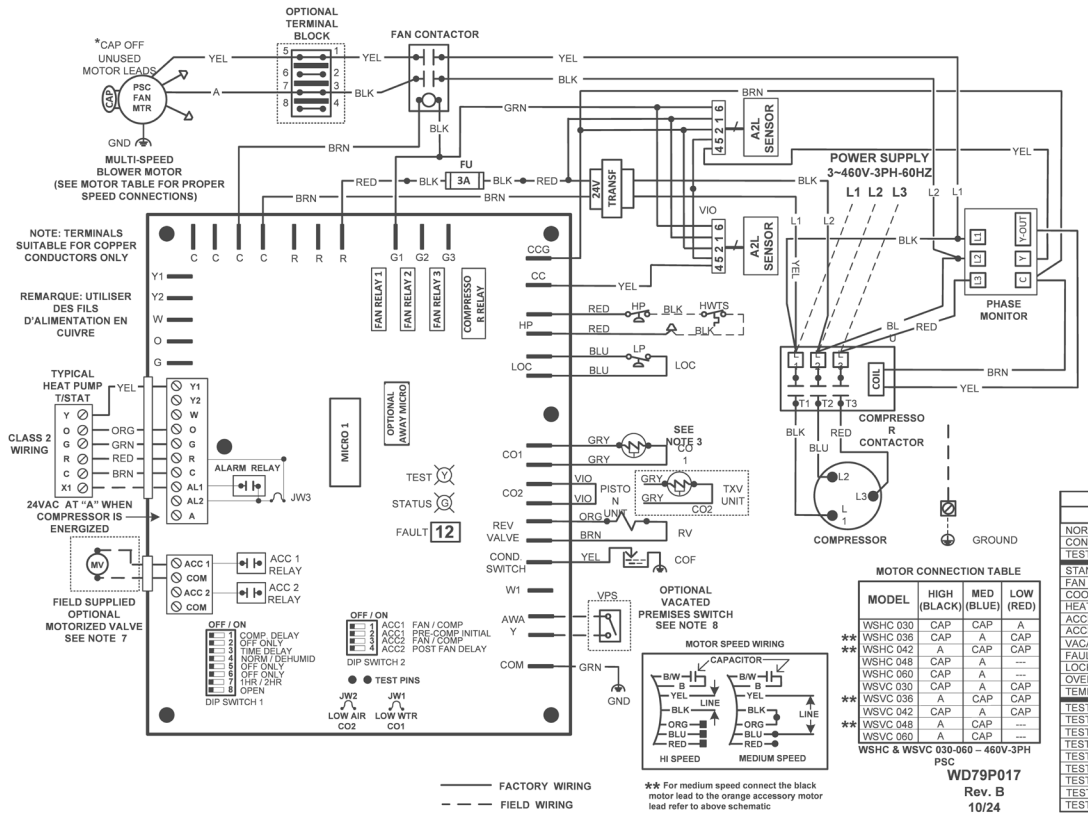


WIIRING DIAGRAMS





WIIRING DIAGRAMS



LEGEND

A2L	A2L SENSOR
AL	ALARM
CC	COMPRESSOR CONTACTOR
COF	CONDENSATE OVERFLOW SENSOR
CO1	SENSOR, LOW TEMP PROTECTION, WATER COIL
CO2	SENSOR, LOW TEMP PROTECTION, AIR COIL
FU	FUSE
HP	HIGH PRESSURE SWITCH
HWTS	HIGH LEAVING WATER TEMP SWITCH (OPTIONAL)
JP1	JUMPER ALARM
LP	LOW PRESSURE SWITCH
LOC	LOSS OF CHARGE PRESSURE SWITCH
MV	MOTORIZED VALVE
RV	REVERSING VALVE

NOTES:
1. COMPRESSOR AND BLOWER MOTOR ARE THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
3. 208-240V-1-60 UNITS ARE WIRED FOR 240V OPERATION. FOR 208V-1-60 OPERATION SWITCH BLACK WIRE TO 208V TAP ON THE TRANSFORMER.
4. CO1 THERMISTOR PROVIDES LOW TEMPERATURE PROTECTION FOR WATER. WHEN USING ANTI-FREEZE SOLUTION CUT JW1 JUMPER.
5. TYPICAL HEAT PUMP THERMOSTAT SHOWN. REFER TO THERMOSTAT INSTALLATION INSTRUCTIONS FOR WIRING TO UNIT. "O" TERMINAL ACTIVATES REVERSING VALVE FOR THE COOLING MODE.
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JW3 JUMPER.
7. FOR BLOWER MOTOR SPEED SELECTION REFER TO MOTOR CONNECTION TABLE.
8. ACCESSORY RELAYS ARE 24V. REFER TO INSTALLATION INSTRUCTIONS FOR PROPER DIP SWITCH SETTINGS.
9. REFER TO VACATED PREMISES SWITCH INSTALLATION INSTRUCTIONS FOR APPLICATION AND SET-UP.

MOTOR CONNECTION TABLE

MODEL	HIGH (BLACK)	MED (BLUE)	LOW (RED)
WSHC 030	CAP	CAP	A
** WSHC 036	CAP	A	CAP
** WSHC 042	A	CAP	CAP
WSHC 048	CAP	A	---
WSHC 060	CAP	A	---
WSVC 030	CAP	A	CAP
** WSVC 036	A	CAP	CAP
WSVC 042	CAP	A	CAP
** WSVC 048	A	CAP	---
WSVC 060	A	CAP	---

WSHC & WSVC 030-060 – 460V-3PH PSC

CONTROLLER FAULT 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)
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
FAULTY RETRY	rE & CODE #
LOCKOUT	Lo & CODE #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & CODE #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE – NO FAULT	CODE 11
TEST MODE – HP FAULT	CODE 12
TEST MODE – LP FAULT	CODE 13
TEST MODE – CO1 FAULT	CODE 14
TEST MODE – CO2 FAULT	CODE 15
TEST MODE – COND. OVERFLOW FAULT	CODE 16
TEST MODE – OVER / UNDER SHUTDOWN	CODE 17
TEST MODE – SWAPPED C01 / CO2 THERMOSTORS	CODE 18
TEST MODE – TEMPERATURE SENSOR ERROR	CODE 19

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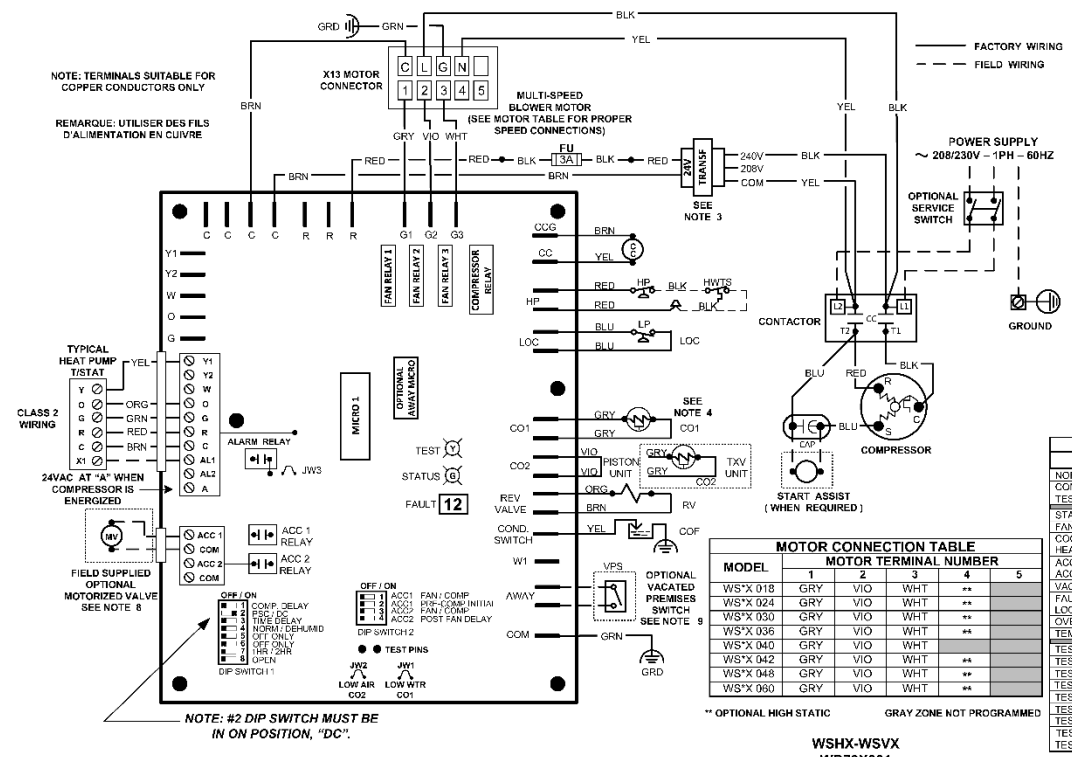
Rev. B
10/24



LEGEND

AL	ALARM
CC	COMPRESSOR CONTACTOR
COF	CONDENSATE OVERFLOW SENSOR
CO1	SENSOR, LOW TEMP PROTECTION, WATER COIL
CO2	SENSOR, LOW TEMP PROTECTION, AIR COIL
FU	FUSE
HP	HIGH PRESSURE SWITCH
HWTS	HIGH LEAVING WATER TEMP SWITCH (OPTIONAL)
JP1	JUMPER ALARM
LP	LOW PRESSURE SWITCH
LOC	LOSS OF CHARGE PRESSURE SWITCH
MV	MOTORIZED VALVE
RV	REVERSING VALVE

NOTES:
1. COMPRESSOR AND BLOWER MOTOR ARE THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
3. 208-240V-1-60 UNITS ARE WIRED FOR 240V OPERATION. FOR 208V-1-60 OPERATION SWITCH BLACK WIRE TO 208V TAP ON THE TRANSFORMER.
4. CO1 THERMISTOR PROVIDES LOW TEMPERATURE PROTECTION FOR WATER. WHEN USING ANTI-FREEZE SOLUTION CUT JW1 JUMPER.
5. TYPICAL HEAT PUMP THERMOSTAT SHOWN. REFER TO THERMOSTAT INSTALLATION INSTRUCTIONS FOR WIRING TO UNIT. "O" TERMINAL ACTIVATES REVERSING VALVE FOR THE COOLING MODE.
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JW3 JUMPER.
7. FOR BLOWER MOTOR SPEED SELECTION REFER TO MOTOR CONNECTION TABLE.
8. ACCESSORY RELAYS ARE 24V. REFER TO INSTALLATION INSTRUCTIONS FOR PROPER DIP SWITCH SETTINGS.
9. REFER TO VACATED PREMISES SWITCH INSTALLATION INSTRUCTIONS FOR APPLICATION AND SET-UP.

MOTOR CONNECTION TABLE

MODEL	MOTOR TERMINAL NUMBER				
	1	2	3	4	5
WS*X 018	GRY	VIO	WHT	**	
WS*X 024	GRY	VIO	WHT	**	
WS*X 030	GRY	VIO	WHT	**	
WS*X 036	GRY	VIO	WHT	**	
WS*X 040	GRY	VIO	WHT		
WS*X 042	GRY	VIO	WHT	**	
WS*X 048	GRY	VIO	WHT	**	
WS*X 060	GRY	VIO	WHT	**	

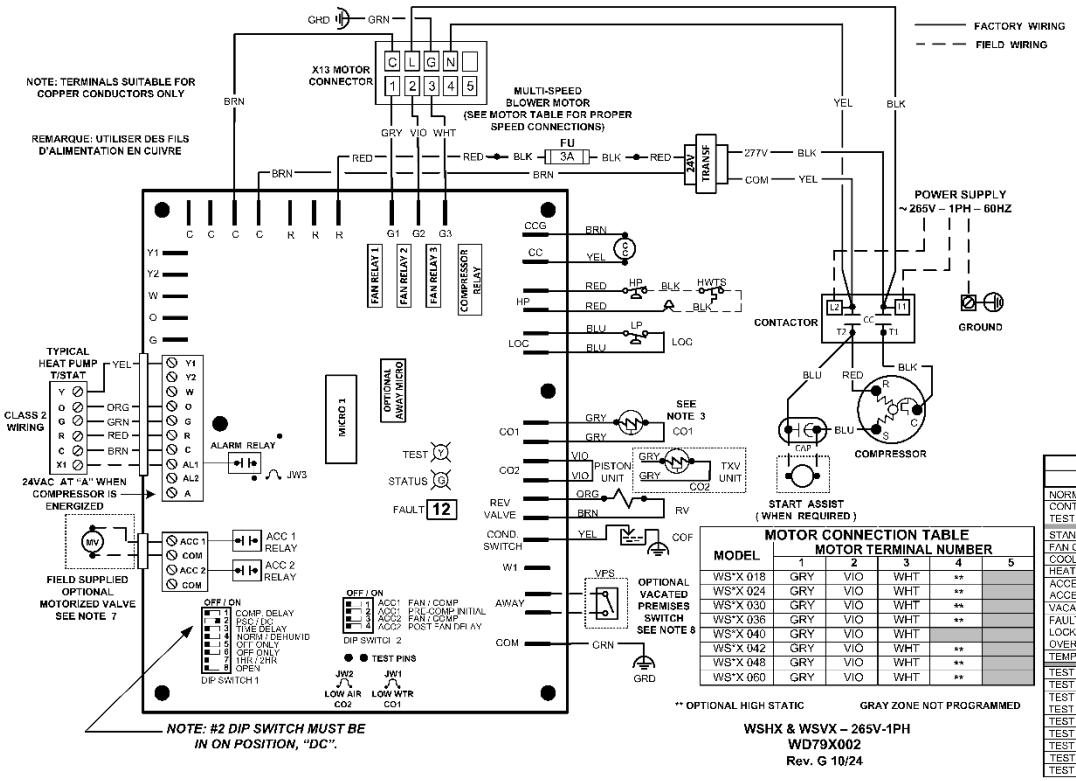
** OPTIONAL HIGH STATIC GRAY ZONE NOT PROGRAMMED

CONTROLLER FAULT 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)
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
FAULTY RETRY LOCKOUT	rE & CODE # Lo & CODE #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & CODE #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE – NO FAULT	CODE 11
TEST MODE – HP FAULT	CODE 12
TEST MODE – LP FAULT	CODE 13
TEST MODE – CO1 FAULT	CODE 14
TEST MODE – CO2 FAULT	CODE 15
TEST MODE – COND. OVERFLOW FAULT	CODE 16
TEST MODE – OVER / UNDER SHUTDOWN	CODE 17
TEST MODE – SWAPPED C01 / CO2 THERMOSTORS	CODE 18
TEST MODE – TEMPERATURE SENSOR ERROR	CODE 19

WSHX-WSVX
WD79X001
Rev. F 10/24

WIIRING DIAGRAMS



MOTOR CONNECTION TABLE						
MODEL	MOTOR TERMINAL NUMBER					
	1	2	3	4	5
WS*X 018	GRY	VIO	WHT	**	
WS*X 024	GRY	VIO	WHT	**	
WS*X 030	GRY	VIO	WHT	**	
WS*X 036	GRY	VIO	WHT	**	
WS*X 040	GRY	VIO	WHT		
WS*X 042	GRY	VIO	WHT	**	
WS*X 048	GRY	VIO	WHT	**	
WS*X 060	GRY	VIO	WHT	**	

** OPTIONAL HIGH STATIC GRAY ZONE NOT PROGRAMMED

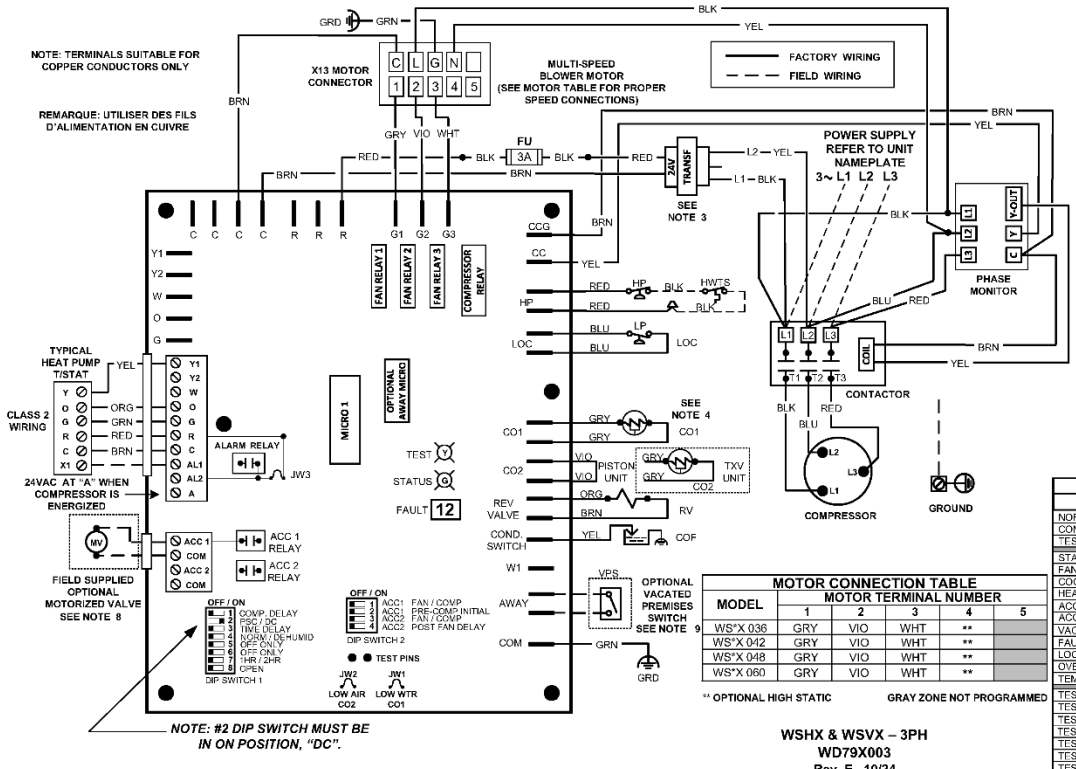
WSHX & WSVX – 265V-1PH
WD79X002
Rev. G 10/24

LEGEND

AL	ALARM
CC	COMPRESSOR CONTACTOR
COF	CONDENSATE OVERFLOW SENSOR
CO1	SENSOR, LOW TEMP PROTECTION, WATER COIL
CO2	SENSOR, LOW TEMP PROTECTION, AIR COIL
FU	FUSE
HP	HIGH PRESSURE SWITCH
HWTS	HIGH LEAVING WATER TEMP SWITCH (OPTIONAL)
JP1	JUMPER ALARM
LP	LOW PRESSURE SWITCH
LOC	LOSS OF CHARGE PRESSURE SWITCH
MV	MOTORIZED VALVE
RV	REVERSING VALVE

NOTES:
1. COMPRESSOR AND BLOWER MOTOR ARE THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
3. 208-240V-1-60 UNITS ARE WIRED FOR 240V OPERATION. FOR 208V-1-60 OPERATION SWITCH BLACK WIRE TO 208V TAP ON THE TRANSFORMER.
4. CO1 THERMISTOR PROVIDES LOW TEMPERATURE PROTECTION FOR WATER. WHEN USING ANTI-FREEZE SOLUTION CUT JW1 JUMPER.
5. TYPICAL HEAT PUMP THERMOSTAT SHOWN. REFER TO THERMOSTAT INSTALLATION INSTRUCTIONS FOR WIRING TO UNIT. "O" TERMINAL ACTIVATES REVERSING VALVE FOR THE COOLING MODE.
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JW3 JUMPER.
7. FOR BLOWER MOTOR SPEED SELECTION REFER TO MOTOR CONNECTION TABLE.
8. ACCESSORY RELAYS ARE 24V. REFER TO INSTALLATION INSTRUCTIONS FOR PROPER DIP SWITCH SETTINGS.
9. REFER TO VACATED PREMISES SWITCH INSTALLATION INSTRUCTIONS FOR APPLICATION AND SET-UP.

CONTROLLER FAULT 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)
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
FAULTY RETRY	rE & CODE #
LOCKOUT	Lo & CODE #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & CODE #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE – NO FAULT	CODE 11
TEST MODE – HP FAULT	CODE 12
TEST MODE – LP FAULT	CODE 13
TEST MODE – CO1 FAULT	CODE 14
TEST MODE – CO2 FAULT	CODE 15
TEST MODE – COND. OVERFLOW FAULT	CODE 16
TEST MODE – OVER / UNDER SHUTDOWN	CODE 17
TEST MODE – SWAPPED CO1 / CO2 THERMOSTORS	CODE 18
TEST MODE – TEMPERATURE SENSOR ERROR	CODE 19



MOTOR CONNECTION TABLE						
MODEL	MOTOR TERMINAL NUMBER					
	1	2	3	4	5
WS*X 036	GRY	VIO	WHT	**	
WS*X 042	GRY	VIO	WHT	**	
WS*X 048	GRY	VIO	WHT	**	
WS*X 060	GRY	VIO	WHT	**	

** OPTIONAL HIGH STATIC GRAY ZONE NOT PROGRAMMED

WSHX & WSVX – 3PH
WD79X003
Rev. E 10/24

LEGEND

AL	ALARM
CC	COMPRESSOR CONTACTOR
COF	CONDENSATE OVERFLOW SENSOR
CO1	SENSOR, LOW TEMP PROTECTION, WATER COIL
CO2	SENSOR, LOW TEMP PROTECTION, AIR COIL
FU	FUSE
HP	HIGH PRESSURE SWITCH
HWTS	HIGH LEAVING WATER TEMP SWITCH (OPTIONAL)
JP1	JUMPER ALARM
LP	LOW PRESSURE SWITCH
LOC	LOSS OF CHARGE PRESSURE SWITCH
MV	MOTORIZED VALVE
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NOTES:
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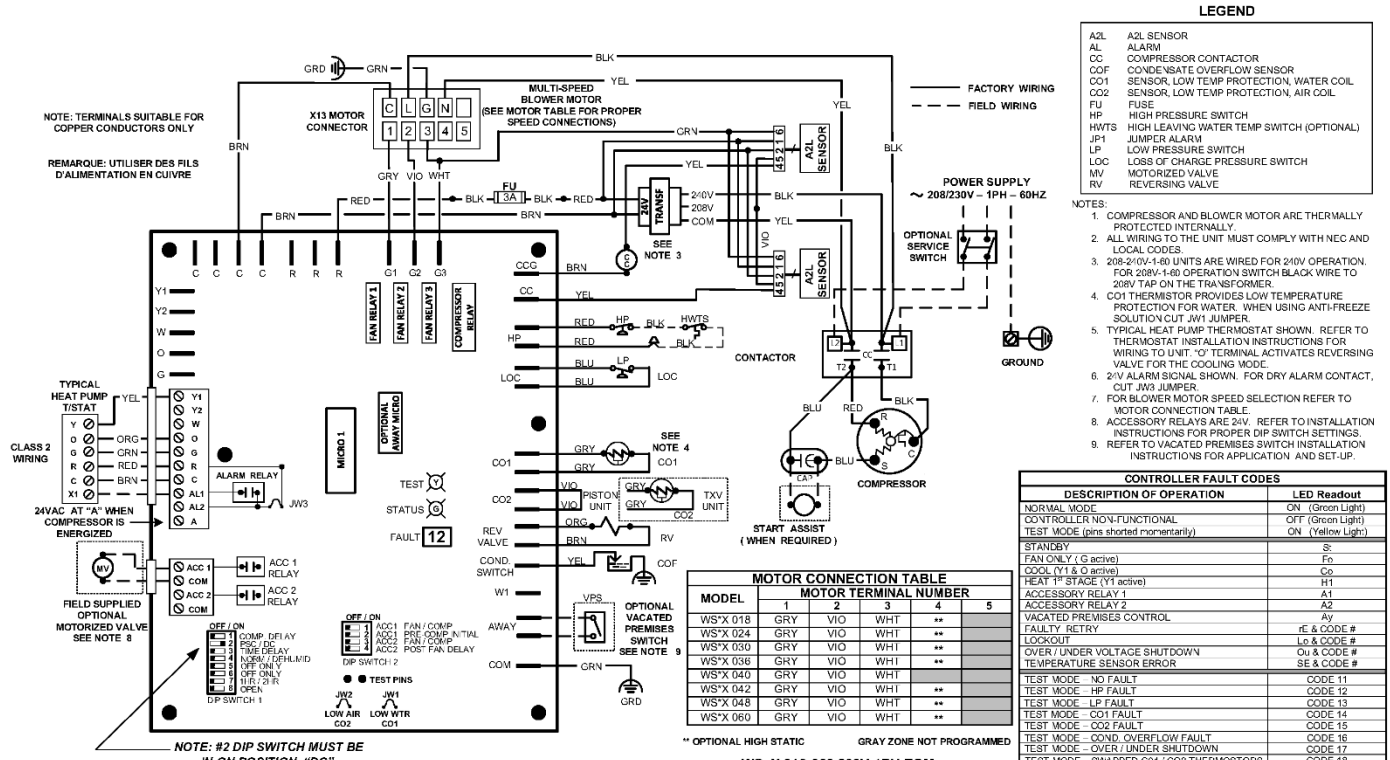
5. TYPICAL HEAT PUMP THERMOSTAT SHOWN. REFER TO THERMOSTAT INSTALLATION INSTRUCTIONS FOR WIRING TO UNIT. "O" TERMINAL ACTIVATES REVERSING VALVE FOR THE COOLING MODE.
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JW3 JUMPER.
7. FOR BLOWER MOTOR SPEED SELECTION REFER TO MOTOR CONNECTION TABLE.
8. ACCESSORY RELAYS ARE 24V. REFER TO INSTALLATION INSTRUCTIONS FOR PROPER DIP SWITCH SETTINGS.
9. REFER TO VACATED PREMISES SWITCH INSTALLATION INSTRUCTIONS FOR APPLICATION AND SET-UP.

CONTROLLER FAULT 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)
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
FAULTY RETRY	rE & CODE #
LOCKOUT	Lo & CODE #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & CODE #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE – NO FAULT	CODE 11
TEST MODE – HP FAULT	CODE 12
TEST MODE – LP FAULT	CODE 13
TEST MODE – CO1 FAULT	CODE 14
TEST MODE – CO2 FAULT	CODE 15
TEST MODE – COND. OVERFLOW FAULT	CODE 16
TEST MODE – OVER / UNDER SHUTDOWN	CODE 17
TEST MODE – SWAPPED CO1 / CO2 THERMOSTORS	CODE 18
TEST MODE – TEMPERATURE SENSOR ERROR	CODE 19

WIIRING DIAGRAMS

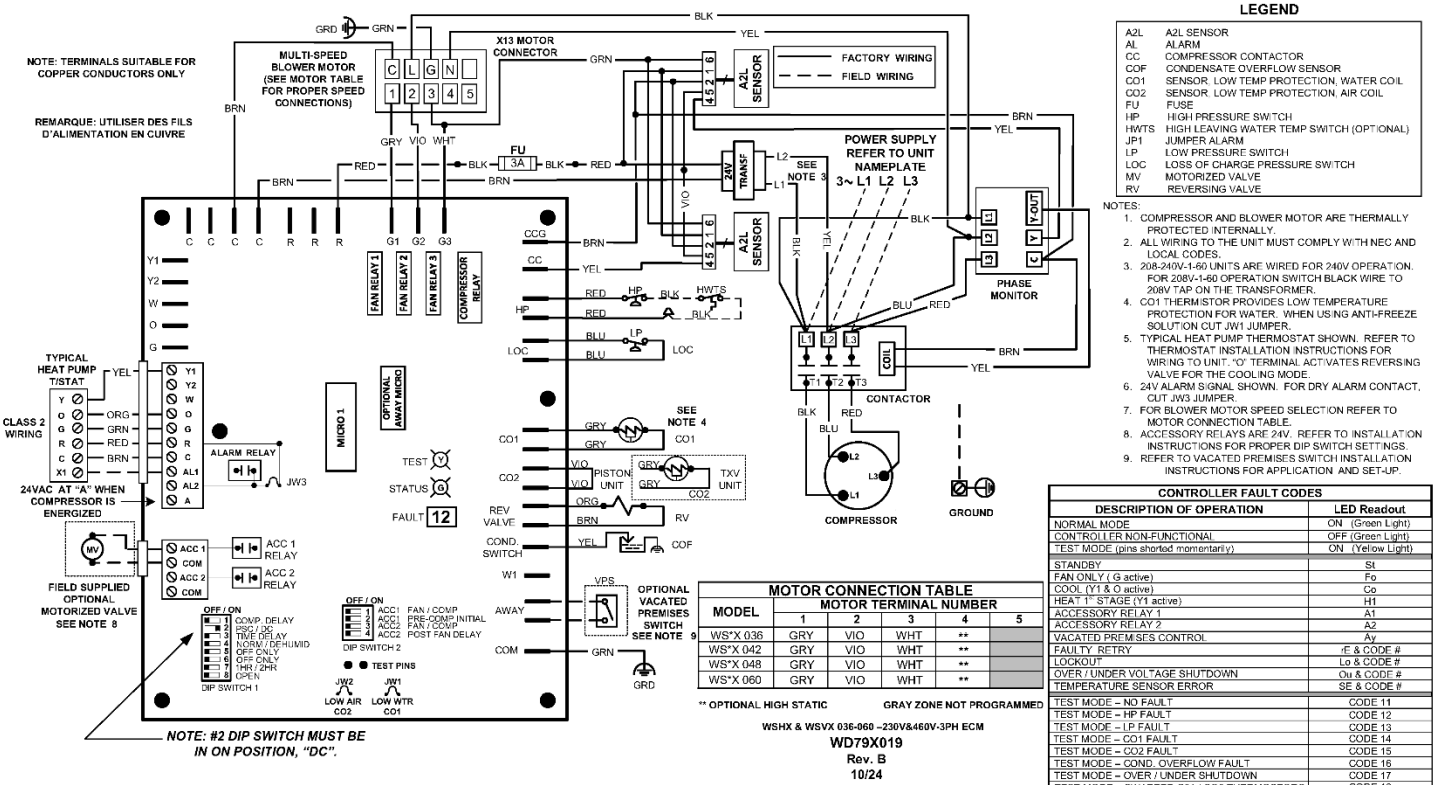


MOTOR CONNECTION TABLE						
MODEL	MOTOR TERMINAL NUMBER					
	1	2	3	4	5	
WS*X 018	GRY	VIO	WHT	**		
WS*X 024	GRY	VIO	WHT	**		
WS*X 030	GRY	VIO	WHT	**		
WS*X 036	GRY	VIO	WHT	**		
WS*X 040	GRY	VIO	WHT			
WS*X 042	GRY	VIO	WHT	**		
WS*X 048	GRY	VIO	WHT	**		
WS*X 060	GRY	VIO	WHT	**		

** OPTIONAL HIGH STATIC GRAY ZONE NOT PROGRAMMED

CONTROLLER FAULT 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)
STANDBY	S:
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
FAULTY RETRY	rE & CODE #
LOCKOUT	Lo & CODE #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & CODE #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE – NO FAULT	CODE 11
TEST MODE – HP FAULT	CODE 12
TEST MODE – LP FAULT	CODE 13
TEST MODE – CO1 FAULT	CODE 14
TEST MODE – CO2 FAULT	CODE 15
TEST MODE – COND. OVERFLOW FAULT	CODE 16
TEST MODE – OVER / UNDER SHUTDOWN	CODE 17
TEST MODE – SWAPPED C01 / CO2 THERMOSTORS	CODE 18
TEST MODE – TEMPERATURE SENSOR ERROR	CODE 19

WS_X 018-060,230V-1PH ECM
WD79X018
Rev. B
10/24



MOTOR CONNECTION TABLE						
MODEL	MOTOR TERMINAL NUMBER					
	1	2	3	4	5	
WS*X 036	GRY	VIO	WHT	**		
WS*X 042	GRY	VIO	WHT	**		
WS*X 048	GRY	VIO	WHT	**		
WS*X 060	GRY	VIO	WHT	**		

** OPTIONAL HIGH STATIC GRAY ZONE NOT PROGRAMMED

CONTROLLER FAULT 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)
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
FAULTY RETRY	rE & CODE #
LOCKOUT	Lo & CODE #
OVER / UNDER VOLTAGE SHUTDOWN	Ou & CODE #
TEMPERATURE SENSOR ERROR	SE & CODE #
TEST MODE – NO FAULT	CODE 11
TEST MODE – HP FAULT	CODE 12
TEST MODE – LP FAULT	CODE 13
TEST MODE – CO1 FAULT	CODE 14
TEST MODE – CO2 FAULT	CODE 15
TEST MODE – COND. OVERFLOW FAULT	CODE 16
TEST MODE – OVER / UNDER SHUTDOWN	CODE 17
TEST MODE – SWAPPED C01 / CO2 THERMOSTORS	CODE 18
TEST MODE – TEMPERATURE SENSOR ERROR	CODE 19

WSHX & WSVX 036-060 –230V&460V-3PH ECM
WD79X019
Rev. B
10/24

OPERATION & MAINTENANCE

WARNING

FIRE, EXPLOSION HAZARD

- Explosion risk, recover refrigerant only in a cylinder designed and intended for this purpose
- Do not use a damaged cylinder
- Do not apply flame or excessive heat to a refrigerant cylinder
- Do not fill a refrigerant cylinder to more than 80% of its capacity
- Do not use a refrigerant cylinder for anything other than its designed and intended purpose
- Do not use an expired refrigerant cylinder
- Use recovery equipment designed to handle the refrigerant being recovered
- Earth-ground refrigerant cylinders before using

CAUTION

Do not use compressors to evacuate the air conditioning system. A vacuum may cause internal electrical arcing resulting in a damaged or failed compressor.

CAUTION

Always wear appropriate Personal Protective Equipment (PPE) when installing and servicing these units.

CAUTION

Contact with metal edges and corners can result in injury. Wear protective gloves when handling. Exercise caution when installing and servicing unit.

WARNING

FIRE, 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.

After completing the installation and before energizing the unit, the following system checks should be made:

- Verify that the supply voltage to the heat pump is in accordance with the nameplate ratings.
- Make sure that all electrical connections are tight and secure.
- Check the electrical overcurrent protection and wiring for the correct size.
- Verify that the low voltage wiring between the thermostat and the unit matches the wiring diagram.
- Verify that all Dip Switches are set to the off position for standard unit operation.

WARNING

Verify that Dip Switch #1, position 2 is set to on, "DC", only if DC motor is installed

- Verify that the water piping is complete and correct.
- Check all water connections for leaks.
- Check condensate overflow sensor for proper operation and adjust position if required.
- Check that the water flow rate is correct and adjust if necessary. Nominal flow rates are 3 GPM per 12 BTUH of cooling or approximately 10° F (6° C) delta T of entering vs leaving water temperature in the cooling mode.
- Check the blower wheel for free rotation and that it is secured to the motor shaft.
- Verify that vibration isolation has been provided.
- Unit is serviceable. Be certain that all access panels are securely in place.

SYSTEM CHECK-OUT

OPERATION & MAINTENANCE CONTINUED

SYSTEM CHECK-OUT & START-UP

UNIT START-UP

- Set the thermostat to its highest setting.
- Set the thermostat system switch to “COOL” and the fan switch to the “AUTO” position. The reversing valve solenoid should energize. The compressor and fan should not run. Wait 5 minutes for anti-short cycle timer to time out.
- Reduce the thermostat setting approximately 5° F (3° C) below the room temperature.
- Verify the heat pump is operating in the cooling mode.
- Turn the thermostat system switch to the “OFF” position. The unit should stop running and the reversing valve should de-energize.
- Leave the unit off for approximately (5) minutes to allow the system pressures to equalize. (Anti-short cycle)
- Turn the thermostat to the lowest setting.
- Set the thermostat switch to “HEAT”.
- Increase the thermostat setting to approximately 5° F (3° C) above the room temperature.
- Verify that the heat pump is operating in the heating mode.
- Set the thermostat to maintain the desired space temperature.
- Check the vibrations, leaks, etc.
- Verify water flow rate is correct and adjust if necessary. Nominal flow rates are 3 GPM per 12,000 BTUH of cooling or approximately 10° F (6° C) delta T of entering vs leaving water temperature in the cooling mode.
- Instruct the owner on the unit and thermostat operation.

To ensure maximum performance and service life of equipment, a formal schedule of regular preventative maintenance must be established and adhered to.

Failure to establish and perform preventative maintenance program can void the manufacturer’s warranty.

Filter replacement or cleaning is required at regular intervals. The time period between filter changes will depend upon the type of environment in which equipment is used. The air filter should be cleaned or replaced every 30 days or more frequently if severe conditions exist. Always replace the filter with the same type as originally furnished.

⚠ CAUTION ⚠

Never operate unit without a filter or with filter not fully seated. Damage to refrigerant coil or heat pump system can result. Failure to follow this CAUTION could result in product or property damage.

An annual checkup is recommended by a licensed refrigerant mechanic. Recording the performance measurements of volts, amps and water temperature differences (both heating and cooling) is recommended. This data should be compared to the information on the unit’s nameplate and the data taken at the original start-up of the equipment

The condensate drain should be checked annually by cleaning and flushing to ensure proper drainage.

MAINTENANCE SERVICE

Periodic lockouts almost always are caused by air or water problems. The lockout (shutdown) of the unit is a normal protective measure in the design of the equipment. If continual lockouts occur then call a licensed mechanic immediately and have them check for:

- Water flow problems
- Water temperature problems
- Air flow problems
- Air temperature problems

Use of pressure and temperature charts for the unit may be helpful to properly determine the cause.

ARI TESTING

To achieve the rated airflow for AHRI testing purposes, contact the manufacturer for supplementary wiring instructions. When the heat pump has less than 100 operational hours and the coil has not had sufficient time to be “seasoned”, it is necessary to clean the coil with a mild surfactant such as Calgon to remove the oils left by manufacturing processes.

OPERATION & MAINTENANCE CONTINUED

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

QUALIFICATION OF WORKERS

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

CHECKS TO THE WORK AREA

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

CHECKING FOR PRESENCE OF REFRIGERANT

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

VENTILATED AREA

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

CHECKS TO THE REFREIGERATING EQUIPMENT

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

The following checks shall be applied to installations using FLAMMANLE REFRIGERANTS:

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

OPERATION & MAINTENANCE CONTINUED

CHECKS TO ELECTRICAL DEVICES AND SEALED ELECTRICAL COMPONENTS

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

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

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

CABLING

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

DETECTION OF FLAMMABLE REFRIGERANTS

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

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

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

REMOVAL AND EVACUATION OF FLAMMABLE REFRIGERANTS

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

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

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

OPERATION & MAINTENANCE CONTINUED

CHARGING PROCEDURES

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

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

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

DECOMISSIONING

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

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

LABELING

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

RECOVERY

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

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

OPERATION & MAINTENANCE CONTINUED

The recovered refrigerant shall be processed according to local Legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely

REFRIGERANT DETECTION SENSOR (RDS) INFORMATION

Refer to the appliance IOM for information regarding the minimum conditioned room requirements, and instructions for the RDS operation, installation, and wiring. Any field installed wiring connected to the RDS must be at least 18AWG and have minimum insulation thickness of 1.58mm or be protected from damage.

The RDS is not intended for service or repair. In the event of a sensor failure, the mitigation mode will engage and the sensor shall be replaced by removing the sensor and replacing it with a new sensor.

DUCTING

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

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

PIPING

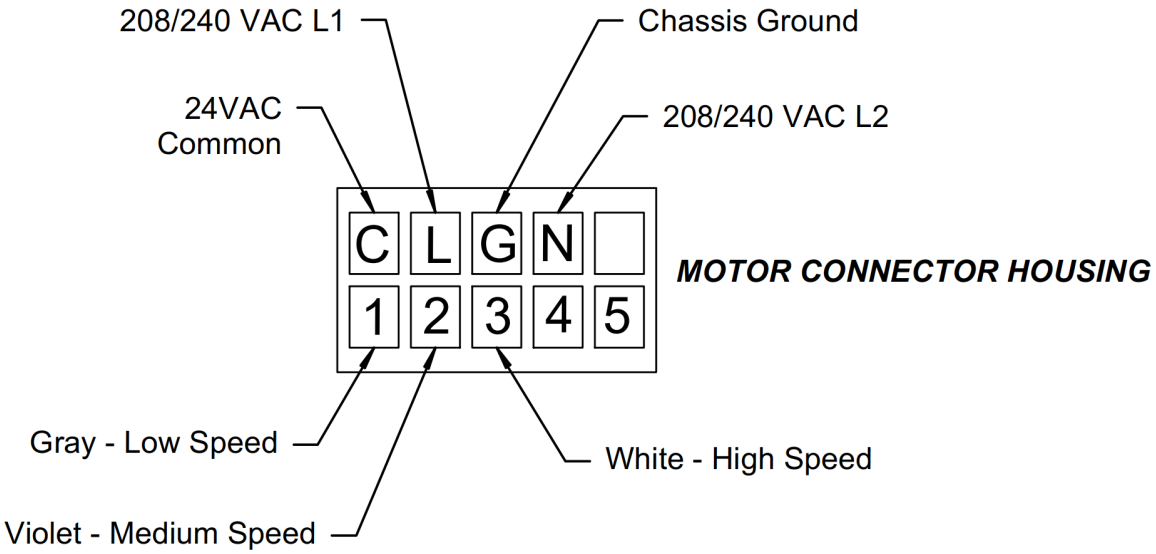
Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as AHRAE 15, ASHRAE 15.2, IAPMO uniform mechanical code, ICC International Mechanical Code,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

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	CHECKS & CORRECTIONS
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.
BLOWER OPERATES BUT COMPRESSOR DOES NOT RUN	Thermostat	Check setting, calibration and wiring
	Wiring	Check for loose or broken wires at compressor, capacitor and contactor
	Compressor Overload Open	If the compressor is cool and the overload will not reset, replace the compressor.
	Compressor Motor Grounded	Internal wiring is grounded to the compressor shell. Replace compressor. Install new filter drier.
	Compressor Windings Open	After compressor has cooled check continuity of compressor windings. If the windings are open, replace compressors.
	Refrigerant Sensor	For units over 4lbs refrigerant charge, an active leak or a faulty sensor will disable the compressor operation. Verify the absence of refrigerant leak and replace sensor.

CONNECTIONS FOR X13 PERMANENT MAGNET MOTORS IF SO EQUIPPED

NOTE: CONTROL BOARD DIP SWITCH 1-2 MUST BE IN ON POSITION, "DC"



CAUTION

High efficiency brushless DC motors are wired with power applied at all times (X13 for example, see illustration above). Low voltage thermostat demand and board algorithms will control its use.

UNIT CHECK-OUT SHEET

Customer Data

Customer Name: _____ Date: _____

Address: _____

_____

Phone: _____ Unit #: _____

Unit Nameplate Data

Unit Model Number: _____ Serial #: _____

Refrigerant Charge (oz): _____

Compressor: RLA _____ LRA: _____

Blower Motor: FLA _____ HP: _____

Minimum Circuit Ampacity (Amps): _____

Maximum Overcurrent Protection (Amps): _____

Operating Conditions

	Cooling Mode		Heating Mode	
Entering/ Leaving Air Temp:	_____	_____	_____	_____
Entering Air Measured at:	_____	_____	_____	_____
Leaving Air Measured at:	_____	_____	_____	_____
Entering/ Leaving Fluid Temp:	_____	_____	_____	_____
Fluid Flow (GPM):	_____	_____	_____	_____
Fluid Side Pressure Drop:	_____	_____	_____	_____
Suction/Discharge Press. (psig)	_____	_____	_____	_____
Suction/Discharge Temp:	_____	_____	_____	_____
Suction Superheat	_____	_____	_____	_____
Entering Metering Device Temp:	_____	_____	_____	_____
Liquid Sub-cooling:	_____	_____	_____	_____
Compressor Volts/Amps:	_____	_____	_____	_____
Blower Motor Volts/Amps:	_____	_____	_____	_____

NOTES

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