



Literature Assembly

911-0650

Contains the following:

2100-615(A)	Installation Instructions
2100-559(A)	ECU Quick Start Guide
2100-560	ECU Advanced Program
7960-780	Supplemental Instructions
2100-615(A)	Wall Mounted PKG A/C Manual
2100-034(G)	User's Guide
2100-479	Servicing Procedures
2110-1418(N)	Replacement Parts Manual
7960-932(A)	8201-171BK CCM Supplement Instructions
7960-420	Warranty Form

INSTALLATION INSTRUCTIONS

WALL-MOUNTED VARIABLE CAPACITY ENVIRONMENTAL CONTROL UNIT

Models:

W3RV2-R W3LV2-R W5RV2-R W5LV2-R W6RV2-S W6LV2-S
W3RV2-S W3LV2-S W5RV2-S W5LV2-S W6RV2-T W6LV2-T
W3RV2-T W3LV2-T W5RV2-T W5LV2-T



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
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Manual: 2100-615A
Supersedes: 2100-615
Date: 1-16-15

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GETTING OTHER INFORMATION AND PUBLICATIONS

These publications can help you install the air conditioner or heat pump. You can usually find these at your local library or purchase them directly from the publisher. Be sure to consult current edition of each standard.

National Electrical Code.....ANSI/NFPA 70

Standard for the InstallationANSI/NFPA 90A
of Air Conditioning and Ventilating Systems

Standard for Warm Air.....ANSI/NFPA 90B
Heating and Air Conditioning Systems

Load Calculation forACCA Manual J
Residential Winter and Summer Air Conditioning

Duct Design for Residential ACCA Manual D
Winter and Summer Air Conditioning and Equipment
Selection

FOR MORE INFORMATION, CONTACT THESE PUBLISHERS:

ACCA **Air Conditioning Contractors of America**
1712 New Hampshire Ave. N.W.
Washington, DC 20009
Telephone: (202) 483-9370
Fax: (202) 234-4721

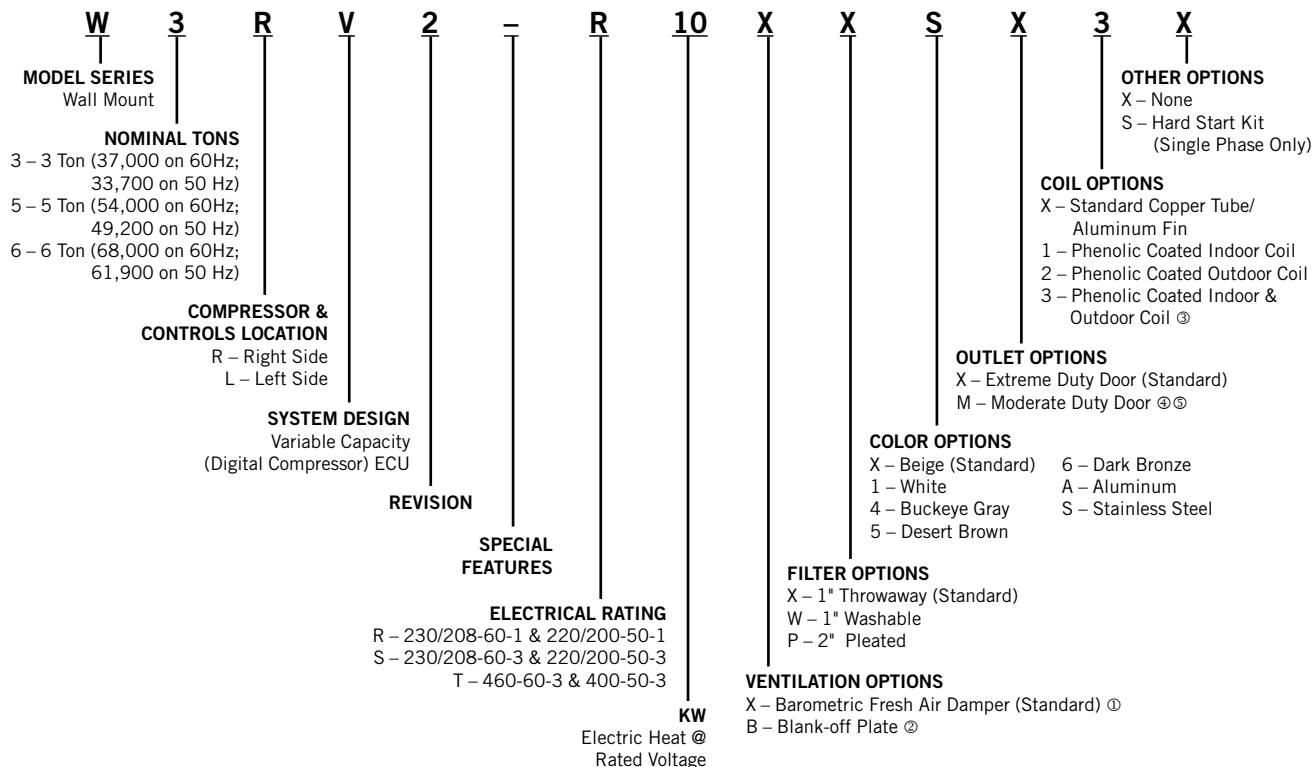
ANSI **American National Standards Institute**
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900
Fax: (212) 302-1286

ASHRAE **American Society of Heating, Refrigeration
and Air Conditioning Engineers, Inc.**
1791 Tullie Circle, N.E.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400
Fax: (404) 321-5478

NFPA **National Fire Protection Association**
Batterymarch Park
P. O. Box 9101
Quincy, MA 02269-9901
Telephone: (800) 344-3555
Fax: (617) 984-7057

WALL MOUNT GENERAL INFORMATION

Environmental Control Unit (ECU) Wall Mount Model Nomenclature



① Vent option X does not have exhaust capability. May require separate field supplied barometric relief in building.

② Blank-off plate recommended whenever maximum requirements against outside air intrusion are needed.

③ Stainless steel cabinet and coated coils recommended for maximum durability in all harsh environments.

④ Moderate duty door not recommended for harsh environments where wind and/or very fine dust are prevalent.

⑤ All units equipped with flush moderate duty door can be field retrofitted with the severe duty door.

Order DDD3A-color for W3R, DDD3L-color for W3L, DDD5A-color for W5R or W6R and DDD5L-color for W5L or W6L.

SHIPPING DAMAGE

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

GENERAL

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

This appliance is not intended for use 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 concerning use of the appliance by a person responsible for their safety.

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

The refrigerant system is completely assembled and charged. All internal wiring is complete.

The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.

These instructions explain the recommended method to install the air cooled self-contained unit and the electrical wiring connections to the unit.

These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly "Starting Procedure" and any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See Page 3 for information on codes and standards.

Size of unit for a proposed installation should be based on heat loss calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

DUCT WORK

All duct work, supply and return, must be properly sized for the design airflow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

Refer to Maximum ESP of Operation Electric Heat Only Table 5 on page 23.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unheated spaces, it should be insulated with a minimum of one inch of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

For model series W3R/LV, W5R/LV and W6R/LV a 1/4 inch clearance to combustible material for the first three feet of duct attached to the outlet air frame is required. See Wall Mounting Instructions and Figures 3A, 3B and 4 for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

Some installations may not require any return air duct. A metallic return air grille is required with installations not requiring a return air duct. The spacing between louvers on the grille shall not be larger than 5/8 inch.

Any grille that meets with 5/8 inch louver criteria may be used. It is recommended that Bard Return Air Grille Kit RG2 through RG5 or RFG2 through RFG5 be installed when no return duct is used. Contact distributor or factory for ordering information. If using a return air filter grille, filters must be of sufficient size to allow a maximum velocity of 400 fpm.

NOTE: *If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.*

FILTERS

A 1-inch throwaway filter is standard with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the filter access panel. A 1-inch washable filter and 2-inch pleated filter are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2-inch filter by bending two (2) tabs down on each side of the filter support bracket.

FRESH AIR INTAKE

All units are built with fresh air inlet slots punched in the service door.

If the unit is equipped with a fresh air damper assembly, the assembly is shipped already attached to the unit. The damper blade is locked in the closed position. To allow the damper to operate, the maximum and minimum blade position stops must be installed. See Figure 1.

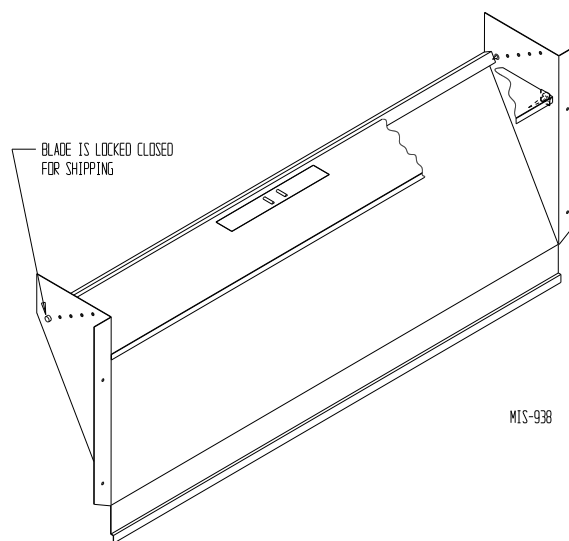
All capacity, efficiency and cost of operation information is based upon the fresh air blank-off plate in place and is recommended for maximum energy efficiency.

The blank-off plate is available upon request from the factory and is installed in place of the fresh air damper shipped with each unit.

CONDENSATE DRAIN

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage.

**FIGURE 1
FRESH AIR DAMPER**



INSTALLATION

WALL MOUNTING INFORMATION

1. Two holes for the supply and return air openings must be cut through the wall as shown in Figures 3A and 3B on pages 8 and 9.
2. On wood frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration.
3. Concrete block walls must be thoroughly inspected to insure that they are capable of carrying the weight of the installed unit.

MOUNTING THE UNIT

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket, attached to skid for shipping, is provided for ease of installation, but is not required.
2. The supply air duct flange and the first 3 feet of supply air duct require a minimum of 1/4 inch clearance to combustible material for model series W3R/LV, W5R/LV and W6R/LV. However, it is generally recommended that a 1-inch clearance is used for ease of installation and maintaining the required clearance to combustible material. See Figures 3A and 3B for details on opening sizes.

WARNING

Failure to provide the 1/4 inch clearance between the supply duct and a combustible surface for the first 3 feet of duct can result in fire causing damage, injury or death.

3. Locate and mark lag bolt locations and bottom mounting bracket location. See Figures 3A and 3B.
4. Mount bottom mounting bracket.
5. Hook top rain flashing, attached to front-right of supply flange for shipping, under back bend of top.

Minimum Clearances Required to Combustible Materials

MODELS	SUPPLY AIR DUCT FIRST THREE FEET	CABINET
W3R/LV2	1/4"	0"
W5R/LV2 W6R/LV2	1/4"	0"

6. Remove packaged control panel door from return opening. Use the instructions in the package to mount the door on the unit after it has been attached to the wall (Step #7). *Disregard this step if already supplied with outer control panel door.*
7. Position unit in opening and secure with 5/16 lag bolts; use 7/8 inch diameter flat washers on the lag bolts.
8. Secure rain flashing to wall and caulk across entire length of top. See Figures 3A & 3B.
9. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall.
10. On side-by-side installations, maintain a minimum of 20 inches clearance on the control panel side of the unit to allow access to control panel and heat strips, and to allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.

Clearances Required for Service Access and Adequate Condenser Airflow

MODELS	LEFT SIDE	RIGHT SIDE
W3RV2	15"	20"
W3LV2	20"	15"
W5RV2, W6RV2	20"	20"
W5LV2, W6LV2	20"	20"

NOTE: For side by side installation of two (2) W*RV models there must be 20" between units. This can be reduced to 15" by using a W*LV model (left side compressor and controls) for the left unit and W*R (right side compressor and controls) for right unit.

See Specification Sheet.

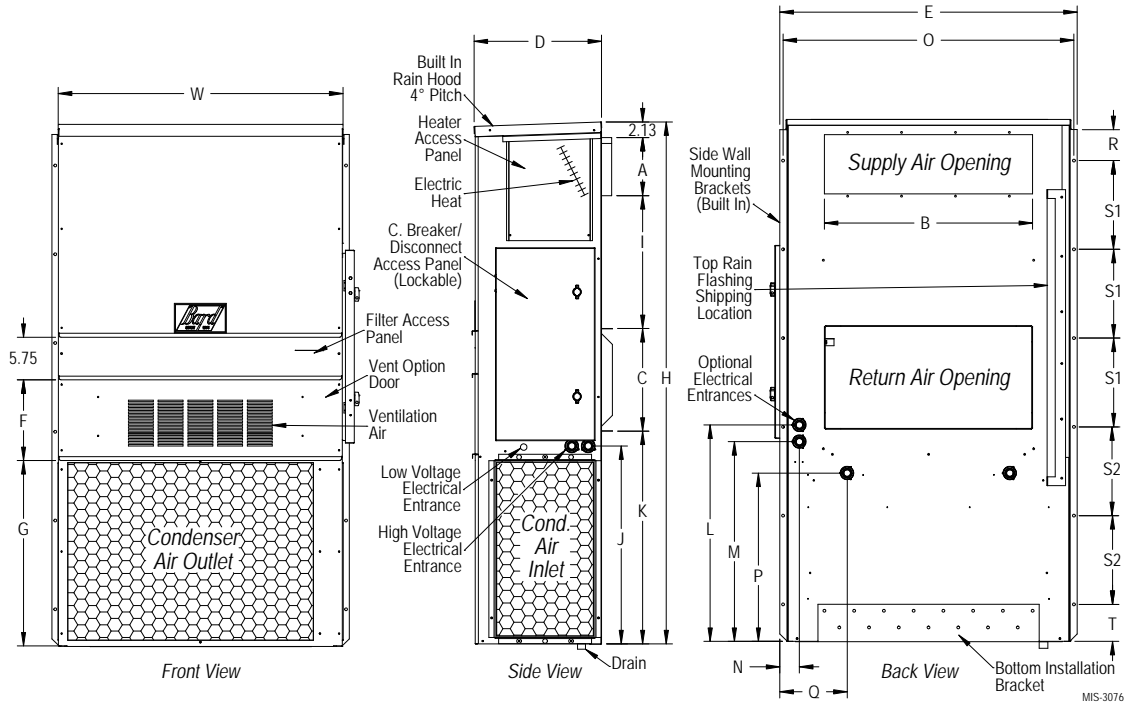
FIGURE 2

Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

MODEL	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN		E	F	G	I	J	K	L	M	N	O	P	Q	R	S1	S2	T
				A	B	C	B																
W3RV2 W3LV2	38.200	17.125	70.563	7.88	27.88	13.88	27.88	40.00	10.88	25.75	17.93	26.38	28.75	29.25	27.00	2.75	39.19	22.75	9.14	4.19	12.00	12.00	5.00
W5RV2 W5LV2	42.075	22.432	84.875	9.88	29.88	15.88	29.88	43.88	13.56	31.66	30.00	32.31	26.94	34.69	32.43	3.37	42.88	23.88	10.00	1.44	16.00	16.00	1.88
W6RV2 W6LV2	42.075	22.432	94.875	9.88	29.88	15.88	29.88	43.88	13.56	41.66	30.00	42.31	36.94	44.69	42.43	3.37	42.88	33.88	10.00	1.44	16.00	21.00	1.88

All dimensions are in inches. Dimensional drawings are not to scale.

**W*RV
RIGHT
UNIT**



**W*LV
LEFT
UNIT**

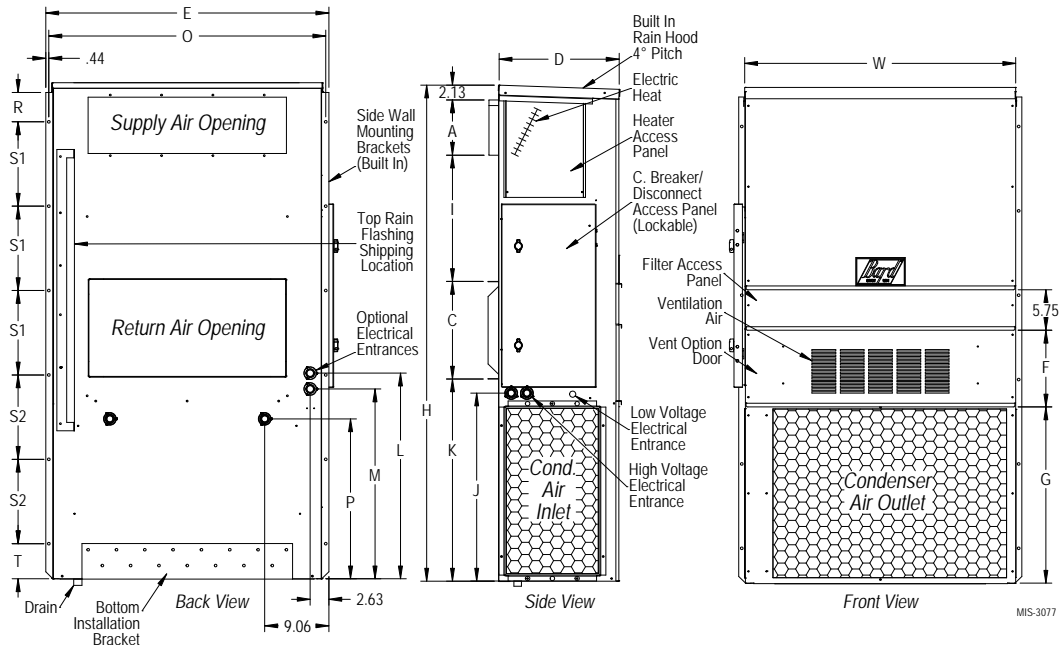


FIGURE 3A
W3RV2, W3LV2
MOUNTING INSTRUCTIONS

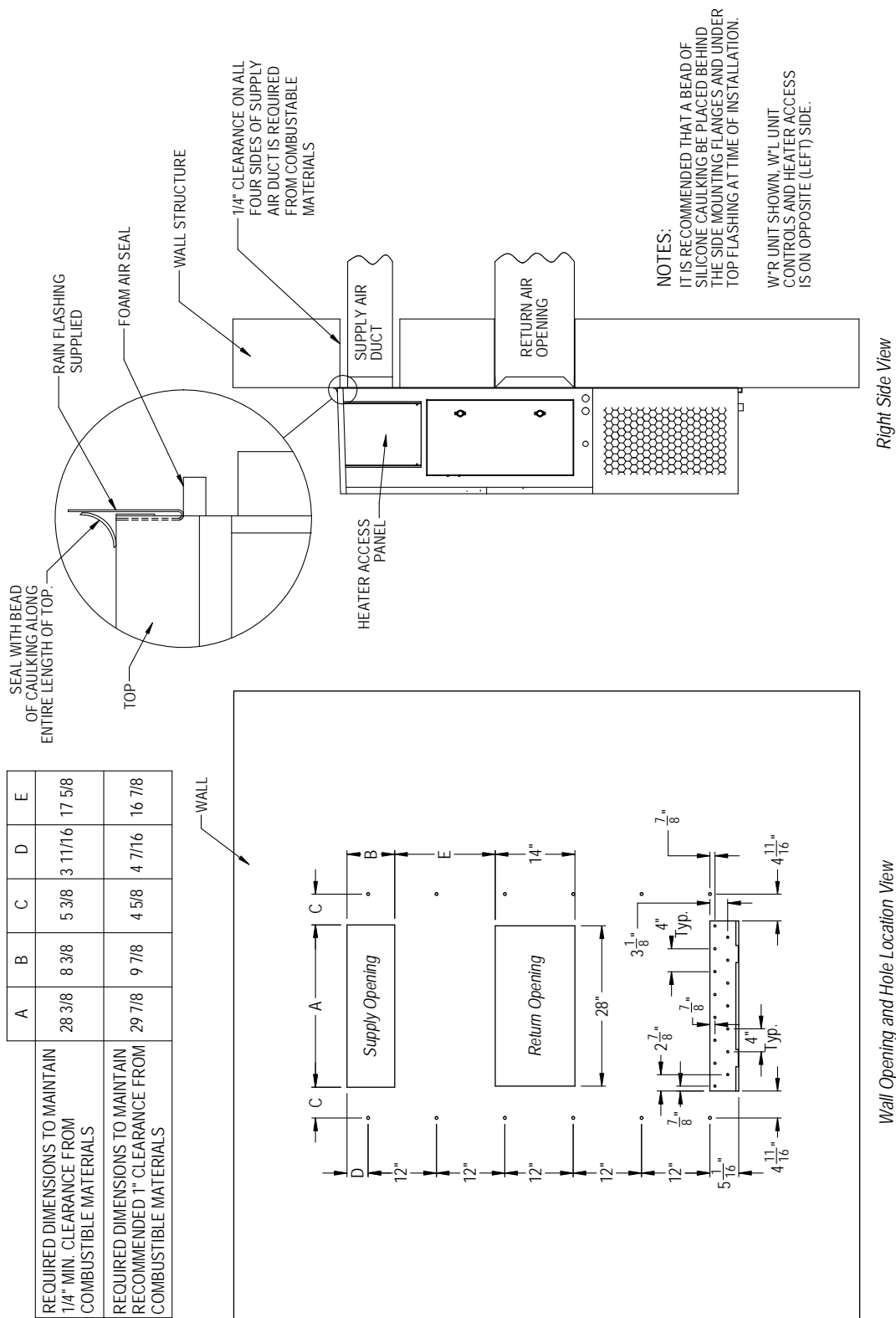
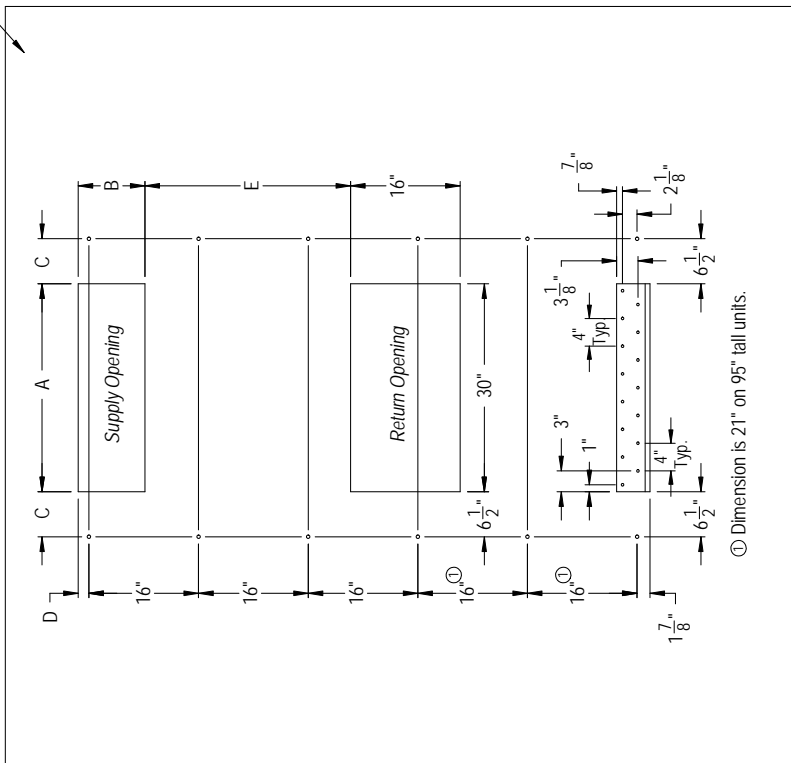


FIGURE 3B

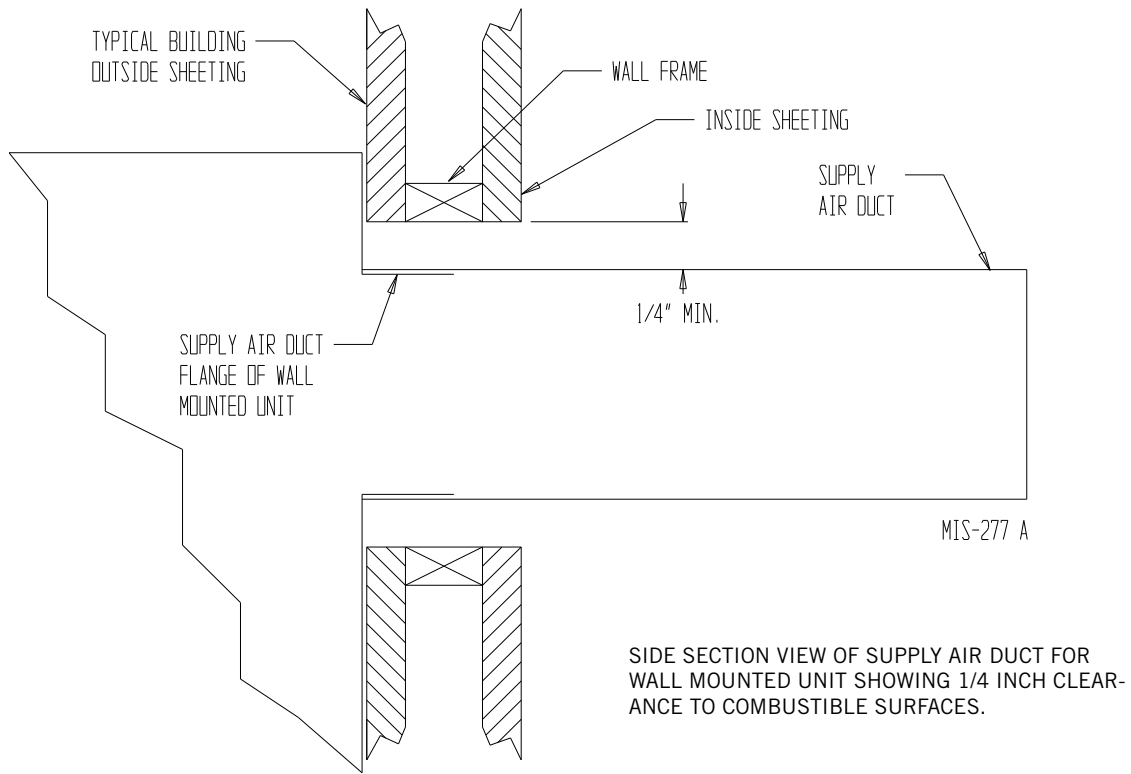
REQUIRED DIMENSIONS TO MAINTAIN
1/4" MIN. CLEARANCE FROM
COMBUSTIBLE MATERIALS



Right Side View

MIS-3079

FIGURE 4
ELECTRIC HEAT CLEARANCE
W3RV2, W3LV2, W5RV2, W5LV2, W6RV2, W6LV2



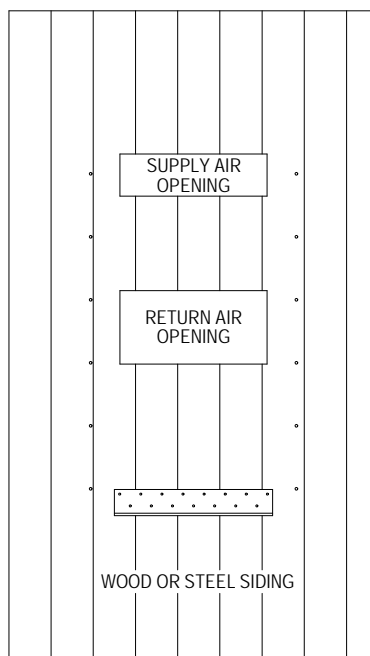
WARNING

A **minimum** of 1/4 inch clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3 feet of ducting.

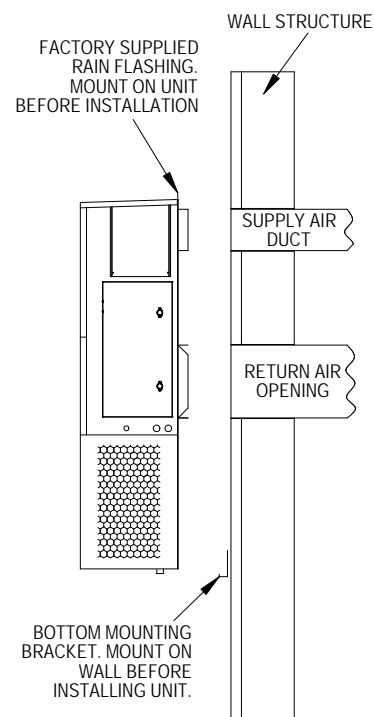
It is important to insure that the 1/4 inch minimum spacing is maintained at all points.

Failure to do this could result in overheating the combustible material and may result in a fire causing damage, injury or death.

SEE FIGURES 3A & 3B – MOUNTING INSTRUCTIONS



WOOD FRAME WALL INSTALLATION



MIS-3080

SEE UNIT DIMENSIONS, FIGURE 2,
FOR ACTUAL DIMENSIONS.

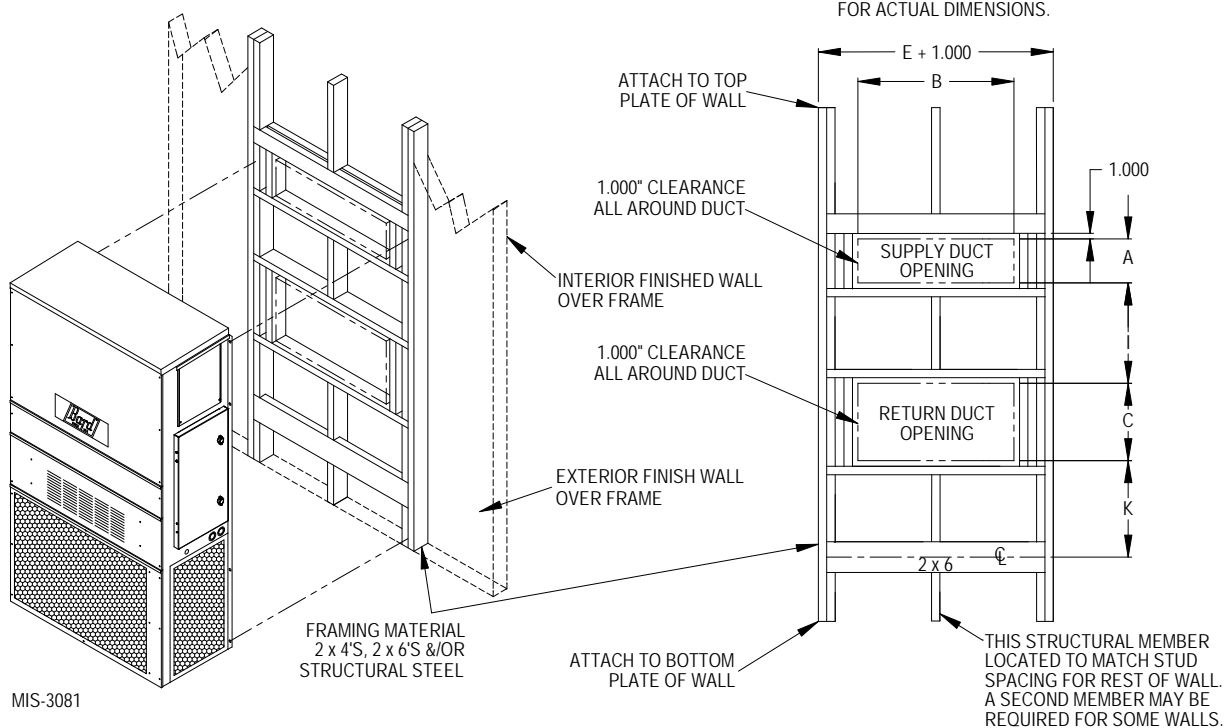
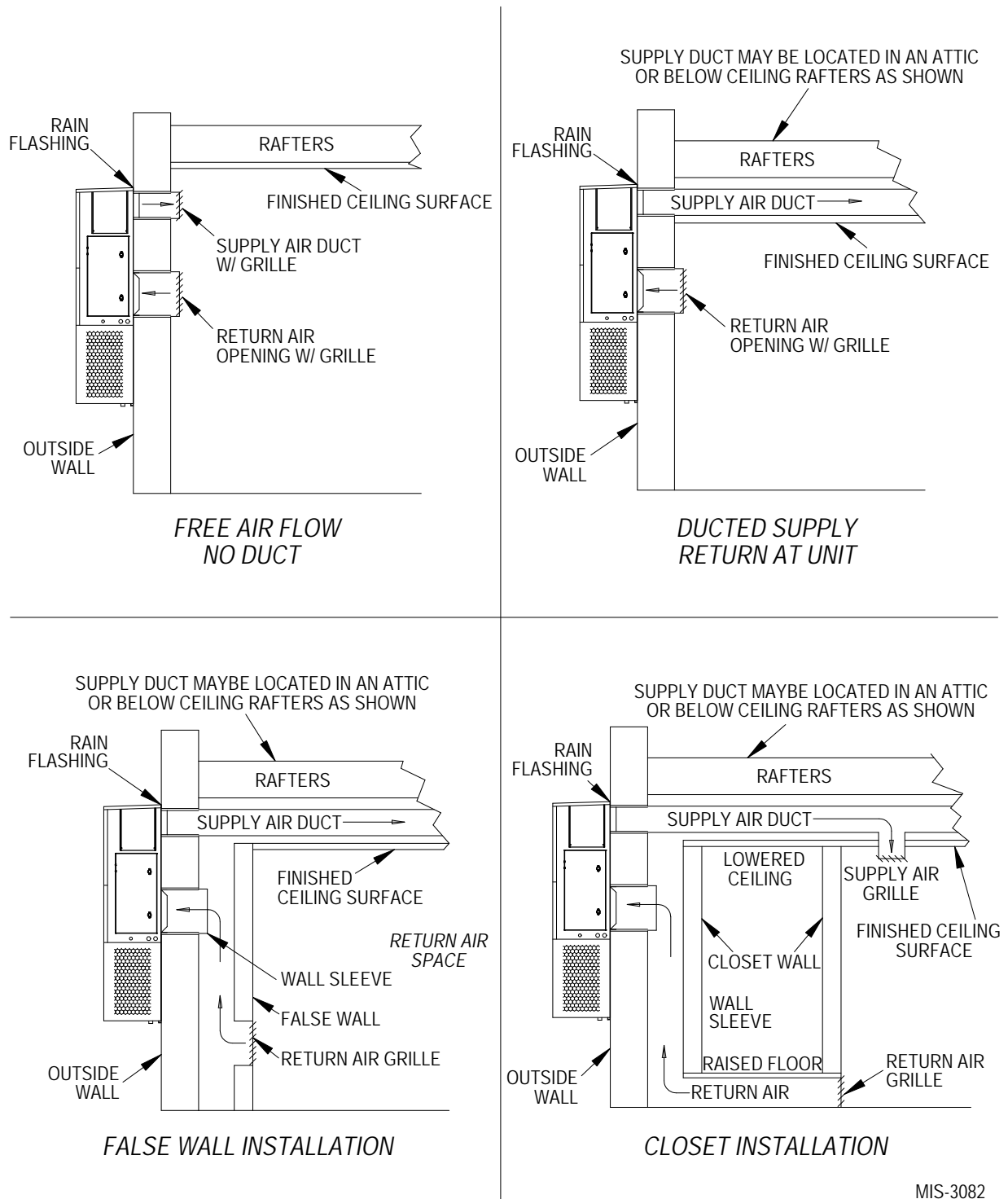


FIGURE 7
COMMON WALL MOUNTING INSTALLATIONS



MIS-3082

WIRING – MAIN POWER

These units are rated for 60/50 Hz operation as follows.

NOTE: *This system must be controlled only by the Bard 8403-066 Digital Thermostat/Controller that is supplied with the unit. See below for wiring and pages 17-18 for operating sequences.*

Electrical Code	Volts Hz Phase	Operating Voltage Range
-R	230/208-60-1 220/200-50-1	197 - 253 180 - 242
-S	230/208-60-3 220/200-50-3	197 - 253 180 - 242
-T	460-60-3 400-50-3	414 - 506 380 - 440

Refer to the unit rating plate for wire sizing information and maximum fuse or circuit breaker size. Each outdoor unit is marked with a “Minimum Circuit Ampacity”. This means that the field wiring used must be sized to carry that amount of current. Depending on the installed KW of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked “Use Copper Conductors Only”. These instructions **must be** adhered to. Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

The electrical data lists fuse and wire sizes (75° C copper) for all models including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters.

The unit rating plate lists a “Maximum Time Delay Relay Fuse” or circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

The control access door on this unit may be locked to prevent unauthorized access to the disconnect. To lock, insert a padlock through the hole in the lower portion of one or both of the door latches. This will prevent the latches from being turned.

See “Start Up” section for important information on three phase scroll compressor start ups.

See Table 3 on page 22 for Electrical Specifications.

IMPORTANT INSTALLER NOTE

Must be followed for proper operation of all controls.

These models are designed for dual 60/50Hz operation. –R and –S models use a 240/208Vx24V control transformer, and are shipped from the factory on the 208V tap. The –R and –S models may require reconnection of the 24V transformer primary from 240 to 208V tap for either 60 or 50Hz:

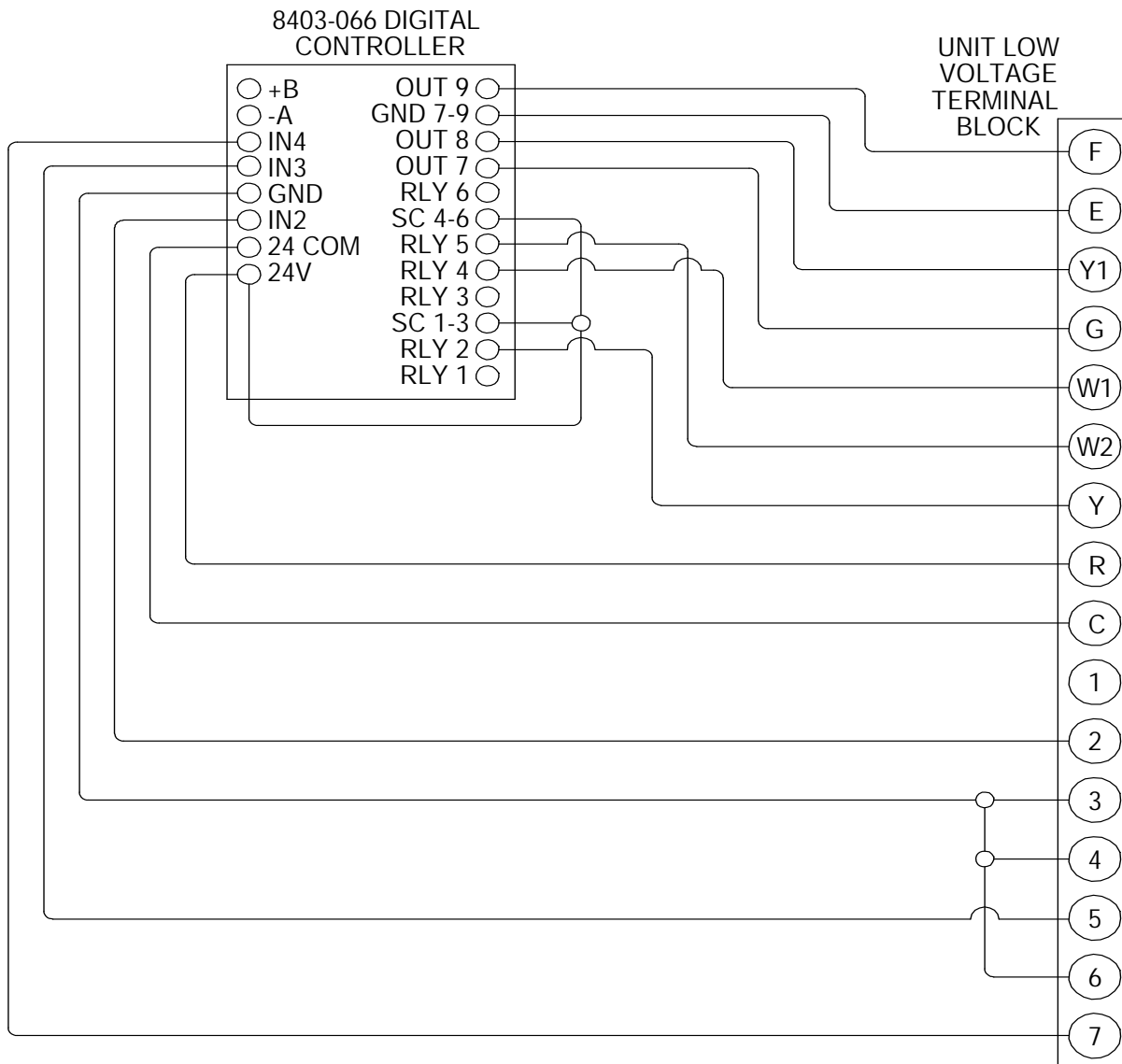
Supply Voltage	Hz	Transformer Primary Tap
253-216	60 or 50	240
220-180	60 or 50	208

WIRING – LOW VOLTAGE

DIGITAL THERMOSTAT/CONTROLLER

Terminal	Function	Type	Form
+B	MSTP + (not used)	Communications	
-A	MSTP - (not used)	Communications	
IN4	Outdoor Temperature Sensor	Input	10K OHM Type 3
IN3	Pressure Transducer	Input	0-5 VDC, 0-700 PSIG
GND	Sensor Grounds	Input	
IN2	Lockout Alarm	Input	Relay Closure
24 COM	24VAC Com	Power	
24V	24VAC	Power	
OUT 9	Fan Motor Control	Analog Output	0-10VDC
GND7-9	Control Ground	Analog Output	
OUT 8	Unloader Solenoid Control	Analog Output	0 or 5VDC PWM
OUT 7	Blower Motor Control	Analog Output	0-10VDC
RLY 4	Heater Contactor #1	Relay Output	Relay
SC 4-6	24VAC to Relay Outputs 4-6	Power	
RLY 5	Heater Contactor #2	Relay Output	Relay
RLY 6	(not used)		
RLY 3	(not used)		
SC1-3	24VAC to Relay Outputs 1-3	Power	
RLY 2	Compressor Contactor	Relay Output	Relay
RLY 1	(not used)		

**FIGURE 8
LOW VOLTAGE WIRING DIAGRAM**



MIS-2852 C

THESE UNITS REQUIRE R-410A REFRIGERANT AND POLYOL ESTER OIL.

GENERAL

1. Use separate service equipment to avoid cross contamination of oil and refrigerants.
2. Use recovery equipment rated for R-410A refrigerant.
3. Use manifold gauges rated for R-410A (800 psi/250 psi low).
4. R-410A is a binary blend of HFC-32 and HFC-125.
5. R-410A is nearly azeotropic—similar to R-22 and R-12. Although nearly azeotropic, charge with liquid refrigerant.
6. R-410A operates at 40-70% higher pressure than R-22, and systems designed for R-22 cannot withstand this higher pressure.
7. R-410A has an ozone depletion potential of zero, but must be reclaimed due to its global warming potential.
8. R-410A compressors use polyol ester oil.
9. Polyol ester oil is hygroscopic; it will rapidly absorb moisture and strongly hold this moisture in the oil.
10. A liquid line dryer must be used—even a deep vacuum will not separate moisture from the oil.
11. Limit atmospheric exposure to 15 minutes.
12. If compressor removal is necessary, always plug compressor immediately after removal. Purge with small amount of nitrogen when inserting plugs.

TOPPING OFF SYSTEM CHARGE

If a leak has occurred in the system, Bard Manufacturing recommends reclaiming, evacuating (see criteria above), and charging to the nameplate charge. If done correctly, topping off the system charge can be done without problems.

With R-410A, there are no significant changes in the refrigerant composition during multiple leaks and recharges. R-410A refrigerant is close to being an azeotropic blend (it behaves like a pure compound or single component refrigerant). The remaining refrigerant charge, in the system, may be used after leaks have occurred and then “top-off” the charge by

utilizing the pressure charts on the inner control panel cover as a guideline.

REMEMBER: When adding R-410A refrigerant, it must come out of the charging cylinder/tank as a liquid to avoid any fractionation, and to insure optimal system performance. Refer to instructions for the cylinder that is being utilized for proper method of liquid extraction.



WARNING

Failure to conform to these practices could lead to damage, injury or death.

SAFETY PRACTICES

1. Never mix R-410A with other refrigerants.
2. Use gloves and safety glasses, Polyol ester oils can be irritating to the skin, and liquid refrigerant will freeze the skin.
3. Never use air and R-410A to leak check; the mixture may become flammable.
4. Do not inhale R-410A—the vapor attacks the nervous system, creating dizziness, loss of coordination and slurred speech. Cardiac irregularities, unconsciousness and ultimate death can result from breathing this concentration.
5. Do not burn R-410A. This decomposition produces hazardous vapors. Evacuate the area if exposed.
6. Use only cylinders rated DOT4BA/4BW 400.
7. Never fill cylinders over 80% of total capacity.
8. Store cylinders in a cool area, out of direct sunlight.
9. Never heat cylinders above 125°F.
10. Never trap liquid R-410A in manifold sets, gauge lines or cylinders. R-410A expands significantly at warmer temperatures. Once a cylinder or line is full of liquid, any further rise in temperature will cause it to burst.

IMPORTANT INSTALLER NOTE

For improved start up performance wash the indoor coil with a dish washing detergent.

THREE PHASE SCROLL COMPRESSOR

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. Direction of rotation is not an issue with single phase compressors since they will always start and run in the proper direction.

However, three phase compressors will rotate in either direction depending upon phasing of the power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, verification of proper rotation must be made. Verification of proper rotation direction is made by observing that suction pressure drops and discharge pressure rises when the compressor is energized. Reverse rotation also results in an elevated sound level over that with correct rotation, as well as substantially reduced current draw compared to tabulated values.

Verification of **proper rotation** must be made at the time the equipment is put into service. If improper rotation is corrected at this time, there will be no negative impact on the durability of the compressor. However, reverse operation for over one hour may have a negative impact on the bearing due to oil pump out.

NOTE: *If compressor is allowed to run in reverse rotation for several minutes, the compressor's internal protector may trip.*

All three phase compressors are wired identically internally. As a result, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same Fusite terminal should maintain proper rotation direction.

The direction of rotation of the compressor may be changed by reversing any two line connections to the unit.

PHASE MONITOR

All units with three phase scroll compressors are equipped with a 3 phase 60/50 Hz line monitor to prevent compressor damage due to phase reversal. No changes required for 60 or 50 Hz operation.

The phase monitor in this unit is equipped with two LEDs. If the Y signal is present at the phase monitor and phases are correct the green LED will light.

If phases are reversed, the red fault LED will be lit and compressor operation is inhibited.

If a fault condition occurs, reverse two of the supply leads to the unit. ***Do not reverse any of the unit factory wires as damage may occur.***

SERVICE HINTS

1. Caution owner/operator to maintain clean air filters at all times. Also, not to needlessly close off supply and return air registers. This reduces airflow through the system, which shortens equipment service life as well as increasing operating costs.
2. Check all power fuses or circuit breakers to be sure they are the correct rating.
3. Periodic cleaning of the outdoor coil to permit full and unrestricted airflow circulation is essential.

DIGITAL CONTROLLER

The W3R/LV2 through W6R/LV2 variable capacity air conditioners utilize dedicated controllers and components to optimize this unit for cooling operation from -40°F up to 131°F (-40°C to +55°C). These units are dual rated for 200-240V operation on both 50 and 60 Hz. Please read the following sequence of operation before attempting any troubleshooting or repair. Troubleshooting and repair procedures will be outlined below and later in this manual.

These models use a digital compressor and variable speed indoor and outdoor motors. The motors and compressor must be replaced with the exact same component to maintain the above stated temperature and voltage ranges of operation. The units are controlled by a Bard digital thermostat/controller. This thermostat/controller contains proprietary programming and must be replaced with the exact same component to ensure proper operation.

See Controller Quick Start Manual 2100-559 and Controller Advanced Programming Manual 2100-560 for complete details.

SEQUENCE OF OPERATION

Modes of Operation

Cool Only Mode:

- Compressor will modulate from 100% down to 20%.
- Compressor will cycle off if thermostat/controller set-point is reached.

Heat Only Mode:

- Electric heat Stage 1 operates at 1st-stage heating set-point.
- Electric heat Stage 2 (if equipped) operates on 2nd stage (-2°F below heating set-point).

Auto Mode:

- Cooling or heating automatically selected based on building temperature vs. thermostat/controller set-points and operates as described above.

CCVC (Continuous Compressor Variable Capacity):

- Compressor will modulate from 100% down to 20%.
- Compressor will not cycle off if thermostat/controller set-point is reached, and would stay running at the 20% minimum capacity.
- If space temperature drops -2°F below cooling set-point electric heat Stage 1 will then cycle to maintain that condition.
- If Stage 2 electric heat is installed, and if required, will cycle at -4°F below cooling set-point to maintain that condition.
- If CCVC is terminated the controller will revert to Cool or Auto operation.
- CCVC would be an Operating Mode for all applications where continuous run of the compressor is a requirement.

Testing and Troubleshooting Mode CCFC (Continuous Compressor Fixed Capacity):

- This unit must be controlled with the digital thermostat controller supplied with the unit. To test or troubleshoot, change system mode to CCFC. This will ensure unit runs continuously and in full capacity mode. AHRI ratings are based on this mode of operation.

CCFC (Continuous Compressor Fixed Capacity):

- The compressor is turned ON and locked ON as long as the thermostat/controller is in Test Mode 2.
- When in CCFC the compressor does not modulate but will be locked ON at 100% capacity.
- If space temperature drops -2°F below cooling set-point electric heat Stage 1 will then cycle to maintain that condition.
- If Stage 2 electric heat is installed, and if required, will cycle at -4°F below cooling set-point to maintain that condition.
- If CCFC is terminated the controller will revert to Cool or Auto operation.

Indoor Blower Operation

The indoor blower speed will modulate with the compressor operation from 50% to 100% of operation. Once compressor operation is at 50 or below, percent airflow will be at 50% and no further reduction of airflow will occur. Modulation is accomplished by modulating a 0-10 volt signal from OUT 7 to the indoor blower motor.

An additional option to maintain airflow at 100% is also available. This selection is done at the thermostat/controller under Fan Modes. Default is No for "Always 100%" setting. Change to Yes to disable indoor blower modulation as described above.

Outdoor Fan Motor Operation

The outdoor fan motor speed is varied in response to outdoor air temperature and pressure. The fan motor will cycle on and off with the compressor when not in a CCVC or CCFC mode. At all times above 122°F OAT, the outdoor fan, OUT 9, will be energized at high speed. From 122°F to 55°F the outdoor fan, OUT 9, will be set at normal outdoor airflow. Below 55°F the outdoor fan will modulate to maintain a 300 psi head pressure. This will act as a low ambient fan cycling control. The output may go to zero output to maintain the 300 PSI. The outdoor ECM motor will be programmed with a minimum RPM allowed to protect the bearing system. Any signal that is less than the percent torque required to maintain the minimum RPM will cause the motor to shut off. Once head pressure rises the motor will restart.

These functions are regulated by the digital thermostat/controller with input from the pressure transducer and output signal to the Fan Motor.

Capacity Modulation and High Head Pressure Control

The pressure transducer monitors the high side pressure providing input to the digital thermostat/controller. It is powered using a 5VDC power supply with a digital relay signaling the compressor unloader solenoid as required. When the ECU head pressure exceeds 615 PSI based on outdoor and indoor ambient conditions the compressor will automatically start to reduce capacity to stay online keeping the pressure at or below 575 PSI. The thermostat/controller display alternates between OD temperature and discharge pressure. When compressor capacity is being reduced due to high pressure conditions it will also indicate "High Head Pressure Control" mode on the display. A separate 650 PSI high pressure cutout switch is also employed as additional safety device. See Compressor Control Module on following page for more details.

COOLING SEQUENCE

Compressor Operation

The cooling capacity of the WV series is controlled by loading or unloading the compressor. On a call for cooling, the unloader solenoid is energized for one second to ensure pressure equalization in the compressor. The compressor contactor, RLY 2, is then energized and the compressor will start. A PI control loop then calculates the compressor capacity needed to reach set point and modulates the compressor. Modulation range is from 20% to 100% capacity. Modulation is accomplished by a pulse width modulated signal from OUT 8 which energizes the solid state relay (SSR) and energizes or de-energizes the unloader solenoid. The required compressor capacity is calculated every 15 seconds.

20% load means 0 VDC for 3.0 seconds and 5 VDC for 12.0 seconds from OUT 8.

30% load means 0 VDC for 4.5 seconds and 5 VDC for 10.5 seconds from OUT 8.

40% load means 0 VDC for 6.0 seconds and 5 VDC for 9.0 seconds from OUT 8.

50% load means 0 VDC for 7.5 seconds and 5 VDC for 7.5 seconds from OUT 8.

60% load means 0 VDC for 9.0 seconds and 5 VDC for 6.0 seconds from OUT 8.

70% load means 0 VDC for 10.5 seconds and 5 VDC for 4.5 seconds from OUT 8.

80% load means 0 VDC for 12.0 seconds and 5 VDC for 3.0 seconds from OUT 8.

90% load means 0 VDC for 13.5 seconds and 5 VDC for 1.5 seconds from OUT 8.

100% load means 0 VDC for 15 seconds and 5 VDC for 0.0 seconds from OUT 8.

Outdoor Temperature Sensor

A sensor probe projects out the bottom of the ECU control box into the outdoor section, and this provides input for the outdoor fan sequences below 55°F and above 115°F described under Outdoor Fan Motor Operation.

Discharge Temperature Sensor

This sensor is mounted on the compressor discharge line and protects the compressor against overheating. It opens at 250°F and closes at 200°F.

HEATING SEQUENCE

On a call for heating, if the space temperature falls 1°F below setpoint, the first stage of heating, RLY 4, will cycle ON. If the space temperature falls 3°F below setpoint, the second stage of heating, RLY 5, will cycle ON. Indoor Blower airflow is maintained at the Rated unit airflow at all times during heating.

LEAD/LAG SEQUENCE

The digital controllers can be used for dual units used in a redundant application by using the scheduling function as follows:

1. The controllers should be mounted side by side so they are in the same temperature zone.
2. The time setting on both controllers need to be synchronized to the same time of day. NOTE: there is a 72-hour time retention if power is removed. If power off-time exceeds 72 hours, the time clock in each device must be reset to match. The exact time is not important as long as both controllers are set the same unless it is critical to control the time of day when the units swap operating positions.
3. Set one controller #1 to be Occupied for a 12-hour period and Unoccupied for the other 12-hour period. Set controller #2 so that it is exactly the opposite. Unoccupied for the 12-hour period when #1 is Occupied and Occupied when #1 is Unoccupied.
4. Set Occupied cooling setpoint the same for each controller, and Unoccupied the same for each. 4°F difference is suggested.
5. Set controllers to "Auto" mode of operation.

Example:

1. Both Unit #1 and #2 have Occupied setpoint of 74°F and Unoccupied setpoint of 78°F
2. Unit #1 set for Occupied from 1:00 a.m. to 1:00 p.m. & Unoccupied from 1:00 p.m. to 1:00 a.m.
3. Unit #2 set for Unoccupied from 1:00 a.m. to 1:00 p.m. & Occupied from 1:00 p.m. to 1:00 a.m.
4. Every 12 hours the units will swap position as being the lead unit, and the lag unit is available for back up operation at the higher temperature should the situation ever arise.

Control Device	Normal	Abnormal
5VDC Power Supply	Red LED lit when 24VAC present. 5VDC present at solid Red and solid Black wires. Both jumpers on Half. 3A 250V fuse.	Red LED not lit. 5VDC not present at solid Red and solid Black wires. Both jumpers on Half. Check 3A fuse.

COMPRESSOR CONTROL MODULE

The compressor control module is standard on all models covered by this manual. The compressor control module is an anti-short cycle/lockout timer with high and low pressure switch monitoring and alarm relay output.

Adjustable Delay On Make and Break Timer

On initial power up or anytime power is interrupted to the unit, the *delay on make* period begins, which will be 2 minutes plus 10% of the *delay on break* setting. When the delay on make is complete and the high pressure switch and low pressure switch is closed, the compressor contactor is energized. Upon shutdown, the delay on break timer starts and prevents restart until the delay on break and delay on make periods have expired.

During routine operation of the unit with no power interruptions, the compressor will operate on demand with no delay.

High Pressure Switch and Lockout Sequence

If the high pressure switch opens, the compressor contactor will de-energize immediately. The lockout timer will go into a *soft lockout* and stay in soft lockout until the high pressure switch closes and the delay on break time has expired. If the high pressure switch opens again in this same operating cycle, the unit will go into *hard lockout* condition and the alarm relay circuit will energize. Recycling the wall thermostat resets the hard lockout.

Low Pressure Switch, Bypass and Lockout Sequence

If the low pressure switch opens for more than 120 seconds, the compressor contactor will de-energize and go into a soft lockout. Regardless the state of the low pressure switch, the contactor will reenergize after the delay on make time delay has expired. If the low pressure switch remains open, or opens again for longer than 120 seconds, the unit will go into hard lockout condition and the alarm relay circuit will energize. Recycling the wall thermostat resets the hard lockout.

Alarm Relay Output

Alarm terminal is output connection for applications where alarm relay is employed. This terminal is powered whenever the compressor is locked out due to HPC or LPC sequences as described.

NOTE: *Both high and low pressure switch controls are inherently automatic reset devices. The high pressure switch and low pressure switch cut out and cut in settings are fixed by specific air conditioner unit model. The lockout features, both soft and hard, are a function of the Compressor Control Module.*

ADJUSTMENTS

Adjustable Delay on Make and Delay on Break Timer

The potentiometer is used to select delay on break time from 30 seconds to 5 minutes. Delay on make (DOM) timing on power-up and after power interruptions is equal to 2 minutes plus 10% of Delay on break (DOB) setting:

0.5 minute (30 seconds) DOB = 123 second DOM
1.0 minute (60 seconds) DOB = 126 second DOM
2.0 minute (120 seconds) DOB = 132 second DOM
3.0 minute (180 seconds) DOB = 138 second DOM
4.0 minute (240 seconds) DOB = 144 second DOM
5.0 minute (300 seconds) DOB = 150 second DOM

During routine operation of the unit with no power interruptions, the compressor will operate on demand with no delay.

Typical Settings for Dual Unit Installation

Unit 1: DOB set at 2 minutes, and DOM is 132 seconds

Unit 2: DOB set at 4 minutes, and DOM is 144 seconds

PRESSURE SERVICE PORTS

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. It is imperative to match the correct pressure table to the unit by model number. See Table 2 on page 21.

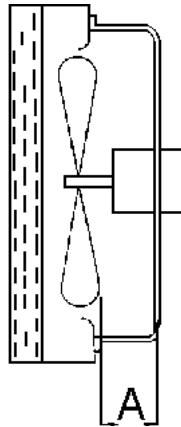
TROUBLESHOOTING

FAN BLADE SETTING DIMENSIONS

Shown in Figure 9 is the correct fan blade setting for proper air delivery across the outdoor coil. Refer to Table 1 for unit specific dimension.

Any service work requiring removal or adjustment in the fan and/or motor area will require that the dimensions below be checked and blade adjusted in or out on the motor shaft accordingly.

**FIGURE 9
FAN BLADE SETTING**



MIS-1724

**TABLE 1
FAN BLADE DIMENSIONS**

Model	Dimension A
W3RV2 W3LV2	1.25"
W5RV2 W5LV2	1.75"
W6RV1 W6LV2	1.75"

REMOVAL OF FAN SHROUD

1. Disconnect all power to the unit.
2. Remove the screws holding both grilles, one on each side of unit, and remove grilles.
3. Unwire condenser fan motor.
4. Remove the bolts and nuts holding the condenser fan motor bracket to the fan shroud.
5. Slide the condenser fan motor and bracket to the rear of the condenser section.
6. Remove screws holding fan shroud to condenser and bottom support plate.
7. Slide fan shroud out the left side of the unit.
8. Reverse steps to install.

R-410A REFRIGERANT CHARGE

This unit was charged at the factory with the quantity of refrigerant listed on the serial plate. AHRI capacity and efficiency ratings were determined by testing with this refrigerant charge quantity.

The following pressure tables show nominal pressures for the units. Since many installation specific situations can affect the pressure readings, this information should only be used by certified technicians as a guide for evaluating proper system performance. They shall not be used to adjust charge. If charge is in doubt, reclaim, evacuate and recharge the unit to the serial plate charge.

TABLE 2
COOLING PRESSURE

Air Temperature Entering Outdoor Coil °F (°C)

Model	D.B/W.B. ①	Pressure	75 (23.9)	80 (26.7)	85 (29.4)	90 (32.2)	95 (35.0)	100 (37.8)	105 (40.6)	110 (43.3)	115 (46.1)	120 (48.9)	125 (51.7)	131 (55.0)
W3RV W3LV	75/62F (23.9/16.7C)	Low Side	128	127	127	127	128	129	130	132	135	See Note ②		
		High Side	355	373	394	416	442	469	498	530	565			
	80/67F (26.7/19.4C)	Low Side	137	136	136	136	139	139	139	141	144			
		High Side	364	383	404	427	444	481	511	544	579			
	85/72F (29.4/22.2C)	Low Side	142	141	141	141	142	143	144	146	149			
		High Side	377	396	418	442	469	498	529	563	599			
W5RV W5LV	75/62F (23.9/16.7C)	Low Side	125	128	130	132	134	136	137	137	138			
		High Side	336	358	380	403	427	451	478	504	531			
	80/67F (26.7/19.4C)	Low Side	134	137	139	141	143	145	146	147	148			
		High Side	345	367	390	413	438	463	490	517	545			
	85/72F (29.4/22.2C)	Low Side	139	142	144	146	148	150	151	152	153			
		High Side	357	380	404	427	453	479	507	535	564			
W6RV W6LV	75/62F (23.9/16.7C)	Low Side	113	113	114	115	117	118	120	122	124			
		High Side	344	361	381	404	430	459	490	526	564			
	80/67F (26.7/19.4C)	Low Side	121	121	122	123	125	126	128	130	133			
		High Side	353	370	391	414	441	471	503	539	578			
	85/72F (29.4/22.2C)	Low Side	125	125	126	127	129	130	132	135	138			
		High Side	365	383	405	428	456	487	521	558	598			

Low side pressure ±4 PSIG

High side pressure ±10 PSIG

Tables are based upon rated CFM (airflow) across the evaporator coil. If there is any doubt as to correct operating charge being in the system, the charge should be removed, system evacuated and recharged to serial plate charge weight.

NOTE ①: Return air temperature at 50% R.H.

NOTE ②: Units rated to 131°F (55°C) outdoor temperature, but higher fan speeds and automatic modulation of the compressor due to pressure control make pressure readings above 115°F very unstable. Pressure table is based on low speed condenser fan operation. Fan speed increases above 115°F. Check pressures on unit at outdoor ambient below 115°F. Set thermostat at least 3° below current room temperature to ensure 100% comp operation for purpose of pressure testing.

TABLE 3

Electrical Specifications — W*RV / W*LV Series

Dual Circuit																	
Model	Electrical Rating: Volts Hz Phase	No. Field Power Circuits	③ Minimum Circuit Ampacity	① Maximum Overcurrent Protection	② Field Power Wire Size	③ Minimum Circuit Ampacity			① Maximum Overcurrent Protection			② Field Power Wire Size			② Ground Wire Size		
						Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C
W3RV2 / W3LV2-R0Z R05 R10	230/208-60-1 220/200-50-1 1 or 2	1	29	35	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	55	60	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1 or 2	81	90	4	55	26	N/A	60	30	N/A	6	10	N/A	10	N/A	N/A
W3RV2 / W3LV2-S0Z S06 S09	230/208-60-3 220/200-50-3	1	21	30	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	39	40	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	48	50	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W3RV2 / W3LV2-T0Z T09 T12	460-60-3 400-50-3	1	11	15	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	25	25	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	29	30	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W5RV2 / W5LV2-R0Z R10 R20	230/208-60-1 220/200-50-1 1 or 3	1	39	60	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1 or 2	91	100	3	39	52	N/A	60	60	N/A	8	6	N/A	10	N/A	N/A
		1 or 3	143	150	1/0	39	52	52	60	60	60	8	6	10	10	10	10
W5RV2 / W5LV2-S0Z S09 S18	230/208-60-3 220/200-50-3	1	28	40	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	55	60	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		2	82	90	4	55	28	N/A	60	30	N/A	6	10	N/A	10	N/A	N/A
W5RV2 / W5LV2-T0Z T09 T18	460-60-3 400-50-3	1	14	20	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	27	30	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	36	40	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
W6RV2 / W6LV2-S0Z S09 S18	230/208-60-3 220/200-50-3	1	39	60	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		2	66	80	4	39	28	N/A	60	30	N/A	8	10	N/A	10	N/A	N/A
		2	93	100	3	39	55	N/A	60	60	N/A	8	6	10	10	N/A	N/A
W6RV2 / W6LV2-T0Z T09 T15	460-60-3 400-50-3	1	19	25	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	33	35	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1	42	45	8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

① Maximum size of the time delay fuse or circuit breaker for protection of field wiring conductors.

② Based on 75C copper wire. All wiring must conform to the National Electrical Code and all local codes.

③ These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing.

Caution: When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.

* Top outlet supply option is available only factory installed and only on the selected models.

IMPORTANT: While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.

**TABLE 4
RECOMMENDED AIRFLOW**

Model	Rated CFM*	Rated ESP*	Recommended Airflow Range
W3R/LV	1100	.15	1100 - 550
W5R/LV	1700	.20	1700 - 850
W6R/LV	1700	.20	1700 - 850

* Rated CFM and ESP on high speed tap.

**TABLE 5
MAXIMUM ESP OF OPERATION
ELECTRIC HEAT ONLY**

Model	W3	W5, W6
	FRONT	FRONT
	High	High
-A0Z	.50	.50
-A05	.50	.50
-A10	.50	.50
-B0Z	.50	.50
-B06	.50	.50
-B09	.50	.50
-C0Z	.50	.50
-C09	.50	.50
-C12	.45	.50

Values shown are for units equipped with standard 1-inch throwaway filter or 1-inch washable filter.
Derate ESP by .15 for 2-inch pleated filters.

**TABLE 6
ELECTRIC HEAT**

Models	240V-1		208V-1		240V-3		208V-3		460V-3	
KW	Amps	BTUH	Amps	BTUH	Amps	BTUH	Amps	BTUH	Amps	BTUH
4	16.7	13650	14.4	10240						
5	20.8	17065	18.1	12800						
6					14.4	20500	12.5	15360	7.2	20500
8	33.3	27300	28.8	20475						
9					21.7	30600	18.7	23030	10.8	30700
10	41.6	34130	36.2	25600						
12									14.4	40950
15	62.5	51250	54.0	38400	36.2	51200	31.2	38400	18.0	51200
18					43.3	61430	37.5	46100		
20	83.2	68260	72.1	51200						

TABLE 7
VENT AND CONTROL OPTIONS

Part Number	Description	W3R/LV	W5R/LV	W6R/LV
CMC-15	Start Kit (230V 1-Phase)	X	X	
BFAD-3	Barometric Fresh Air Damper - Standard	X		
BOP-3	Blank Off Plate	X		
BFAD-5	Barometric Fresh Air Damper - Standard		X	X
BOP-5	Blank Off Plate		X	X

INSTALLATION INSTRUCTIONS

CONTROLLER INSTALLATION, OPERATION & QUICK START GUIDE

8403-066 ECU Series Controller



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 2100-559A
Supersedes: 2100-559
Date: 5-18-16

INSTALLATION

IMPORTANT: For optimum temperature sensor performance, the Bard ECU Series Controller must be mounted on an interior wall and away from any heat sources, sunlight, windows, air vents, air circulation obstructions and/or any other cause of erratic or false temperature sensing. **Thermostat covers are not recommended as they interfere with motion and temperature sensing.**

Mounting Controller

1. To complete rough-in wiring, it is suggested that 18 gauge solid conductor control wiring be used in general applications, particularly for ease in termination. When shielded wire is used, or in the rare instance where wire gauge required for length of run is greater than 18 gauge, stranded wire is recommended. See Figure 1 for exact number of conductors.

NOTE: Shielded wire must be used in applications where transient signals may accumulate and affect digital signal from control to unit.

2. Turn the hex screws in the bottom and top of the controller clockwise (inward) until they clear the cover. Remove base plate from controller.
3. Route completed wiring through base plate.
4. With the embossed "UP" arrows of the base plate pointing to the ceiling, fasten the base plate to the desired wall location or vertical 2x4 wall handybox.
5. Make appropriate control wire connections (see Table 1) to terminal blocks.
6. Replace controller over base plate, being careful not to pinch/dislodge connections.
7. Turn hex screws in bottom/top of controller counter-clockwise (outward) to secure cover.

ECU Series Controller 8403-066

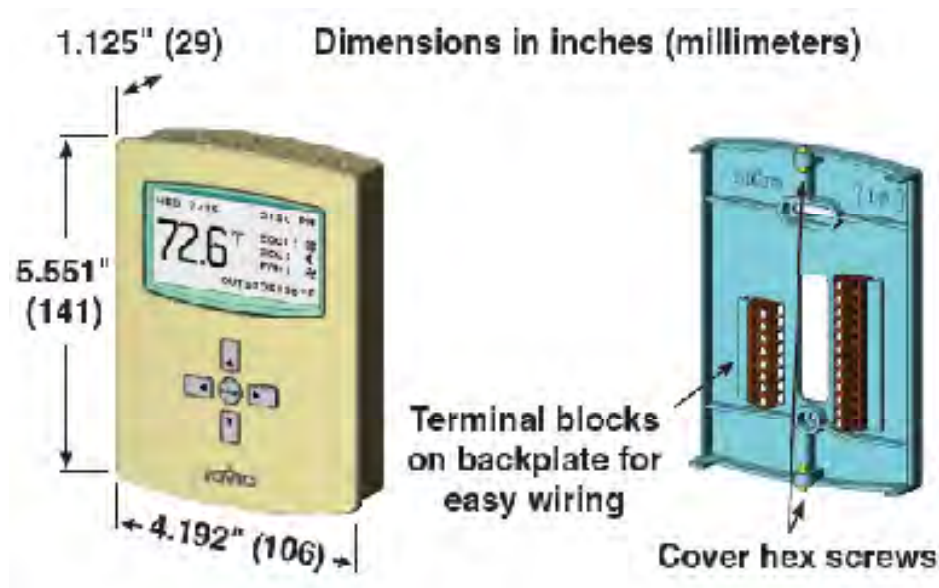


Figure 1
Control Wiring

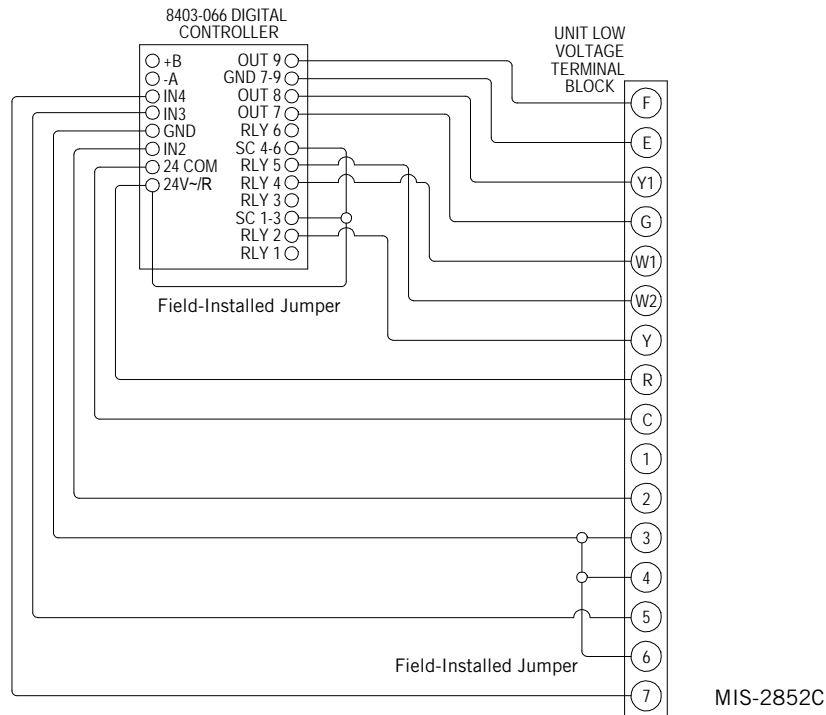


Table 1
Controller Connections

Control Terminal	Unit Terminal	Function	Type	Form
+B	--	MSTP + (Not Used)	Communications	--
-A	--	MSTP - (Not Used)	Communications	--
IN4	7	Outdoor Temperature Sensor	Input	10K Ohm Type 3
IN3	5	Pressure Transducer	Input	0-5 VDC, 0-700PSIG
GND	3,4,6	Sensor Grounds	Input	2-10 VDC
IN2	2	Lockout Alarm	Input	Relay Closure ¹
24 COM	C	24VAC COM	Power	24 VAC
24V~R	R	24VAC	Power	24 VAC
OUT 9	F	Fan Motor Control	Analog Output	2-10 VDC
GND7-9	E	Control Guard	Analog Output	2-10 VDC
OUT 8	Y1	Unloader Solenoid Control	Analog Output	0 or 5 VDC PWM ²
OUT 7	G	Blower Motor Control	Analog Output	2-10 VDC
RLY 4	W1	Heater Contactor #1	Relay Output	Relay 24 VAC
SC4-6	Jump to 24V	24VAC to Relay Outputs 4-6	Power	24 VAC
RLY 5	W2	Heater Contactor #2	Relay Output	Relay 24 VAC
RLY 6	--	Not Used	--	--
RLY 3	--	Not Used	--	--
SC1-3	Jump to 24V	24VAC to Relay Outputs 1-3	Power	24 VAC
RLY2	Y	Compressor Contactor	Relay Output	Relay 24 VAC
RLY 1		Not Used		--

¹ Open relay contacts 3 VDC, closed contacts 0 VDC

² Pulse Width Modulation

BASIC OPERATION

START-UP NOTE: Upon initial power-up, indoor fan will cycle on for approximately 30 seconds, and then shut off. System will be in the "OFF" position. Default time and date will be 12:00 a.m., Jan. 1, 2000. In order for the system to operate in either heating or cooling mode(s), the controller must be initially programmed with specific HVAC model number, specific system enabling and appropriate temperature setpoints.

BASIC SETUP

Home, Main Menu and Override Screens

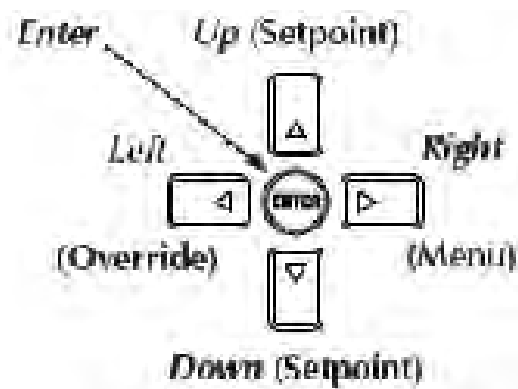
FIGURE 2
ECU Series Controller Home, Override and Configuration Screens



Navigate the menus and change settings by pressing a combination of the four arrow buttons and the ENTER button.

- ENTER button to select and/or exit value editing
- UP or DOWN button to move among entries
- RIGHT or LEFT button to move among value fields
- LEFT button to return to the Home screen

FIGURE 3
ECU Series Controller Buttons



QUICK START PROGRAMMING

Model Selection, System Enabling and Temperature Setpoints

Model Selection

To select specific HVAC unit model from the Home screen:

1. Press RIGHT button to access Main Menu screen.
2. Press DOWN button to scroll to ADVANCED. Press ENTER button.
3. In the ADVANCED menu screen, press ENTER button to enter the APPLICATION menu.
4. Controller will ask for Admin Level Password. Enter BARD. Press ENTER button.
5. Press DOWN button to scroll to ADDITIONAL SETUP. Press ENTER button.
6. Press ENTER button again to select/enter Unit Model screen.
7. Press ENTER button again to highlight current model.
8. Press UP or DOWN button to choose from available models:
 - **W3*V** Model – Wall Mount 3 Ton Variable Capacity System (factory default)
 - **W5/6*V** Models – Wall Mount 4/5 Ton Variable Capacity Systems
 - **P60/72*V** Models – Packaged 5/6 Ton Variable Capacity Systems
9. Press ENTER button to select/save appropriate model.
10. Press LEFT button five (5) times to return to the Home screen.

System Enabling

To access system types from the Home screen:

1. Press RIGHT button to access the Main Menu screen.
2. Press DOWN button to scroll to SYSTEM. Press ENTER button.
3. Press ENTER button again to select System Enable.
4. Press UP or DOWN button to choose between six (6) options.

- AUTO = Conventional system in “Auto-Changeover” mode. HVAC system will cycle heating and cooling automatically to stay within preset heating and cooling setpoints.
- HEATING = Conventional system in “Heating-Only” mode. HVAC system will cycle heating in reference to heating setpoint only. Unit will not activate cooling sequence.
- COOLING = Conventional system in “Cooling-Only” mode. HVAC system will cycle cooling in reference to cooling setpoint only. Unit will not activate heating sequence.
- OFF = HVAC system is inactive.
- CCVC = “Continuous Compressor, Variable Capacity” application in “Auto-Changeover” mode. HVAC system will cycle heating and cooling automatically to stay within preset heating and cooling setpoints. Compressor will modulate from 100% to 20%, but will not shut off. Typically used for applications such as an MRI mobile trailer where cycling of compressor is not allowable due to use of onsite generators.
- CCFC = “Continuous Compressor, Full Capacity” application in “Auto-Changeover” mode. HVAC system will cycle heating and cooling automatically to stay within preset heating and cooling setpoints. Compressor will not modulate, but will stay at 100% capacity and will not shut off. Typically, this mode is selected for testing purposes only.

NOTE: Upon initial start-up of any system-enable utilizing compressor, the unit may undergo a series of self-diagnostics, wherein a series of audible “clicks” are heard. This may delay compressor function for up to 5 minutes.

4. Press ENTER button to save choice.
5. Press LEFT button two (2) times to return to Home screen.

Temperature Setpoints

To access temperature setpoints from the Home screen:

1. Press RIGHT button to access the Main Menu screen.
2. Press DOWN button to scroll to SETPOINTS. Press ENTER button.
4. Press UP or DOWN button to scroll through setpoint options.

- Cool Setpt/Heat Setpt are for occupied periods
 - Cool Setback/Heat Setback are for unoccupied periods, and will only be used if scheduling is enabled (see the Advanced Programming Features manual 2100-560)
 - Min Setpt Diff is the closest the heating and cooling setpoints can come to one another (3°F is recommended minimum).
 - Deadband is the space in degrees from setpoint in which the cooling and/or heating sequence will modulate to 100% capacity (2°F is recommended minimum).
5. Press ENTER button to select setpoint option.
 6. Press UP or DOWN buttons to enter specific degree amount for setpoint. Press ENTER button to save new setpoint.
 7. Press LEFT button two (2) times to return to Home screen.

NOTE: *Although cooling/heating setpoints can be accessed by simply pressing the UP or DOWN buttons during normal operation, any changes made in this fashion will not be permanent but last only for a specific length of time as an “override” feature. This temperature change will not be permanent. See the Advanced Programming Features manual 2100-560 for further information.*

NOTE: *Any system start-up conducted with indoor ambient temperatures lower than 56°F or above 86°F will experience an internal Low Temperature or High Temperature alarm. This will not affect normal operation and can be cleared easily. See the Advanced Programming Features manual 2100-560 for further information. Start-up procedures conducted with extreme temperatures indoors/outdoors may cause a “SERVICE” warning flashing on the face of the controller. This also will not affect normal operation, and should clear itself once interior temperatures and refrigerant pressures normalize.*

NOTE: *The ECU Series Controller will become sluggish/inoperable at extremely low temperatures (< 20°F). Care should be taken to warm controller before initial start-up.*

The ECU Series Controller should be fully operational at this point. For further controller enhancement or operation detail, please consult the most recent version of the Advanced Programming Features manual 2100-560.



ADVANCED PROGRAMMING & FEATURES

Controller: 8403-066
ECU Series Controller



Manual: 2100-560
Supersedes: **NEW**
File: Tab 19
Date: 05-02-11

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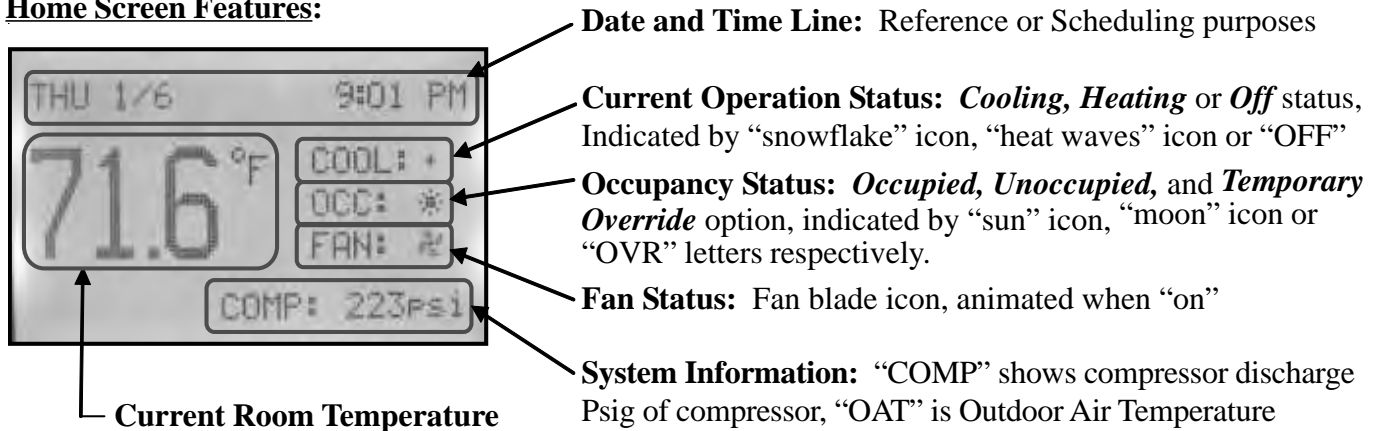
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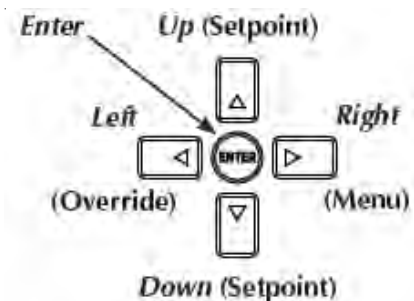
***NOTE:** Implement Controller Install/Operation/Quick Start Guide first.

Home Screen Features:



Navigate the menus and change settings by pressing a combination of various arrow buttons and the Enter button. Push the:

- **Enter** button to select and/or exit value editing
- **Up** or **Down** button to move among entries
- **Right** or **Left** button to move among value fields
- **Left** button to return to the home screen

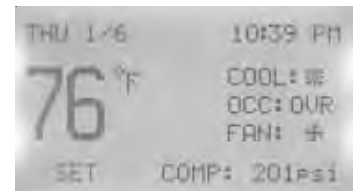


*Note: Access to the Main Menu, setpoint adjust, and System/Occupancy/Fan override may require a password.

Temporary Temperature Override: Any changes to temperature from the Home Screen will result in a temporary “override” which will last for a programmable length of time (factory default is 1 hour).

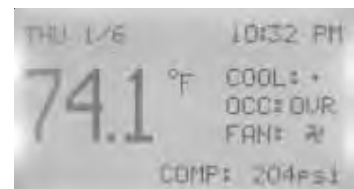
To change temperature temporarily from the Home Screen, press:

1. **Up or Down** button to access the current temperature setpoint. “SET” will appear under temperature reading.
2. **Up or Down** button again to adjust current temperature setpoint to desired temperature
3. **Enter or Left/Right** buttons to select temporary setpoint change. “OVR” will appear in the **Occupancy Status Line**.



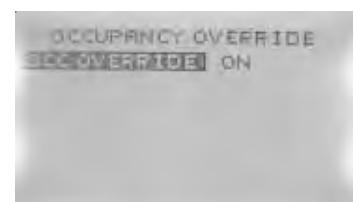
To cancel Temporary Override from the Home Screen, press:

1. **Left** button to highlight **Current Operation Status Line**.
2. **Down** button to highlight **Occupancy Status Line**
3. **Enter** button to select **Occupancy Status Line**
4. **Enter** button again to select “Occ Override” and highlight “ON”
5. **Up/Down** button(s) to change from “ON” to “OFF”
6. **Enter** button to select override cancellation
7. **Left** button to navigate back to **Home Screen**



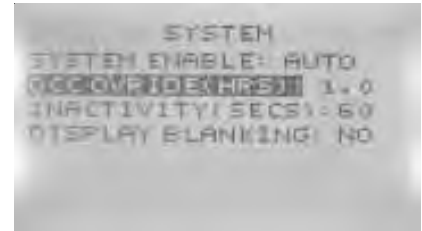
To adjust Temporary Override time length from Home Screen, press:

1. **Right** button to access **Main Menu Screen**
2. **Down** button through entries to highlight **System**
3. **Enter** button to select **System** and enter **System Screen**



Adjusting Temporary Override time length (continued)

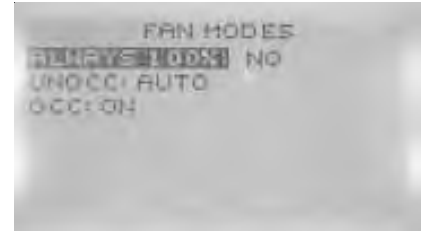
4. **Down** button through entries to highlight **Occ Override (Hrs)**
5. **Enter** button to select **Occ Override (Hrs)**
6. **Up/Down** button(s) to adjust time
(1/2 hour increments, Max. 12 hours)
7. **Enter** button to select new override time limit
8. **Left** button to navigate back to **Main Menu**
9. **Left** button to navigate back to **Home Screen**



Indoor Blower Settings: The indoor blower can be set to **always** run at 100% capacity regardless of call, and also to run in either continuous or auto mode during occupied (always) periods.

To access/change Blower Settings from the Home Screen, press:

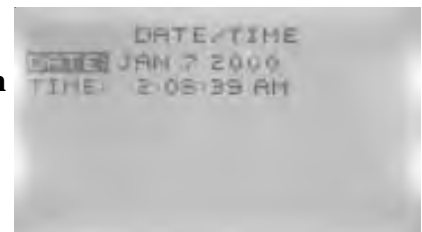
1. **Left** button to highlight **Current Operation Status Line**
2. **Down** button to highlight **Fan Status Line**
3. **Enter** button to select **Fan Status Line** and enter **Fan Modes Screen**
4. **Down** button through selections, adjust as necessary.
 - **Always 100%:** “YES” = system blower always runs 100% speed regardless of compressor modulation or stages of heating, “NO” = system blower modulates to specific speeds engineered by factory for best efficiency (**Factory Default**)
 - **Unocc:** Since scheduling is not active on this controller, this setting has no effect on fan operation.
 - **Occ:** “ON” = system fan will run continuously during all operational modes (**Factory Default**), “Auto” = system fan will operate during call for cooling or heating, but will cycle off when no compressor or no heating is needed.
5. **Enter** button to save changes to Fan Modes Selections
 - Repeat steps 4 through 5 for all changes to Fan Modes Selections
6. **Left** button to return to Home Screen



Setting Date/Time: Unless scheduling is desired, the absolute date and time are not necessary, and only used for alarm reporting reference points. Not entering a date/time will have no operational effect upon the controller.

To enter the current date and time from the Home Screen, press:

1. **Right** button to access **Main Menu Screen**
2. **Down** button through entries to highlight **Date/Time**
3. **Enter** button to select **Date/Time** and enter **Date/Time Screen**
4. **Enter** button to select **Date:**
5. **Up/Down** button(s) to adjust existing **Month, Day, Year**
6. **Enter** button to select new entry
7. **Down** button to highlight **Time:**
8. **Up/Down** button(s) to adjust existing **Hours, Minutes, Seconds**
9. **Enter** button to select new entry
10. **Left** button to navigate back to **Main Menu**
11. **Left** button to navigate back to **Home Screen**



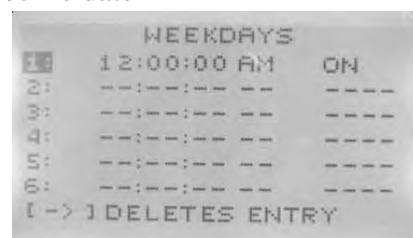
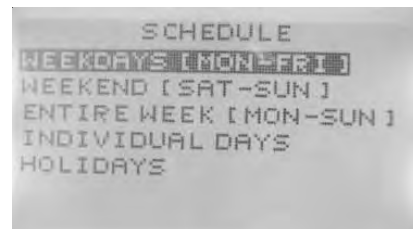
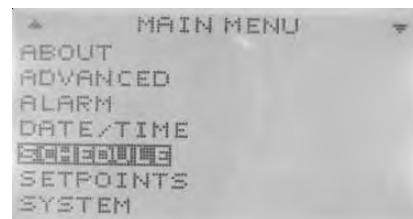
Scheduling: Scheduling is not a necessary part of the initial programming. It is an optional function meant to allow for **setback** temperatures during **unoccupied** periods. From the factory, the controller has no scheduling and will only allow **occupied** setpoints unless otherwise scheduled. If scheduling is desired, current **Date/Time** will be necessary (see above).

***Note:** Scheduling is NOT available for **CCVC** or **CCFC** system operation.

Scheduling: (continued)

To access scheduling from the Home Screen, press:

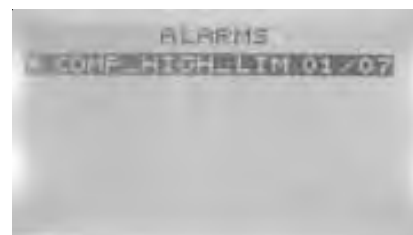
1. **Right** button to access **Main Menu** Screen
2. **Down** button through entries to highlight **Schedule**
3. **Enter** button to select **Schedule** and enter **Schedule** Screen
 - Use the Up/Down buttons to scroll through schedule options
Weekdays and **Weekend** for a “5+2” style of scheduling
Up to six (6) separate Occ/Unocc periods/day
Entire Week for a “7-Day” style of scheduling
Up to six (6) separate Occ/Unocc periods/day
Individual Days for specific day-customization scheduling
Up to six (6) separate Occ/Unocc periods/day
Holidays for up to twelve (12) holiday exceptions to the main scheduling
***Holidays** will override to setback temperatures for that specific date
4. **Enter** button to select specific **Schedule** Option
5. **Enter** button to select specific period of Occ/Unocc
6. **Right** button to access hours/minutes/seconds
 - Adjust as necessary with Up/Down buttons
7. **Right** button to access period status
 - Adjust as necessary with Up/Down buttons
choice of ON (occupied), OFF (unoccupied), or NULL (do not program this value)
“NULL” is used in certain Commercial Control platforms, and is not suitable for use in a stand-alone ECU-Controller configuration.
8. **Enter** button to save scheduling programming
9. Repeat steps 3-8 as necessary to complete Scheduling time periods.
10. **Left** button to navigate back to **Main Menu** Screen
11. **Left** button to navigate back to **Home Page**



Alarms Feature: High pressure, low pressure, high temperature, and low temperature anomalies will be recorded within an internal page. Alarms may be viewed and deleted as necessary for serviceability.

To view/delete internal Alarms, press:

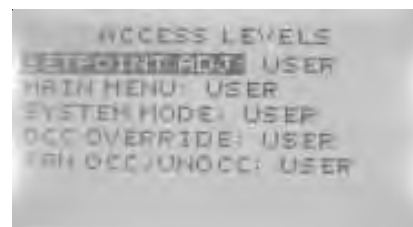
1. **Right** button to access **Main Menu** Screen
2. **Down** button through entries to highlight **Alarm**
3. **Enter** button to select **Alarm** and enter **Alarm** Screen
 - Logged alarms with show brief description/date
4. **Enter** button to show more detailed descriptions of **Alarm**
5. **Enter** button to be given **delete** choice
6. **Enter** button to delete alarm
7. **Left** button to navigate back to **Main Menu**
8. **Left** button to navigate back to **Home Screen**



Security Settings: There are five (5) separate areas that can be controlled by passwords, and four (4) individual levels of security.

To access/program areas of security from Home Screen, press:

1. **Right** button to access **Main Menu** Screen
2. **Down** button through entries to highlight **Advanced**
3. **Enter** button to select **Advanced** and enter **Advanced** Screen
4. **Down** button through entries to highlight **Security**
5. **Enter** button to select **Security** and enter **Security** Screen
6. Controller will ask for **Admin Level Password**
Factory Default **Admin Level Password: BARD**



Security Settings: (continued)

7. **Enter** button to select **Access Levels** and enter **Access Levels Screen**, scroll through and select among the **five (5) Access Levels** you would like to secure:
Setpoint Adj., Main Menu, System Mode, Occ Override, and Fan Occ/Unocc
8. **Up/Down** button(s) to select among the **four (4) levels of security** for each **Access Level**
None, User, Operator, and Administrator
9. **Enter** button to select the new level of security for the **Access Level**
 - Repeat steps 6 through 8 for each of the **five (5) Access Levels**
9. **Left** button to navigate back to **Security Screen**
10. **Left** button to navigate back to **Advanced Screen**
11. **Left** button to navigate back to **Main Menu**
12. **Left** button to navigate back to **Home Screen**

To access/change Passwords from the Home Screen, press:

1. **Right** button to access **Main Menu Screen**
2. **Down** button through entries to highlight **Advanced**
3. **Enter** button to select **Advanced** and enter **Advanced Screen**
4. **Down** button through entries to highlight **Security**
5. **Enter** button to select **Security** and enter **Security Screen**
6. Controller will ask for **Admin Level Password**
Factory Default **Admin Level Password: BARD**
7. **Down** button through entries to highlight **Passwords**
8. **Enter** button to select **Passwords** and enter **Passwords Screen**
9. **Up/Down** button(s) to select among the **three (3) levels of security passwords**
User, Operator, and Administrator (“None” Level has no Password)
10. **Enter** button to select specific **Password**
11. **Up/Down** and **Right** button(s) to enter digits to specific **Passwords**
12. **Enter** button to save **Password**
 - Repeat steps 9 through 12 for each of the **three (3) levels of security passwords**
13. **Left** button to navigate back to **Security Screen**
14. **Left** button to navigate back to **Advanced Screen**
15. **Left** button to navigate back to **Main Menu**
16. **Left** button to navigate back to **Home Screen**

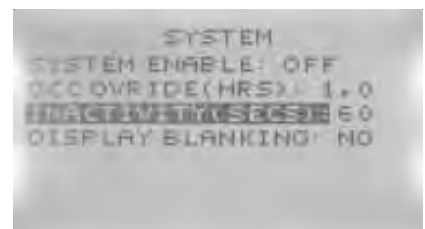


***Note:** After any password is given, the only delay to enabling security programming will be the **Inactivity (Secs)** setting of controller (60 seconds is factory default). Once 60 seconds of button inactivity is realized, security settings will go into effect.

****Note:** If Admin password is changed to “0000,” it will inactivate all security passwords, and allow unlimited access at all levels.

To access/change **Inactivity (Secs)** setting of controller from the Home Screen, press:

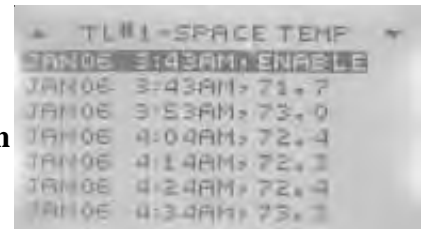
1. **Right** button to access **Main Menu Screen**
2. **Down** button through entries to highlight **System**
3. **Enter** button to select **System** and enter **System Screen**
4. **Down** button through entries to highlight **Inactivity (Secs)**
5. **Enter** button to select **Inactivity** and highlight seconds
6. **Up/Down** button(s) to adjust amount of seconds of inactivity
7. **Enter** button to save new time limit
8. **Left** button to navigate back to **Main Menu**
9. **Left** button to navigate back to **Home Screen**



Trend Logs: The controller can be enabled to show a history log of recorded information, specific to input sensors installed on the unit. Space temperature has been set up as a factory default log, with 10 min. samples taken continuously.

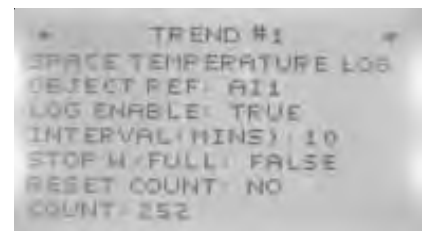
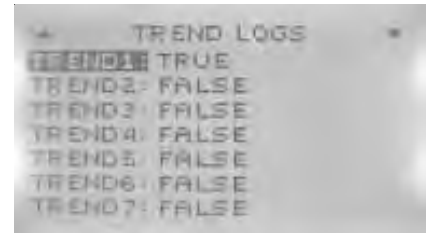
To access Trend Logs from the Home Screen, press:

1. **Right** button to access the **Main Menu** Screen
2. **Down** button through entries to highlight **Trend Viewer**
3. **Enter** button to select **Trend Viewer** & enter **Trend Viewer Screen**
4. **Down** button through entries to highlight chosen **Log**
5. **Enter** button to select **Log** and view recorded results
6. **Left** button to navigate back to **Trend Viewer Screen**
7. **Left** button to navigate back to **Main Menu**
8. **Left** button to navigate back to **Home Screen**



To program Trend Logs from the Home Screen, press:

1. **Right** button to access **Main Menu** Screen
2. **Down** button through entries to highlight **Advanced**
3. **Enter** button to select **Advanced** and enter **Advanced Screen**
4. **Down** button through entries to highlight **Trend Logs**
5. **Enter** button to select **Trend Logs** and enter **Logs Screen**
6. **Down** button to highlight chosen Trend Logs
 - **Trend 1** is factory default set-up to trend space temp
 - **Trend 2 - Trend 8** are programmable
7. **Enter** button to select chosen **Log** and enter **Setup Screen**
8. **Down** button to highlight **Object Ref.**
9. **Select** button to select **Object Ref.** and choose from the following:
 - A11 Space Temperature (Factory Default Trend 1)
 - BV1 Occupancy - BO1 Indoor Fan - AV1 Minimum Deadband
10. **Down** button to highlight **Log Enable**
11. **Enter** button to select **Log Enable**
12. **Up/Down** button(s) to toggle **False** to **True**
13. **Enter** button to save **True** Setting
14. **Down** button to highlight Interval (Mins)
15. **Enter** button to select Interval (Mins)
16. **Up/Down** button(s) to adjust minutes of interval between readings
17. **Enter** button to save new setting
18. **Left** button to navigate back to **Trend Log Screen**
19. **Left** button to navigate back to **Advanced Screen**
20. **Left** button to navigate back to **Main Menu Screen**
21. **Left** button to navigate back to **Home Screen**



Restart: Should the controller exhibit erratic/haphazard performance during programming or operation, a “soft-start” function has been enabled into the programming.

To initiate a Restart from Home Screen, press:

1. **Right** button to access the **Main Menu** Screen
2. **Down** button through entries to highlight **Advanced**
3. **Enter** button to select/enter **Advanced Screen**
4. **Down** button through entries to highlight **Restart/Restore**
5. **Select** button to select/enter **Restart/Restore Screen**
6. Controller will ask for **Admin Level Password**

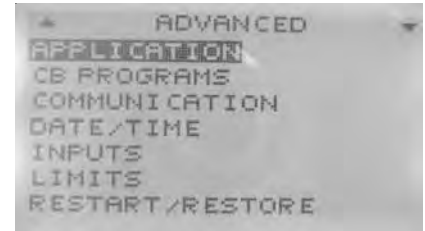
Factory Default **Admin Level Password: BARD**



Initiating a Restart (continued)

7. **Enter** button to select **Restart**
8. **Up/Down** button(s) and choose from the following options:
 - Warm Start (least intrusive, quickest response)
 - Cold Start (comprehensive restart)
 - No (no Restart made)
9. **Enter** button to initiate

Note: controller will restart to **Home Screen**



Restore Factory: If the controller becomes unmanageable due to improper settings, the device can be reset to “factory” settings by initiating a Restore Factory command.

To initiate a Factory Reset from the Home Screen, press:

1. **Right** button to access the **Main Menu** Screen
2. **Down** button through entries to highlight **Advanced**
3. **Enter** button to select/enter **Advanced Screen**
4. **Down** button through entries to highlight **Restart/Restore**
5. **Select** button to select/enter **Restart/Restore Screen**
6. Controller will ask for **Admin Level Password**
Factory Default **Admin Level Password: BARD**
7. **Select** button to select/enter **Restart/Restore**
8. **Down** button through entries to highlight **Restore**
9. **Enter** button to select **Restore Factory**
10. **Up/Down** button(s) to Toggle “No” to “Yes”
11. **Enter** button to initiate

Note: controller will restart to **Home Screen**



WARNING! All other levels of programming within this control are specific to performance parameters of this unit, and changes or alterations may result in damage to the unit and/or component failure. Before making any changes to specific programming details not present in this manual, please consult with the Technical Service Department of Bard Manufacturing Company, Inc.

SUPPLEMENTAL INSTRUCTIONS

8403-066 ECU Series Controller: Lead/Lag Unit Operation

Lead/Lag Overview

The Bard 8403-066 ECU Series Controller has an additional lead/lag feature that allows up to four units* to operate in a unit rotational mode. Once programmed, the ECU Series controller operation will rotate cooling and heating setpoints for up to four units every 24 hours. It is important to verify all ECU Series controllers used are set to the correct time and date. Please refer to the user manual to verify the time and date setting for each ECU Series controller.

Navigate the menus and change settings by pressing a combination of the four arrow buttons and the ENTER button.

- **ENTER** button to select and/or exit value editing
- **UP** or **DOWN** button to move among entries
- **RIGHT** or **LEFT** button to move among value fields
- **LEFT** button to return to the home screen

* Software version R1.3.5.1 or newer. Earlier versions allowed two units to rotate.

Accessing the Lead/Lag Setup Menu

To access the lead/lag setup menu:

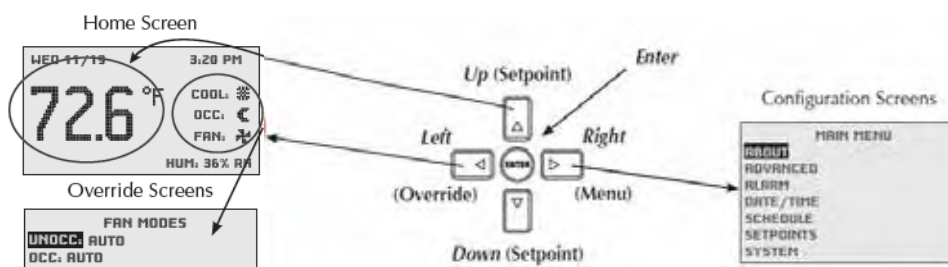
1. Press RIGHT button to access Main Menu screen.
2. Press DOWN button to scroll to ADVANCED. Press ENTER button.
3. In the ADVANCED menu screen, press DOWN button to scroll to LEAD/LAG. Press ENTER button.
4. Controller will ask for Admin Level Password. Use UP, DOWN and RIGHT buttons to enter BARD or 1914. Press ENTER button.

Lead/Lag Menu Options

Once the LEAD/LAG menu is accessed, the following settings are available:

- The ability to enable the lead/lag feature.
- Identify the unit # the ECU Series controller will be connected to.

FIGURE 1
ECU Series Controller Buttons and Home, Override and Configuration Screens



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 7960-780
Supersedes: **NEW**
Date: 9-2-16

- Input the total number of units that will use this feature.
- Set the Lead Unit cooling setpoint.
- Set the Lead Unit heating setpoint.
- Set the Lag 1 Unit cooling setpoint.
- Set the Lag1 Unit heating setpoint.
- Set the Lag2 Unit cooling setpoint.
- Set the Lag2 Unit heating setpoint.
- Set the Lag3 Unit cooling setpoint.
- Set the Lag3 Unit heating setpoint.

Enable Lead/Lag

Use this option to turn on the lead/lag feature. Press ENTER button to enable LEAD/LAG. Press UP or DOWN button to change NO to YES. Press ENTER button. Default setting is "NO".

Unit #

Use this option to identify the unit that the ECU Series controller will be connected to. For easy identification in the future, it is suggested that each wall mount be identified with a unit number. This unit number will correspond with the controller unit number programmed into this setting. Default setting is "1".

Example: Four units are being set up with lead/lag operation. Each of the four units are identified 1 thru 4, and each controller is set up with the corresponding unit number 1 thru 4.

Press DOWN button to scroll to Unit #. Press ENTER button. Press UP or DOWN button to select unit #. Press ENTER button to save unit #.

of Units

Use this option to identify how many total units will be used in lead/lag operation. Default setting is "4".

Press DOWN button to scroll to # of Units. Press ENTER button. Press UP or DOWN button to select # of units. Press ENTER button to save # of units. This number must be the same on all the units that are used in lead/lag operation.

Unit Temperature Setpoints for Cooling and Heating

Cooling and heating setpoints are adjustable for the lead unit and up to three lag units. During normal lead/lag operation, every 24 hours lead operation will rotate to the next unit in the unit # order. Lag unit(s) will also follow the same unit # rotation. It is important that each ECU Series controller has the same value for all heating and cooling setpoints to ensure that as each unit is selected as Lead, Lag1, Lag2 or Lag3, it operates at the same temperature settings. Default setpoints are as follows:

- Lead Unit cooling setpoint is 72°
- Lead Unit heating setpoint is 70°
- Lag1 Unit cooling setpoint is 74°
- Lag1 Unit heating setpoint is 68°
- Lag2 Unit cooling setpoint is 76°
- Lag2 Unit heating setpoint is 66°
- Lag3 Unit cooling setpoint is 78°
- Lag3 Unit heating setpoint is 64°

Press DOWN button to scroll to LEAD COOL SETPT. Press ENTER button. Press UP or DOWN button to adjust. Press ENTER button to save.

Repeat above steps for each of the units' lead and lag setpoints as needed.

The Home screen will show the unit lead/lag status continually. This is located on the top line of the display between the date and time. The screen will display one of the following status indicators: LEAD, LAG 1, LAG 2, LAG 3. The lead/lag status determines the setpoint that will be used that day. Status will rotate based on day of the year.

INSTALLATION INSTRUCTIONS

WALL-MOUNTED VARIABLE CAPACITY ENVIRONMENTAL CONTROL UNIT

Models:

W3RV2-R W3LV2-R W5RV2-R W5LV2-R W6RV2-S W6LV2-S
W3RV2-S W3LV2-S W5RV2-S W5LV2-S W6RV2-T W6LV2-T
W3RV2-T W3LV2-T W5RV2-T W5LV2-T



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 2100-615A
Supersedes: 2100-615
Date: 1-16-15

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GETTING OTHER INFORMATION AND PUBLICATIONS

These publications can help you install the air conditioner or heat pump. You can usually find these at your local library or purchase them directly from the publisher. Be sure to consult current edition of each standard.

National Electrical Code.....ANSI/NFPA 70

Standard for the InstallationANSI/NFPA 90A
of Air Conditioning and Ventilating Systems

Standard for Warm Air.....ANSI/NFPA 90B
Heating and Air Conditioning Systems

Load Calculation forACCA Manual J
Residential Winter and Summer Air Conditioning

Duct Design for Residential ACCA Manual D
Winter and Summer Air Conditioning and Equipment
Selection

FOR MORE INFORMATION, CONTACT THESE PUBLISHERS:

ACCA **Air Conditioning Contractors of America**
1712 New Hampshire Ave. N.W.
Washington, DC 20009
Telephone: (202) 483-9370
Fax: (202) 234-4721

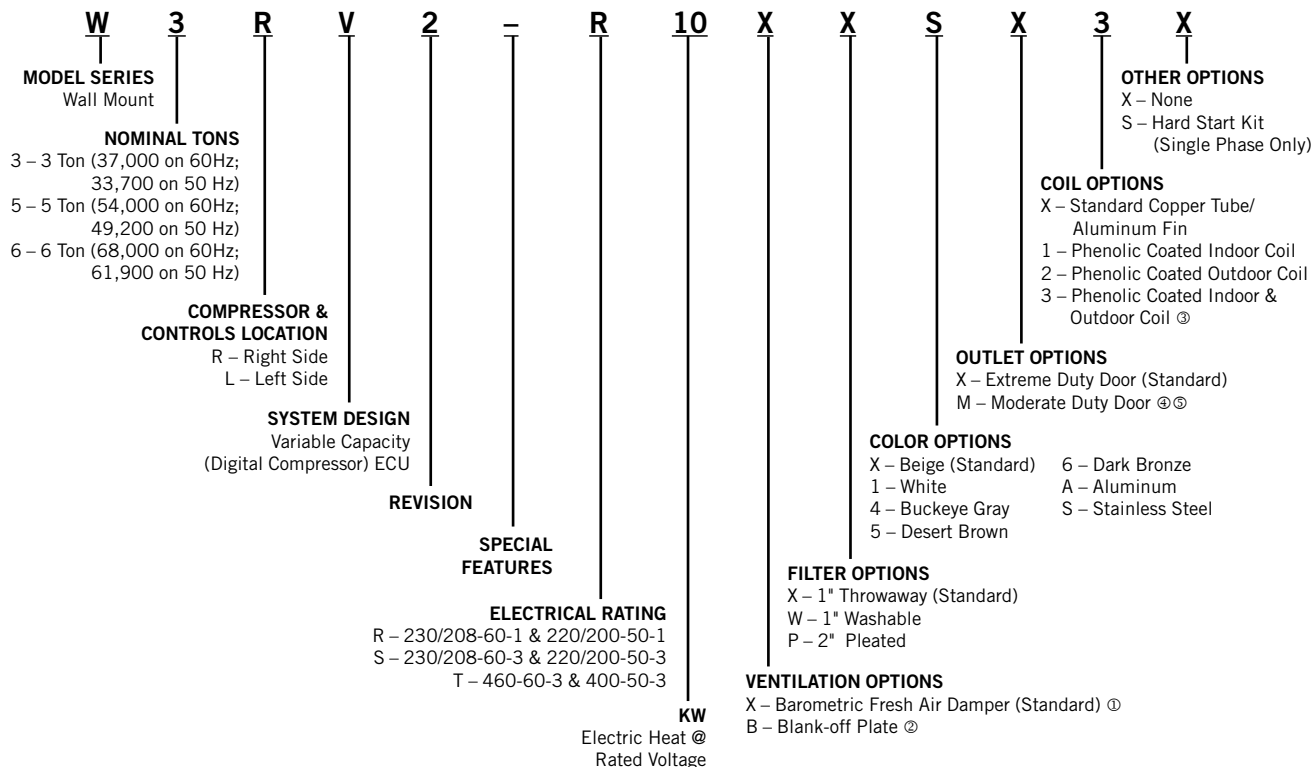
ANSI **American National Standards Institute**
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900
Fax: (212) 302-1286

ASHRAE **American Society of Heating, Refrigeration
and Air Conditioning Engineers, Inc.**
1791 Tullie Circle, N.E.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400
Fax: (404) 321-5478

NFPA **National Fire Protection Association**
Batterymarch Park
P. O. Box 9101
Quincy, MA 02269-9901
Telephone: (800) 344-3555
Fax: (617) 984-7057

WALL MOUNT GENERAL INFORMATION

Environmental Control Unit (ECU) Wall Mount Model Nomenclature



① Vent option X does not have exhaust capability. May require separate field supplied barometric relief in building.

② Blank-off plate recommended whenever maximum requirements against outside air intrusion are needed.

③ Stainless steel cabinet and coated coils recommended for maximum durability in all harsh environments.

④ Moderate duty door not recommended for harsh environments where wind and/or very fine dust are prevalent.

⑤ All units equipped with flush moderate duty door can be field retrofitted with the severe duty door.

Order DDD3A-color for W3R, DDD3L-color for W3L, DDD5A-color for W5R or W6R and DDD5L-color for W5L or W6L.

SHIPPING DAMAGE

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

GENERAL

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

This appliance is not intended for use 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 concerning use of the appliance by a person responsible for their safety.

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

The refrigerant system is completely assembled and charged. All internal wiring is complete.

The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.

These instructions explain the recommended method to install the air cooled self-contained unit and the electrical wiring connections to the unit.

These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly "Starting Procedure" and any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See Page 3 for information on codes and standards.

Size of unit for a proposed installation should be based on heat loss calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

DUCT WORK

All duct work, supply and return, must be properly sized for the design airflow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

Refer to Maximum ESP of Operation Electric Heat Only Table 5 on page 23.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unheated spaces, it should be insulated with a minimum of one inch of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

For model series W3R/LV, W5R/LV and W6R/LV a 1/4 inch clearance to combustible material for the first three feet of duct attached to the outlet air frame is required. See Wall Mounting Instructions and Figures 3A, 3B and 4 for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

Some installations may not require any return air duct. A metallic return air grille is required with installations not requiring a return air duct. The spacing between louvers on the grille shall not be larger than 5/8 inch.

Any grille that meets with 5/8 inch louver criteria may be used. It is recommended that Bard Return Air Grille Kit RG2 through RG5 or RFG2 through RFG5 be installed when no return duct is used. Contact distributor or factory for ordering information. If using a return air filter grille, filters must be of sufficient size to allow a maximum velocity of 400 fpm.

NOTE: *If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.*

FILTERS

A 1-inch throwaway filter is standard with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the filter access panel. A 1-inch washable filter and 2-inch pleated filter are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2-inch filter by bending two (2) tabs down on each side of the filter support bracket.

FRESH AIR INTAKE

All units are built with fresh air inlet slots punched in the service door.

If the unit is equipped with a fresh air damper assembly, the assembly is shipped already attached to the unit. The damper blade is locked in the closed position. To allow the damper to operate, the maximum and minimum blade position stops must be installed. See Figure 1.

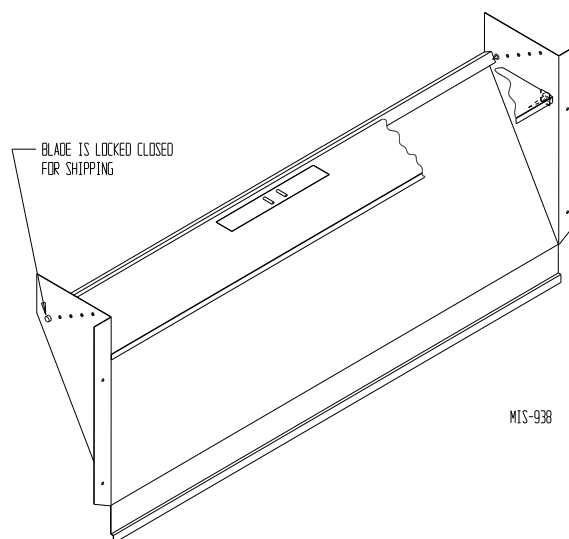
All capacity, efficiency and cost of operation information is based upon the fresh air blank-off plate in place and is recommended for maximum energy efficiency.

The blank-off plate is available upon request from the factory and is installed in place of the fresh air damper shipped with each unit.

CONDENSATE DRAIN

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage.

**FIGURE 1
FRESH AIR DAMPER**



INSTALLATION

WALL MOUNTING INFORMATION

1. Two holes for the supply and return air openings must be cut through the wall as shown in Figures 3A and 3B on pages 8 and 9.
2. On wood frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration.
3. Concrete block walls must be thoroughly inspected to insure that they are capable of carrying the weight of the installed unit.

MOUNTING THE UNIT

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket, attached to skid for shipping, is provided for ease of installation, but is not required.
2. The supply air duct flange and the first 3 feet of supply air duct require a minimum of 1/4 inch clearance to combustible material for model series W3R/LV, W5R/LV and W6R/LV. However, it is generally recommended that a 1-inch clearance is used for ease of installation and maintaining the required clearance to combustible material. See Figures 3A and 3B for details on opening sizes.

WARNING

Failure to provide the 1/4 inch clearance between the supply duct and a combustible surface for the first 3 feet of duct can result in fire causing damage, injury or death.

3. Locate and mark lag bolt locations and bottom mounting bracket location. See Figures 3A and 3B.
4. Mount bottom mounting bracket.
5. Hook top rain flashing, attached to front-right of supply flange for shipping, under back bend of top.

Minimum Clearances Required to Combustible Materials

MODELS	SUPPLY AIR DUCT FIRST THREE FEET	CABINET
W3R/LV2	1/4"	0"
W5R/LV2 W6R/LV2	1/4"	0"

6. Remove packaged control panel door from return opening. Use the instructions in the package to mount the door on the unit after it has been attached to the wall (Step #7). *Disregard this step if already supplied with outer control panel door.*
7. Position unit in opening and secure with 5/16 lag bolts; use 7/8 inch diameter flat washers on the lag bolts.
8. Secure rain flashing to wall and caulk across entire length of top. See Figures 3A & 3B.
9. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall.
10. On side-by-side installations, maintain a minimum of 20 inches clearance on the control panel side of the unit to allow access to control panel and heat strips, and to allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.

Clearances Required for Service Access and Adequate Condenser Airflow

MODELS	LEFT SIDE	RIGHT SIDE
W3RV2	15"	20"
W3LV2	20"	15"
W5RV2, W6RV2	20"	20"
W5LV2, W6LV2	20"	20"

NOTE: For side by side installation of two (2) W*RV models there must be 20" between units. This can be reduced to 15" by using a W*LV model (left side compressor and controls) for the left unit and W*R (right side compressor and controls) for right unit.

See Specification Sheet.

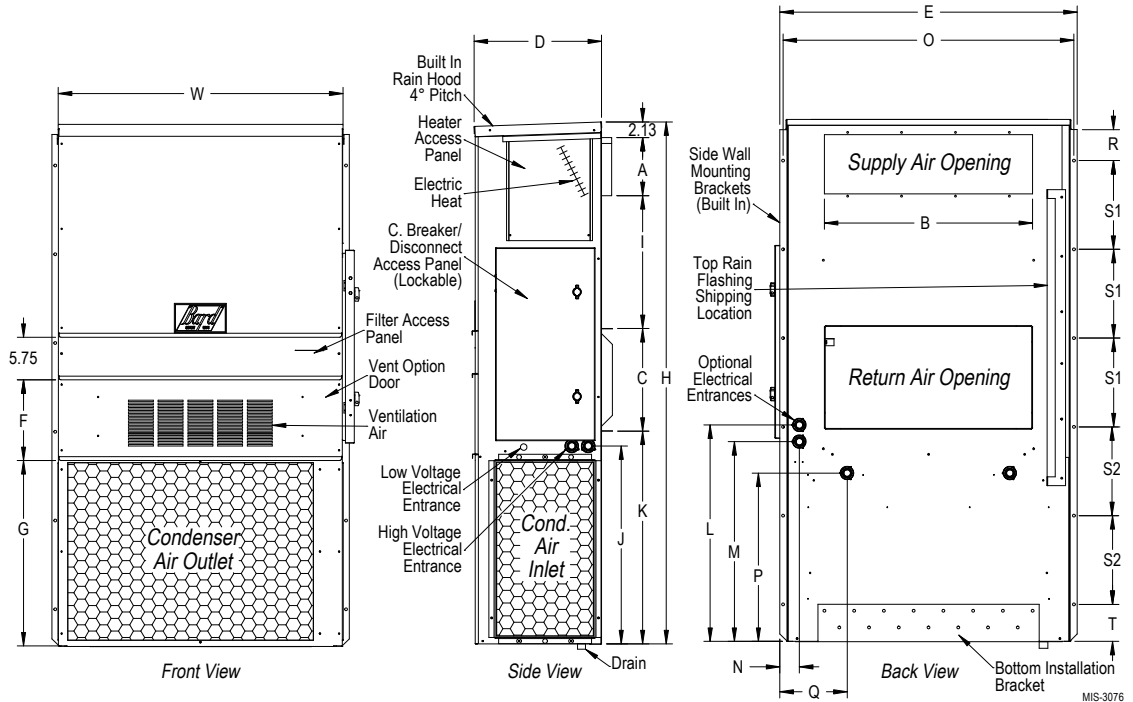
FIGURE 2

Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

MODEL	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN		E	F	G	I	J	K	L	M	N	O	P	Q	R	S1	S2	T
				A	B	C	B																
W3RV2 W3LV2	38.200	17.125	70.563	7.88	27.88	13.88	27.88	40.00	10.88	25.75	17.93	26.38	28.75	29.25	27.00	2.75	39.19	22.75	9.14	4.19	12.00	12.00	5.00
W5RV2 W5LV2	42.075	22.432	84.875	9.88	29.88	15.88	29.88	43.88	13.56	31.66	30.00	32.31	26.94	34.69	32.43	3.37	42.88	23.88	10.00	1.44	16.00	16.00	1.88
W6RV2 W6LV2	42.075	22.432	94.875	9.88	29.88	15.88	29.88	43.88	13.56	41.66	30.00	42.31	36.94	44.69	42.43	3.37	42.88	33.88	10.00	1.44	16.00	21.00	1.88

All dimensions are in inches. Dimensional drawings are not to scale.

**W*RV
RIGHT
UNIT**



**W*LV
LEFT
UNIT**

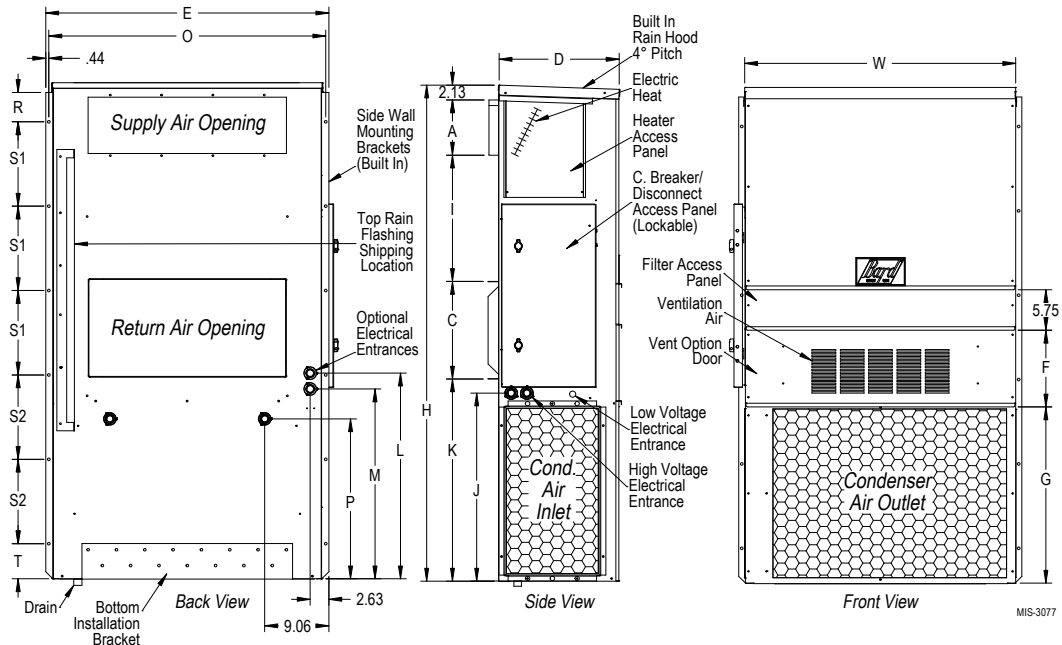


FIGURE 3A
W3RV2, W3LV2
MOUNTING INSTRUCTIONS

REQUIRED DIMENSIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS	A	B	C	D	E
	28 3/8	8 3/8	5 3/8	3 11/16	17 5/8
REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS	29 7/8	9 7/8	4 5/8	4 7/16	16 7/8

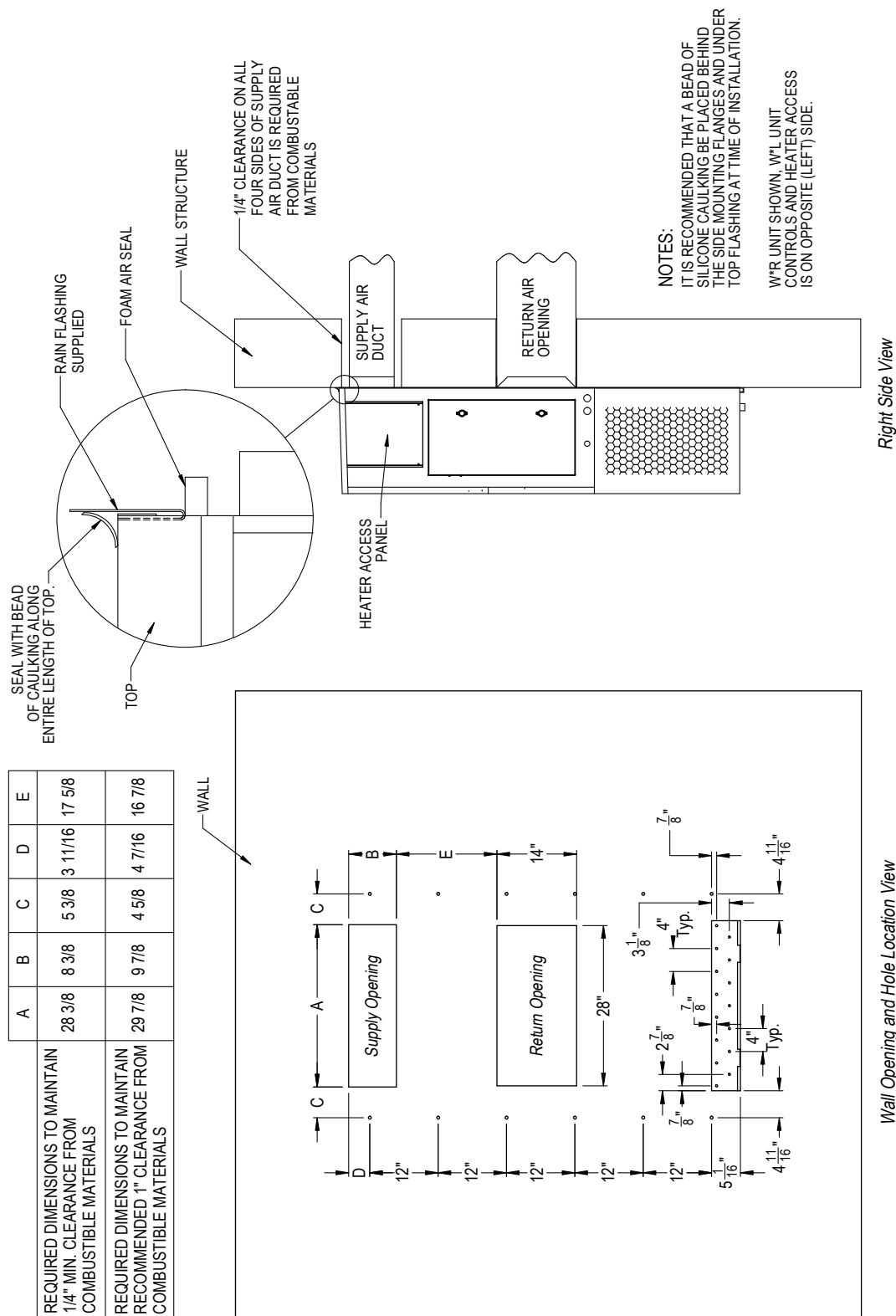
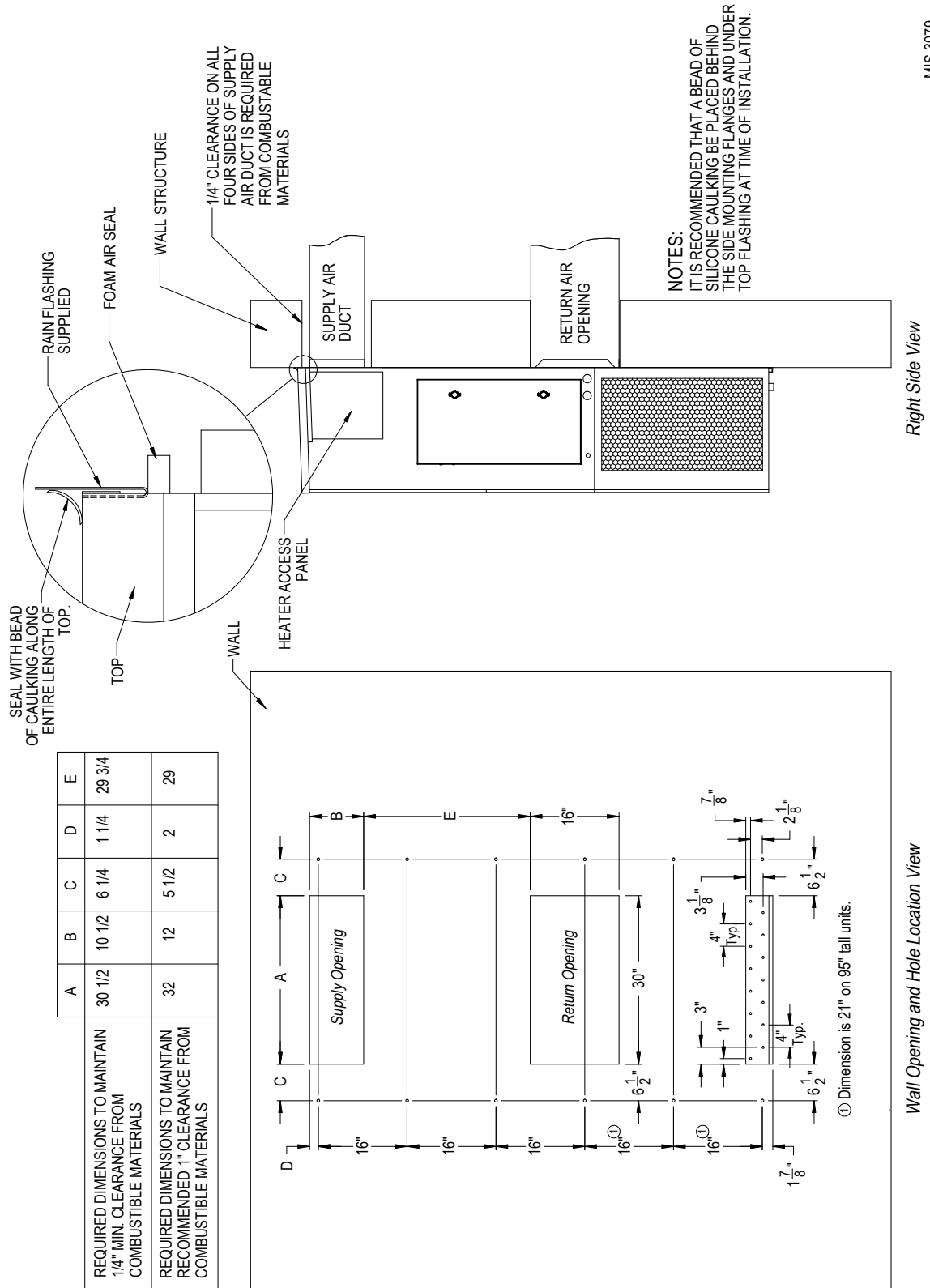
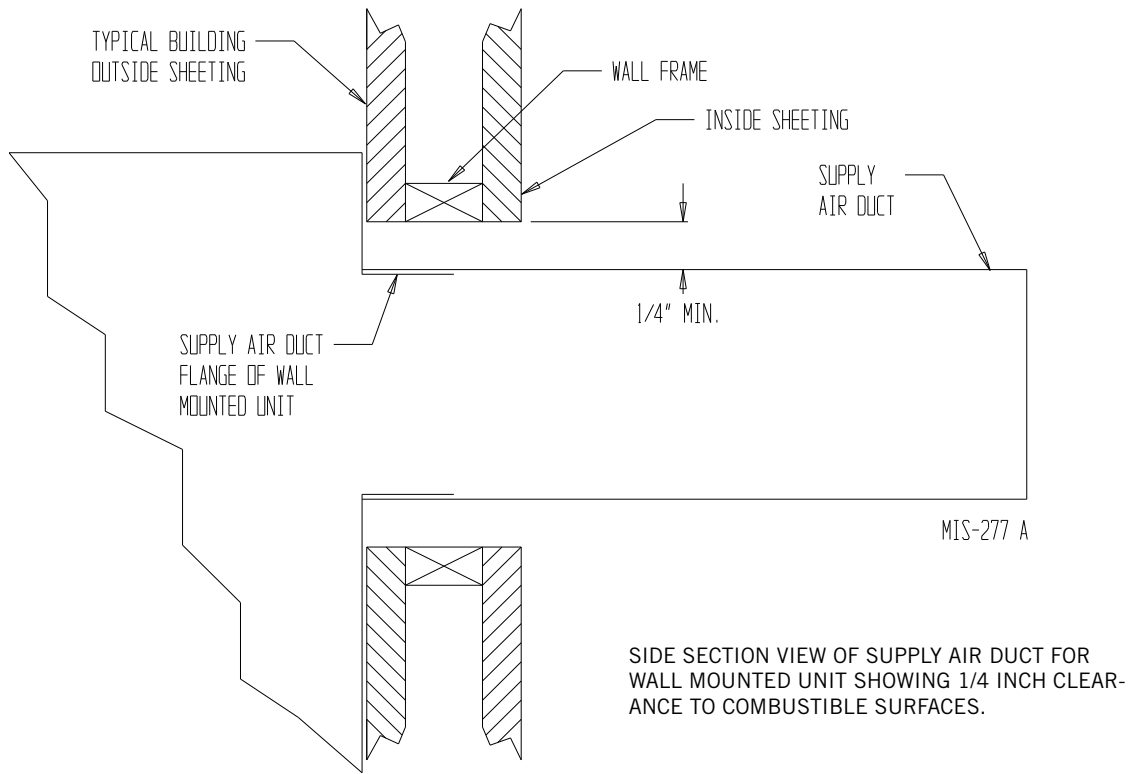


FIGURE 3B
W5RV2, W5LV2, W6RV2, W6LV2
MOUNTING INSTRUCTIONS



MIS-3079

FIGURE 4
ELECTRIC HEAT CLEARANCE
W3RV2, W3LV2, W5RV2, W5LV2, W6RV2, W6LV2



WARNING

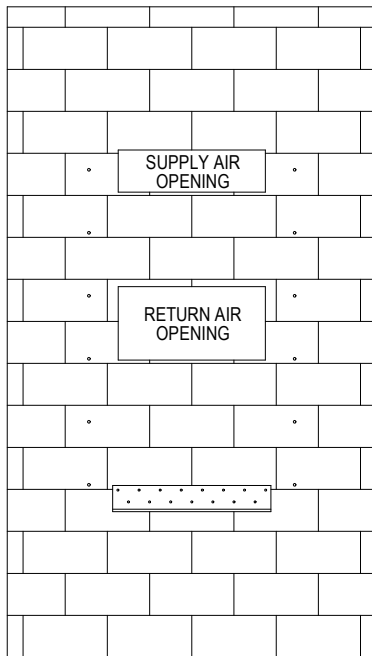
A **minimum** of 1/4 inch clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3 feet of ducting.

It is important to insure that the 1/4 inch minimum spacing is maintained at all points.

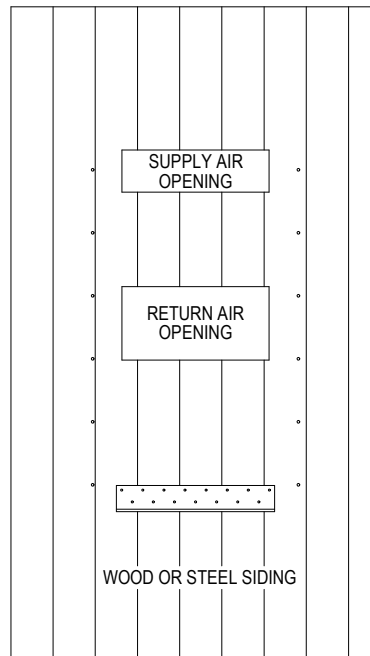
Failure to do this could result in overheating the combustible material and may result in a fire causing damage, injury or death.

**FIGURE 5
WALL MOUNTING INSTRUCTIONS**

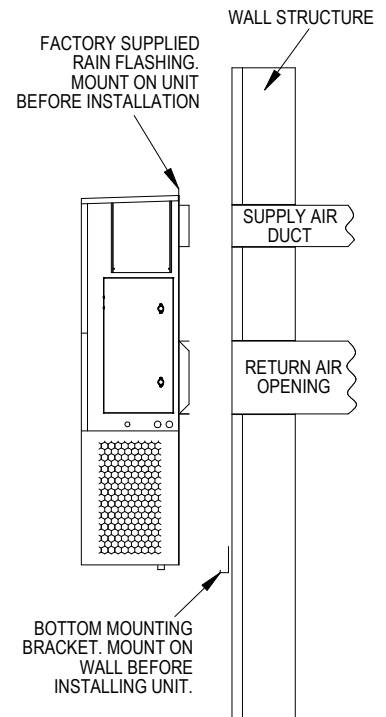
SEE FIGURES 3A & 3B – MOUNTING INSTRUCTIONS



CONCRETE BLOCK WALL INSTALLATION



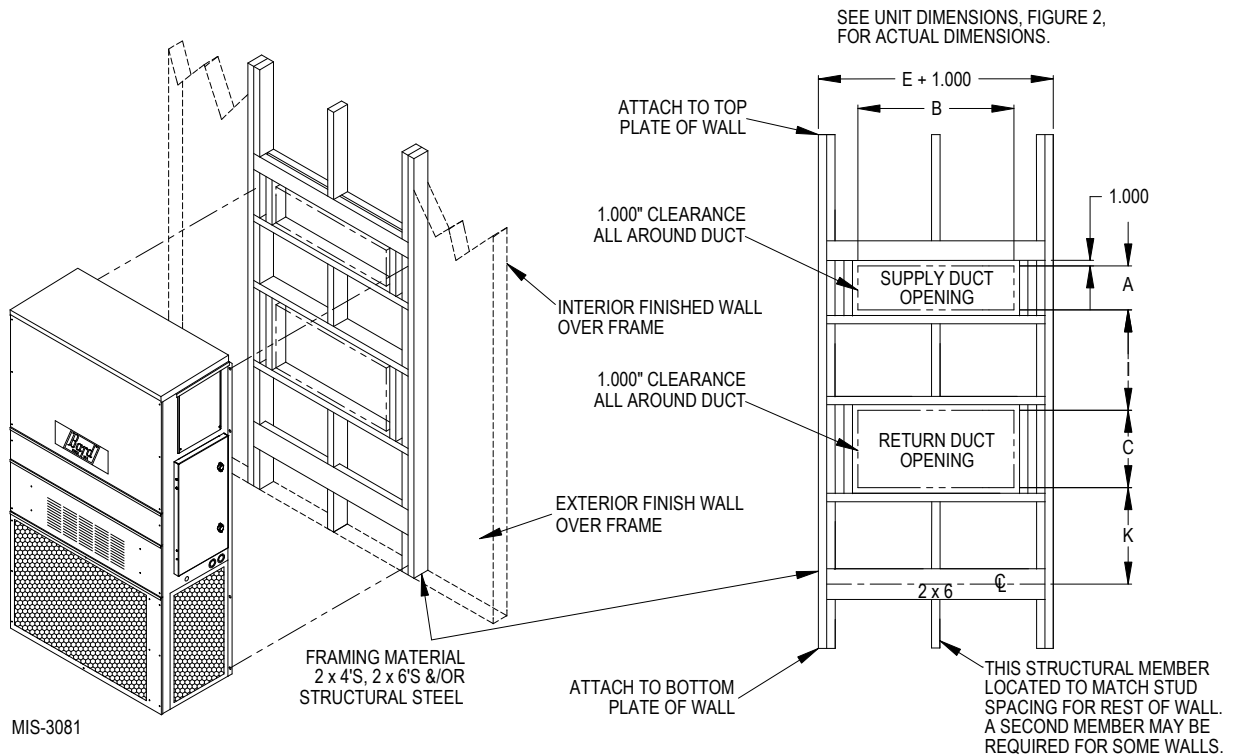
WOOD FRAME WALL INSTALLATION



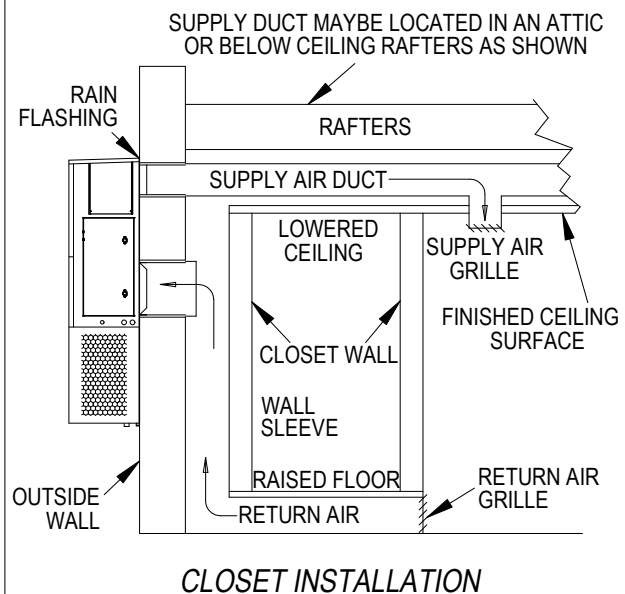
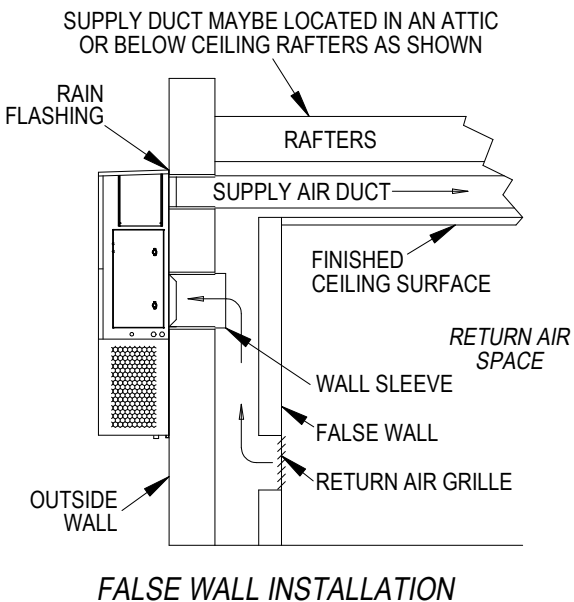
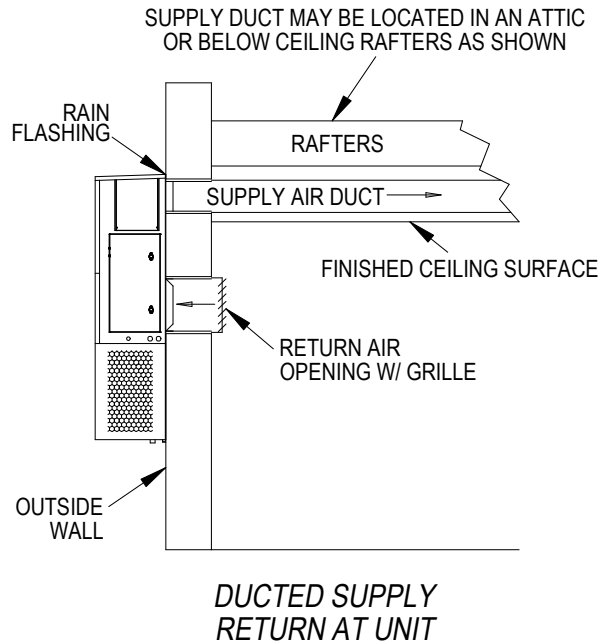
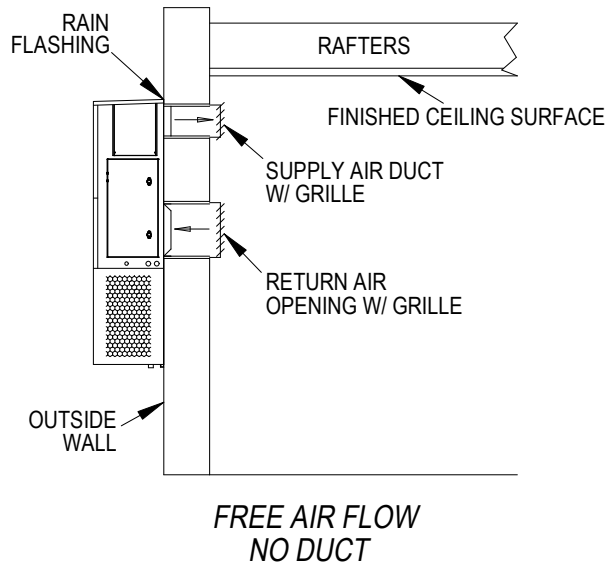
SIDE VIEW

MIS-3080

**FIGURE 6
WALL MOUNTING INSTRUCTIONS**



**FIGURE 7
COMMON WALL MOUNTING INSTALLATIONS**



MIS-3082

WIRING – MAIN POWER

These units are rated for 60/50 Hz operation as follows.

NOTE: *This system must be controlled only by the Bard 8403-066 Digital Thermostat/Controller that is supplied with the unit. See below for wiring and pages 17-18 for operating sequences.*

Electrical Code	Volts Hz Phase	Operating Voltage Range
-R	230/208-60-1 220/200-50-1	197 - 253 180 - 242
-S	230/208-60-3 220/200-50-3	197 - 253 180 - 242
-T	460-60-3 400-50-3	414 - 506 380 - 440

Refer to the unit rating plate for wire sizing information and maximum fuse or circuit breaker size. Each outdoor unit is marked with a “Minimum Circuit Ampacity”. This means that the field wiring used must be sized to carry that amount of current. Depending on the installed KW of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked “Use Copper Conductors Only”. These instructions **must be** adhered to. Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

The electrical data lists fuse and wire sizes (75° C copper) for all models including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters.

The unit rating plate lists a “Maximum Time Delay Relay Fuse” or circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

The control access door on this unit may be locked to prevent unauthorized access to the disconnect. To lock, insert a padlock through the hole in the lower portion of one or both of the door latches. This will prevent the latches from being turned.

See “Start Up” section for important information on three phase scroll compressor start ups.

See Table 3 on page 22 for Electrical Specifications.

IMPORTANT INSTALLER NOTE

Must be followed for proper operation of all controls.

These models are designed for dual 60/50Hz operation. –R and –S models use a 240/208Vx24V control transformer, and are shipped from the factory on the 208V tap. The –R and –S models may require reconnection of the 24V transformer primary from 240 to 208V tap for either 60 or 50Hz:

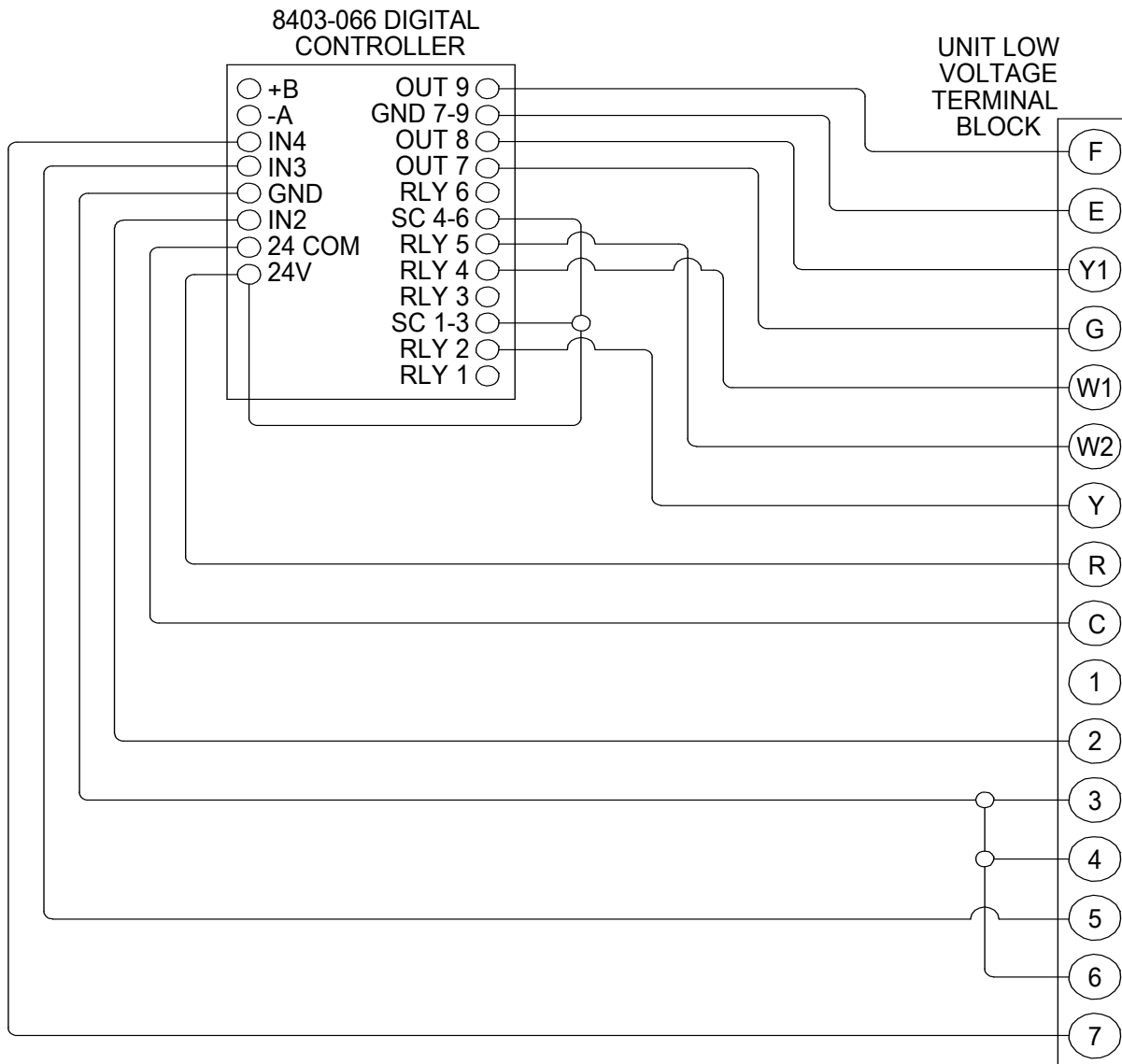
Supply Voltage	Hz	Transformer Primary Tap
253-216	60 or 50	240
220-180	60 or 50	208

WIRING – LOW VOLTAGE

DIGITAL THERMOSTAT/CONTROLLER

Terminal	Function	Type	Form
+B	MSTP + (not used)	Communications	
-A	MSTP - (not used)	Communications	
IN4	Outdoor Temperature Sensor	Input	10K OHM Type 3
IN3	Pressure Transducer	Input	0-5 VDC, 0-700 PSIG
GND	Sensor Grounds	Input	
IN2	Lockout Alarm	Input	Relay Closure
24 COM	24VAC Com	Power	
24V	24VAC	Power	
OUT 9	Fan Motor Control	Analog Output	0-10VDC
GND7-9	Control Ground	Analog Output	
OUT 8	Unloader Solenoid Control	Analog Output	0 or 5VDC PWM
OUT 7	Blower Motor Control	Analog Output	0-10VDC
RLY 4	Heater Contactor #1	Relay Output	Relay
SC 4-6	24VAC to Relay Outputs 4-6	Power	
RLY 5	Heater Contactor #2	Relay Output	Relay
RLY 6	(not used)		
RLY 3	(not used)		
SC1-3	24VAC to Relay Outputs 1-3	Power	
RLY 2	Compressor Contactor	Relay Output	Relay
RLY 1	(not used)		

**FIGURE 8
LOW VOLTAGE WIRING DIAGRAM**



MIS-2852 C

THESE UNITS REQUIRE R-410A REFRIGERANT AND POLYOL ESTER OIL.

GENERAL

1. Use separate service equipment to avoid cross contamination of oil and refrigerants.
2. Use recovery equipment rated for R-410A refrigerant.
3. Use manifold gauges rated for R-410A (800 psi/250 psi low).
4. R-410A is a binary blend of HFC-32 and HFC-125.
5. R-410A is nearly azeotropic—similar to R-22 and R-12. Although nearly azeotropic, charge with liquid refrigerant.
6. R-410A operates at 40-70% higher pressure than R-22, and systems designed for R-22 cannot withstand this higher pressure.
7. R-410A has an ozone depletion potential of zero, but must be reclaimed due to its global warming potential.
8. R-410A compressors use polyol ester oil.
9. Polyol ester oil is hygroscopic; it will rapidly absorb moisture and strongly hold this moisture in the oil.
10. A liquid line dryer must be used—even a deep vacuum will not separate moisture from the oil.
11. Limit atmospheric exposure to 15 minutes.
12. If compressor removal is necessary, always plug compressor immediately after removal. Purge with small amount of nitrogen when inserting plugs.

TOPPING OFF SYSTEM CHARGE

If a leak has occurred in the system, Bard Manufacturing recommends reclaiming, evacuating (see criteria above), and charging to the nameplate charge. If done correctly, topping off the system charge can be done without problems.

With R-410A, there are no significant changes in the refrigerant composition during multiple leaks and recharges. R-410A refrigerant is close to being an azeotropic blend (it behaves like a pure compound or single component refrigerant). The remaining refrigerant charge, in the system, may be used after leaks have occurred and then “top-off” the charge by

utilizing the pressure charts on the inner control panel cover as a guideline.

REMEMBER: When adding R-410A refrigerant, it must come out of the charging cylinder/tank as a liquid to avoid any fractionation, and to insure optimal system performance. Refer to instructions for the cylinder that is being utilized for proper method of liquid extraction.



WARNING

Failure to conform to these practices could lead to damage, injury or death.

SAFETY PRACTICES

1. Never mix R-410A with other refrigerants.
2. Use gloves and safety glasses, Polyol ester oils can be irritating to the skin, and liquid refrigerant will freeze the skin.
3. Never use air and R-410A to leak check; the mixture may become flammable.
4. Do not inhale R-410A—the vapor attacks the nervous system, creating dizziness, loss of coordination and slurred speech. Cardiac irregularities, unconsciousness and ultimate death can result from breathing this concentration.
5. Do not burn R-410A. This decomposition produces hazardous vapors. Evacuate the area if exposed.
6. Use only cylinders rated DOT4BA/4BW 400.
7. Never fill cylinders over 80% of total capacity.
8. Store cylinders in a cool area, out of direct sunlight.
9. Never heat cylinders above 125°F.
10. Never trap liquid R-410A in manifold sets, gauge lines or cylinders. R-410A expands significantly at warmer temperatures. Once a cylinder or line is full of liquid, any further rise in temperature will cause it to burst.

IMPORTANT INSTALLER NOTE

For improved start up performance wash the indoor coil with a dish washing detergent.

THREE PHASE SCROLL COMPRESSOR

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. Direction of rotation is not an issue with single phase compressors since they will always start and run in the proper direction.

However, three phase compressors will rotate in either direction depending upon phasing of the power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, verification of proper rotation must be made. Verification of proper rotation direction is made by observing that suction pressure drops and discharge pressure rises when the compressor is energized. Reverse rotation also results in an elevated sound level over that with correct rotation, as well as substantially reduced current draw compared to tabulated values.

Verification of **proper rotation** must be made at the time the equipment is put into service. If improper rotation is corrected at this time, there will be no negative impact on the durability of the compressor. However, reverse operation for over one hour may have a negative impact on the bearing due to oil pump out.

NOTE: *If compressor is allowed to run in reverse rotation for several minutes, the compressor's internal protector may trip.*

All three phase compressors are wired identically internally. As a result, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same Fusite terminal should maintain proper rotation direction.

The direction of rotation of the compressor may be changed by reversing any two line connections to the unit.

PHASE MONITOR

All units with three phase scroll compressors are equipped with a 3 phase 60/50 Hz line monitor to prevent compressor damage due to phase reversal. No changes required for 60 or 50 Hz operation.

The phase monitor in this unit is equipped with two LEDs. If the Y signal is present at the phase monitor and phases are correct the green LED will light.

If phases are reversed, the red fault LED will be lit and compressor operation is inhibited.

If a fault condition occurs, reverse two of the supply leads to the unit. ***Do not reverse any of the unit factory wires as damage may occur.***

SERVICE HINTS

1. Caution owner/operator to maintain clean air filters at all times. Also, not to needlessly close off supply and return air registers. This reduces airflow through the system, which shortens equipment service life as well as increasing operating costs.
2. Check all power fuses or circuit breakers to be sure they are the correct rating.
3. Periodic cleaning of the outdoor coil to permit full and unrestricted airflow circulation is essential.

DIGITAL CONTROLLER

The W3R/LV2 through W6R/LV2 variable capacity air conditioners utilize dedicated controllers and components to optimize this unit for cooling operation from -40°F up to 131°F (-40°C to +55°C). These units are dual rated for 200-240V operation on both 50 and 60 Hz. Please read the following sequence of operation before attempting any troubleshooting or repair. Troubleshooting and repair procedures will be outlined below and later in this manual.

These models use a digital compressor and variable speed indoor and outdoor motors. The motors and compressor must be replaced with the exact same component to maintain the above stated temperature and voltage ranges of operation. The units are controlled by a Bard digital thermostat/controller. This thermostat/controller contains proprietary programming and must be replaced with the exact same component to ensure proper operation.

See Controller Quick Start Manual 2100-559 and Controller Advanced Programming Manual 2100-560 for complete details.

SEQUENCE OF OPERATION

Modes of Operation

Cool Only Mode:

- Compressor will modulate from 100% down to 20%.
- Compressor will cycle off if thermostat/controller set-point is reached.

Heat Only Mode:

- Electric heat Stage 1 operates at 1st-stage heating set-point.
- Electric heat Stage 2 (if equipped) operates on 2nd stage (-2°F below heating set-point).

Auto Mode:

- Cooling or heating automatically selected based on building temperature vs. thermostat/controller set-points and operates as described above.

CCVC (Continuous Compressor Variable Capacity):

- Compressor will modulate from 100% down to 20%.
- Compressor will not cycle off if thermostat/controller set-point is reached, and would stay running at the 20% minimum capacity.
- If space temperature drops -2°F below cooling set-point electric heat Stage 1 will then cycle to maintain that condition.
- If Stage 2 electric heat is installed, and if required, will cycle at -4°F below cooling set-point to maintain that condition.
- If CCVC is terminated the controller will revert to Cool or Auto operation.
- CCVC would be an Operating Mode for all applications where continuous run of the compressor is a requirement.

Testing and Troubleshooting Mode CCFC (Continuous Compressor Fixed Capacity):

- This unit must be controlled with the digital thermostat controller supplied with the unit. To test or troubleshoot, change system mode to CCFC. This will ensure unit runs continuously and in full capacity mode. AHRI ratings are based on this mode of operation.

CCFC (Continuous Compressor Fixed Capacity):

- The compressor is turned ON and locked ON as long as the thermostat/controller is in Test Mode 2.
- When in CCFC the compressor does not modulate but will be locked ON at 100% capacity.
- If space temperature drops -2°F below cooling set-point electric heat Stage 1 will then cycle to maintain that condition.
- If Stage 2 electric heat is installed, and if required, will cycle at -4°F below cooling set-point to maintain that condition.
- If CCFC is terminated the controller will revert to Cool or Auto operation.

Indoor Blower Operation

The indoor blower speed will modulate with the compressor operation from 50% to 100% of operation. Once compressor operation is at 50 or below, percent airflow will be at 50% and no further reduction of airflow will occur. Modulation is accomplished by modulating a 0-10 volt signal from OUT 7 to the indoor blower motor.

An additional option to maintain airflow at 100% is also available. This selection is done at the thermostat/controller under Fan Modes. Default is No for "Always 100%" setting. Change to Yes to disable indoor blower modulation as described above.

Outdoor Fan Motor Operation

The outdoor fan motor speed is varied in response to outdoor air temperature and pressure. The fan motor will cycle on and off with the compressor when not in a CCVC or CCFC mode. At all times above 122°F OAT, the outdoor fan, OUT 9, will be energized at high speed. From 122°F to 55°F the outdoor fan, OUT 9, will be set at normal outdoor airflow. Below 55°F the outdoor fan will modulate to maintain a 300 psi head pressure. This will act as a low ambient fan cycling control. The output may go to zero output to maintain the 300 PSI. The outdoor ECM motor will be programmed with a minimum RPM allowed to protect the bearing system. Any signal that is less than the percent torque required to maintain the minimum RPM will cause the motor to shut off. Once head pressure rises the motor will restart.

These functions are regulated by the digital thermostat/controller with input from the pressure transducer and output signal to the Fan Motor.

Capacity Modulation and High Head Pressure Control

The pressure transducer monitors the high side pressure providing input to the digital thermostat/controller. It is powered using a 5VDC power supply with a digital relay signaling the compressor unloader solenoid as required. When the ECU head pressure exceeds 615 PSI based on outdoor and indoor ambient conditions the compressor will automatically start to reduce capacity to stay online keeping the pressure at or below 575 PSI. The thermostat/controller display alternates between OD temperature and discharge pressure. When compressor capacity is being reduced due to high pressure conditions it will also indicate "High Head Pressure Control" mode on the display. A separate 650 PSI high pressure cutout switch is also employed as additional safety device. See Compressor Control Module on following page for more details.

COOLING SEQUENCE

Compressor Operation

The cooling capacity of the WV series is controlled by loading or unloading the compressor. On a call for cooling, the unloader solenoid is energized for one second to ensure pressure equalization in the compressor. The compressor contactor, RLY 2, is then energized and the compressor will start. A PI control loop then calculates the compressor capacity needed to reach set point and modulates the compressor. Modulation range is from 20% to 100% capacity. Modulation is accomplished by a pulse width modulated signal from OUT 8 which energizes the solid state relay (SSR) and energizes or de-energizes the unloader solenoid. The required compressor capacity is calculated every 15 seconds.

20% load means 0 VDC for 3.0 seconds and 5 VDC for 12.0 seconds from OUT 8.

30% load means 0 VDC for 4.5 seconds and 5 VDC for 10.5 seconds from OUT 8.

40% load means 0 VDC for 6.0 seconds and 5 VDC for 9.0 seconds from OUT 8.

50% load means 0 VDC for 7.5 seconds and 5 VDC for 7.5 seconds from OUT 8.

60% load means 0 VDC for 9.0 seconds and 5 VDC for 6.0 seconds from OUT 8.

70% load means 0 VDC for 10.5 seconds and 5 VDC for 4.5 seconds from OUT 8.

80% load means 0 VDC for 12.0 seconds and 5 VDC for 3.0 seconds from OUT 8.

90% load means 0 VDC for 13.5 seconds and 5 VDC for 1.5 seconds from OUT 8.

100% load means 0 VDC for 15 seconds and 5 VDC for 0.0 seconds from OUT 8.

Outdoor Temperature Sensor

A sensor probe projects out the bottom of the ECU control box into the outdoor section, and this provides input for the outdoor fan sequences below 55°F and above 115°F described under Outdoor Fan Motor Operation.

Discharge Temperature Sensor

This sensor is mounted on the compressor discharge line and protects the compressor against overheating. It opens at 250°F and closes at 200°F.

HEATING SEQUENCE

On a call for heating, if the space temperature falls 1°F below setpoint, the first stage of heating, RLY 4, will cycle ON. If the space temperature falls 3°F below setpoint, the second stage of heating, RLY 5, will cycle ON. Indoor Blower airflow is maintained at the Rated unit airflow at all times during heating.

LEAD/LAG SEQUENCE

The digital controllers can be used for dual units used in a redundant application by using the scheduling function as follows:

1. The controllers should be mounted side by side so they are in the same temperature zone.
2. The time setting on both controllers need to be synchronized to the same time of day. NOTE: there is a 72-hour time retention if power is removed. If power off-time exceeds 72 hours, the time clock in each device must be reset to match. The exact time is not important as long as both controllers are set the same unless it is critical to control the time of day when the units swap operating positions.
3. Set one controller #1 to be Occupied for a 12-hour period and Unoccupied for the other 12-hour period. Set controller #2 so that it is exactly the opposite. Unoccupied for the 12-hour period when #1 is Occupied and Occupied when #1 is Unoccupied.
4. Set Occupied cooling setpoint the same for each controller, and Unoccupied the same for each. 4°F difference is suggested.
5. Set controllers to "Auto" mode of operation.

Example:

1. Both Unit #1 and #2 have Occupied setpoint of 74°F and Unoccupied setpoint of 78°F
2. Unit #1 set for Occupied from 1:00 a.m. to 1:00 p.m. & Unoccupied from 1:00 p.m. to 1:00 a.m.
3. Unit #2 set for Unoccupied from 1:00 a.m. to 1:00 p.m. & Occupied from 1:00 p.m. to 1:00 a.m.
4. Every 12 hours the units will swap position as being the lead unit, and the lag unit is available for back up operation at the higher temperature should the situation ever arise.

Control Device	Normal	Abnormal
5VDC Power Supply	Red LED lit when 24VAC present. 5VDC present at solid Red and solid Black wires. Both jumpers on Half. 3A 250V fuse.	Red LED not lit. 5VDC not present at solid Red and solid Black wires. Both jumpers on Half. Check 3A fuse.

COMPRESSOR CONTROL MODULE

The compressor control module is standard on all models covered by this manual. The compressor control module is an anti-short cycle/lockout timer with high and low pressure switch monitoring and alarm relay output.

Adjustable Delay On Make and Break Timer

On initial power up or anytime power is interrupted to the unit, the *delay on make* period begins, which will be 2 minutes plus 10% of the *delay on break* setting. When the delay on make is complete and the high pressure switch and low pressure switch is closed, the compressor contactor is energized. Upon shutdown, the delay on break timer starts and prevents restart until the delay on break and delay on make periods have expired.

During routine operation of the unit with no power interruptions, the compressor will operate on demand with no delay.

High Pressure Switch and Lockout Sequence

If the high pressure switch opens, the compressor contactor will de-energize immediately. The lockout timer will go into a *soft lockout* and stay in soft lockout until the high pressure switch closes and the delay on break time has expired. If the high pressure switch opens again in this same operating cycle, the unit will go into *hard lockout* condition and the alarm relay circuit will energize. Recycling the wall thermostat resets the hard lockout.

Low Pressure Switch, Bypass and Lockout Sequence

If the low pressure switch opens for more than 120 seconds, the compressor contactor will de-energize and go into a soft lockout. Regardless the state of the low pressure switch, the contactor will reenergize after the delay on make time delay has expired. If the low pressure switch remains open, or opens again for longer than 120 seconds, the unit will go into hard lockout condition and the alarm relay circuit will energize. Recycling the wall thermostat resets the hard lockout.

Alarm Relay Output

Alarm terminal is output connection for applications where alarm relay is employed. This terminal is powered whenever the compressor is locked out due to HPC or LPC sequences as described.

NOTE: *Both high and low pressure switch controls are inherently automatic reset devices. The high pressure switch and low pressure switch cut out and cut in settings are fixed by specific air conditioner unit model. The lockout features, both soft and hard, are a function of the Compressor Control Module.*

ADJUSTMENTS

Adjustable Delay on Make and Delay on Break Timer

The potentiometer is used to select delay on break time from 30 seconds to 5 minutes. Delay on make (DOM) timing on power-up and after power interruptions is equal to 2 minutes plus 10% of Delay on break (DOB) setting:

0.5 minute (30 seconds) DOB = 123 second DOM
1.0 minute (60 seconds) DOB = 126 second DOM
2.0 minute (120 seconds) DOB = 132 second DOM
3.0 minute (180 seconds) DOB = 138 second DOM
4.0 minute (240 seconds) DOB = 144 second DOM
5.0 minute (300 seconds) DOB = 150 second DOM

During routine operation of the unit with no power interruptions, the compressor will operate on demand with no delay.

Typical Settings for Dual Unit Installation

Unit 1: DOB set at 2 minutes, and DOM is 132 seconds

Unit 2: DOB set at 4 minutes, and DOM is 144 seconds

PRESSURE SERVICE PORTS

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. It is imperative to match the correct pressure table to the unit by model number. See Table 2 on page 21.

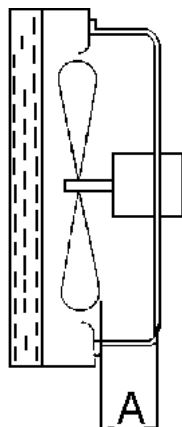
TROUBLESHOOTING

FAN BLADE SETTING DIMENSIONS

Shown in Figure 9 is the correct fan blade setting for proper air delivery across the outdoor coil. Refer to Table 1 for unit specific dimension.

Any service work requiring removal or adjustment in the fan and/or motor area will require that the dimensions below be checked and blade adjusted in or out on the motor shaft accordingly.

**FIGURE 9
FAN BLADE SETTING**



MIS-1724

**TABLE 1
FAN BLADE DIMENSIONS**

Model	Dimension A
W3RV2 W3LV2	1.25"
W5RV2 W5LV2	1.75"
W6RV1 W6LV2	1.75"

REMOVAL OF FAN SHROUD

1. Disconnect all power to the unit.
2. Remove the screws holding both grilles, one on each side of unit, and remove grilles.
3. Unwire condenser fan motor.
4. Remove the bolts and nuts holding the condenser fan motor bracket to the fan shroud.
5. Slide the condenser fan motor and bracket to the rear of the condenser section.
6. Remove screws holding fan shroud to condenser and bottom support plate.
7. Slide fan shroud out the left side of the unit.
8. Reverse steps to install.

R-410A REFRIGERANT CHARGE

This unit was charged at the factory with the quantity of refrigerant listed on the serial plate. AHRI capacity and efficiency ratings were determined by testing with this refrigerant charge quantity.

The following pressure tables show nominal pressures for the units. Since many installation specific situations can affect the pressure readings, this information should only be used by certified technicians as a guide for evaluating proper system performance. They shall not be used to adjust charge. If charge is in doubt, reclaim, evacuate and recharge the unit to the serial plate charge.

TABLE 2
COOLING PRESSURE

Air Temperature Entering Outdoor Coil °F (°C)

Model	D.B/W.B. ①	Pressure	75 (23.9)	80 (26.7)	85 (29.4)	90 (32.2)	95 (35.0)	100 (37.8)	105 (40.6)	110 (43.3)	115 (46.1)	120 (48.9)	125 (51.7)	131 (55.0)
W3RV W3LV	75/62F (23.9/16.7C)	Low Side	128	127	127	127	128	129	130	132	135	See Note ②		
		High Side	355	373	394	416	442	469	498	530	565			
	80/67F (26.7/19.4C)	Low Side	137	136	136	136	139	139	139	141	144			
		High Side	364	383	404	427	444	481	511	544	579			
	85/72F (29.4/22.2C)	Low Side	142	141	141	141	142	143	144	146	149			
		High Side	377	396	418	442	469	498	529	563	599			
W5RV W5LV	75/62F (23.9/16.7C)	Low Side	125	128	130	132	134	136	137	137	138			
		High Side	336	358	380	403	427	451	478	504	531			
	80/67F (26.7/19.4C)	Low Side	134	137	139	141	143	145	146	147	148			
		High Side	345	367	390	413	438	463	490	517	545			
	85/72F (29.4/22.2C)	Low Side	139	142	144	146	148	150	151	152	153			
		High Side	357	380	404	427	453	479	507	535	564			
W6RV W6LV	75/62F (23.9/16.7C)	Low Side	113	113	114	115	117	118	120	122	124			
		High Side	344	361	381	404	430	459	490	526	564			
	80/67F (26.7/19.4C)	Low Side	121	121	122	123	125	126	128	130	133			
		High Side	353	370	391	414	441	471	503	539	578			
	85/72F (29.4/22.2C)	Low Side	125	125	126	127	129	130	132	135	138			
		High Side	365	383	405	428	456	487	521	558	598			

Low side pressure ±4 PSIG

High side pressure ±10 PSIG

Tables are based upon rated CFM (airflow) across the evaporator coil. If there is any doubt as to correct operating charge being in the system, the charge should be removed, system evacuated and recharged to serial plate charge weight.

NOTE ①: Return air temperature at 50% R.H.

NOTE ②: Units rated to 131°F (55°C) outdoor temperature, but higher fan speeds and automatic modulation of the compressor due to pressure control make pressure readings above 115°F very unstable. Pressure table is based on low speed condenser fan operation. Fan speed increases above 115°F. Check pressures on unit at outdoor ambient below 115°F. Set thermostat at least 3° below current room temperature to ensure 100% comp operation for purpose of pressure testing.

TABLE 3

Electrical Specifications — W*RV / W*LV Series

Dual Circuit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Model	Electrical Rating: Volts Hz Phase	No. Field Power Circuits	③	①	②	③			①			②			②																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
			Minimum Circuit Ampacity	Maximum Overcurrent Protection	Field Power Wire Size	②	Ground Wire	Minimum Circuit Ampacity	Ckt. A	Ckt. B	Ckt. C	Maximum Overcurrent Protection	Ckt. A	Ckt. B	Ckt. C	Field Power Wire Size	Ckt. A	Ckt. B	Ckt. C	②	Ground Wire Size	Ckt. A	Ckt. B	Ckt. C																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
W3RV2 / W3LV2-R0Z R05 R10	230/208-60-1 220/200-50-1	1	29	35	8	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

① Maximum size of the time delay fuse or circuit breaker for protection of field wiring conductors.

② Based on 75C copper wire. All wiring must conform to the National Electrical Code and all local codes.

③ These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing.

Caution: When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.

* Top outlet supply option is available only factory installed and only on the selected models.

IMPORTANT: While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.

**TABLE 4
RECOMMENDED AIRFLOW**

Model	Rated CFM*	Rated ESP*	Recommended Airflow Range
W3R/LV	1100	.15	1100 - 550
W5R/LV	1700	.20	1700 - 850
W6R/LV	1700	.20	1700 - 850

* Rated CFM and ESP on high speed tap.

**TABLE 5
MAXIMUM ESP OF OPERATION
ELECTRIC HEAT ONLY**

Model	W3	W5, W6
	FRONT	FRONT
	High	High
-A0Z	.50	.50
-A05	.50	.50
-A10	.50	.50
-B0Z	.50	.50
-B06	.50	.50
-B09	.50	.50
-C0Z	.50	.50
-C09	.50	.50
-C12	.45	.50

Values shown are for units equipped with standard 1-inch throwaway filter or 1-inch washable filter.
Derate ESP by .15 for 2-inch pleated filters.

**TABLE 6
ELECTRIC HEAT**

Models	240V-1		208V-1		240V-3		208V-3		460V-3	
KW	Amps	BTUH	Amps	BTUH	Amps	BTUH	Amps	BTUH	Amps	BTUH
4	16.7	13650	14.4	10240						
5	20.8	17065	18.1	12800						
6					14.4	20500	12.5	15360	7.2	20500
8	33.3	27300	28.8	20475						
9					21.7	30600	18.7	23030	10.8	30700
10	41.6	34130	36.2	25600						
12									14.4	40950
15	62.5	51250	54.0	38400	36.2	51200	31.2	38400	18.0	51200
18					43.3	61430	37.5	46100		
20	83.2	68260	72.1	51200						

TABLE 7
VENT AND CONTROL OPTIONS

Part Number	Description	W3R/LV	W5R/LV	W6R/LV
CMC-15	Start Kit (230V 1-Phase)	X	X	
BFAD-3	Barometric Fresh Air Damper - Standard	X		
BOP-3	Blank Off Plate	X		
BFAD-5	Barometric Fresh Air Damper - Standard		X	X
BOP-5	Blank Off Plate		X	X



USER'S APPLICATION GUIDE AND TECHNICAL PRODUCT OVERVIEW

Manual: 2100-034G
Supersedes: 2100-034F
Date: 12-17-20

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com



BARDHVAC.COM

Climate Control Solutions

General Information

The User's Application Guide covers a wide range of heating and cooling products manufactured by Bard Manufacturing Company. It is intended to be a general guide for care and operation of typical systems and covers the most important features you should be aware of and are responsible for as the user of the equipment.

Because our product offerings are so varied and can be equipped with many features and options, it is not possible to cover all aspects of what your specific system may be configured for. Some systems may be quite simple in features to provide basic cooling and possibly heating, while other systems may also incorporate various ventilation technologies, dehumidification circuits and many different internal controls as well as room temperature controls. Therefore, you should request a detailed operation sequence and explanation of any special features from your installer and/or service company and also have them instruct you as to any routine maintenance procedures you are responsible for.

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The User's Application Guide and Technical Product Overview covers the following products:



WALL MOUNT
Air Conditioners
and Heat Pumps



I-TEC®
Air Conditioners
and Heat Pumps



Q-TEC™
Air Conditioners
and Heat Pumps

The User's Application Guide and Technical Product Overview covers the following topics:

- Documentation provided by Bard for proper use of your new product.
- Unit installation guidelines.
- Routine unit maintenance.
- Unit operation.
- Unit troubleshooting.

Please use this guide as a general overview regarding unit application, maintenance and troubleshooting. Refer to product installation instructions and supplemental documentation provided with the unit or go to www.bardhvac.com for detailed individual product information.

Documentation

There are two sources of valuable information for your new Bard product:

- Documentation provided with your unit, normally located inside the unit control panel during shipping. This information should be saved once the unit is installed for future maintenance reference or to answer questions about equipment after installation.
- Documentation provided on the internet at www.bardhvac.com. This may be accessed from a desktop computer at the office, a laptop or an internet-capable cell phone at the worksite. Up-to-date documentation is available, along with specification sheets and other valuable resources regarding your new Bard product.

Unit Literature Assembly – Documentation Provided with Your Unit

Bard products are shipped with documentation that when used by a technician with cooling and heating knowledge, can ensure that your product is installed safely, performs optimally and achieves the longest life cycle possible.

Shipped literature includes the following:

- User Manual (this document)
- Installation Instructions
- Replacement Parts Manual
- Wiring Diagrams
- Warranty Information

Installation plays a key part in unit functionality, performance and safety. Product securing and placement, duct design and supply/return location, electrical routing and condensate and defrost drainage all play key roles in making sure a unit will perform per the design specifications.

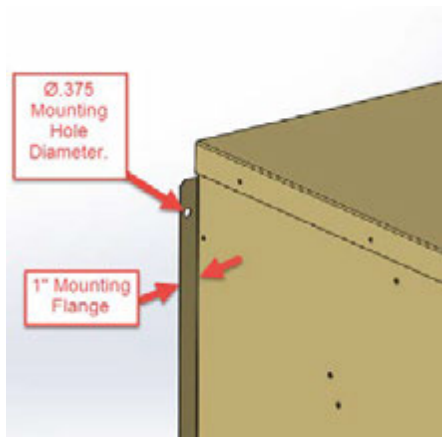
WALL MOUNT Products – Mounting the Product on a Wall Surface



Outdoor products are normally mounted to an exterior wall surface, including brick, cement block, metal or wood construction. These products are labeled as “WALL MOUNT” units. **Before installation begins, the wall surface should be inspected by a construction professional to ensure it will support the weight of the unit and accessory items.** Approximate weights are available from the product specification sheet, and a safety factor should be designed into the installation. Typical fasteners to attach the unit to the wall using the integrated mounting flanges on both sides of the unit include tap cons, bolts, studs and other fastening devices. The selection of the fasteners to be used needs to be reviewed by a construction professional and decided upon based on the wall construction and fastener strength required. It is important to follow all guidelines and procedures covered in the installation instructions manual provided for the product.

Built-In Mounting Flange Detail:

Outdoor WALL MOUNT products include a mounting flange that is part of the cabinet construction. Ø.375" holes are provided for unit mounting unless specified otherwise in installation instructions.



Specification Sheets:

Unit specification sheets provided at www.bardhvac.com include basic unit weights and dimensions (see example below). Ventilation options and other accessories must be added into the total weight of the unit.

Specification Sheet Example

w/Filter (Rated-Wet Coil)	
Filter Sizes (inches) STD.	16x25x1
Basic Unit Weight-LBS.	318
Barometric Fresh Air Damper	3.5
Blank-Off Plate	1.0
Motorized Fresh Air Damper	10.0
Commercial Room Ventilator	69.0
Economizer	69.0
Energy Recovery Ventilator	50.0

WALL MOUNT Products – Clearances for Outdoor Condenser Fan Airflow

Unit placement and avoidance of obstructions outside the structure are very critical to unit performance. **Avoid installing the unit in areas that will obstruct outdoor condenser fan airflow or create “pockets” of heated air being exhausted from the condenser coil.** Solid construction fences should not be placed directly in front of the unit without provisions for condenser airflow. Solid exterior walls need to be spaced as far away from units as possible to avoid pockets of heated air causing condenser air recirculation.

Solid barriers located too close to the face or side surfaces (condenser fan inlet and outlet) of the WALL MOUNT can both impede airflow and force heated air to short circuit (be returned) from the condenser outlet to the condenser inlet. Either condition will effectively raise the condensing temperature and pressure reducing cooling capacity and efficiency. In extreme cases, the unit may fail to operate due to high refrigerant pressures inside the unit, and compressor and/or fan motor failure may occur. Clearances given in installation instructions ensure components can be serviced and maintenance can be performed when needed.

National and local electrical codes must be reviewed before unit installation.

Always use common sense when installing products, follow unit clearances given in the installation instructions and contact local Bard distributors when additional knowledge is needed regarding unit clearances for proper unit functionality.

WALL MOUNT Products – Clearances for Indoor Supply and Return Airflow

The Bard unit should be placed in an area where the supply (leaving conditioned air) and return (unit air intake) air paths will be unrestricted. Avoid placing objects in the structure within 24" of the return (unit air intake) grille. Avoid placing objects directly in the path of the supply (conditioned) air grille. This will inhibit the “throw” of the supply air throughout the structure and reduce the cooling and/or heating ability of the unit; in extreme cases, this may cause evaporator coil freezing issues. Supply air must be able to freely circulate conditioned air throughout the structure. Adjustment of supply grille deflectors is often necessary to ensure proper room circulation.

Ducted applications should not exceed the rated duct static pressures given in the unit specification sheets. Special requirements for duct construction and distances to combustible materials need to be followed per the installation instructions when electric heating is used.

WALL MOUNT Products – Condensate and Defrost Drainage

Condensate drainage for air conditioning units needs to be planned before installation. Your new Bard WALL MOUNT product includes provisions to allow condensate water to exit the bottom of the unit. If condensate water is to be routed away from the unit, adequate drain sizing needs to be provided to allow proper drainage for condensate water generation. During normal air conditioning operation, large amounts of condensate water is generated inside the unit as moisture is extracted from the supply air. This is collected in an evaporator pan and drained to either a drainage system (indoor products) or outside the unit cabinet (outdoor products). Evaporator drain traps are not necessary for any of our wall mounted outdoor products, and the use of “standing water” U-shaped traps may be prone to freezing in certain climate zones.

Defrost water drainage from heat pump units needs to be planned before installation. During seasons requiring heating operation, the unit will need to warm the condenser coil to remove frost build-up (defrost). **Outdoor heat pump products include holes in the unit base under the condenser coil for proper water drainage when in the heating defrost cycle. Avoid placing the unit on a pad or blocking the base drainage holes under the condenser coil without proper allowances (6" recommended) for water drainage due to damage caused by freezing conditions.** Without proper drainage, defrost water may freeze causing ice build up and damage the lower portion of the condenser coil.

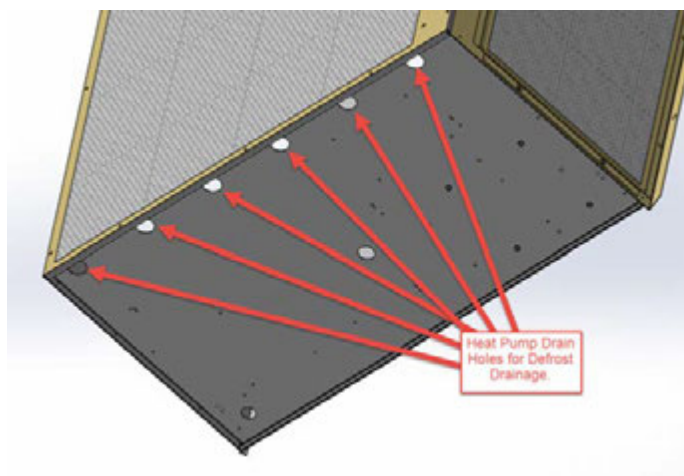
Condensate Water Drainage:

Unit condensate water exits the base of the unit during cooling operation.



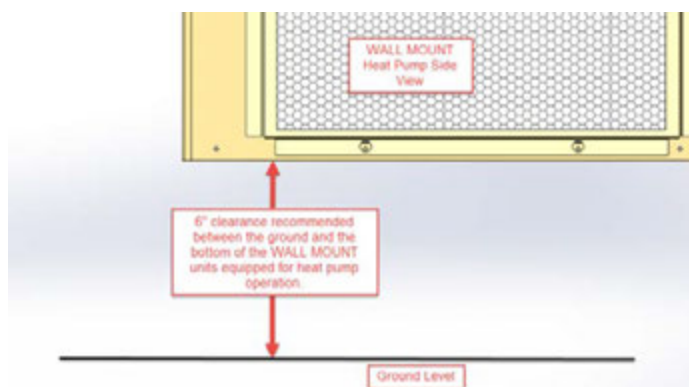
Defrost Water Drainage:

Holes are provided in the front of the unit base for heat pump condensate water drainage.



Defrost Water Drainage:

6" clearance is recommended under WALL MOUNT Heat Pump products to allow proper defrost water drainage.



I-TEC and Q-TEC Products – Installing the Product Inside a Room



I-TEC



Q-TEC

Indoor products are normally supported by the floor surface and are adjacent to an interior wall surface, including brick, cement block, metal or wood construction. These products are normally labeled as “I-TEC” or “Q-TEC” units. **Before installation begins, the floor surface should be inspected by a construction professional to ensure it will support the weight of the unit and accessory items.** Approximate weights are available from the product specification sheet, and a safety factor should be designed into the installation.

A sheet metal sleeve is normally installed in the wall allowing vent and condenser fan air to enter and exit the unit. Different sleeve depths are available for installation into various wall depths. Typical fasteners to attach the sleeve to the outside surface of the wall include tap cons and other fastening devices. The I-TEC or Q-TEC unit is then slid up to the wall surface and connected to the sleeve using screws. Trim kits are available to enclose gaps between the wall surface and the unit. A louver grille is used to cover the external wall opening and fasteners used during sleeve installation.

Wall Sleeve:

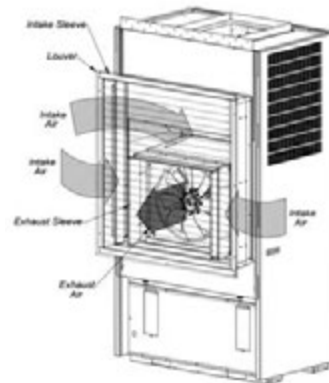
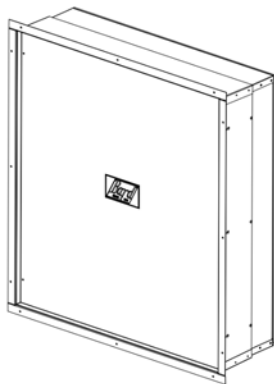
Wall sleeves allow for outdoor air to enter and exit the unit inside the room.

Air Paths:

Air paths through the unit allow for cooling operation and fresh air to enter the structure (I-TEC shown).

Louver Installation:

Outdoor louvers provide an esthetically pleasing look to the installation and cover the unit opening (I-TEC shown).



I-TEC and Q-TEC Products – Clearances for Outdoor Condenser Fan Airflow

Solid barriers located too close to the face of the outdoor louver of the I-TEC or Q-TEC can both impede airflow and force heated air to short circuit (be returned) from the condenser outlet to the condenser inlet. Either condition will effectively raise the condensing temperature and pressure reducing cooling capacity and efficiency. In extreme cases, the unit may fail to operate due to high refrigerant pressures inside the unit, and compressor and/or fan motor failure may occur. It is recommended to allow 15' (457.2 cm) in front of unit louver for proper condenser airflow. Always use common sense when installing products, follow unit clearances given in the installation instructions and contact local Bard distributors when additional knowledge is needed regarding unit clearances for proper unit functionality.

I-TEC and Q-TEC Products – Clearances for Indoor Supply and Return Airflow

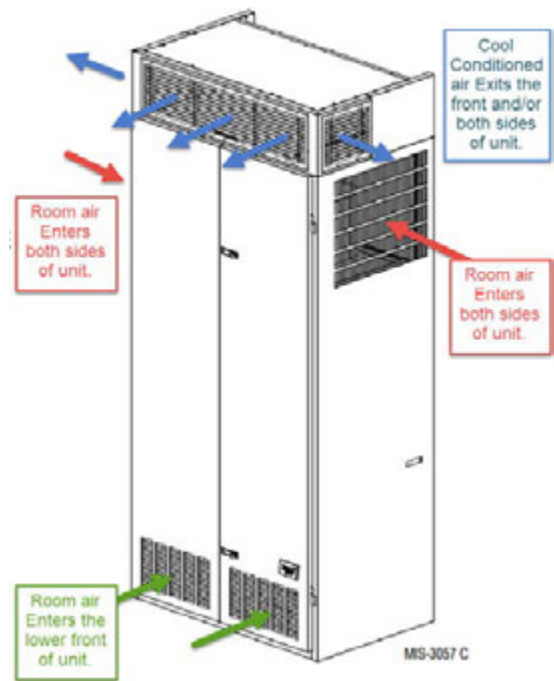
The Bard unit should be placed in an area where the supply (leaving conditioned air) and return (unit air intake) air paths will be unrestricted. Avoid placing objects inside the room within 24" of the return (unit air intake) louvers or grille. Avoid placing objects directly in the path of the supply (conditioned) air grilles. This will inhibit the “throw” of the supply air throughout the structure and reduce the cooling and/or heating ability of the unit and in extreme cases may cause evaporator coil freezing issues. Ducted applications should not exceed the rated duct static pressures given in the unit specification sheets. Special requirements for duct construction and distances to combustible materials need to be followed per the unit installation instructions when electric heating is used.

I-TEC Air Path

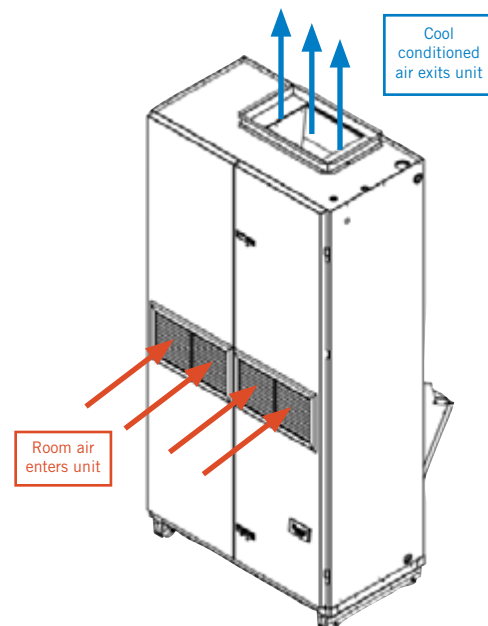
The I-TEC product has been engineered for extremely quiet unit operation and has multiple air paths for air entering and exiting the unit. Room air enters the upper sides to be conditioned (cooled) inside the unit and exits the unit top. The unit will either be ducted to supply registers or have a supply air plenum box installed. A supply air plenum box allows quiet operation without ducting the air leaving the unit. Room air also enters the bottom of both front doors during ventilation operation.

Q-TEC Air Path

The Q-TEC product has been engineered for efficient, economical unit operation and has a mid-mounted front grille for air entering the unit. The unit will either be ducted to supply registers or have a supply air plenum box installed. A supply air plenum box allows quiet operation without ducting the air leaving the unit.



Typical I-TEC Installation



Typical Q-TEC Installation

The I-TEC and Q-TEC product installation instructions contain additional information regarding unit air paths and required clearances. This information may be accessed at www.bardhvac.com.

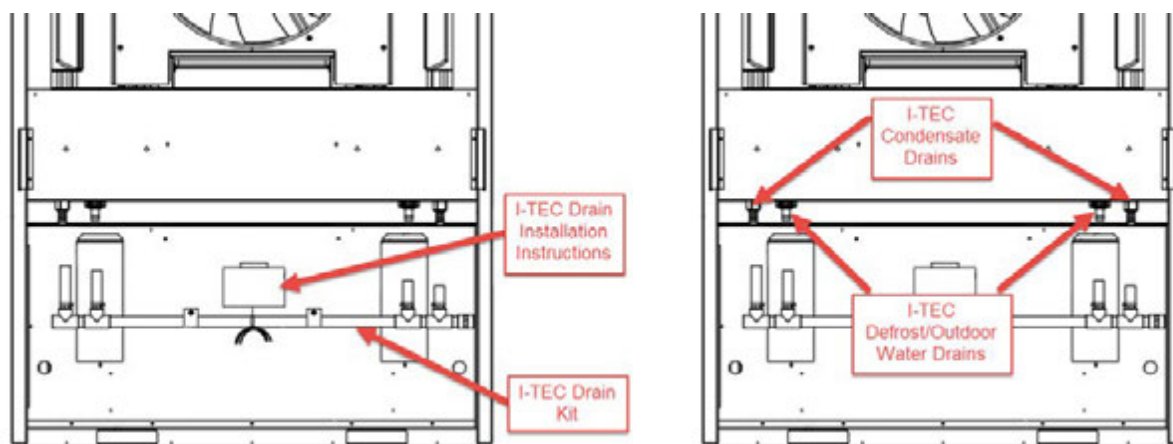
I-TEC and Q-TEC Products – Condensate Drainage

Condensate drainage for Bard indoor cooling units is a very important part of unit installation. During normal air conditioning operation, large amounts of condensate water are generated inside the unit as moisture is extracted from the supply air. This is collected in an evaporator pan and needs to be drained to an external drainage system. Your new Bard product includes provisions to allow condensate water to exit the unit and fittings will need to be field supplied to connect the unit drain to the building. Adequate drain sizing needs to be provided to allow proper drainage for condensate water generation and restriction in drain lines should be avoided. Evaporator drain traps are not necessary unless required by local codes.

Defrost water for heat pump operation and outdoor water entering the condenser area also needs to be drained out of the unit. The I-TEC product uses a combined defrost and outdoor water drainage system. The Q-TEC has a combined defrost and evaporator drain connection unless an optional in-wall drain box is used. Outdoor water exits the Q-TEC through the wall sleeve. Follow all instructions provided in the unit installation instructions regarding drain connections and sleeve installation to avoid water leakage inside the building or structure.

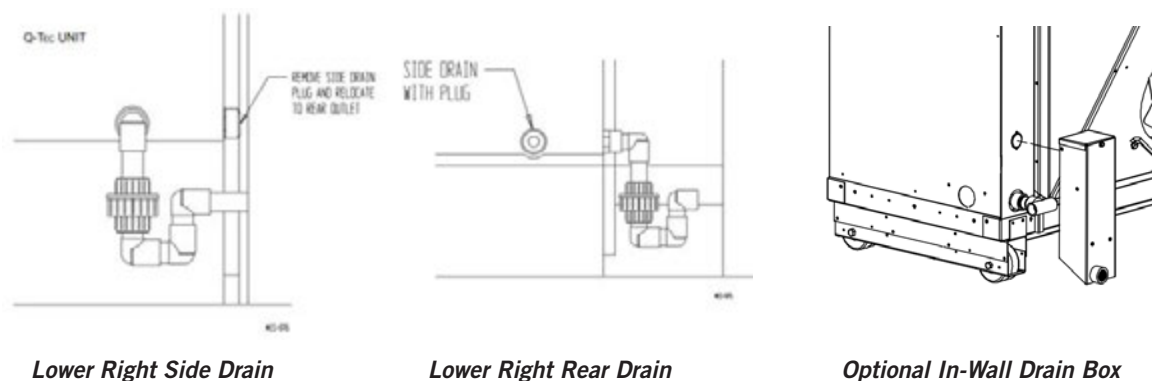
I-TEC Drain System:

The I-TEC drainage system consists of a manifold drain kit that combines all drains behind the unit to allow connection to the building system.



Q-TEC Drain System:

The Q-TEC drainage system consists of a lower right side or lower right rear connection fitting. An optional in-wall drain box may also be purchased as an accessory that allows separate evaporator and defrost water drainage.



All Products – Power Supply Verification

It is very important to follow all electrical and mechanical safety guidelines and instructions provided in the product installation instructions. Failure to do so may result in death, injury or product damage.

A proper power supply to your new Bard unit is very important. Be sure to verify the following with a multi-meter or other power measuring device before applying power to your Bard product.

Field-Supplied Voltage

Electrical voltage ratings and proper voltage operating ranges are provided in the unit specification sheets and installation instructions. It is important that power supplied to the unit stay in the specified operating voltage range. Voltage above or below the minimum operating value given could result in improper unit startup, unit shutdown, low unit performance, improper thermostat and unit controller operation, compressor damage and premature failure of functional parts. As a general guideline, it is always best if the power source for the unit supplies the nominal electrical rating value given in the specification sheets, installation instructions and unit serial plate for the product being used. To do so will provide the best unit performance possible from your new Bard product.

Single and Three Phase Power

Bard products are available in single and three phase power options. It is important to connect the proper phase listed on the unit serial plate. Three phase power is often used to reduce energy usage, and units rated for 3 phase operation are equipped with a phase monitor safety device. The phase monitor will not allow unit operation with improper phase connection and a red LED light on the monitor indicates phase wiring issues. Connecting 3 phase power to a single phase unit will result in component damage and improper unit operation. Connecting single phase power to a 3 phase unit will also result in component damage and improper unit operation.

Hertz (Frequency)

Bard products are available in 50hz and 60hz power options. It is important to connect power with the proper hz value listed on the unit serial plate. 60hz power is often used in the United States and Canada and units rated for 50hz operation are normally for international sales outside of this area. Connecting 50hz power to a 60hz unit not rated for 50hz operation may result in component damage and improper unit operation. Some equipment may be rated for 50/60hz operation. Review the unit specifications and installation instructions for further information regarding the power requirements of the unit.

The product installation instructions and unit specification sheets contain additional information regarding unit electrical data. This information may be accessed at www.bardhvac.com.

Unit Maintenance

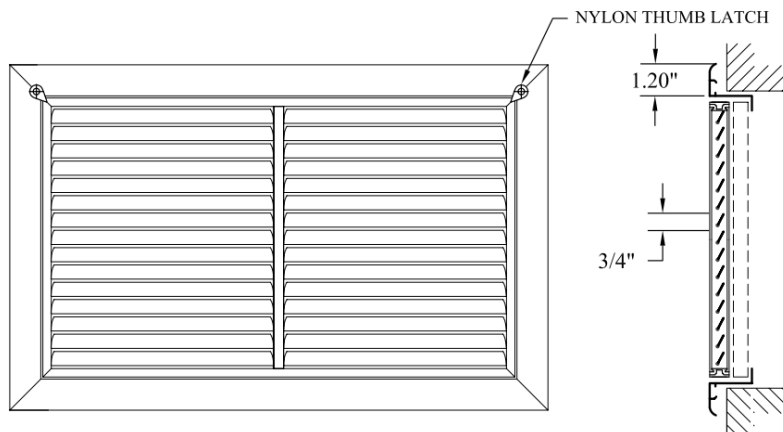
All Products – Filters and Filter Servicing

All Bard products contain air filters that must be cleaned or replaced on a regular basis.

Keeping air filter(s) clean is the single most important responsibility of the user of the equipment. Each type of system must be equipped with an air filter(s) in the indoor circulating air system to clean the air, keep the system itself clean for peak efficiency and capacity and prolong the useful life of the equipment. DO NOT operate the system without the proper air filters. Filters should be inspected at least monthly and replaced or cleaned (depending on type) as needed. The useful life of an air filter can vary widely depending upon application and use of the equipment, and it is critical to monitor filter condition and establish an acceptable maintenance schedule. Failure to do so will increase operating and repair costs, decrease capacity and efficiency and shorten the service life of the equipment. A common symptom of a dirty filter in the cooling mode is a freeze-up of the indoor coil. The air filters used may be a disposable (throwaway) type or may be a cleanable type that can be thoroughly cleaned, rinsed and reused many times. It is important to make sure that the correct filter size and type for your system is always used. If there is any question as to acceptable filter size or type, review the installation instructions for the specific equipment involved, if available. Otherwise, consult with your installing dealer or service company. Most equipment can have the filters inspected and serviced by the user with no problems. In some instances, because of equipment design or specific installation conditions, it may be necessary to have this procedure done by a qualified service company. Have your installer or service company show you where the filter(s) are and demonstrate the service procedure or make arrangements for them to provide this service on an as-needed basis.

Outdoor Unit Wall Mount Room Air Filters

Wall mount filters are normally accessed from the outside of the building. Bard does offer a return air grille with a filter frame built-in for indoor filter access. The return air filter grille is not acceptable as the only source of filtration if vent options are installed in the wall mount unit.



Return Air Filter Grille:

Bard offers the RFG return air filter grille, which may be used in applications where outdoor air is not brought into the structure through vent options. If vent options are used, the filter tray inside the Bard Wall Mount unit must be used.

The product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

WALL MOUNT Products – Filters and Filter Servicing

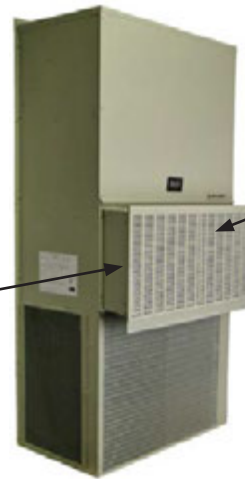
The built-in filter tray and room air filters in the wall mount are located in the middle of the cabinet below the indoor blowers. Units with vent options will have a washable screen behind the vent intake panel.



Filter Door:

The unit room air filter is located behind this panel for units without a vent hood.

Vent Intake Panel



Vent Intake Panel

Vent Hood Door:

The unit indoor filter is located behind this panel for units with a vent hood. The hood contains a washable pre-filter that needs to be cleaned regularly.

Filter Door:
The unit room air filter is located behind this panel.



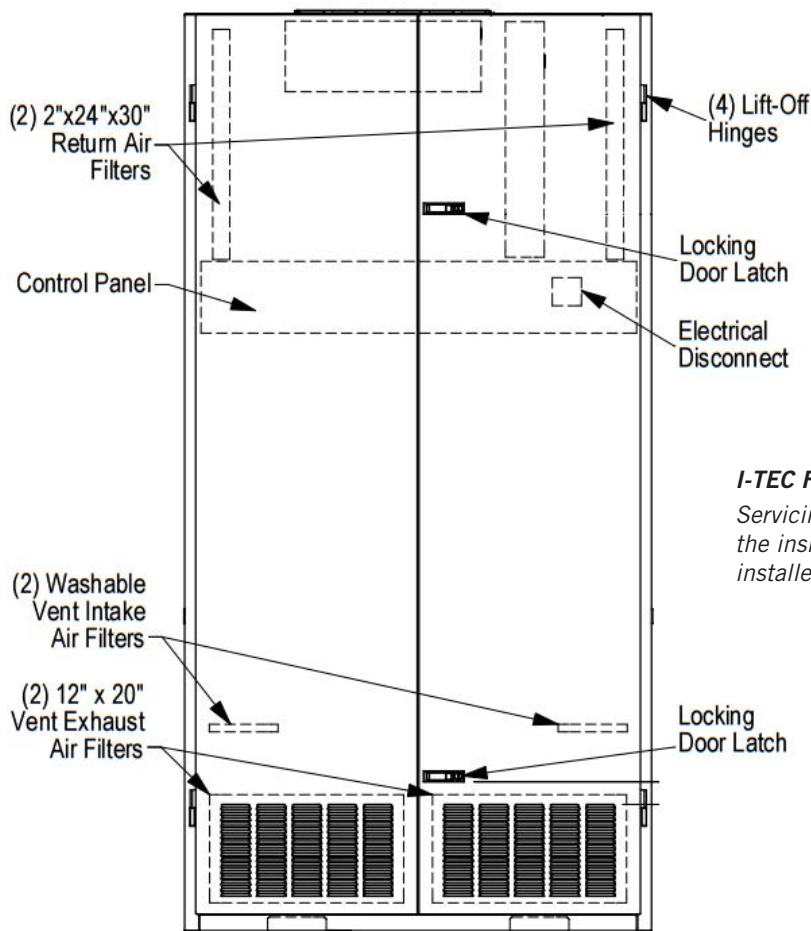
I-TEC Indoor Products – Filters and Filter Servicing

The I-TEC indoor air conditioners and heat pumps have multiple filters that must be maintained and inspected when servicing the unit. Filters play an important part in proper unit operation and prevent dirt and dust buildup inside the I-TEC and the room the unit is installed in. To access the unit filters, open the front hinged doors by unlocking the door latches. The doors fold outward and are on hinges with lift-off pins. Use care when opening doors. If doors are lifted off of the hinge pins, use care as the dense insulation used for sound reduction causes the doors to be heavy.

The upper section of the unit contains two 2" x 24" x 30" throwaway filters as standard with every unit. MERV ratings of the filter are available up to MERV13. These filters filter the air used for cooling inside the classroom or structure and should be changed regularly.

If the unit has an air intake vent option installed, two 1" x 12" x 20" filters are located in the lower section of the front doors behind the louvers. These filters help keep the vent option clean and operating properly.

Two washable filters are also installed in the air intake vent option. These should be inspected during servicing and cleaned when necessary. The washable filters are used to remove dirt and dust from outdoor air that is entering the vent area. If at any time these filters are damaged, they must be replaced with Bard-approved filters.



I-TEC Filter Locations:

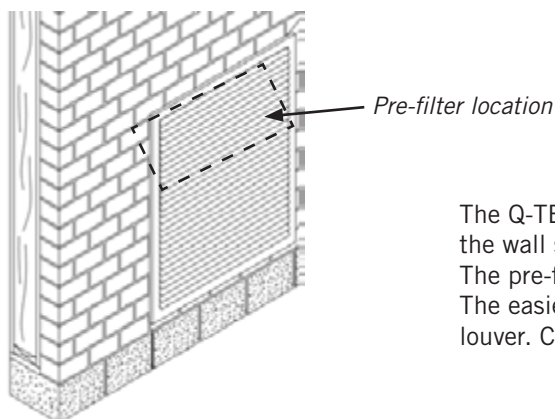
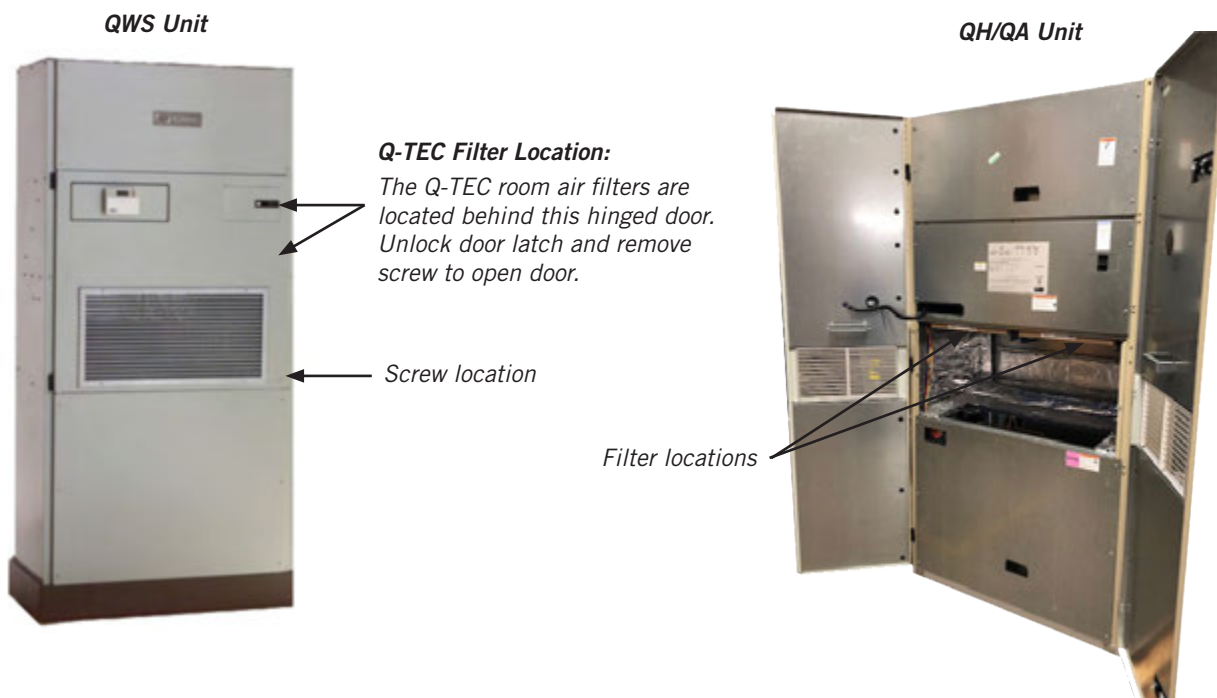
Servicing the filters in your unit will help keep the inside of the unit clean and also the area it is installed in.

The I-TEC product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

Q-TEC Indoor Products – Filters and Filter Servicing

The Q-TEC indoor air conditioners and heat pumps have two room air filters that must be replaced when servicing the unit. Filters play an important part in proper unit operation and prevent dirt and dust buildup inside the Q-TEC and the room the unit is installed in. To access the unit filters, open the front hinged door by unlocking the door latch. The door folds outward and is on hinges with lift-off pins. Use care when opening doors. If the door is lifted off of the hinge pins, use care as the insulation and louver grille cause the door to be heavy.

The upper section of the Q-TEC contains two 1" throwaway filters standard with every unit. These filters filter the air used for cooling inside the classroom or structure and should be changed regularly.



The Q-TEC will have a permanent pre-filter installed inside the wall sleeve if air intake vent options are inside the unit. The pre-filter must be inspected and cleaned when necessary. The easiest way to remove the pre-filter is through the outdoor louver. Clean the pre-filter with soapy water.

The Q-TEC product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

All Products – Coil Cleaning

The outdoor coil must be kept clean and free of any airborne debris, which can accumulate over time. Large volumes of air are circulated over the coil, and airborne debris such as lint, dust, materials shed from trees, paper or other types of airborne material that can become airborne can collect on the entering coil surface. The outdoor coil must dissipate heat during the cooling mode and for a heat pump, also absorb heat during the heating mode. If the coil is dirty and matted with debris, the airflow across the coil will be reduced causing poor performance, increased operating run time and associated utility bills and in extreme conditions can shorten the useful life of the equipment.

Depending on the specific equipment involved, the surface that can accumulate debris can be on the opposite side that is exposed to view when standing in front of the machine. Closely review the machine when operating to see which direction or path the airflow takes as it moves through the machine. If the air inlet side of the coil is hidden, try to observe the back (hidden) side by looking into the side grilles, using a flashlight if necessary. While the user of the equipment needs to be aware of the potential of clogging of the outdoor coil surface, actual cleaning of the outdoor coil should not be attempted under most circumstances. If the user should attempt this procedure on their own, never do so without first having the installing dealer or service company instruct you in the proper procedure and technique.

WARNING: Do not open or enter the equipment without first turning off the electrical service disconnect. Failure to do so can result in personal injury due to moving parts and/or electric shock hazard resulting in death.

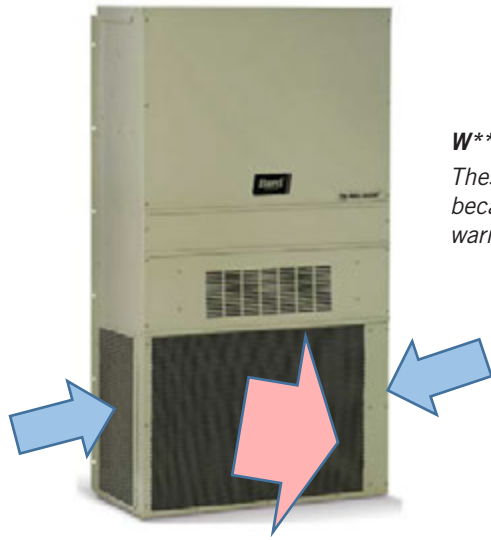
Other conditions that can cause reduction of airflow across the outdoor coil are flowers, shrubbery or other growth too near the outdoor coil air inlet and outlet openings. These living things, especially as they mature and grow, will be just as effective in blocking the airflow and create the same problems as will stacking things against the equipment. These conditions can be easily managed and controlled by the user, as they do not require actually entering into the equipment enclosure, which should only be done by qualified service technicians.

Equipment Corrosion Protection

1. Avoid having any lawn sprinkler spray directly on the equipment, especially if from a brackish water source.
2. In coastal areas or corrosive environments, locate equipment as far away from the corrosion source as feasible. Units exposed directly to salt spray should be coated by a secondary protective coating operation to reduce corrosion on copper tubing, fasteners, motors and other metal parts. Coils should be ordered with a corrosion protective coating. Contact Bard for coating options.
3. Frequent cleaning and waxing of the cabinet using a good automobile polish will help extend its original appearance and protect painted surfaces.

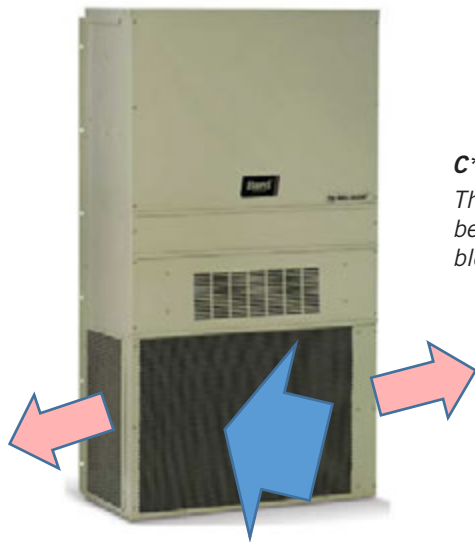
The product installation instructions contain additional information regarding unit coil cleaning. This information may be accessed at www.bardhvac.com.

All Products – Condenser Airflow



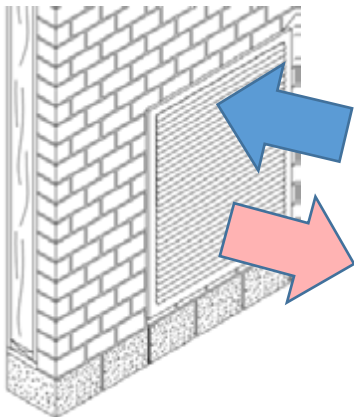
WA, W**H, T**H, T**S, W*RV Wall Mount Units:**

These units are called “blow through condenser airflow” units because they draw cool outdoor air from the sides and blow the warm condenser air exiting the coil through the front grille.



CH Wall Mount Units:**

These units are called “draw through condenser airflow” units because they draw cool outdoor air in the front through the coil and blow the exiting warm condenser air through the unit sides.



I-TEC and Q-TEC Units:

These units draw the cool outdoor air through the top section of the wall louver and exhaust the warmer condenser air out of the lower section of the louver. I-TEC units also draw a small amount of air through the outer right and left side of the louver.

Unit Operation

Air-to-Air Cooling Products (Air Conditioners)

The cooling mode operates similar to a refrigerator, removing heat from inside the conditioned space and rejecting it outside of the space being controlled. There are three main parts of the system:

1. The evaporator (indoor) coil where cold refrigerant absorbs heat from the air, which circulates from the conditioned space through the machine and is returned to the space at a lower temperature and with some of the humidity (moisture) removed. The moisture exits through a condensate drain system. A motor/blower assembly moves the indoor air through the system.
2. The compressor, which is a sealed pump that moves the refrigerant through the system.
3. The condenser (outdoor) coil where the heat that was absorbed from the indoor space is discharged to the outdoor environment. A motor/fan system moves the outdoor air across the condenser coil. A properly sized air conditioner cannot cool a structure off rapidly and instead will pull down the temperature slowly. It also will remove a certain amount of moisture (humidity) from the circulating airstream in the process. It may take several hours to pull down a hot, moist building or structure on initial startup or anytime the system has been turned off for a long period of time. It is generally best to set the thermostat at a comfortable temperature and let it control the system as needed, rather than turning it on and off.

Moisture (humidity) removal with a conventional air conditioner (cooling) unit, or heat pump when operating in the cooling mode, is not directly controlled and is a by-product of the unit operating to control temperature in response to the temperature (thermostat) control device. **Oversized equipment can easily control temperature but will have short run-times, thus reducing its ability to remove moisture from the circulating air stream.**

There are also many additional influences that can affect humidity levels within the conditioned space such as laundry appliances, cooking, showers, exhaust fans and any other items that can generate moisture or affect its removal from the space. Therefore, while operation of the air conditioning or heat pump system in the cooling mode will remove some amount of moisture as it reduces the air temperature, precise humidity regulation in the conditioned space cannot be assured and additional equipment such as a dedicated dehumidifier may be required.

Air-to-Air Cooling and Heating Products (Heat Pumps)

A heat pump is a refrigerant-based system that has additional components and controls that both heats and cools using a compressor for both modes of operation. Most heat pumps will also be equipped with some amount of electric heat to supplement the heating capacity of the compressor system on an as-needed basis. This operation is entirely automatic and is controlled by the indoor thermostat and possibly also an outdoor thermostat.

Cooling Mode

The cooling mode of a heat pump is exactly the same as that described for an air conditioner in the above section.

Heating Mode

The system operates in reverse cycle, meaning that it absorbs and moves heat from the outdoors and transfers it indoors to be rejected into the circulating air stream. Even though it seems cold to humans, there is usable heat that can be extracted efficiently from the outdoor air down to 0°F, although the colder the air is there is less heat to extract and the operating efficiency is diminished.

Defrost Cycle

When operating in the heating mode, the outdoor coil will be colder than the outdoor air that is forced over it by the fan system. When the outdoor air temperature is above approximately 40°F, moisture can accumulate on the coil and it will drain down and out the base of the unit. As the air temperature gets below approximately 40°F, the coil temperature will start to drop below 32°F, and frost or ice will begin to form on the coil.

An automatic defrost system keeps track of system run time when the outdoor coil temperature is in the freezing zone and will initiate a defrost cycle at the appropriate time. The unit continues to operate during the defrost cycle, but the outdoor fan motor will stop and the reversing valve will shift positions to flow hot refrigerant gas through the outdoor coil to melt the accumulated frost. Water will start to drain freely from the unit, and steam may be emitted from the unit.

The length of the defrost cycle will vary depending upon actual outdoor temperature, humidity levels and amount of accumulated frost. It could range from 1-2 minutes up to but not exceeding 8 minutes. When the defrost cycle

terminates, the reversing valve will shift back to heating mode and the outdoor fan will restart. There is typically a large puff of steam emitted as the fan restarts. When the heat pump shifts from cool to heating mode, from heating to cooling mode and especially during defrost cycles, there will be a pressure transfer sound heard as the reversing valve redirects the flow of refrigerant. This is commonly described as a hissing noise and is a normal sound for this type equipment.

For air source heat pumps, it is important to keep heavy snow from accumulating around the machine to the point of blocking the inlet and outlet openings to the outdoor coil section. For wall mounted or other equipment that is elevated, this should not be a factor; but for equipment installed on or near the ground, this can be an issue in areas prone to heavy and/or blowing snow. The air source heat pump cannot operate effectively and efficiently when snowbound just as a car cannot function well in heavy snow conditions.

Water-to-Air Cooling and Heating Products (Geothermal Heat Pumps)

These types of heat pumps are also commonly referred to as water source or geothermal systems. Just like the air source heat pump, they are refrigerant-based systems that both heat and cool using a compressor for both modes of operation. The primary difference is that the system uses water or antifreeze-protected water solution instead of an air-cooled outdoor heat transfer coil, and there is no outdoor motor/fan system but instead a water pump to provide adequate water flow to the system.

Cooling Mode

The cooling mode of a water-to-air heat pump is exactly the same as that described for an air conditioner in the previous Air Conditioner section, except that the outdoor coil uses water instead of air for the heat transfer medium.

Heat Mode

The system operates in reverse cycle, meaning that it acquires and moves heat from the water supply flowing through the water to refrigerant coil and transfers it indoors to be rejected into the circulating air stream.

Most water-to-air heat pumps (but not all) will also be equipped with some amount of electric heat to supplement the heating capacity of the compressor system on an as-needed basis. This operation is entirely automatic and is controlled by the indoor thermostat.

Because of the design of water-to-air heat pumps and the water temperatures involved, no defrost system is required as in air-to-air heat pumps.

Water Supply Systems

Depending upon the type and application of the water-to-air heat pump, the water side of the system could be one of the following:

1. Individual closed loop buried in a trench or vertical bore hole(s).
2. Individual loop submerged in a pond.
3. Water supplied from a well and discharged into pond, stream, ditch or another well.
4. Water supplied from a boiler/tower system, typically only in larger multi-unit installations.

Dehumidification and Ventilation Operation

Dehumidification (Air-to-Air or Water-to-Air Systems)

Many Bard systems, typically those used in schools or other commercial applications, have a dedicated dehumidification capability by having a special additional refrigeration circuit (factory-installed option only) in addition to the basic system. These special systems, sometimes also referred to as hot gas reheat, are designed to control humidity on demand from a humidity controller much the same as the basic cooling and/or heating system is controlled by a wall thermostat. Consult your installer and/or service company to determine if your installation has any of these devices and for any instructions or maintenance requirements you should be aware of as the user.

Ventilation Options (Air-to-Air or Water-to-Air Systems)

All Bard systems are available with factory-installed vent options. Most units can have ventilation field installed after unit installation.

Ventilation has multiple purposes:

- Outside air intake for occupied structures
- Positive pressurization
- Energy savings when outdoor air can be used for cooling
- Agricultural use of bringing in outdoor air and exhausting room air
- Equipment and electronics ventilation

Review product specifications and manuals for more details regarding available ventilation options and features. Product documentation is shipped with the product and also available at www.bardhvac.com.

All Units – Troubleshooting

Your Bard product is made to operate for many trouble-free years if installed properly and maintenance practices are followed. Be sure to verify that all filters are clean, and condenser coils are free of dirt and debris. Often these items may look clean at first, but upon closer inspection, show signs of dirt and debris build-up. New units on new structures may have dirt and dust in filters from the building construction process.

Thermostats and unit controllers often contain vent holes for proper sensor measurement inside the device. Make sure the thermostat or controller are not full of dirt and dust from building construction or years of use.

Verify all requirements in the installation instructions and specification sheets are met. Unit voltages, airflow clearance requirements and clean unit power without brownouts or spikes play a critical role in unit performance. If 208 VAC power is supplied to the unit, the 208V tap must be used on the 24 VAC transformer located inside the control panel. Common sense must also be used when installing the unit in an environment that may put the unit at risk of improper operation.

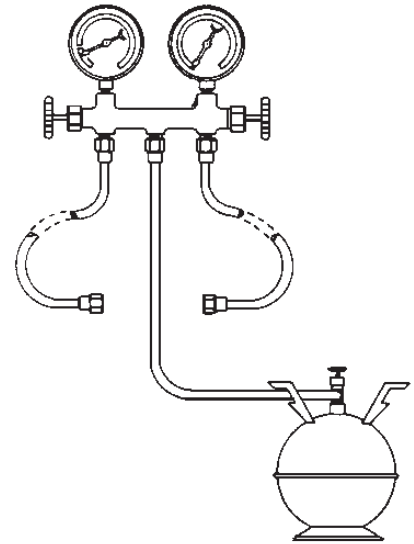
Helpful Hints and Good Operating Practices

The following information will help you enjoy the full comfort and benefits of your Bard cooling and heating system, maximize the performance and efficiency and help extend the life of your system.

1. Always keep the equipment in peak operating condition with routine scheduled maintenance, especially for the air filters, and to assure a clean outdoor coil.
2. For most efficient operation, set the thermostat at the temperature you prefer and then let it take control. If any changes to the settings are required, they should be made in small adjustments and the system be allowed time to respond. Rapid changes either up or down should not be done.
3. Setting the thermostat very high does not make the system heat faster and setting it very low does not make it cool faster.
4. It is not recommended to turn the system "Off" then back "On" when you need it. This can allow temperature and humidity to build up in warm weather conditions and force the system to run continuously to try and catch up. If the building is to be unoccupied for a lengthy period, it is best to adjust the thermostat to a reasonable higher (or lower—depending on the season) setting rather than turning it completely off. Upon return, the inside conditions will not be totally out of control and recovery time to desired conditions would be much shorter.
5. Airflow inside the room or building is very important. Keep all supply registers open and all returns free and unrestricted. Avoid placing objects in areas that will hinder unit airflow. The heating and cooling system is designed to have a certain amount of airflow for proper operation. Therefore, closing off registers, in unused rooms as an example, could reduce airflow below acceptable levels and should not be done without review by your service company who can assess the overall situation and advise you accordingly.
6. Heat pumps, especially air-to-air heat pumps, may have the system (compressor) run continuously at lower outdoor temperatures, and this is normal. The heat pump (compressor) mode is controlled by the beginning stages of the thermostat and delivers the most efficient heat. As the outdoor temperature drops off, the heat pump mode heat will also diminish (because there is less heat in the outdoor air to absorb) and must be supplemented by additional electric heat stages, which are not as efficient as the heat pump. The thermostat automatically controls everything and the backup heat will only operate on demand as needed to maintain the desired temperature.
7. The thermostat or controller is the user's primary connection to the system so it is very important to have a thorough understanding of how it works and how to use it properly. Have your installer or service company explain and demonstrate proper operation of the controls.
8. Make sure you thoroughly understand how the heating and cooling system itself is intended to operate and what to expect from it. Have your installer or service company explain and demonstrate proper operation of the heating and cooling system.

SERVICING PROCEDURE

R-410A LEAK TEST EVACUATION CHARGING



Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

Since 1914...Moving ahead, just as planned.

Manual No.: 2100-479
Supersedes: NEW
File: Volume I, Tab 1
Date: 03-08-07

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GENERAL



WARNING

The oils used with R-410A refrigerant are hygroscopic and absorb water from the atmosphere readily. Do not leave systems open to the atmosphere for more than 5 minutes. If the system has been open for more than 5 minutes, change the filter dryer immediately before evacuation. Then recharge the system to the factory specified charge.

Recovery equipment rated for R-410A refrigerant

R-410A has an ozone depletion potential of zero, but must be reclaimed due to its global warming potential.

The gauge manifold set is specially designed to withstand the higher pressure associated with R-410A. Manifold sets are required to range up to 800 psig on the high side and 250 psig on the low side with a 250 psig low side retard.

All hoses must have a service rating of 800 psig. (This information will be indicated on the hoses.)

Vacuum Pump and micron gauge must be used when evacuating a system to 500 microns.

Leak Detectors

An electronic leak detector capable of detecting HFC refrigerant can be used with R-410A refrigerant.

GAUGE MANIFOLD



WARNING

Gauge manifold must be suitable for use with R-410A refrigerant and POE oils.

A necessary instrument in checking and serving air conditioning and heat pump equipment is the gauge manifold. Its purpose is to determine the operating refrigerant pressures in order for the serviceman to analyze the condition of the system.

The valving on the manifold is so arranged that when the valves are closed (front-seated) the center port on the manifold is closed to the gauges and gauge ports. With the valves in the closed position, the gauge ports are still open to the gauges, permitting the gauges to register system pressures. Opening either valve opens the center port to that side of the manifold and system.

ATTACHING GAUGE MANIFOLD

For leak testing, purging, checking charge, charging liquid or evacuating, connect high pressure side of gauge manifold to Schrader valve on liquid or discharge line. Connect suction side of gauge manifold to Schrader valve on suction line. On heat pumps the suction line is between compressor and reversing valve.

ATTACHING MANIFOLD HOSE TO SCHRADER VALVE



WARNING

As a safety measure, it is wise to detach refrigerant hoses at the lowest pressure readings on the system. To do this:

- A. Put high pressure hose "B" on first. (Unit should not be running.)
- B. Put low pressure hose "A" on second. (Unit should be running.)

1. Remove cap from valve.
2. Make sure gauge manifold valves are closed.
3. If hose does not have an unseating pin, a number 395 Superior or equivalent unseating coupler must be used.
4. Make sure coupler is lined up straight with Schrader valve. Screw coupler on to valve.
5. Open gauge manifold valve slightly and purge air from hose with refrigerant.
6. Read the suction pressure on compound gauge and heat pressure on pressure gauge.
7. To remove, push end of hose tight against end of Schrader valve and hold in place while quickly unscrewing coupler nut from Schrader valve.
8. Remove coupler from Schrader valve. Replace caps on valve.

Leak Test

1. Remove gauge port cap from suction and liquid service valve ports and attach manifold gauge hoses. Connect an upright R-410A drum to center port of gauge manifold. Open refrigerant drum valve and manifold high pressure gauge valve to pressurize system to a positive pressure with refrigerant vapor. Pressurize the complete system with dry nitrogen, or CO2 until the pressure reaches 200 psig. **Do not** exceed 250 psig.
2. Close manifold high pressure gauge valve. Check all soldered joints, including those on the evaporator coil with an Electronic Leak Detector suitable for use with HFC refrigerants or R-410A. If a leak is found which requires soldering, pressure in the system must be bled off since it is impossible to solder with unit pressurized. Be sure all leaks are located and marked before bleeding pressure from system.

3. Close drum valve and disconnect from center port. Release nitrogen or CO2 into the atmosphere through suction line of gauge manifold.
4. Correct any leaks and recheck. When leaks, if any, have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.
5. Change the filter dryer. When leaks, if any, have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.

EVACUATION

Evacuation

An evacuation to 500 microns is usually sufficient to remove moisture from a system using R-22 and mineral oil lubricant. A 500 micron evacuation, however, will not separate moisture from Polyol Ester oil (POE) in R-410A systems.

In addition to a 500 micron evacuation, the liquid line filter dryer (R-410A compatible) must be replaced any time the system is open. When removing a filter dryer from a system, do not use a torch; use a tubing cutter to avoid releasing moisture back into the system.

Older R-22 leak detectors, as well as halide torch leak detectors, will not detect leaks in R-410A systems. Never use air and R-410A to leak check, as the mixture may become flammable at pressures above 1 atmosphere. A system can be safely leak-checked by using nitrogen or a trace gas of R-410A and nitrogen.

Remember: *Always use a pressure regulator with nitrogen and a safety valve down stream - set at no more than 150 psig.*

1. Evacuate system to less than 500 microns, using a good vacuum pump and an accurate high vacuum gauge. Operate the pump below 500 microns for 60 minutes and then close valve to the vacuum pump. Allow the system to stand for 30 additional minutes to be sure a 500 micron vacuum or less is maintained.



WARNING

At no time use the compressor to evacuate the system or any part of it.

2. Disconnect charging line at vacuum pump and connect to refrigerant supply. Crack the cylinder valve and purge charging line at center on manifold. Then close cylinder valve.
3. The system is now ready for the correct operating charge of Refrigerant R-410A.

R-410A System Charging

Even though R-410A has a very small fractionation potential, it cannot be ignored completely when charging. To avoid fractionation, charging of an air conditioner or heat pump system incorporating R-410A **shall be done with “liquid”** to maintain optimum system performance. To insure that the proper blend composition is charged into the system, it is important that liquid only be removed from the charging cylinder. Some cylinders supplied by manufacturers have dip tubes, which allow liquid refrigerant to be removed from the cylinder when it is in the upright position. Cylinders without dip tubes have to be tipped upside down in order for liquid to be removed. The Service Technician must differentiate between which type of charging cylinder they are using to avoid removing vapor refrigerant instead of liquid refrigerant to avoid fractionation and for safety concerns.

Connect the gauge manifold to the high and low side. Allow liquid to enter the high side only. The high side will hold 80-100% of the total charge. When liquid stops flowing, close high side port. The remainder of the charge will be added to the low side. Keep in mind two issues: first, never start the compressor with less than 55 psig of suction pressure. Secondly, make sure the liquid is throttled, thus vaporized into the low side of the system to avoid compressor damage. A throttling valve can be used to insure that liquid is converted to vapor prior to entering the system. Proper manipulation (restricting) of the manifold gauge set can also act as a throttling device to insure liquid is not entering the compressor.

CHARGING

1. **Single Package Units**—Refer to the unit serial plate for the full operating charge.

PRELIMINARY CHARGING STEPS

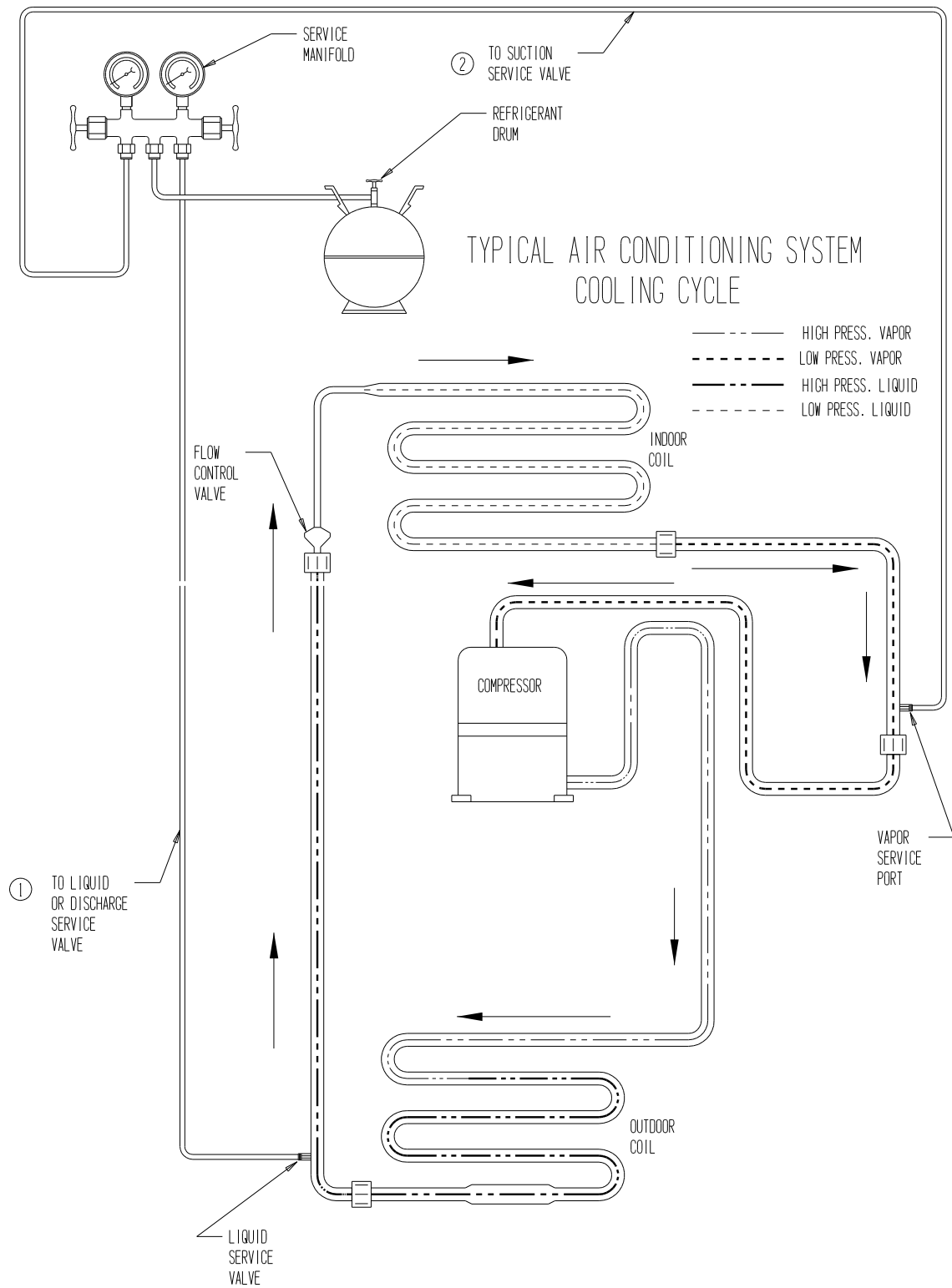
If the system has been open to the atmosphere, the filter dryer should be replaced and then evacuated. Then proceed as follows:

1. Attach a drum of proper, clean refrigerant to the center port of the charging manifold with one of the charging hoses.
2. Attach a second charging hose to the suction gauge (low pressure) side of the gauge manifold.
3. Remove the cap from the suction line valve.
4. Loosely attach the suction gauge hose to the line valve. Open the valve on the refrigerant drum and the suction valve on the charging manifold slightly to purge the air from the manifold and hoses before tightening the fitting.
5. Attach the third hose to the high pressure side of the manifold and the liquid line valve. Repeat steps 3 and 4 above.

CHARGING THE SYSTEM BY WEIGHT

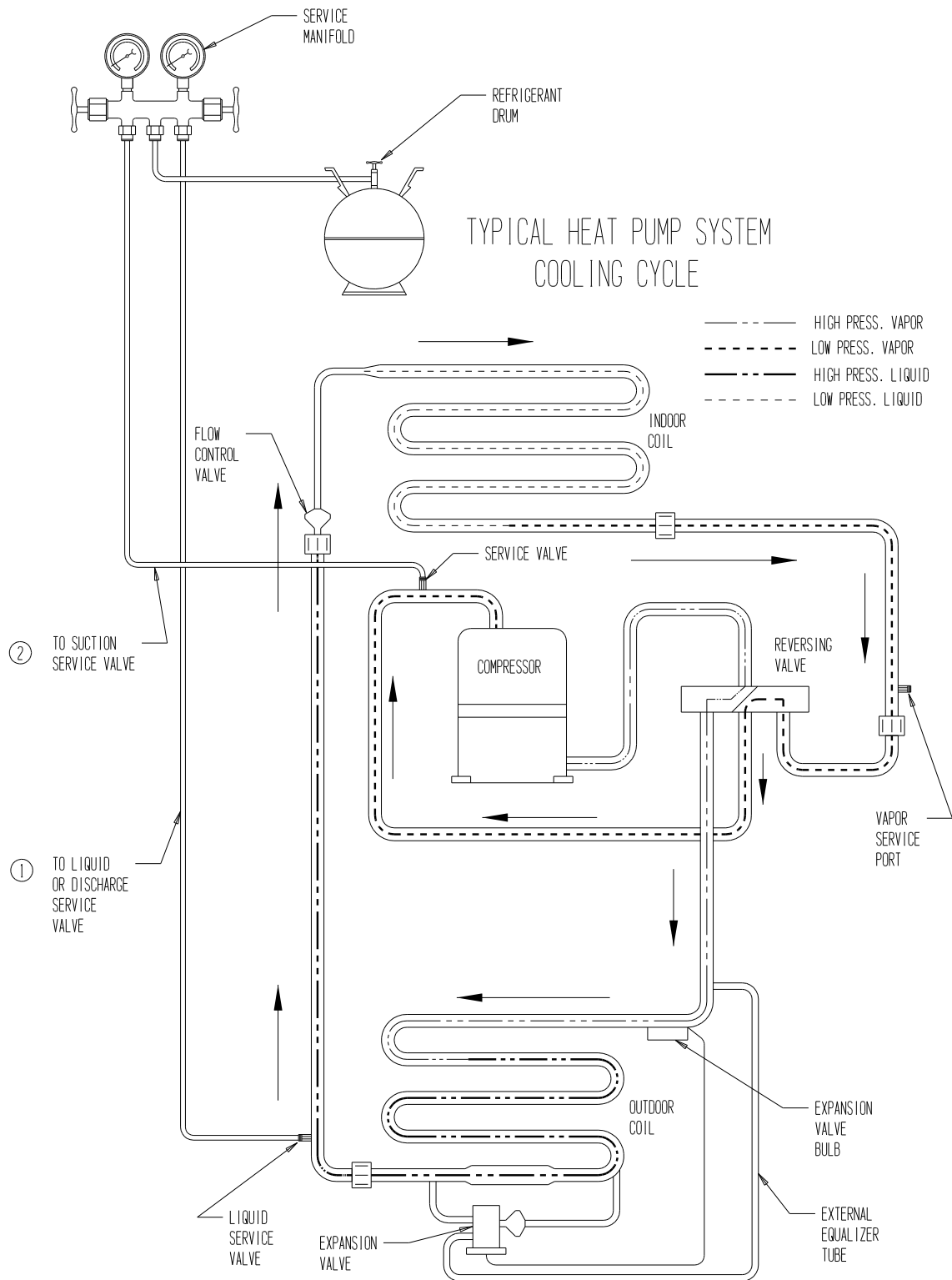
1. Connect manifold as instructed.
2. Place refrigerant drum upright on scale and determine exact weight of the refrigerant and cylinder.
3. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder liquid valve and allow pressure in system to balance with pressure of cylinder or 80% of charge is in the unit - whichever comes first.
4. When there is approximately an 80% charge, front seat (close) the discharge manifold valve and let the system stabilize for about five minutes.
5. Start compressor by setting thermostat.
6. Finish charging with liquid by cracking the suction valve. Open the manifold low pressure valve to allow refrigerant to flow into the system. Throttle the manifold valve to keep pressure about 100 psig for R-410A.
7. When the correct weight of refrigerant has been added to the unit, close refrigerant cylinder valve and allow unit to run for 30 minutes. Refer to Start-Up Procedure and Check List for further start-up details.
8. Front seat gauge manifold valves, disconnect charging and gauge hoses and replace all valve caps.

FIGURE 1
TYPICAL AIR CONDITIONING SYSTEM COOLING CYCLE



MIS-369

FIGURE 2
TYPICAL HEAT PUMP SYSTEM COOLING CYCLE



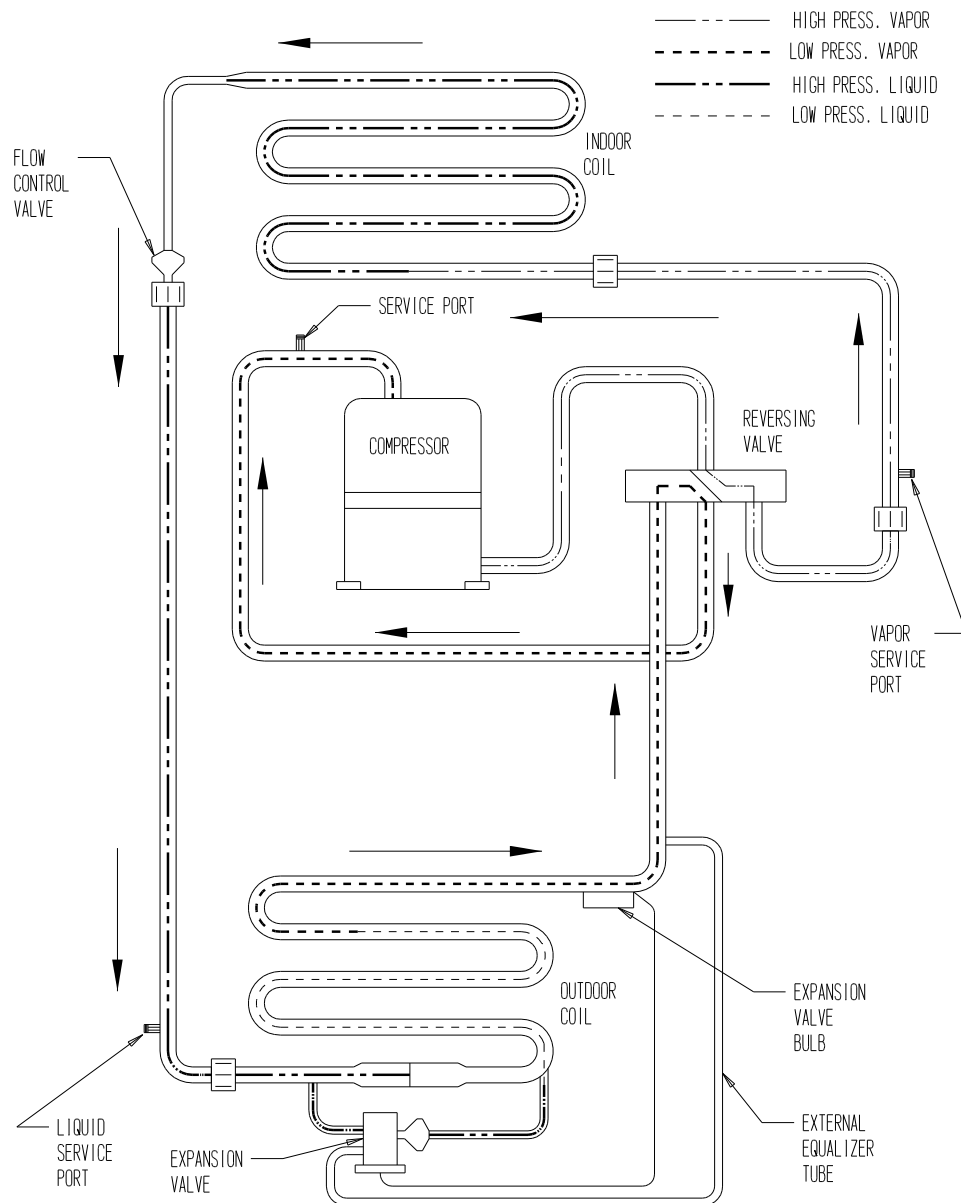
MIS-368



WARNING

To speed refrigerant flow, it may be necessary to place refrigerant drum in a pan of warm water (not greater than 130°F). Remember to either consider the total weight of the pan of water or remove the drum for weighing frequently to keep track of the charging process.

**FIGURE 3
HEATING CYCLE**



MIS-289

TROUBLESHOOTING THE MECHANICAL SYSTEM

AIR CONDITIONING AND HEAT PUMP — COOLING

LOW SUCTION—LOW HEAD PRESSURE

1. Restricted airflow over indoor coil.
2. Defective indoor fan motor.
3. Low indoor temperature
4. Iced indoor coil.
5. Restricted liquid line, dryer, metering device, etc.
6. Low charge.
7. Low ambient entering air temperature. (Low entering water temperature to water coil.①)

HIGH SUCTION—LOW HEAD PRESSURE

1. Defective or broken valves.
2. IPRV valve open.
3. Defective reversing valve.

LOW SUCTION—HIGH HEAD PRESSURE

1. Partial restriction and then overcharged.

HIGH SUCTION—HIGH HEAD PRESSURE

1. High entering outdoor air temperature. (High entering water temperature.①)
2. Low airflow outdoor coil. (Low water flow.①)
3. Overcharged.
4. Air in system.
5. Restricted outdoor coil. (Restricted water coil.①)
6. High indoor air temperature.

① Water source heat pump.

HEAT PUMP — HEATING

LOW SUCTION—LOW HEAD PRESSURE

1. Restricted airflow through outdoor coil. (Restricted water flow through water coil.①)
2. Defective outdoor motor. (Defective water pump.①)
3. Low outdoor air temperature. (Low water temperature.①)
4. Frozen outdoor coil. (Frozen water coil.①)
5. Restricted liquid line, dryer, metering device, etc.
6. Low charge.
7. Low indoor air temperature.

HIGH SUCTION—LOW HEAD PRESSURE

1. Defective or broken valves.
2. IPR valve open.
3. Defective reversing valve.

LOW SUCTION—HIGH HEAD PRESSURE

1. Partial restriction and then overcharged.

HIGH SUCTION—HIGH HEAD PRESSURE

1. High entering outdoor air temperature. (High entering water temperature.①)
2. Low indoor airflow.
3. Overcharged.
4. Air in system.
5. Restricted air coil.
6. High indoor air temperature.

① Water source heat pump.

Manual 2100-479
Page 10 of 11

Manual 2100-479
Page 10 of 11

TROUBLESHOOTING CHART FOR AIR TO AIR HEAT PUMPS

[illegible]

REPLACEMENT PARTS MANUAL

Wall-Mounted Variable Capacity Environmental Control Unit

Models:

W6RV2-S W6LV2-S
W6RV2-T W6LV2-T

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General Notes

- Revised and/or additional pages may be issued from time to time.
- A complete and current manual consists of pages shown in the following contents section.

Important

- Contact the installing and/or local Bard distributor for all parts requirements. Make sure to have the complete model and serial number available from the unit rating plates.

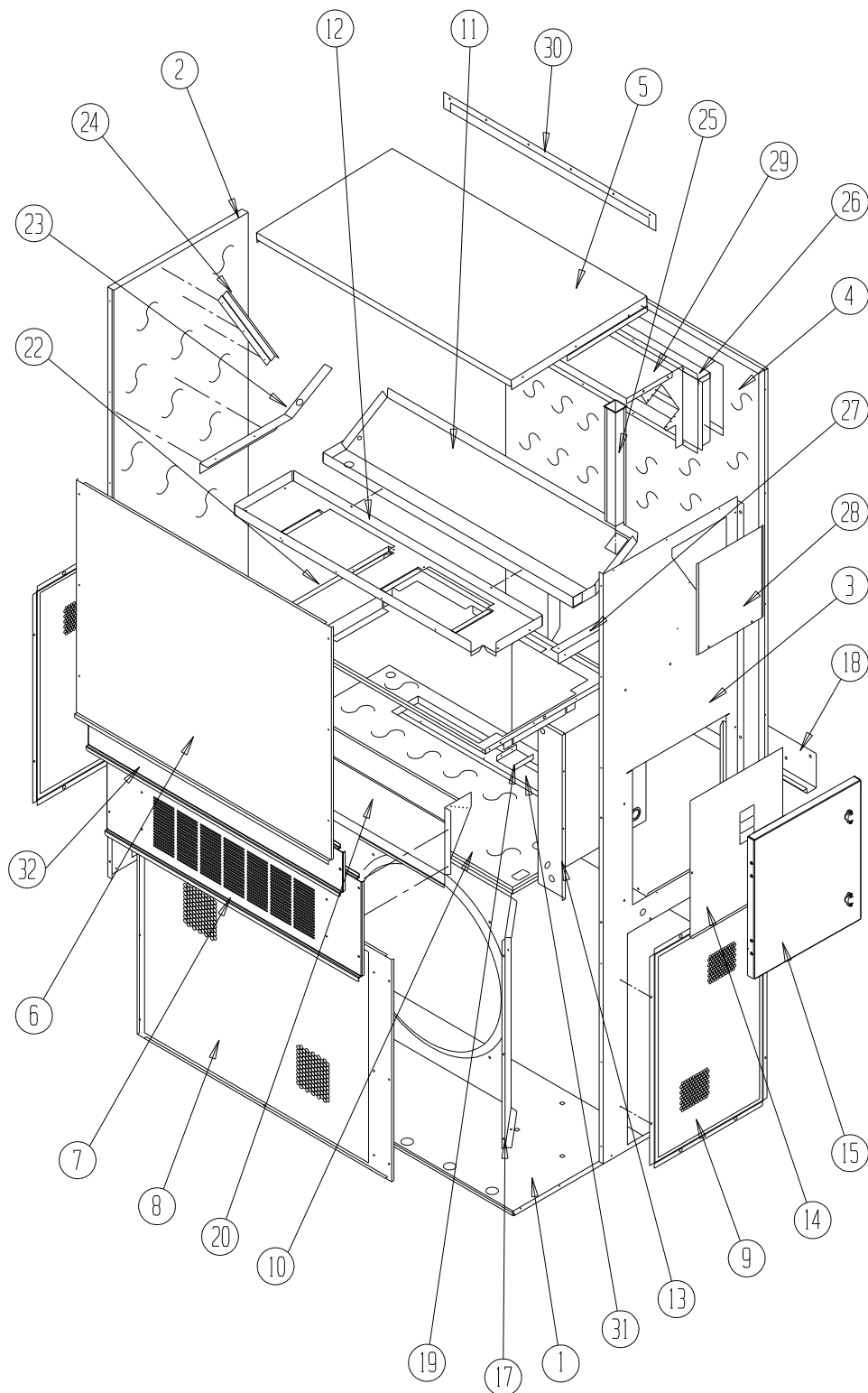


Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 2110-1418N
Supersedes: 2110-1418M
Date: 12-22-23

CABINET COMPONENTS – RIGHT (EXTREME DUTY DOOR)



SEXP-734

CABINET COMPONENTS – RIGHT (EXTREME DUTY DOOR)

Drawing No.	Part No.	Description	W6RV2-S	W6RV2-T
1	S127-425	Lower Base	X	X
1	S127-430 ③	Lower Base	X	X
2	S501-819-* ①	Left Side	X	X
2	S501-822 ②	Left Side	X	X
2	S501-820 ③	Left Side	X	X
3	S501-861-* ①	Right Side	X	X
3	S501-862 ②	Right Side	X	X
3	S501-863 ③	Right Side	X	X
4	S508-129	Back	X	X
4	S508-229 ②	Back	X	X
4	S508-228 ③	Back	X	X
5	S507-307-* ①	Top	X	X
5	S507-309 ②	Top	X	X
5	S507-310 ③	Top	X	X
6	S515-230-* ①	Upper Front	X	X
6	S514-231 ②	Upper Front	X	X
6	S514-232 ③	Upper Front	X	X
7	S553-522-* ①	Vent Option Door	X	X
7	S552-525 ②	Vent Option Door	X	X
7	S553-527 ③	Vent Option Door	X	X
8	118-052-* ①	Condenser Grille	X	X
8	118-080 ②	Condenser Grille	X	X
8	118-078 ③	Condenser Grille	X	X
9	118-058-* ①	Side Grille	2	2
9	118-081 ②	Side Grille	2	2
9	118-079 ③	Side Grille	2	2
10	S521X462	Condenser Partition	X	X
11	S123-125	Drain Pan	X	X
12	121X463	Blower Partition	X	X
13	Control Panel Assy.	See Control Panel Assy. Dwg. & Parts List	X	X
14	S132-114	Control Panel Cover (Inner)	X	
14	S132-344	Control Panel Cover (Inner)		X
15	DDD5A-* ①	Control Panel Cover (Outer)	X	X
15	DDD5A-S ④	Control Panel Cover (Outer)	X	X
17	125-029	Fan Shroud	X	X
17	125-059 ③	Fan Shroud	X	X
18	113-140	Bottom Mounting Bracket	X	X
19	S137-1006	Fill	X	X
20	BFAD-5	Fresh Air Damper Assembly	X	X
22	S919-0007	Filter Tray	X	X
23	105X877	Left Side Support	X	X
24	147-046	Left Evaporator Support	X	X
25	135-128	Raceway	X	X
26	S111X034	Outlet Air Frame Assembly	X	X
27	105X878	Right Side Support	X	X
28	S543-172-* ①	Heater Access Cover Assembly	X	X
28	S543-176 ②	Heater Access Cover Assembly	X	X
28	S543-177 ③	Heater Access Cover Assembly	X	X
29	135-129	Heat Shield	X	X
30	113-150-* ①	Top Rain Flashing	X	X
30	113-359 ③	Top Rain Flashing	X	X
31	S536X610	Condenser Partition Block-Off Plate	X	X
32	S553-521-* ①	Filter Door Assembly	X	X
32	S552-526 ②	Filter Door Assembly	X	X
32	S553-528 ③	Filter Door Assembly	X	X
NS	105-1302	Grommet Retainer	X	X

① Exterior cabinet parts are manufactured with various paint color options. To ensure the proper paint color is received, include the complete model and serial number of the unit for which cabinet parts are being ordered.

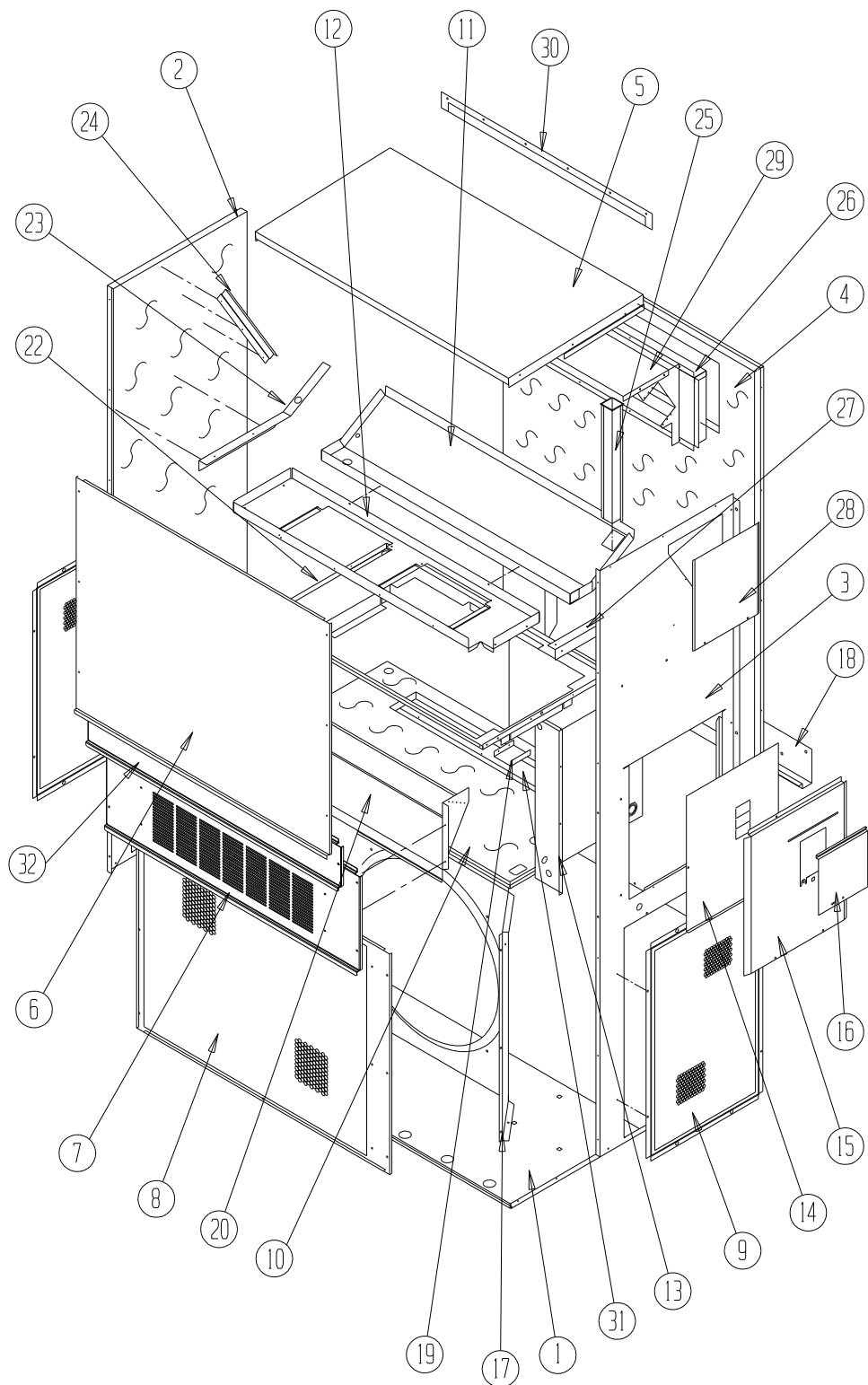
② Exterior cabinet parts are manufactured from aluminum Code "A"

③ Exterior cabinet parts are manufactured from stainless steel Code "S"

④ Exterior cabinet parts are used for both aluminum and stainless steel cabinets

NS – Not Shown

CABINET COMPONENTS – RIGHT (MODERATE DUTY DOOR)



SEXP-735

CABINET COMPONENTS – RIGHT (MODERATE DUTY DOOR)

Drawing No.	Part No.	Description	W6RV2-S	W6RV2-T
1	S127-425	Lower Base	X	X
1	S127-430 ③	Lower Base	X	X
2	S501-819-* ①	Left Side	X	X
2	S501-822 ②	Left Side	X	X
2	S501-820 ③	Left Side	X	X
3	S501-818-* ①	Right Side	X	X
3	S501-823 ②	Right Side	X	X
3	S501-821 ③	Right Side	X	X
4	S508-129	Back	X	X
4	S508-229 ②	Back	X	X
4	S508-228 ③	Back	X	X
5	S507-307-* ①	Top	X	X
5	S507-309 ②	Top	X	X
5	S507-310 ③	Top	X	X
6	S515-230-* ①	Upper Front	X	X
6	S514-231 ②	Upper Front	X	X
6	S514-232 ③	Upper Front	X	X
7	S553-522-* ①	Vent Option Door	X	X
7	S552-525 ②	Vent Option Door	X	X
7	S553-527 ③	Vent Option Door	X	X
8	118-052-* ①	Condenser Grille	X	X
8	118-080 ②	Condenser Grille	X	X
8	118-078 ③	Condenser Grille	X	X
9	118-058-* ①	Side Grille	2	2
9	118-081 ②	Side Grille	2	2
9	118-079 ③	Side Grille	2	2
10	S521X462	Condenser Partition	X	X
11	S123-125	Drain Pan	X	X
12	121X463	Blower Partition	X	X
13	Control Panel Assy.	See Control Panel Assy. Dwg. & Parts List	X	X
14	S132-114	Control Panel Cover (Inner)	X	
14	S132-344	Control Panel Cover (Inner)		X
15	S533-225-* ①	Control Panel Cover (Outer)	X	X
15	S533-229 ②	Control Panel Cover (Outer)	X	X
15	S533-230 ③	Control Panel Cover (Outer)	X	X
16	S153-218-* ①	Disconnect Access Door	X	X
16	S153-387 ②	Disconnect Access Door	X	X
16	S153-405 ③	Disconnect Access Door	X	X
17	125-029	Fan Shroud	X	X
17	125-059 ③	Fan Shroud	X	X
18	113-140	Bottom Mounting Bracket	X	X
19	137-209	Fill	X	X
20	BFAD-5	Fresh Air Damper Assembly	X	X
22	131X099	Filter Tray	X	X
23	105X877	Left Side Support	X	X
24	147-046	Left Evaporator Support	X	X
25	135-128	Raceway	X	X
26	S111X034	Outlet Air Frame Assembly	X	X
27	105X878	Right Side Support	X	X
28	S543-172-* ①	Heater Access Cover Assembly	X	X
28	S543-176 ②	Heater Access Cover Assembly	X	X
28	S543-177 ③	Heater Access Cover Assembly	X	X
29	135-129	Heat Shield	X	X
30	113-150-* ①	Top Rain Flashing	X	X
30	113-359 ③	Top Rain Flashing	X	X
31	S536X610	Condenser Partition Block-Off Plate	X	X
32	S553-521-* ①	Filter Door Assembly	X	X
32	S552-526 ②	Filter Door Assembly	X	X
32	S553-528 ③	Filter Door Assembly	X	X
NS	105-1302	Grommet Retainer	X	X

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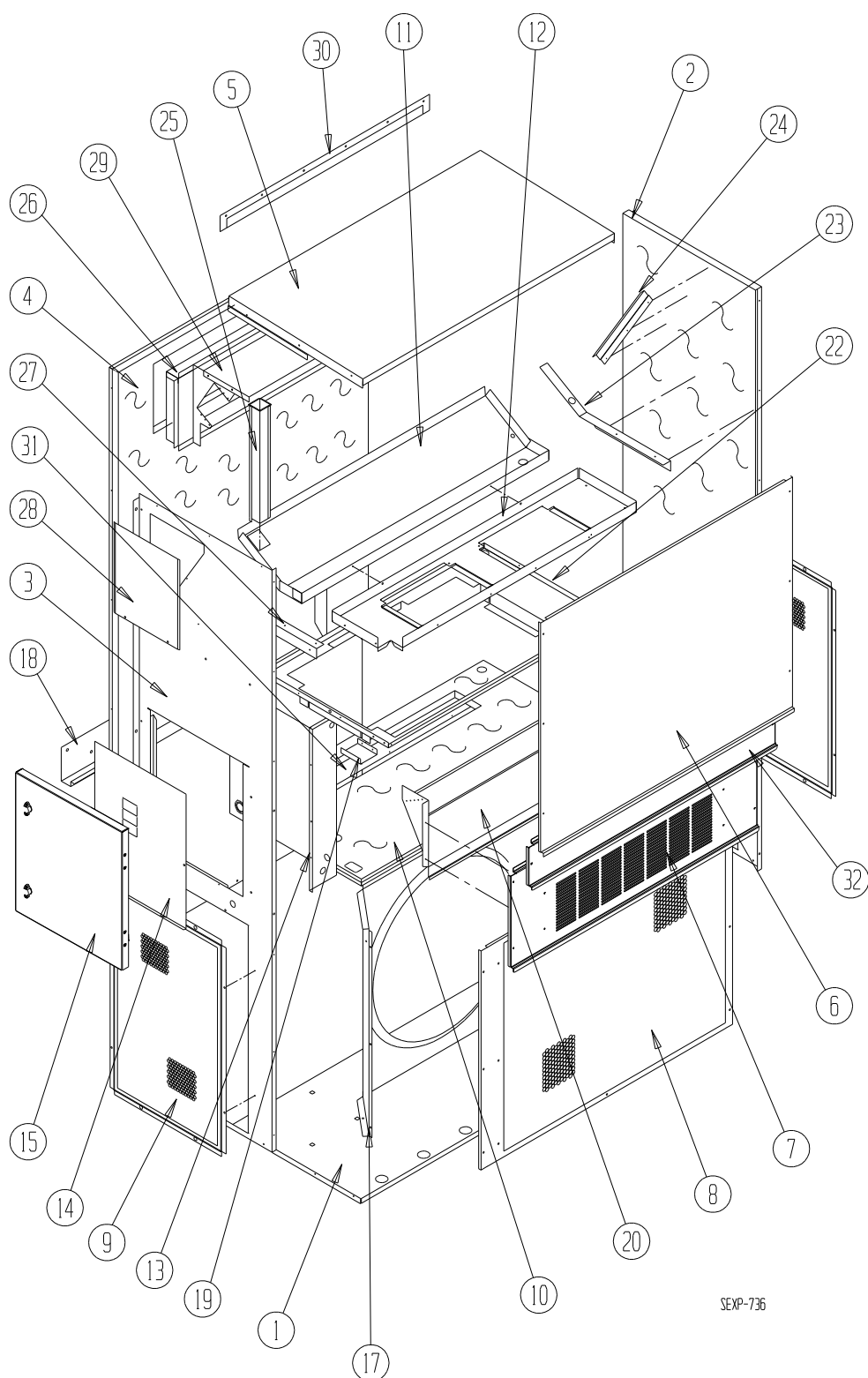
② Exterior cabinet parts are manufactured from aluminum Code "A"

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NS – Not Shown

CABINET COMPONENTS - LEFT (EXTREME DUTY DOOR)



SEXP-736

CABINET COMPONENTS – LEFT (EXTREME DUTY DOOR)

Drawing No.	Part No.	Description	W6LV2-S	W6LV2-T
1	S127Y428	Lower Base	X	X
1	S127Y436 ③	Lower Base	X	X
2	S501-830-* ①	Right Side	X	X
2	S501-835 ②	Right Side	X	X
2	S501Y833 ③	Right Side	X	X
3	S501-864-* ①	Left Side	X	X
3	S501-865 ②	Left Side	X	X
3	S501-866 ③	Left Side	X	X
4	S508-129	Back	X	X
4	S508-229 ②	Back	X	X
4	S508-228 ③	Back	X	X
5	S507-307-* ①	Top	X	X
5	S507-309 ②	Top	X	X
5	S507-310 ③	Top	X	X
6	S515-230-* ①	Upper Front	X	X
6	S514-231 ②	Upper Front	X	X
6	S514-232 ③	Upper Front	X	X
7	S553-522-* ①	Vent Option Door	X	X
7	S552-525 ②	Vent Option Door	X	X
7	S553-527 ③	Vent Option Door	X	X
8	118-053-* ①	Condenser Grille	X	X
8	118-082 ②	Condenser Grille	X	X
8	118-078 ③	Condenser Grille	X	X
9	118-058-* ①	Side Grille	2	2
9	118-081 ②	Side Grille	2	2
9	118-079 ③	Side Grille	2	2
10	S521Y462	Condenser Partition	X	X
11	123-137	Drain Pan	X	X
12	121Y463	Blower Partition	X	X
13	Control Panel Assembly	See Control Panel Assembly Drawing and Parts List	X	X
14	S133-114	Control Panel Cover (Inner)	X	
14	S132-349	Control Panel Cover (Inner)		X
15	DDD5L-* ①	Control Panel Cover (Outer)	X	X
15	DDD5L-S ④	Control Panel Cover (Outer)	X	X
17	125-029	Fan Shroud	X	X
17	125-059 ③	Fan Shroud	X	X
18	113-140	Bottom Mounting Bracket	X	X
19	S137-1006	Fill	X	X
20	BFAD-5	Fresh Air Damper Assembly	X	X
22	S919-0010	Filter Tray	X	X
23	105Y878	Left Side Support	X	X
24	147-046	Left Evaporator Support	X	X
25	135-128	Raceway	2	2
26	S111Y034	Outlet Air Frame Assembly	X	X
27	105Y877	Right Side Support	X	X
28	S543-172-* ①	Heater Access Cover Assembly	X	X
28	S543-176 ②	Heater Access Cover Assembly	X	X
28	S543-177 ③	Heater Access Cover Assembly	X	X
29	135-129	Heat Shield	X	X
30	113-150-* ①	Top Rain Flashing	X	X
30	113-359 ③	Top Rain Flashing	X	X
31	S536Y610	Condenser Partition Block-Off Plate	X	X
32	S553-521-* ①	Filter Door Assembly	X	X
32	S552-526 ②	Filter Door Assembly	X	X
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NS	105-1302	Grommet Retainer	X	X

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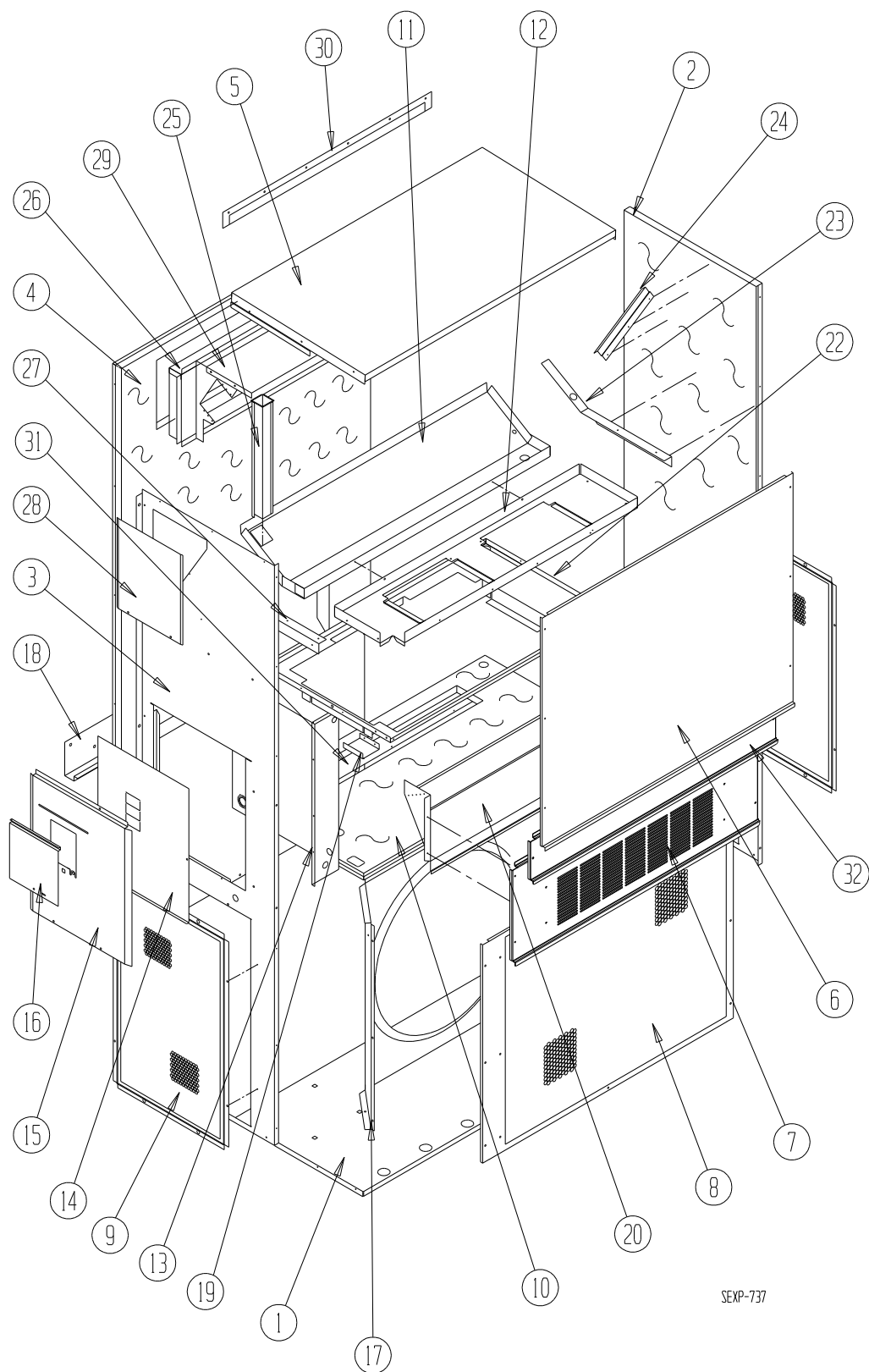
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CABINET COMPONENTS - LEFT (MODERATE DUTY DOOR)



SEXP-737

CABINET COMPONENTS – LEFT (MODERATE DUTY DOOR)

Drawing No.	Part No.	Description	W6LV2-S	W6LV2-T
1	S127Y428	Lower Base	X	X
1	S127Y436 ③	Lower Base	X	X
2	S501-830-* ①	Right Side	X	X
2	S501-835 ②	Right Side	X	X
2	S501-833 ③	Right Side	X	X
3	S501-831-* ①	Left Side	X	X
3	S501-834 ②	Left Side	X	X
3	S501-832 ③	Left Side	X	X
4	S508-129	Back	X	X
4	S508-229 ②	Back	X	X
4	S508-228 ③	Back	X	X
5	S507-307-* ①	Top	X	X
5	S507-309 ②	Top	X	X
5	S507-310 ③	Top	X	X
6	S515-230-* ①	Upper Front	X	X
6	S514-231 ②	Upper Front	X	X
6	S514-232 ③	Upper Front	X	X
7	S553-522-* ①	Vent Option Door	X	X
7	S552-525 ②	Vent Option Door	X	X
7	S553-527 ③	Vent Option Door	X	X
8	118-053-* ①	Condenser Grille	X	X
8	118-080 ②	Condenser Grille	X	X
8	118-078 ③	Condenser Grille	X	X
9	118-058-* ①	Side Grille	2	2
9	118-081 ②	Side Grille	2	2
9	118-079 ③	Side Grille	2	2
10	S521Y462	Condenser Partition	X	X
11	123-137	Drain Pan	X	X
12	121Y463	Blower Partition	X	X
13	Control Panel Assembly	See Control Panel Assembly Drawing and Parts List	X	X
14	S133-114	Control Panel Cover (Inner)	X	
14	S132-349	Control Panel Cover (Inner)		X
15	S533-227-* ①	Control Panel Cover (Outer)	X	X
15	S533-231 ②	Control Panel Cover (Outer)	X	X
15	S533-233 ③	Control Panel Cover (Outer)	X	X
16	S153-218-* ①	Disconnect Access Door	X	X
16	S153-387 ②	Disconnect Access Door	X	X
16	S153-405 ③	Disconnect Access Door	X	X
17	125-029	Fan Shroud	X	X
17	125-059 ③	Fan Shroud	X	X
18	113-140	Bottom Mounting Bracket	X	X
19	137-209	Fill	X	X
20	BFAD-5	Fresh Air Damper Assembly	X	X
22	131Y099	Filter Tray	X	X
23	105Y878	Left Side Support	X	X
24	147-046	Left Evaporator Support	X	X
25	135-128	Raceway	2	2
26	S111Y034	Outlet Air Frame Assembly	X	X
27	105Y877	Right Side Support	X	X
28	S543-172-* ①	Heater Access Cover Assembly	X	X
28	S543-176 ②	Heater Access Cover Assembly	X	X
28	S543-177 ③	Heater Access Cover Assembly	X	X
29	135-129	Heat Shield	X	X
30	113-150-* ①	Top Rain Flashing	X	X
30	113-359 ③	Top Rain Flashing	X	X
31	S536Y610	Condenser Partition Block-Off Plate	X	X
32	S553-521-* ①	Filter Door Assembly	X	X
32	S552-526 ②	Filter Door Assembly	X	X
32	S553-528 ③	Filter Door Assembly	X	X
NS	105-1302	Grommet Retainer	X	X

① Exterior cabinet parts are manufactured with various paint color options. To ensure the proper paint color is received, include the complete model and serial number of the unit for which cabinet parts are being ordered.

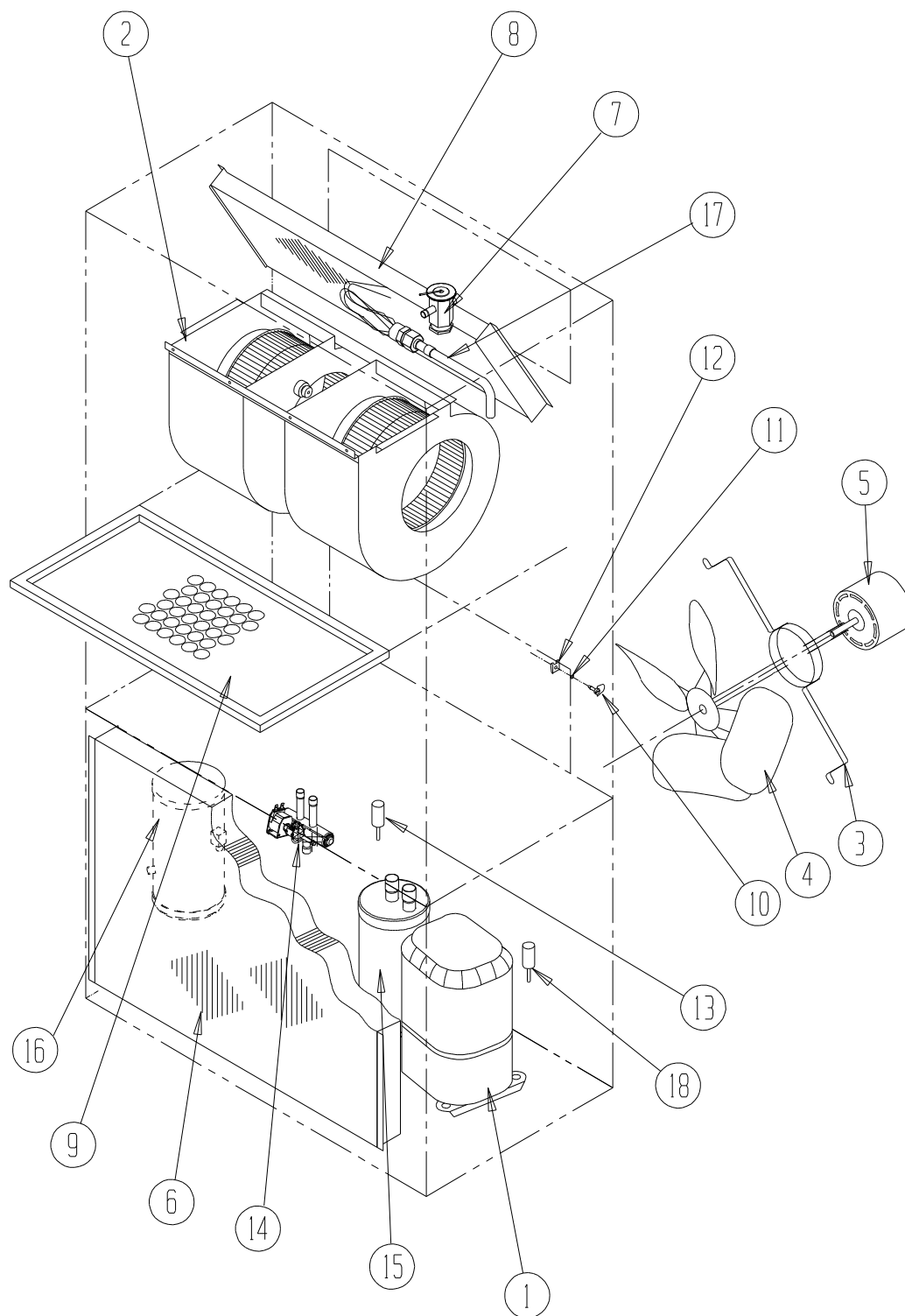
② Exterior cabinet parts are manufactured from aluminum Code "A"

③ Exterior cabinet parts are manufactured from stainless steel Code "S"

④ Exterior cabinet parts are used for both aluminum and stainless steel cabinets

NS – Not Shown

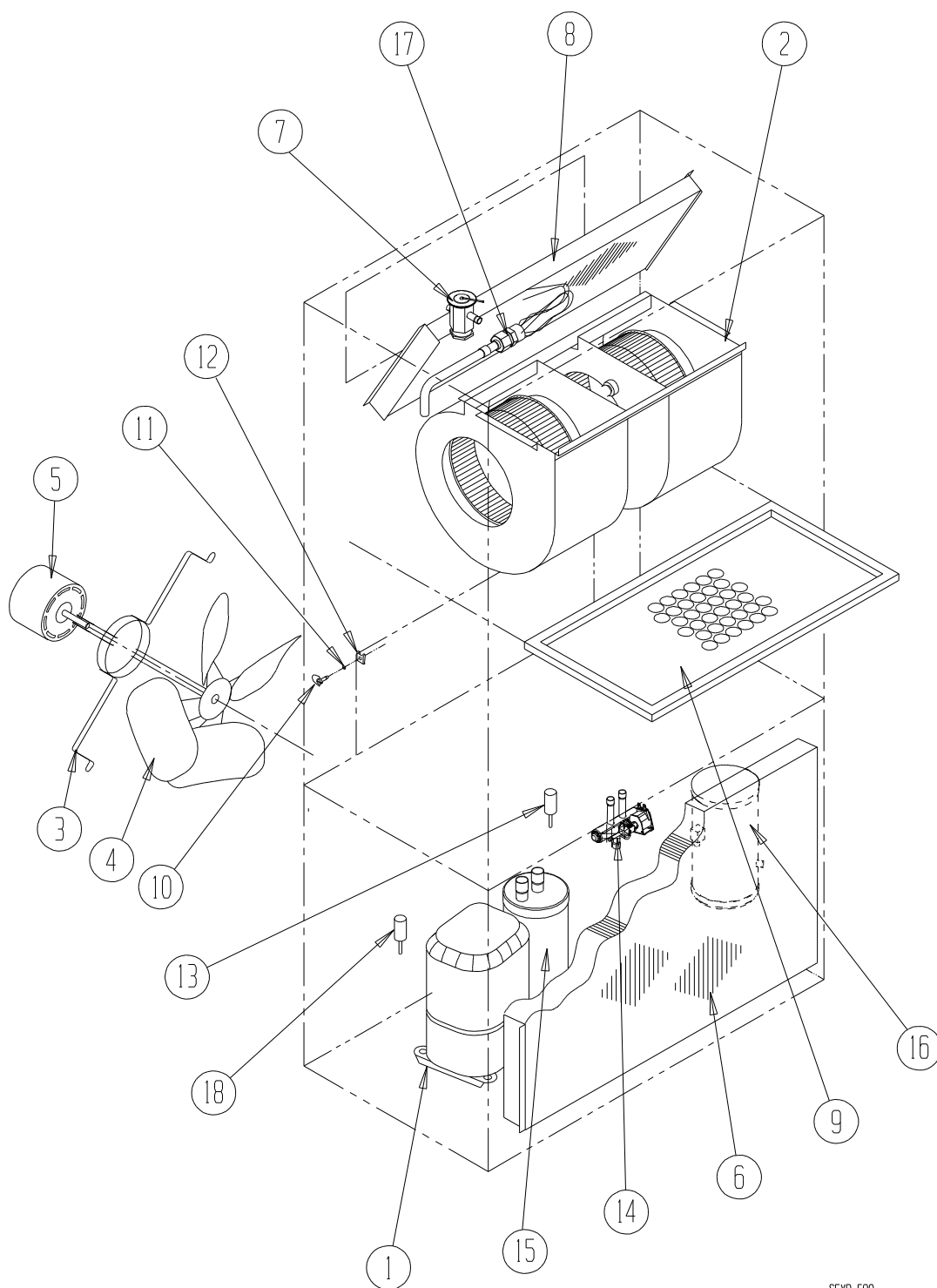
FUNCTIONAL COMPONENTS – RIGHT HAND



SEXP-589

This exploded view references table on page 12

FUNCTIONAL COMPONENTS - LEFT HAND



SEXP-590

This exploded view references table on page 12

FUNCTIONAL COMPONENTS – RIGHT & LEFT HAND

Drawing No.	Part No.	Description	W6RV2-S	W6RV2-T	W6LV2-S	W6LV2-T
1	8000-358	Compressor	X		X	
1	8000-359	Compressor		X		X
2	900-340-0130BX	Blower Assembly	X		X	
2	900-341-0249BX	Blower Assembly		X		X
3	8200-004	Fan Motor Mount	X	X	X	X
4	5151-060	Fan Blade	X	X	X	X
5	S8106-061-0132	1/2 HP ECM Motor with Programmed Control	X		X	
5	8106-080-0251BX	1/2 HP ECM Motor with Programmed Control		X		X
6	5051-088BX	Condenser Coil	X	X	X	X
6	5054-088BX	Condenser Coil - Coated	O	O	O	O
7	5651-213	Cooling TXV	X	X	X	X
8	5060-082BX	Evaporator Coil	X	X	X	X
8	5062-082BX	Evaporator Coil - Coated	O	O	O	O
9	7004-016	Air Filter 1" Throw-Away	X	X	X	X
9	7003-030	Air Filter 1" Washable	O	O	O	O
9	7004-027	Air Filter 2" Pleated	O	O	O	O
10	1171-022	1/4 Turn Fastener	X	X	X	X
11	1171-024	1/4 Turn Retainer	X	X	X	X
12	1171-023	1/4 Turn Receptacle	X	X	X	X
13	8406-142	High Pressure Switch - Red Leads	X	X	X	X
14	5650-049	Solenoid Valve	X	X	X	X
15	5202-018	Accumulator	X	X	X	X
16	5203-007	Receiver	X	X	X	X
17	800-0395	Cooling Distributor Assembly	X	X	X	X
18	8406-135	Low Pressure Switch - Blue Leads	X	X	X	X
NS	5201-002	Filter Drier	X	X	X	X
NS	8605-017	Crankcase Heater	X		X	
NS	8605-018	Crankcase Heater		X		X
NS	8408-039	Discharge Line Thermostat	X	X	X	X
NS	8406-128	Pressure Transducer	X	X	X	X
NS	5451-024	Grommet Retainer	2	2	2	2

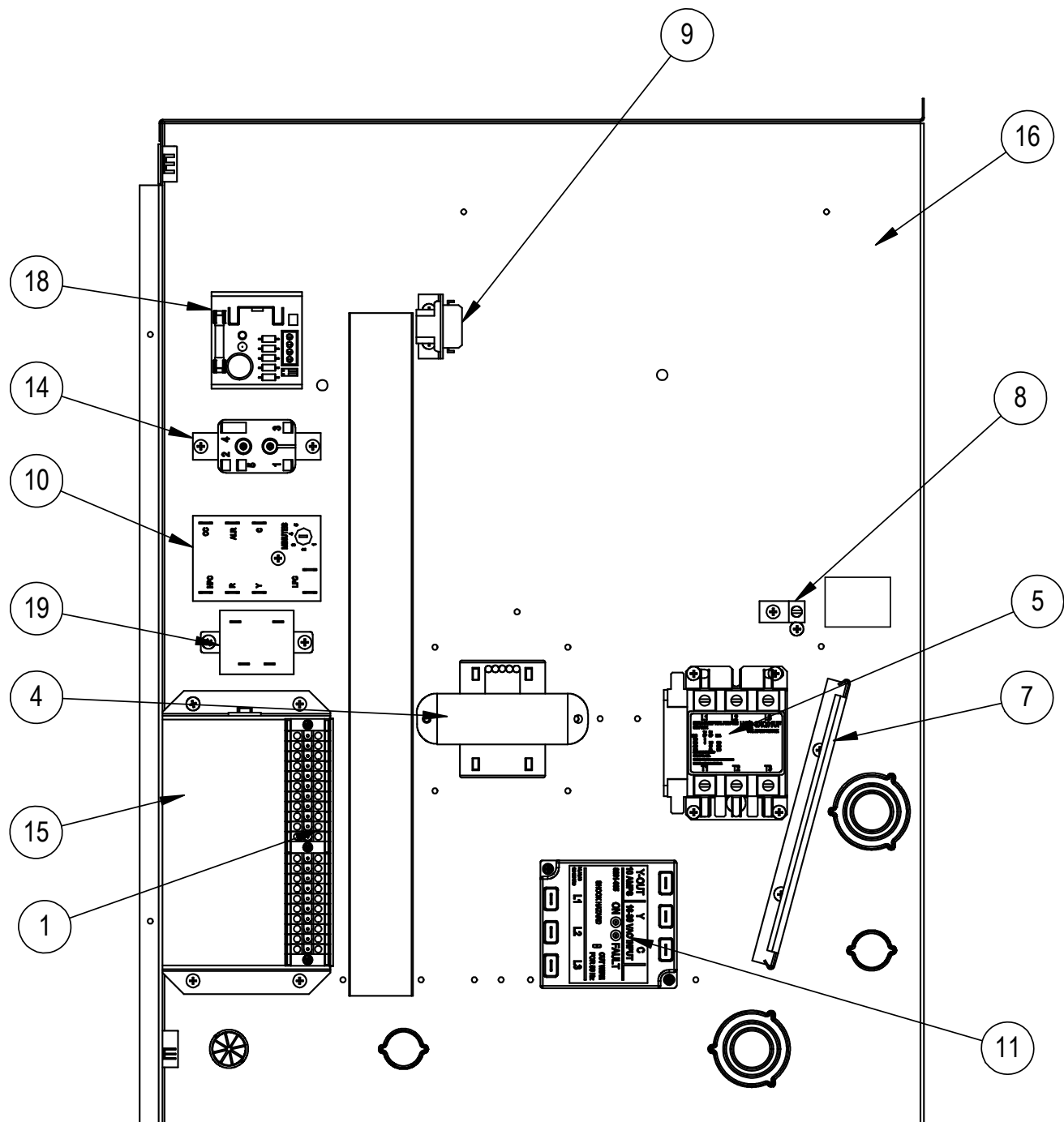
NS – Not Shown

X – Standard Component

O – Optional Component

This table references exploded views on pages 10 & 11

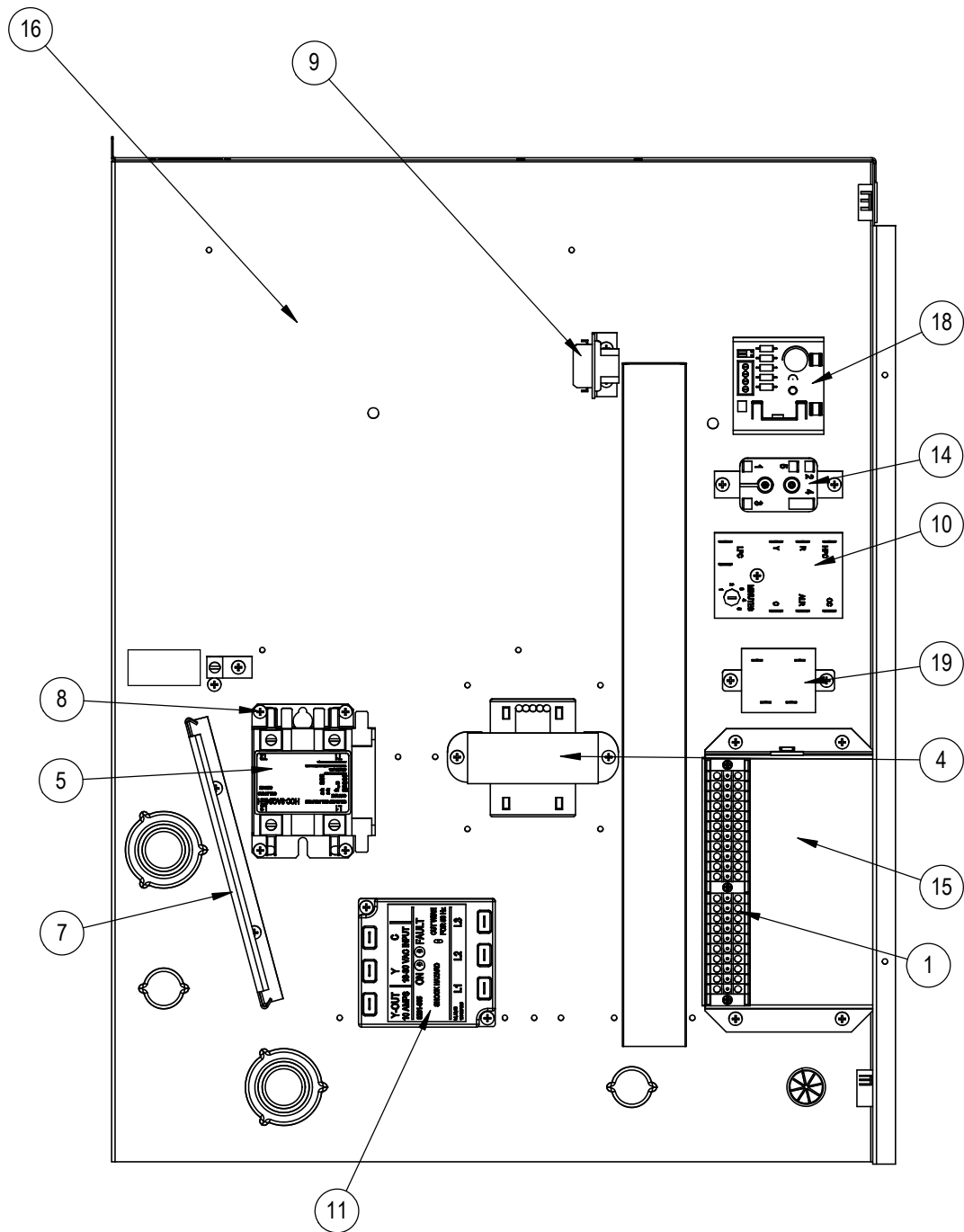
CONTROL PANEL – RIGHT HAND



SEXP-738 A

This layout view references table on page 15

CONTROL PANEL – LEFT HAND



SEXP-739 A

This layout view references table on page 15

CONTROL PANEL – RIGHT & LEFT HAND

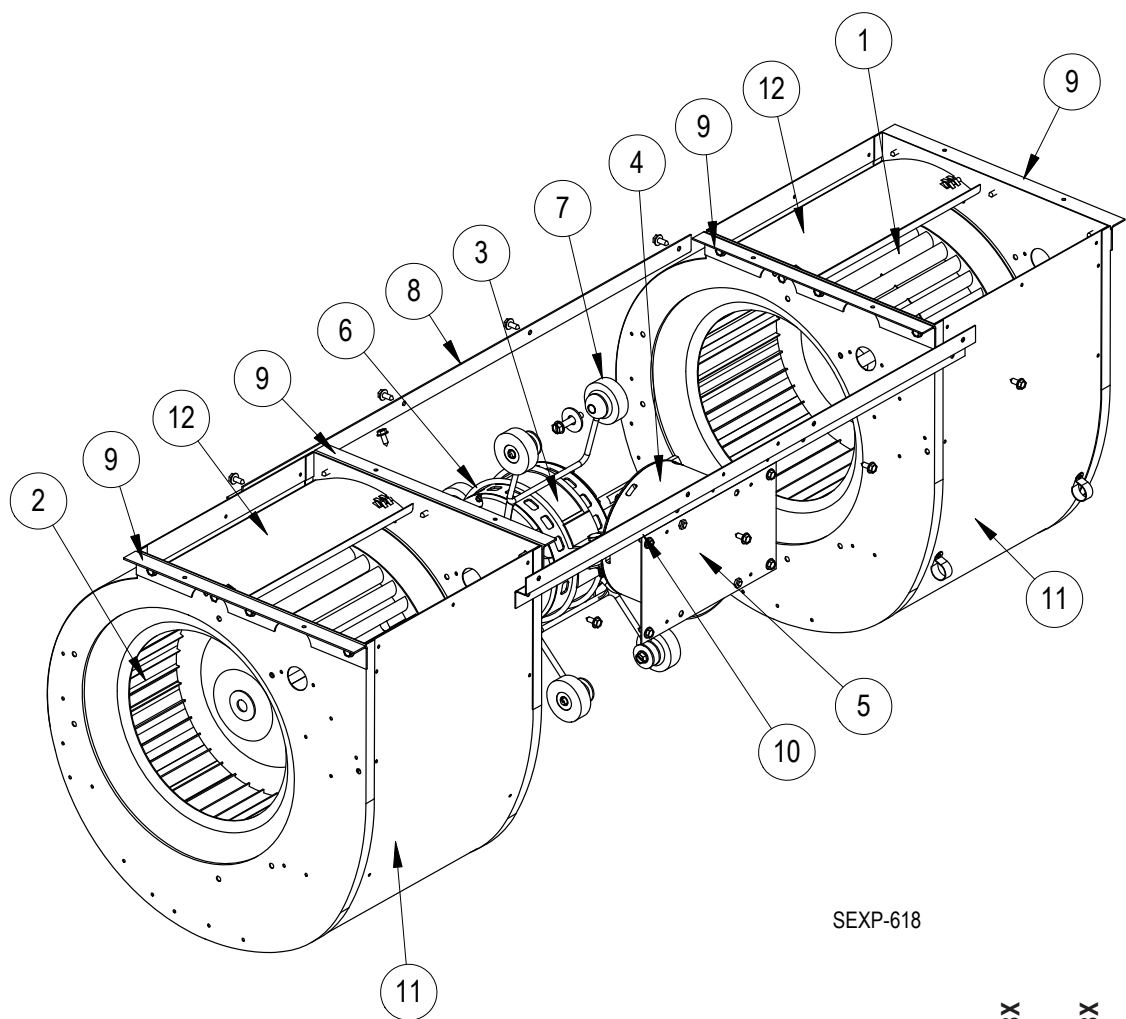
Drawing No.	Part No.	Description	W6RV2-S	W6RV2-T	W6LV2-S	W6LV2-T
1	8607-036	Low Voltage Terminal Strip	X	X	X	X
4	8407-071	Transformer	X		X	
4	8407-072	Transformer		X		X
5	8401-037	Compressor Contactor	X	X	X	X
7	135-130	Wire Shield	X	X	X	X
8	8611-006	Ground Terminal	X	X	X	X
9	3000-1463	6 Pin Connector	X	X	X	X
10	8201-176BX	Compressor Control Module	X	X	X	X
11	8201-174BX	Phase Monitor	X	X	X	X
14	8201-062	Alarm Relay	X	X	X	X
15	S117-350	Low Voltage Box	X	X	X	X
16	117X351	Control Panel	X	X		
16	117Y351	Control Panel			X	X
18	8301-041	5VDC Supply	X	X	X	X
19	8201-149	Solid State Relay	X	X	X	X
NS	8301-014	Outdoor Air Sensor	X	X	X	X
NS	8403-066	Thermostat Controller	X	X	X	X
NS	8615-043	Circuit Breaker 40A 3 Pole (Opt) ①	X		X	
NS	8615-101	Toggle Disconnect (Optional)		X		X
NS	3000-1361	Pressure Transducer Harness	X	X	X	X
NS	3000-1230	Compressor Harness	X	X	X	X
NS	4095-275	Wiring Diagram	X		X	
NS	4095-375	Wiring Diagram		X		X

NS – Not Shown

- ① Circuit breakers listed are for units without electric heat "OZ" models.
See Heater Replacement Parts Manual for units with electric heat.

This table references layout views on pages 13 & 14

BLOWER ASSEMBLY



SEXP-618

Drawing No.	Part No.	Description	900-340-0130BX	900-341-0249BX
1	5152-011	Wheel (CW)	X	X
2	5152-012	Wheel (CCW)	X	X
3	S8107-023-0130	Programmed Motor w/Control	X	
3	8107-036-0249BX	Programmed Motor w/Control		X
5	112-344	Blower Motor Control Mount	X	X
6	8200-040	Motor Mount	X	X
7	5451-011	Grommets	6	6
8	105-881	Back Brace	X	X
9	105-880	Blower Angle	4	4
10	103-389	Front Brace	X	X
11	151-101	Blower Housing	2	2
12	144-166	Diffuser	2	2

Supplemental Instructions

8201-176BX Compressor Control Module

(Replaces 8201-088, 8201-148, 8201-157,
8201-162, 8201-164, 8201-169, 8201-171, 8620-244)

Features

Delay-on-Make Timer
Short Cycle Protection/Delay-on-Break
Low Pressure Detection
High Pressure Detection
HPC and LPC Status LEDs
Test Mode
Brownout Protection with Adjustment

Delay-on-Make Timer

A delay-on-make timer is included to be able to delay startup of the compressor. This is desired when more than one unit is on a structure so that all of the units do not start at the same time which could happen after a power loss or building shutdown. The delay-on-make time period is 2 minutes plus 10% of the delay-on-break time period. To ensure that all of the units do not start at the same time, adjust the delay-on-break timer on each unit to a slightly different delay time.

Short Cycle Protection/Delay-on-Break

An anti-short cycle timer is included to prevent short cycling the compressor. This is adjustable from 30 seconds to 5 minutes via the adjustment knob. Once a compressor call is lost, the time period must expire before a new call will be initiated.

Low Pressure Detection

Low pressure switch monitoring allows for a lockout condition in a situation where the switch is open. If the low pressure switch remains open for more than 2 minutes, the compressor control module (CCM) will

de-energize the compressor for the delay-on-break time. If the switch closes again, it will then restart the compressor. If the switch trips again during the same Y call, the compressor will be de-energized and the alarm terminal will be energized indicating an alarm. The blue LED will light and stay on until power is cycled to the control or a loss of voltage is present at Y terminal for more than ½ second.

High Pressure Detection

High pressure switch monitoring allows for a lockout condition in a situation where the switch is open. If the high pressure switch opens, the CCM will de-energize the compressor. If the switch closes again, it will then restart the compressor after the delay-on-break setting has expired on the device. If the switch trips again during the same thermostat call, the compressor will be de-energized and the alarm terminal will be energized indicating an alarm. The red LED will light and stay on until power is cycled to the control or a loss of voltage is present at Y terminal for more than ½ second.

Test Mode

By rapidly rotating the potentiometer (POT) clockwise (see Figure 1 on page 2), all timing functions will be removed for testing.

The conditions needed for the unit to enter test mode are as follows: POT must start at a time less than or equal to the 40 second mark. The POT must then be rapidly rotated to a position greater than or equal to the 280 second mark in less than ¼ second. Normal operation will resume after power is reset or after the unit has been in test mode for at least 5 minutes.



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 7960-932A
Supersedes: 7960-932
Date: 12-13-23

Brownout Protection with Adjustment

Brownout protection may be necessary if the utility power or generator power has inadequate power to prevent the voltage from dropping when the compressor starts. This is rare but can happen if the generator is undersized at the site or if the site is in a remote location far from the main power grid. Under normal circumstances, allowing the brownout to be ignored for a time period should not be needed. The 8201-176BX is shipped in "0" do not ignore position, with all the DIP switches off (see Figure 1).

If ignoring the brownout is needed because of the above conditions, three preset timers can be set by DIP switches in order to delay signaling a power brownout for a specific length of time after compressor contactor is energized. This allows the compressor a time period to start even if the voltage has dropped and allows the voltage to recover. This delay only happens when the CC terminal energizes. The delay can be set to 1 second ("A" DIP switch), 5 seconds ("B" DIP switch) or 10 seconds ("C" DIP switch); time is not cumulative—only the longest setting will apply. If the voltage recovers during the brownout delay period, the compressor will continue running.

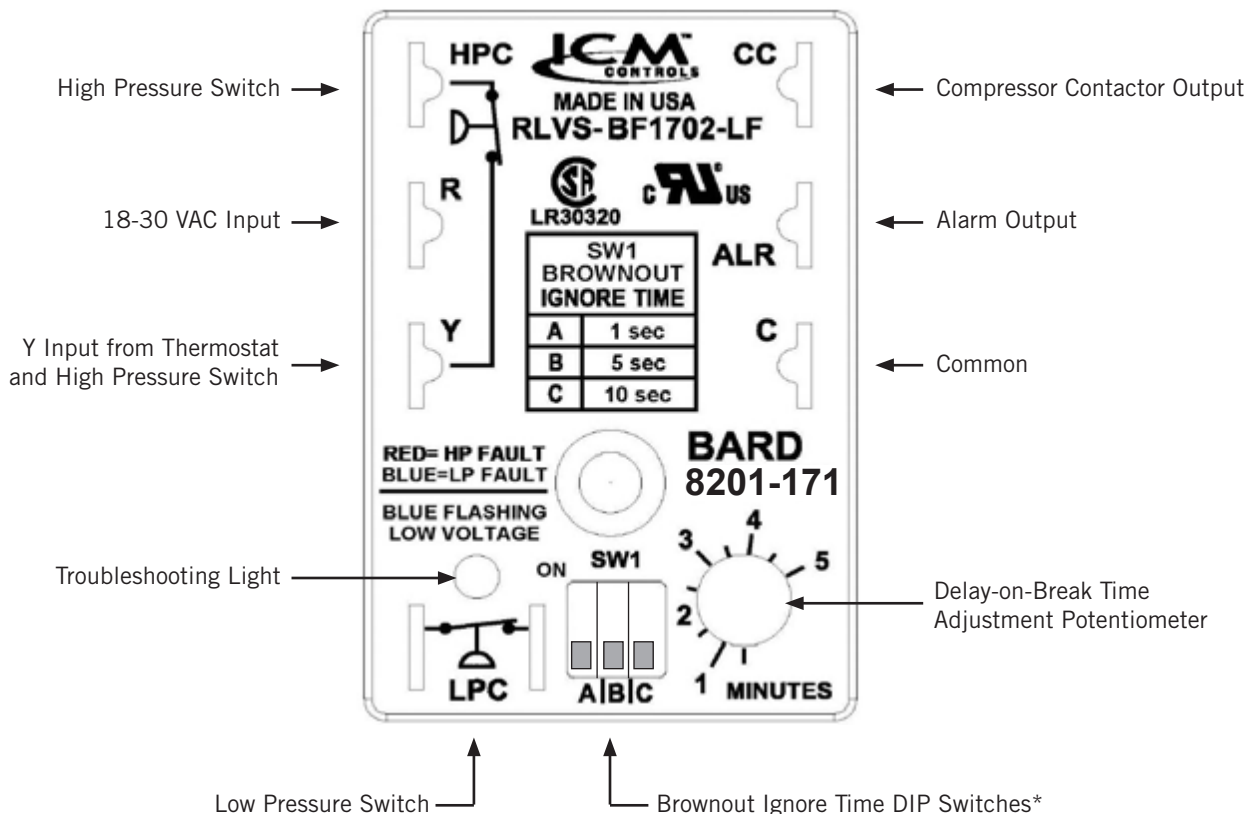
If a brownout condition is detected by the compressor control module at any point while there is a cooling

call or power is on at Y, the troubleshooting light will flash blue. The light will continue to flash until the cooling call is satisfied or power is removed from the Y terminal. This condition does not prevent operation, it only indicates that a brownout condition was present at some point during the call. If a brownout condition is detected while CC has an output, CC will be de-energized and will retry after the delay-on-break timer is satisfied, honoring any DIP switch timer chosen when the CC output is re-energized; this process will continue until call is satisfied.

If inadequate utility or generator power continues after the Delay-on-Make or Delay-on-Break timer is fulfilled, the CC output will not energize. This could lead to the compressor never starting. The control will see the brownout immediately and not start.

A common scenario and one that has been seen in the field is when a unit or units switches from utility power to generator power. With slower transfer switches, the time delay between the utility power and generator power didn't cause a problem. The units lost power, shut off and came back on line normally. With the introduction of almost instantaneous transfer switches, the power glitch may be enough that the compressor will start to run backwards.

FIGURE 1
8201-176BX Compressor Control Module



* Turn on only one switch for that specific "Ignore Time" setting. 10 seconds is the maximum brownout "Ignore Time".



Limited Warranty

**For units applied within the United States, Puerto Rico,
US Virgin Islands, Guam, Canada and Mexico**

Limited Warranty To Original Purchaser:

Bard Manufacturing Company, Inc. Bryan, Ohio 43506 warrants to you, the original purchaser, that your Bard product will be free from defects in materials and workmanship when used under normal conditions from the installation date through the time periods outlined in the "Duration of Warranty" section (see reverse side).

Proof Of Purchase:

You must be able to show us the date on which you purchased your product when you make a claim under this warranty. Your owner's registration card filed online at www.wallmountwarranty.com or your contractor's invoice, bill of sale, or similar document is sufficient at time of warranty claim. If you can not show us the actual date of purchase, the time periods in this warranty will start on the date that we shipped your Bard product from our factory.

What This Warranty Does Not Cover: (Also see Duration of Warranty on reverse side.)

This warranty does not cover defects or damage caused by:

1. Alterations not approved by us; improper installation (including over or under sizing), improper repairs, or servicing; or improper parts and accessories not supplied by us.
2. Misuse or failure to follow installation and operating instructions (including failure to perform preventative maintenance) or limitations on the rating plate. This includes failure to use low ambient controls on all applications requiring compressor operation in cooling mode below 60F outdoor ambient.
3. Any corrosion from operation in a corrosive atmosphere (examples: acids, halogenated hydrocarbons or environmental conditions).
4. Parts that must be replaced periodically (such as filters, mist eliminators, ERV belts, pile seals, etc.).
5. Improper fuel or electrical supply (such as low voltage, voltage transients, power interruption, and units on generators with no brownout protection).
6. Accidents or other events beyond our reasonable control (such as storm, fire, or transportation damage).
7. Defects that happen after
 - (a) Anyone has tampered with the product.
 - (b) The product has been improperly serviced according to accepted trade practices;
 - (c) The product has been moved from its original place of installation; or,
 - (d) The product has been damaged by an event beyond Bard's control (See also No. 5 above).
8. Consequential damages (such as increased living expenses while the product is being repaired). Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
9. This warranty has certain limitations for units installed on over-the-road trucks, vans and trailers. (See reverse side.)
10. Cost of service call at installation site to diagnose causes of trouble, labor to replace defective component or transportation costs for replacement parts.
11. This Limited Warranty does not apply to products installed or operated outside of the US, Puerto Rico, US Virgin Islands, Guam, Canada and Mexico. Units operated in coastal areas where the operating environment is exposed to airborne saline particles (typically 5 miles from coast line) must have corrosion protection or warranty claims will be declined on corrosion-based cabinet and part failures.
12. Bard does not endorse, approve or certify any online sales of its products through auction websites, online retailers, liquidators or any other method of online sales direct to consumers. Bard will not honor the factory warranty of any Bard equipment purchased over the Internet.

Your Responsibilities:

You are responsible for

1. Preventative maintenance of the product (such as cleaning coils and replacement of filters, nozzles and other consumable parts).
2. Ensuring that the instruction manual is followed for care and use of your product.
3. Ensuring that your product is installed by a competent, qualified contractor, following all local and national codes, and industry standards.

What We Will Do About A Defect:

We will either repair or replace the defective part only. Replacement parts may be reconditioned parts. The warranty for the repaired or replaced part will last only for the remainder of the warranty period for the original part.

Defective parts and a properly completed Bard parts warranty form must be returned to a Bard distributor for submitting to Bard to be eligible for a warranty credit or replacement. Credits are issued to the Bard distributor.

We will not pay or be responsible for labor or defective/replacement part transportation costs or delays in repairing or failures to complete repairs caused by events beyond our reasonable control.

What You Must Do

1. Tell your heating and air conditioning contractor as soon as you discover a problem and have the contractor make repairs.
2. Pay for all transportation, related service labor, diagnostic charges, refrigerant, refrigerant recovery and related items.

Service

If your product requires service, you should contact the contractor who installed it or the contractor that has been providing the product's preventative maintenance and repair service. You may find the installing contractor's name on the product or in your Owner's packet. If you do not know who that is, you should contact a competent, qualified contractor to make the repairs. If in doubt, you should contact the nearest distributor that handles Bard products (www.bardhvac.com). Please note that contractors and distributors that handle Bard products are independent contractors and distributors, and therefore, are not under the direction of Bard Manufacturing Company, Inc.

Only Warranty

This is the only warranty that we make. There are no other express warranties. All implied warranties are limited in duration to the duration of the applicable written warranty made above.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you.

Other Rights

This warranty gives you specific legal rights and you may have other rights which vary from state to state.

BARD MANUFACTURING CO., INC. — BRYAN, OHIO 43506
Dependable quality equipment . . . since 1914

Form No. 7960-420
Issued: 03/07/22
Supersedes: 11/18/21

Duration Of Warranty is limited to defects arising during the periods shown in the following table:

Model Number Series: Includes all Models in each Series and which may have additional characters. (Example: W12-72A includes W36A w/additional characters.)	— Number of Years from Installation Date ① —			
	Compressor ④	Sealed System Components ② ④ ⑤	All Other Functional Parts ③	Heat Exchangers
AIR CONDITIONERS W12A, W18A, W24A, W30A, W36A, W42A, W48A, W60A, W72A, W090A, W120A, W150, W180A, W18L, W24L, W30L, W36L, W3SA, W4SA, W5SA, Q36A, Q42A, Q48A, I30A, I36A, I42A, I48A, I60A	5	5	5	N/A
AIR SOURCE HEAT PUMPS W18H, W24H, W30H, W36H, W42H, W48H, W60H, C24H, C30H, C36H, C42H, C48H, C60H, T24H, T30H, T36H, T42H, T48H, T60H, T24S, T30S, T36S, T42S, T48S, T60S, Q24H, Q30H, Q36H, Q43H, Q48H, I30H, I36H, I42H, I48H, I60H, I36Z, I48Z, I60Z	5	5	5	N/A
ENVIRONMENTAL CONTROL UNITS W6RV, W6LV	5	5	1	N/A
EQUIPMENT SHELTER UNITS MULTI-TEC, MEGA-TEC, FUSION-TEC	5	5	1	N/A
GEOTHERMAL/WATER SOURCE HEAT PUMPS QW2S, QW3S, QW4S, QW5S	5	5	5	N/A
CHILLED WATER QC50 (No Compressor)	N/A	5	5	N/A
GAS/ELECTRIC WALL-MOUNT W24G, W30G, W36G, W42G, W48G, W60G, WG3S, WG4S, WG5S	5	5	5	10
ACCESSORIES Factory/Field Installed Bard Ventilation and Heater Packages Bard branded Thermostats/Temperature Controllers, UV-C LED Light Kits LC6000, LV1000, MC4002, DC3003, TEC40, BG1000, PGD, PGDX, MC5300, MC5600 Humidistats, CO ₂ Controllers and all other field-installed accessories not listed separately	N/A N/A N/A N/A	N/A N/A N/A N/A	5 5 1 1	N/A N/A N/A N/A

① For equipment that does not have an online warranty registration, the warranty period starts when the product was shipped from the factory.

② Heat transfer coils (refrigerant to air coils for air source and coaxial coils for water source units) are covered for leaks for 5 years. Physical damage to air side coils resulting in leaks or insufficient airflow, or fin deterioration due to corrosive atmosphere (such as acids, halogenated hydrocarbons, or coastal environmental conditions) are not covered. Leaks in coaxial coils due to freezing of the coils are not covered. Copper coaxial coils for QW are not warranted for ground water/open loop installations.

③ Functional parts warranty is 1 year for all telecommunication, electric switch stations, pump stations, and similar applications. This also applies to all OTR (over the road) applications.

④ All OTR (over the road) applications that are moved from one location to another:

Factory Warranty applies up to the point of initial start-up and test at all OEM manufacturing locations or subsequent outfitting facility. Once it goes into OTR service, the warranty expires immediately for compressor and sealed system components. This OTR exemption does not apply to relocatable classrooms, construction, or office trailers.

⑤ Factory-coated coils have a "5" year warranty in corrosive environments that are listed as approved.

Internet Resources

Recognized as a leader in the HVAC industry, Bard combines quality products and outstanding service with innovation and technological advances to deliver high-performance heating and cooling products around the world. Please visit www.bardhvac.com for additional information regarding warranty and product information.

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