

**Model RPH / RPV  
Horizontal & Vertical  
Heat Pumps**

Supersedes: 145.16-IOM1 (708)

Form 145.16-IOM1 (908)

**UNIT MODELS  
RPH (Horizontal) & RPV (Vertical)  
WATER SOURCE HEAT PUMPS  
INSTALLATION, & OPERATION  
INSTRUCTIONS**

<u>Horizontal</u>	<u>Model Numbers</u> <u>Vertical</u>	<u>Capacity (Tons)</u>
RPH007A	RPV007A	1/2
RPH009A	RPV009A	3/4
RPH012A	RPV012A	1
RPH018A	RPV018A	1-1/2
RPH024A	RPV024A	2
RPH030A	RPV030A	2-1/2
RPH036A	RPV036A	3
RPH048A	RPV048A	4
RPH060A	RPV060A	5



# IMPORTANT!

## READ BEFORE PROCEEDING!

### GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in

which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

## SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:



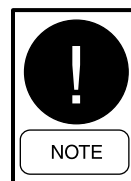
**DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**CAUTION** identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.



**WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**NOTE** is used to highlight additional information which may be helpful to you.



**All wiring must be in accordance with published specifications and must be performed ONLY by qualified service personnel. Johnson Controls will not be responsible for damages/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this will void the manufacturer's warranty and cause serious damage to property or injury to persons.**

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## CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls policy for continuous product improvement, the information contained in this document is subject to change without notice. While Johnson Controls makes no commitment to update or provide current information automatically to the manual owner, that information, if applicable, can be obtained by contacting the nearest Johnson Controls service office.

It is the responsibility of operating/service personnel as to the applicability of these documents to the equipment in question. If there is any question in the mind of operating/service personnel as to the applicability of these documents, then, prior to working on the equipment, they should verify with the owner whether the equipment has been modified and if current literature is available.



**Work on this equipment should only be done by properly trained personnel who are qualified to work on this type of equipment. Failure to comply with this requirement could expose the worker, the equipment and the building and its inhabitants to the risk of injury or property damage.**

**The instructions are written assuming the individual who will perform this work is a fully trained HVAC & R journeyman or equivalent, certified in refrigerant handling and recovery techniques, and knowledgeable with regard to electrical lock out/tag out procedures. The individual performing this work should be aware of and comply with all national, state and local safety and environmental regulations while carrying out this work. Before attempting to work on any equipment, the individual should be thoroughly familiar with the equipment by reading and understanding the associated service literature applicable to the equipment. If you do not have this literature, you may obtain it by contacting a Johnson Controls Service Office.**

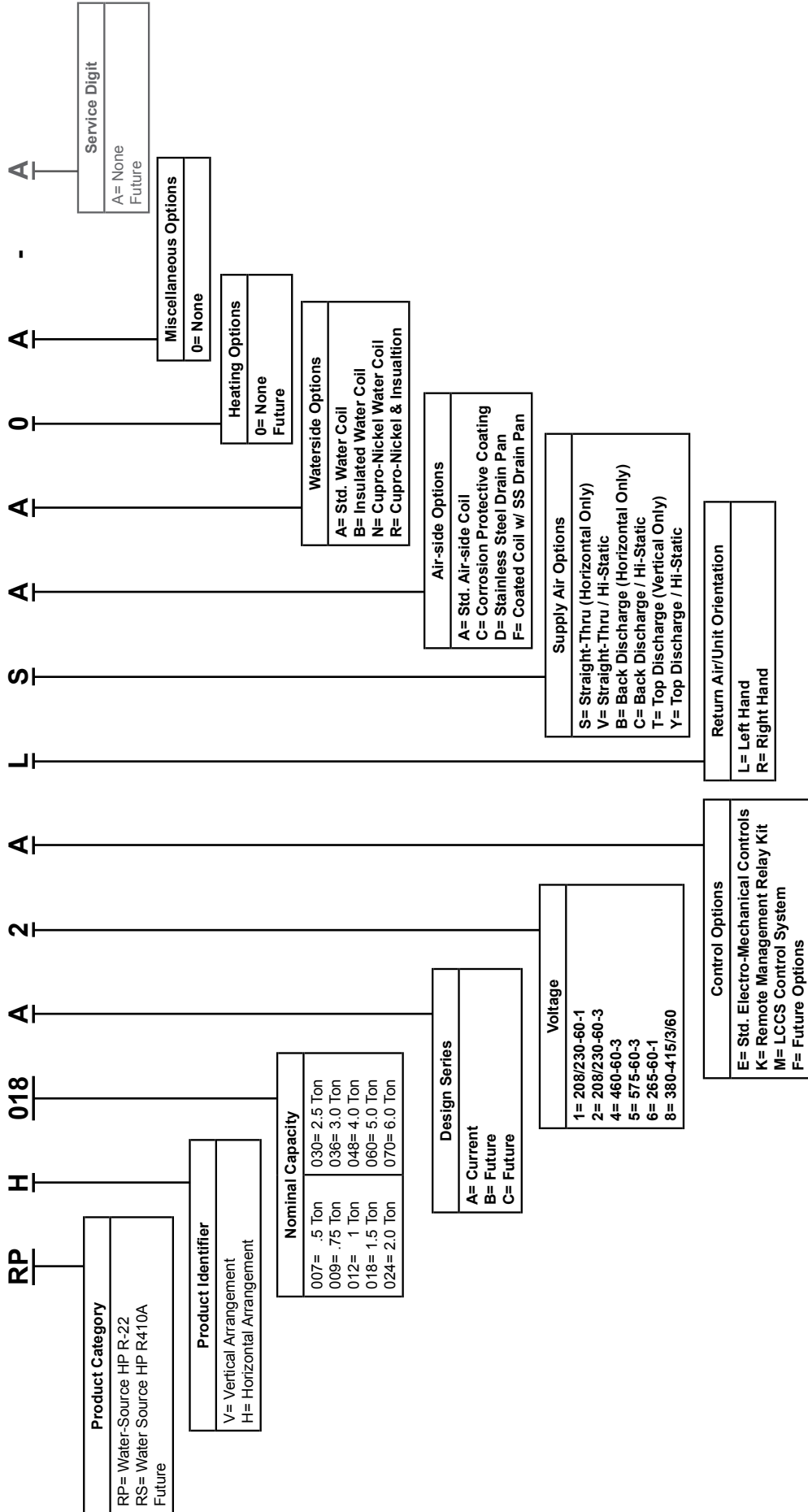
**Should there be any question concerning any aspect of the tasks outlined in this instruction, please consult a Johnson Controls Service Office prior to attempting the work. Please be aware that this information may be time sensitive and that Johnson Controls reserves the right to revise this information at any time. Be certain you are working with the latest information.**

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# UNIT NOMENCLATURE



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## INTRODUCTION

Skymark 'RPH' and 'RPV' units are completely self-contained heating and/or air conditioning units. This equipment employs a water-to-refrigerant heat exchanger to extract (heating cycle) or reject (cooling cycle) heat from/to a circulating water-loop.

All models 1/2 through 5 tons are shipped as factory-charged packages. Horizontal (RPH) units are designed for suspended ceiling mounting, and are constructed with integral hanger channels. Vertical (RPV) units are designed for free-standing floor mounting. All units are shipped completely factory wired and pre-piped. Water supply, water outlet, and condensate drain connections are via female threaded pipe fittings.

Each refrigeration circuit includes an adjustable bi-flow expansion valve, liquid line filter drier, and multiple service gauge ports. External high pressure and low pressure protection switches are included in each compressor circuit. Heat Pump models feature a pilot operated, sliding piston type, 4-way reversing valve with a replaceable magnetic solenoid coil.

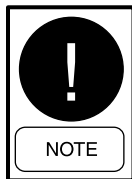
The coaxial water-to-refrigerant heat exchanger, and all water piping within the unit are rated for water side working pressures up to 400 psig. Automatic water flow regulating valves are available as field installed accessories.

All units are completely factory wired with all necessary operating controls. A 24 volt control circuit, with oversize transformer, is provided for field connection. Units are designed to operate with conventional thermostat control interface. The reversing valve solenoid coil shall be energized in cooling mode only. A manual reset lock-out relay is provided to disable the compressor control circuit in the event of high/low pressure cutout.

These units are designed for indoor installation only. They are not intended or approved for outdoor installation.

## PRE-INSTALLATION INSPECTION OF EQUIPMENT

All units are factory tested to ensure safe operation and quality assembly. Units are packaged and sealed on wooden skid runners and shipped in first class condition. Torn and broken packaging, scratched or dented panels should be reported to carrier immediately. Internal inspection of all units should be performed prior to installation. Remove all access doors and check for visual defects that can occur during transport. Any problems found internally should be reported to carrier and manufacturer immediately. Refrigerant circuit should be checked to ensure no leaks have occurred during shipment. Install gauge set to high and low pressure ports to confirm pressure has been maintained and no leaks have occurred during shipment. Repair any damage prior to installation to ensure safe operation.



**Record any unit damage on the Bill of Lading and report to carrier and factory immediately. Shipping and handling damages are not warranty items.**

## RIGGING



**PRIOR TO MOUNTING UNIT, CHECK INDIVIDUAL UNIT WEIGHTS AND VERIFY LIFTING CAPACITY OF LIFTING EQUIPMENT EXCEEDS WEIGHT OF UNITS BY SAFE MARGINS. FAILURE TO DO SO MAY RESULT IN UNIT DAMAGE, PERSONAL INJURY OR EVEN DEATH.**

## INSTALLATION



**LOCK ALL ELECTRICAL POWER SUPPLY SWITCHES IN THE OFF POSITION BEFORE INSTALLING THE UNIT. FAILURE TO DISCONNECT POWER SUPPLY MAY RESULT IN ELECTRICAL SHOCK OR EVEN DEATH.**

**Location** - To ensure unit operates at maximum efficiencies, choose a dry indoor area where the temperature is controlled between 40°F and 115°F. Consideration of surrounding areas should be taken when choosing a location to install the unit. Common vibration and sound levels associated with commercial equipment may be objectionable to people or equipment.



**Failure to allow adequate space between units may result in poor unit performance and possible unit failure.**

Install thermostats, supply air ductwork, and return air ductwork (if applicable) so that each unit will operate only in a single cooling or heating zone. In order to assure proper drainage of condensate, horizontal units can be slightly pitched in the same direction as drain pan outlet.

**GENERAL DATA**

<b>Model Series</b>	007	009	012	018	024	030	036	048	060
Nominal Cooling(Ton)	0.5	0.75	1.0	1.5	2.0	2.5	3.0	4.0	5.0
<b>Cooling Performance</b>									
Cooling Capacity (BTUH)	7000	9000	12800	18100	24200	30800	36100	48200	59000
EER	12.4	13.0	12.6	14.4	14.4	13.5	14.2	14.0	12.6
Heating Capacity (BTUH)	8800	10700	14800	20900	27500	35200	41400	56000	72000
COP	4.2	4.4	4.2	4.5	4.6	4.4	4.6	4.6	4.4
Design CFM	200	300	400	600	800	1000	1200	1600	2000
Nominal Water flow (gpm)	1.5	2.25	3.0	4.5	6.0	7.5	9.0	12.0	15.0
<b>Compressor-Type</b>									
	Rotary	Rotary	Rotary	Rotary	Recip.	Recip.	Recip.	Recip.	Recip.
Number sed U	1	1	1	1	1	1	1	1	1
<b>Air Coil-Type</b>									
	Enhanced Copper Tubes, Enhanced Aluminum Fins								
Face Area(sq ft)	1.00	1.00	1.00	1.51	2.56	2.56	2.88	4.38	5.00
Rows/FPI	2/14	2/14	3/14	3/14	3/14	3/14	3/14	3/14	3/14
<b>Water Coil-Type</b>									
	Co-axial								
Water Connection Size	1/2" FPT	1/2" FPT	1/2" FPT	3/4" FPT	3/4" FPT	3/4" FPT	3/4" FPT	3/4" FPT	1"FPT
Drain Connection Size	3/4" FPT								
<b>Direct Drive Fan-Type</b>									
	Centrifugal, Forward Curved								
Number sed U	1	1	1	1	1	1	1	1	1
Diameter x Width (in)	9x4	9x4	9x4	9x6	9x7	9x7	9x7	10x9	10x9
Motor HP/Speed	0.10/3	0.10/3	0.17/3	0.25/3	0.25/3	0.33/3	0.50/3	0.75/3	1.0/3
<b>Filters</b>									
<b>HWP</b> - Quantity-Size(in)	1-14x16x1	1-14x16x1	1-14x16x1	1-16x20x1	1-18x25x1	1-18x25x1	1-20x25x1	2-20x20x1	1-20x20x1 1-20x25x1
<b>VWP</b> - Quantity-Size(in)	1-14x16x1	1-14x16x1	1-14x16x1	1-16x20x1	1-18x25x1	1-18x25x1	1-20x25x1	1-16x25x1 1-14x25x1	1-18x25x1 1-16x25x1
<b>Weight</b>									
Operating	130	135	155	180	215	235	260	325	345
Shipping	145	150	170	195	230	255	280	345	365

**NOTE:**

- 1) Performance calculated in accordance with ARI / ISO Standard 13256-1 for Water Loop Application
- 2) Cooling capacities are rated at entering air conditions of 80.6 F db / 66.2 F wb, 86 F entering water temperature.
- 3) Heating capacities are rated at entering air conditions of 68 F db / 59 F wb, 68 F entering water temperature.

LD13508

**OPERATING LIMITS - Water Loop Application**

	<b>COOLING</b>	<b>HEATING</b>
Min. Entering Water	50°F	40°F*
Max. Entering Water	110°F	80°F
Normal Entering Water	60-90°F	50-70°F

\* Heating operation below 55°F requires insulated water circuit



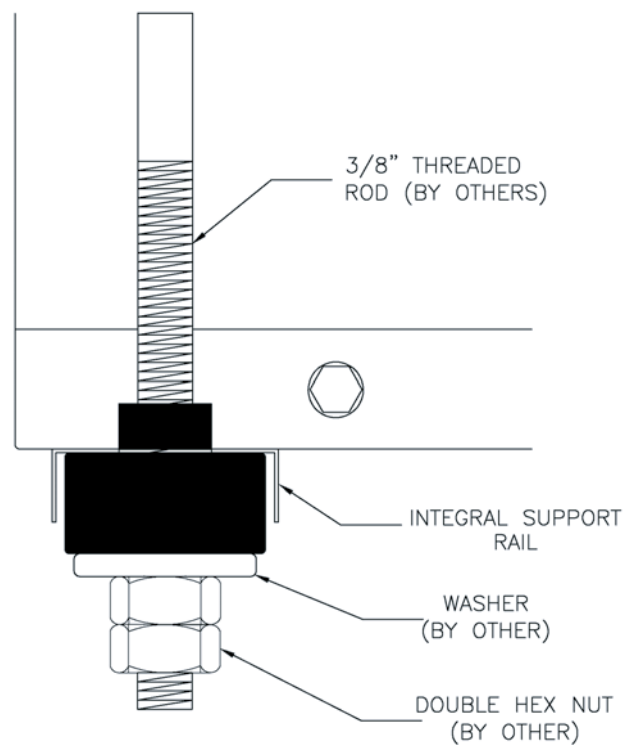
## CLEARANCES REQUIRED

Twenty-four (24) inch clearance is required on all sides of the unit for service access. Service access doors are equipped with lifting handles, and are located on all sides of the unit to allow easy servicing of all components.

## UNIT MOUNTING

Vertical units should be mounted level on a vibration absorbing pad(s) to minimize vibration transmission through the floor structure. It is not necessary to anchor the unit to the floor.

Horizontal units are typically suspended above a ceiling by threaded steel rods, securely anchored to the building structure. Units should be supported from the holes in the rail extensions at the four corners, using steel threaded rods having a minimum diameter of 3/8 inch. Four rubber bushings are supplied with the unit to be placed between the unit and the supporting rods to absorb vibration.



LD13509

## DUCT CONNECTIONS

Canvas or other types of flexible collars are recommended for connecting the air ducts to the unit. The supply air duct collar can be connected directly to the blower outlet flange. Allowance must be made in the supply duct for removal of the first duct section adjacent to the unit, for the servicing of the blower and motor assembly. Return air may be ducted to the unit or drawn directly from the ceiling space into the filter.

Supply ducts should be sized for an air velocity of not more than 1000 feet per minute. Return ducts should be sized for a velocity of not more than 700 feet per minute. When the sound level 7 is critical, it is recommended that both the supply and return ducts be lined with acoustic insulation for the first ten feet closest to the unit. The supply duct should also have at least one elbow or tee upstream of the first outlet connection for good sound attenuation.

## ELECTRICAL POWER SUPPLY AND CONNECTIONS

Before installing the unit, make sure that the voltage and number of phases on the unit data plate are the same as the available power supply. All wiring and switchgear installed external to the unit must conform to all applicable local codes. The maximum allowable size of fuses or circuit breaker required is shown on the unit data label. Fuses must be of the time delay type.

The power supply wiring is to be connected directly to the line side of compressor contactor as shown on the connection wiring diagram. A ground wire must be connected to the ground lug marked GND in the electrical control box.

## ROOM THERMOSTAT AND CONTROL WIRING

Any single stage 24-volt room thermostat can be used with the 'cooling only' models. It is recommended that the thermostat sub-base should include a fan switch, so that constant fan operation can be selected if desired. Heat Pump models require the installation of a heating and cooling thermostat with a dedicated "O" terminal for activating the reversing valve. Wiring between the thermostat and the unit should be 18 Ga. minimum. Appropriate room thermostats can be ordered as an optional accessory for delivery with the units if desired.

## ELECTRICAL DATA

MODEL Series	SUPPLY VOLTAGE	COMPRESSOR				BLOWER		MIN. CCT. AMPACITY	MAX FUSE / CCT. BKR. AMP
		QTY	RLA	LRA	HP	FLA			
007	208-230/1/60	1 @	2.8	17.7	0.10	0.9	4.35	15	
009	208-230/1/60	1 @	3.4	23.0	0.10	0.9	5.15	15	
012	208-230/1/60	1 @	4.8	26.3	0.17	1.4	7.40	15	
018	208-230/1/60	1 @	6.4	38.0	0.25	1.5	9.5	15	
024	208-230/1/60	1 @	10.4	49.0	0.25	1.5	14.50	20	
030	208-230/1/60	1 @	12.4	61.0	0.33	2.6	18.10	30	
	208-230/3/60	1 @	7.7	55.0	0.33	2.6	12.23	15	
036	208-230/1/60	1 @	15.3	82.0	0.50	3.2	22.33	35	
	208-230/3/60	1 @	10.0	68.0	0.50	3.2	15.70	25	
	460/3/60	1 @	4.8	34.0	0.50	1.9	7.90	15	
048	208-230/1/60	1 @	19.0	105.0	0.75	4.9	28.65	45	
	208-230/3/60	1 @	14.0	91.0	0.75	4.9	22.40	35	
	460/3/60	1 @	5.9	42.0	0.75	2.2	9.58	15	
	575/3/60	1 @	4.8	34.0	0.75	1.8	7.80	15	
060	208-230/1/60	1 @	24.6	132.0	1.00	5.1	35.85	60	
	208-230/3/60	1 @	16.0	97.0	1.00	5.1	25.10	40	
	460/3/60	1 @	8.2	50.0	1.00	3.2	13.45	20	
	575/3/60	1 @	5.0	44.0	1.00	2.6	8.85	15	

LD13510

**BLOWER PERFORMANCE**

All units employ direct-drive blower motors with multiple speed taps available. The motors have been selected to deliver the nominal air volume against varying external static pressures when necessary. After installation of the unit, it will be necessary to check the air volume and change the motor speed connection accordingly, if the air volume is too high or too low. All units are factory-wired with the medium speed winding connected.

A simple method for approximating sufficient air volume is to measure the difference between the supply and return air temperatures. In Heating mode, the air temperature rise should be in the range of 20°F to 30°F. In Cooling mode, the temperature drop should be between 15°F to 25°F. If values are outside the appropriate range, increase or reduce the motor speed as necessary.

**BLOWER PERFORMANCE (CFM)**

Unit	Speed	External Static Pressure (in w.g.)								
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
007	High	-	-	-	-	270	235	195	150	-
	Med	-	-	260	240	210	175	-	-	-
	Low	225	215	200	180	150	-	-	-	-
009	High	-	-	380	360	330	290	240	-	-
	Med	350	340	325	300	270	235	-	-	-
	Low	285	275	260	240	210	-	-	-	-
012	High	495	475	450	420	385	345	300	-	-
	Med	470	455	430	400	365	325	-	-	-
	Low	385	370	355	330	300	-	-	-	-
018	High	-	-	705	660	610	555	495	430	-
	Med	-	700	660	615	565	510	450	-	-
	Low	690	665	630	585	535	480	-	-	-
024	High	-	-	1005	950	890	820	740	650	-
	Med	925	905	875	840	790	730	660	-	-
	Low	-	-	780	765	725	660	590	-	-
030	High	-	-	1170	1120	1060	985	905	810	-
	Med	1150	1125	1090	1045	990	925	850	765	-
	Low	-	975	970	940	905	855	785	-	-
036	High	-	1390	1330	1270	1210	1140	1055	960	-
	Med	1355	1320	1270	1215	1155	1085	1005	920	-
	Low	1200	1190	1170	1130	1085	1020	950	-	-
048	High	-	-	1990	1915	1835	1750	1660	1550	1415
	Med	1880	1860	1820	1770	1710	1640	1550	1450	1320
	Low	-	1490	1485	1480	1460	1420	1360	1285	1160
060	High	2340	2280	2210	2140	2070	1990	1895	1790	1660
	Med	2040	2030	2005	1970	1925	1860	1785	1700	1590
	Low	-	-	1705	1700	1680	1660	1610	1540	-

Note: Units are shipped pre-wired for Medium speed.

All airflow ratings are at lowest voltage rating of dual rating (ie. 208 volt)  
Airflow ratings include resistance of wet coil and clean air filters.

LD13511

## LOOP WATER SUPPLY AND PIPING CONNECTIONS

The recommended circulating water supply for heat pump systems is a closed-water loop, utilizing a cooling tower and boiler to maintain the loop temperature within acceptable temperature limits. Typically, the closed loop temperature is maintained above 60 F and below 90 F. All units function independently, either adding heat to the loop (cooling mode) or removing heat from the loop (heating mode).

When utilizing an open cooling tower (evaporative type), chemical treatment is mandatory to ensure that the loop water is free of corrosive minerals. A secondary heat exchanger between the open cooling tower and the closed water loop may also be used. It is imperative that all air is purged from the closed loop side to prevent condenser fouling.

Dual acting water regulating valves should be used when there is potential for low fluid flow and/or, low fluid temperature or high fluid temperature conditions to exist. These water regulating valve assemblies consist of a direct acting valve parallel coupled to a reverse acting valve. The direct acting valve opens in response to an increase in discharge pressure during cooling mode. The reverse acting valve opens in response to a decrease in suction pressure during heating mode.

The heat rejection water source for cooling-only units may be from a municipal supply main, a cooling tower, or a chilled water system. An automatic water flow regulating valve is normally required, except if the inlet water temperature is constant and the flow rate can be pre-set and turned on and off by some other means, such as a dedicated pump circuit or solenoid valve.

Automatic water flow regulating valves, for both heat pump and cooling-only applications, are available as field installed accessories. The valves are installed on the water outlet connection from the unit. Schrader type refrigerant pressure access fittings are included as standard in all units.

## SUPPLY/RETURN PIPING

Supply and return piping should be as large as the unit connection sizes (larger on long pipe runs). Never use flexible hoses of a smaller inside diameter than that of the nominal water pipe size. Both supply and return water lines will sweat if subjected to low water temperatures. Insulate these lines as necessary to prevent condensation damage.

Flexible hoses should be used between the unit and rigidly mounted piping to avoid vibration transmission. Teflon tape thread sealant is recommended. Do not overtighten threaded connections. Ball valves should be installed in the supply and return lines for unit isolation and water flow balancing. Before final connection to the unit, the supply and return hoses should be connected together and the piping system flushed to remove any dirt or foreign material.

Pressure and temperature ports are recommended in both the supply and return lines for system flow balancing. The water flow can be accurately set by measuring the water-side pressure drop through the unit. See the flow versus pressure drop specification table for application information. Do not exceed the recommended water flow rates. Damage due to erosion of the water-to-refrigerant heat exchanger could occur.

## UNIT WATER PRESSURE DROP

EWT °F	UNIT MODEL																	
	007		009		012		018		024		030		036		048		060	
	GPM	WPD (psi)	GPM	WPD (psi)	GPM	WPD (psi)	GPM	WPD (psi)	GPM	WPD (psi)	GPM	WPD (psi)	GPM	WPD (psi)	GPM	WPD (psi)	GPM	WPD (psi)
50	1.0	0.8	1.35	1.4	1.8	2.1	2.75	2.3	3.5	3.3	4.5	3.6	5.5	2.9	7.5	3.9	9.0	3.6
	1.5	2.0	2.25	3.5	3.0	5.3	4.50	5.7	6.0	8.0	7.5	9.0	9.0	7.0	12.0	9.6	15.0	8.8
60	1.0	0.7	1.35	1.4	1.8	2.0	2.75	2.2	3.5	3.2	4.5	3.5	5.5	2.8	7.5	3.7	9.0	3.5
	1.5	1.9	2.25	3.4	3.0	5.1	4.50	5.5	6.0	7.7	7.5	8.7	9.0	6.8	12.0	9.2	15.0	8.5
70	1.0	0.7	1.35	1.3	1.8	1.9	2.75	2.1	3.5	3.0	4.5	3.3	5.5	2.6	7.5	3.5	9.0	3.3
	1.5	1.8	2.25	3.2	3.0	4.8	4.50	5.2	6.0	7.3	7.5	8.2	9.0	6.4	12.0	8.7	15.0	8
85	1.0	0.7	1.35	1.2	1.8	1.8	2.75	2.0	3.5	2.9	4.5	3.1	5.5	2.5	7.5	3.3	9.0	3.1
	1.5	1.7	2.25	3.0	3.0	4.6	4.50	4.9	6.0	6.9	7.5	7.8	9.0	6.1	12.0	8.3	15.0	7.6
100	1.0	0.6	1.35	1.2	1.8	1.7	2.75	1.9	3.5	2.7	4.5	3.0	5.5	2.4	7.5	3.2	9.0	3.0
	1.5	1.6	2.25	2.9	3.0	4.4	4.50	4.7	6.0	6.6	7.5	7.5	9.0	5.8	12.0	7.9	15.0	7.3

LD13512

### CONDENSATE DRAIN PIPING

Horizontal Units - The 3/4 FPT drain connection on the unit is NOT internally trapped. The cooling coil compartment and drain pan are under negative pressure when the blower is running, therefore a P trap MUST be used in the drain line.

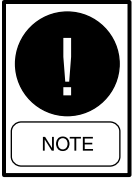
It is recommended that a 3/4 inch drain line be sloped (1/4 inch/foot) all the way to an open drain. Each unit must be installed with its own individual trap, and have the means to flush out the condensate line if necessary. If it is not possible to reach an open drain by gravity flow, a pump kit, which is available as an accessory, can be mounted close to the unit.

Vertical Units - Each unit utilizes a flexible hose inside the cabinet as a trapping loop. An external P-trap is not necessary.

### WATER REGULATING VALVE – INSTALLATION

The water regulating valve is to be installed in the water outlet line, as close as possible to the unit cabinet (maximum 18 inches distance). The capillary tube from the sensing bellows on the valve(s) must be connected to the 1/4 inch male flare connection, which is on the refrigerant liquid line in the condenser compartment. Connect the capillary tube flare nut directly to the unit male flare fitting. When one is making this connection, it is normal for some refrigerant to escape as the schrader valve core is being opened and the nut is being tightened. Complete the tightening of the nut as soon as possible to minimize the loss of refrigerant. Do not over-tighten.

## START-UP AND OPERATION



**The services of a qualified Refrigeration Service Mechanic should be employed in the start-up and commissioning of these systems.**



**LOCK ALL ELECTRICAL POWER SUPPLY SWITCHES IN THE OFF POSITION BEFORE INSTALLING THE UNIT. FAILURE TO DISCONNECT POWER SUPPLY MAY RESULT IN ELECTRICAL SHOCK OR EVEN DEATH.**

After completing the installation, and before energizing the power supply to the unit, the following checks should be made -

- Verify that the electrical supply to the unit is of the correct voltage, and rated for sufficient amperage in accordance with the nameplate values.
- Verify that the low voltage wiring between the unit and the thermostat is correct.
- Confirm that the water piping is complete and free of leaks
- Check that the water flow rate is correct, and adjust as necessary
- Confirm that the blower wheel rotates freely
- All service access panels are in place and properly secured

A room thermostat should be used to cycle the unit on and off automatically as required to maintain the room temperature at the set point of the thermostat. The air circulating fan will cycle on and off with the compressor. If desired, the air circulating fan can be run continuously.

The units have a lock out relay that will prevent the unit from cycling on the low pressure cut out or the high pressure cut out. If either of these safety devices open, the compressor will not restart when the safety device resets. To restart the compressor after a safety lock out, it will be necessary to interrupt the power to the control circuit. This can be done at the thermostat or at the disconnect switch.

### START-UP

- 1) Set the thermostat to the highest setting.
- 2) Set the fan switch to the 'AUTO' position, and the thermostat system switch to 'COOL'.
- 3) Reduce the thermostat setting to approximately 5 degrees below room temperature.

- 4) The compressor, and the supply air blower, will start. Simultaneously the reversing valve will be energized.
- 5) After five minutes, verify cooling mode operation by checking for cool air discharge at the supply air outlet.
- 6) Set the thermostat system switch to the 'OFF' position. The unit will stop running, and the reversing valve will deenergize.
- 7) Allow approximately five minutes to allow for system pressures to equalize.
- 8) Set the thermostat to its lowest temperature setting.
- 9) Move the thermostat system switch to 'HEAT'.
- 10) Increase the thermostat setting approximately 5 degrees above room temperature.
- 11) After five minutes, verify heating mode operation by checking for warm air discharge at the supply air outlet.
- 12) Adjust the thermostat to maintain the desired space temperature.
- 13) Check the unit for unusual vibrations, noises, leaks, etc.

### WATER REGULATING VALVE - ADJUSTMENT

The water regulating valve needs to be adjusted to maintain a condensing pressure of 170 to 220 PSIG. The valve is adjusted by turning the ¼ inch square shaft on top of the spring housing. Turning the adjusting screw counter clockwise will raise the opening pressure and raise the condensing pressure being maintained. Turning the adjusting screw clockwise will lower the opening point and lower the condensing pressure being maintained. If mains water is being used, make sure the valve closes soon after the compressor stops. If the flow does not stop after a few minutes, raise the opening pressure by turning the adjusting shaft counter clockwise until the flow stops.

If the unit is running on mains water, we recommend adjusting the water regulating valve to give 100°F leaving water temperature or 220 PSIG condensing temperature. This will give the best compromise between low water flow and high operating efficiency. If the condenser water is being re-circulated through a cooling tower or a chilled water system, it is recommended that the water regulating valve be set for a lower condensing temperature. This will provide higher efficiency, lower operating cost and a lower sound level. The minimum condensing pressure required for satisfactory expansion valve operation is 170 PSIG.

## MAINTENANCE

The air circulating fan motor has bearings that are factory lubricated and sealed for long life. No further lubrication is required. The compressor is part of a sealed refrigeration system that does not require any additional lubrication.

Filter changes are required at regular intervals. It is suggested that the filter be checked at 60-day intervals for the first year of operation, until field experience is acquired. If light cannot be seen through the filter, it should be changed. Always replace the filter with the same size of 1-inch thick disposable type of fiberglass filter. (See General Data for listing of required filter sizes.)

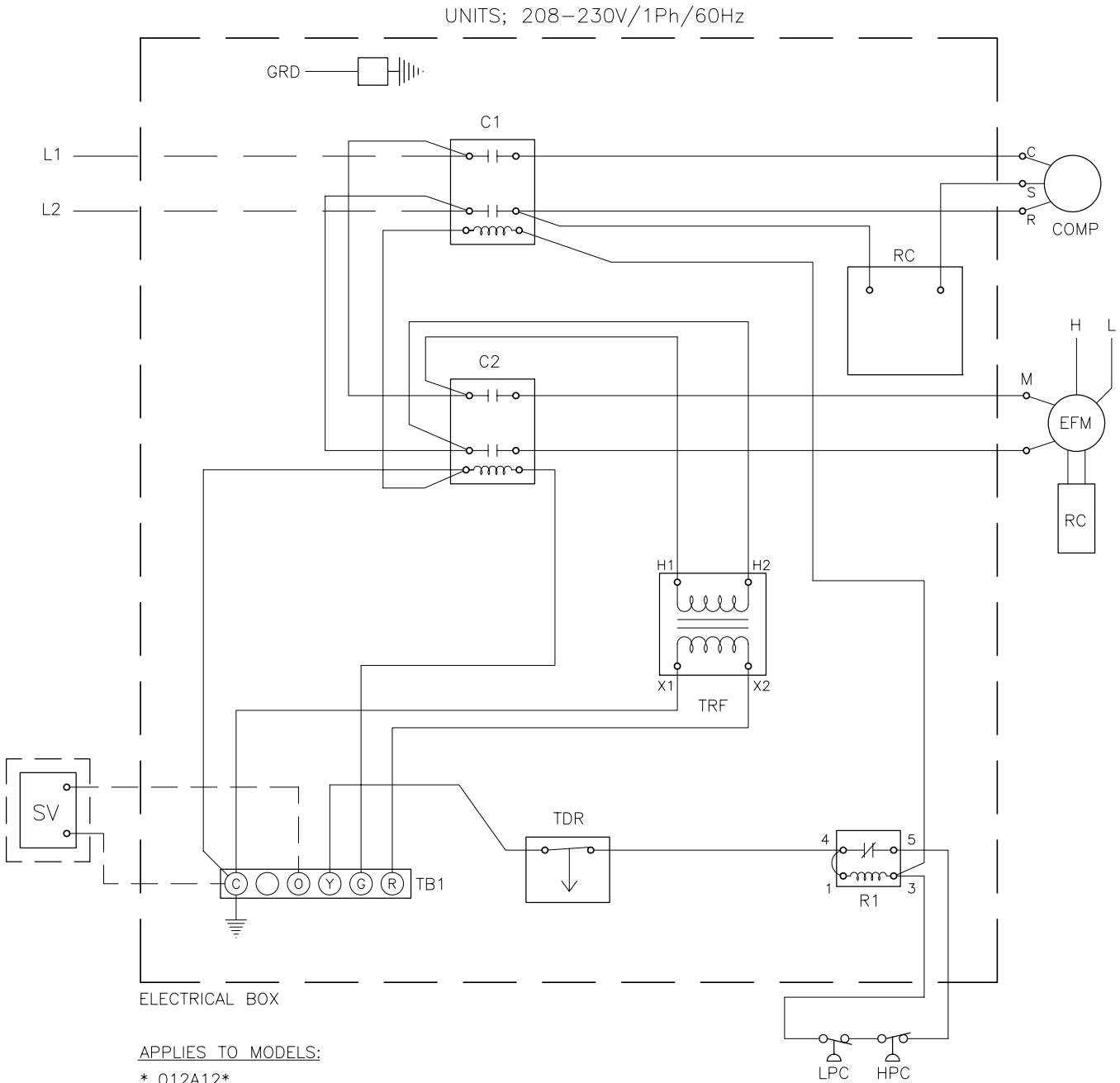
The condensate drain pan should be checked annually, and cleaned and flushed as required. Recording of reference operating parameters is recommended (volts, amp draw, water temperature differences, etc.). A comparison of logged data with start-up and annual data is useful as an indicator of general equipment condition.

Periodic lockouts are almost always caused by air or water problems. The lockout of the compressor is a normal protective result of insufficient heat transfer. Check for dirt in the water system, insufficient water flow rates, excessive water temperatures, air flow rates (dirty filters), and air temperatures.

## R-22 REFRIGERANT CHARGE

UNIT SIZE	CAPACITY TONS	HWP – HORIZ.	VWP – VERT.
060	5.0	5 lbs. – 8 oz.	5 lbs. – 13 oz.
048	4.0	4 lbs. – 6 oz.	4 lbs. – 9 oz.
036	3.0	3 lbs. – 5 oz.	3 lbs. – 7 oz.
030	2.5	2 lbs. – 12 oz.	2 lbs. – 14 oz.
024	2.0	2 lbs. – 4 oz.	2 lbs. – 6 oz.
018	1.5	1 lbs. – 12 oz.	1 lbs. – 14 oz.
012	1.0	1 lbs. – 6 oz.	1 lbs. – 7 oz.
009	0.75	1 lbs. – 1 oz.	1 lbs. – 1 oz.
007	0.50	10 oz.	10 oz.

LD13513



APPLIES TO MODELS:

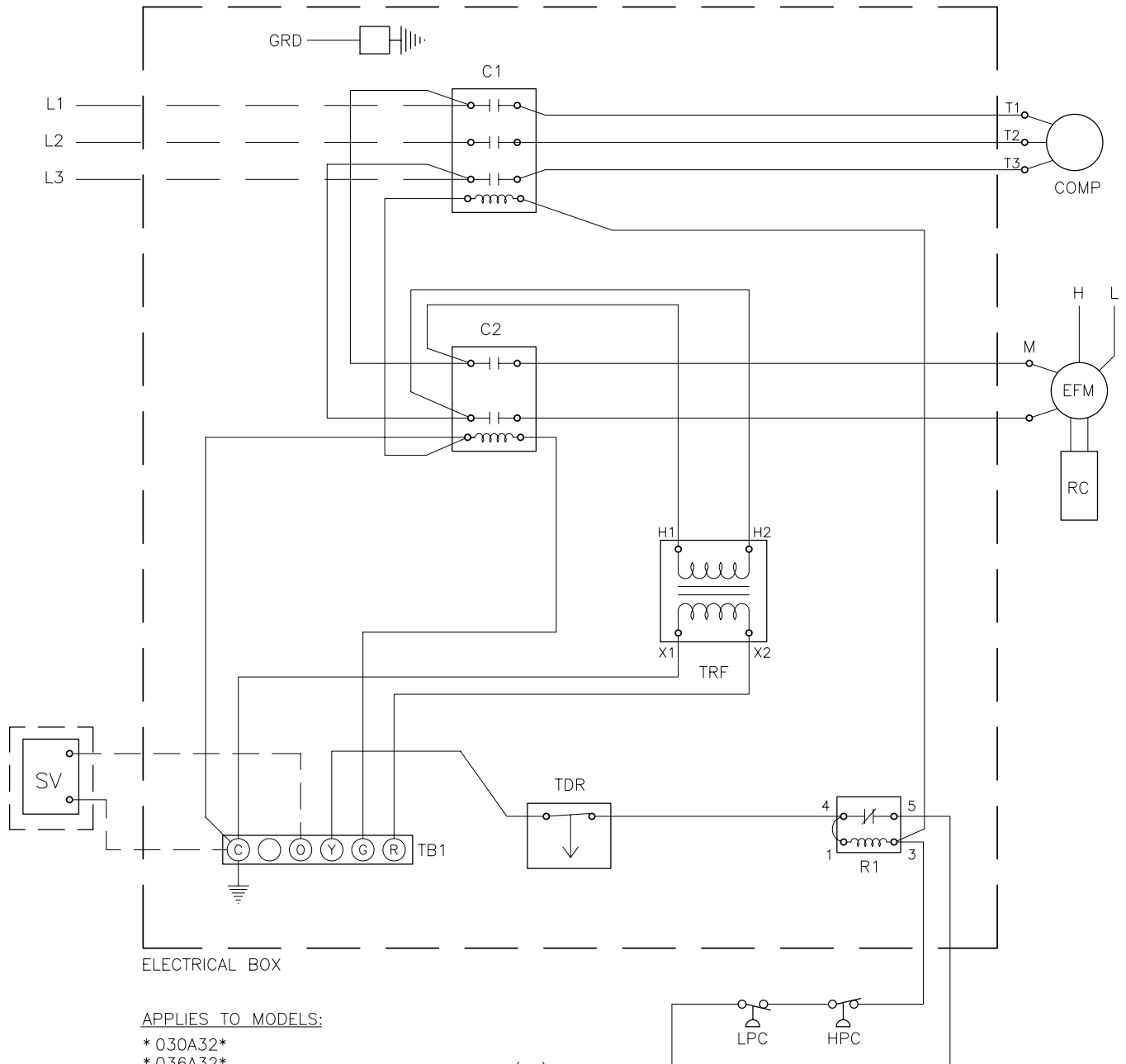
- \* 012A12\*
- \* 018A12\*
- \* 024A12\*
- \* 030A12\*
- \* 036A12\*
- \* 048A12\*
- \* 060A12\*

NOTE: SOLENOID VALVE (SV) USED  
ON HEAT PUMP VERSION ONLY

LD13514



\* UNITS; 208-230V/3Ph/60Hz



ELECTRICAL BOX

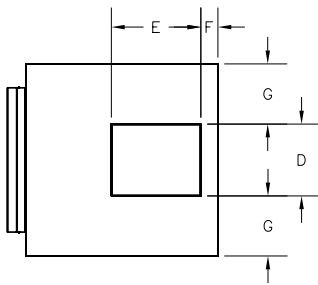
APPLIES TO MODELS:

- \* 030A32\*
- \* 036A32\*
- \* 048A32\*
- \* 060A32\*

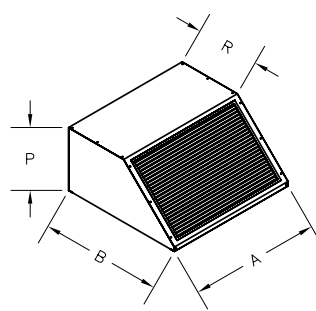
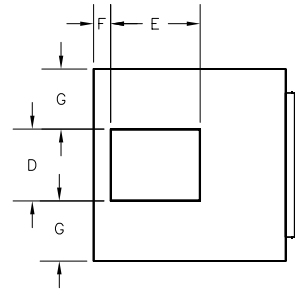
NOTE: SOLENOID VALVE (SV) USED  
ON HEAT PUMP VERSION ONLY

LD13515

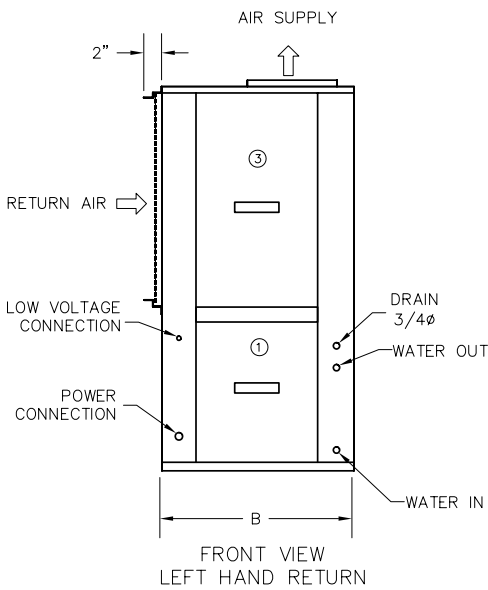
LEFT HAND RETURN



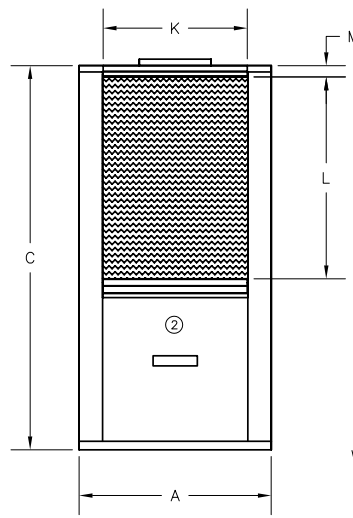
RIGHT HAND RETURN



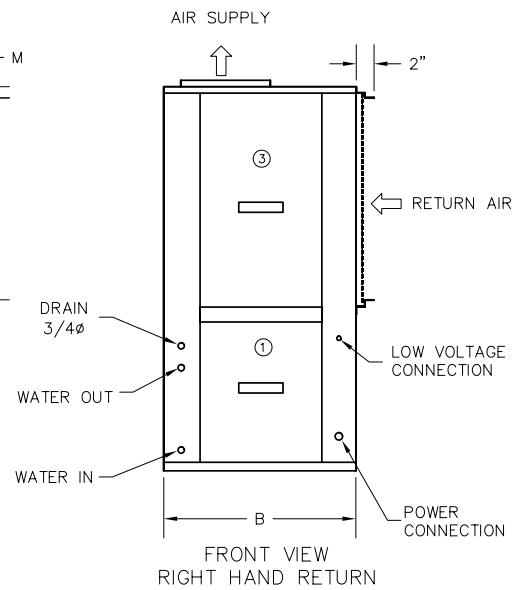
DISCHARGE PLENUM



FRONT VIEW  
LEFT HAND RETURN



AIR COIL SIDE



FRONT VIEW  
RIGHT HAND RETURN

SERVICE DOORS

- ① - ELECTRICAL BOX SERVICE DOOR
- ② - COMPRESSOR AND CONDENSER SERVICE DOOR
- ③ - BLOWER SERVICE DOOR

MODEL	A	B	C	AIR SUPPLY		F	G	RETURN AIR			OPTIONAL PLENUM	
				D	E			K	L	M	P	R
007	22.50	22.50	33.00	6.81	10.31	2.00	7.81	14.88	12.50	1.25	N/A	N/A
009	22.50	22.50	33.00	6.81	10.31	2.00	7.81	14.88	12.50	1.25	N/A	N/A
012	22.50	22.50	33.00	6.81	10.31	2.00	7.81	14.88	12.50	1.25	11.50	12.00
018	22.50	22.50	35.00	8.25	10.31	2.00	7.13	16.88	14.50	1.25	11.50	12.00
024	22.50	22.50	45.00	9.19	10.31	2.00	7.13	16.88	23.50	1.25	11.50	12.00
030	22.50	22.50	45.00	9.19	10.31	2.00	6.63	16.88	23.50	1.25	11.50	12.00
036	24.50	24.00	45.00	9.19	10.31	3.00	7.63	18.88	23.50	1.25	12.50	12.50
048	29.50	27.50	52.00	12.25	11.38	3.00	8.63	23.00	28.50	0.75	14.19	14.31
060	29.50	27.50	56.00	12.25	11.38	3.00	8.81	23.00	32.50	0.75	14.19	14.31

DIMENSIONS IN INCHES

LD13517

### **LIMITED WARRANTY**

Johnson Controls warrants this product to be free from defects in workmanship or material for a period of one year from date of original installation or 18 months from date of shipment, whichever comes first.

Johnson Controls obligation under this Warranty is LIMITED to repairing or replacing at our sole option, at our factory, any part thereof which shall be returned to our factory, transportation charges prepaid and which on examination proves to have been thus defective under normal domestic use not exceeding the fuel rating. The defective part should be returned through a qualified servicing dealer. Upon warranty determination, the replacement part will be shipped freight collect and assumes the unexpired portion of this Limited Warranty.

When a defective part can be repaired or replaced, Johnson Controls shall not be obligated to repair the entire unit or any part thereof other than the defective part.

This warranty applies only to the original homeowner, and is subject to the terms and conditions hereof.

### **COMPRESSOR – FIVE YEAR LIMITED WARRANTY**

In addition to the One Year Limited Warranty, Johnson Controls warrants the compressor to be free from defects in workmanship or material for a period of five (5) years from the date of original installation. If a compressor fails during this five year period, a new compressor will be supplied. The customer will be responsible for freight costs from our factory for delivery of the replacement compressor and also for the return of the defective compressor which may be required under the terms of the Warranty. Labor and any other expense involved in replacing the compressor is not covered by this Warranty.

### **LABOR AND COST NOT COVERED**

This Warranty provides only replacement parts or credits, and does not provide for or cover any labor, shipping, handling or other costs for service travel, servicing, removing, or installing any parts.

### **EXCLUSIONS**

This Warranty shall be void if:

1. The unit is not installed by a licensed or otherwise qualified contractor and in compliance with the Installation Manual, applicable installation and good trade practices.
2. The defect or damage is caused by accident, abuse, negligence of any person or company, misuse, riot, flood, fire or Acts of God.
3. The unit is not operated and regularly serviced and maintained as called for in the Users' Manual.
4. Damages are caused by operating the unit in a commercial or corrosive atmosphere containing any damaging or dangerous chemicals.
5. The unit is modified or services in a manner not in accordance with the Installation Manual and Users' Manual.
6. Components, replacement parts, or other accessories not compatible with the unit or not approved by Johnson Controls have been used with or attached to the unit.
7. The defect or damage is not caused by Johnson Controls, or it arises from circumstances beyond the control of Johnson Controls.
8. The unit is installed outside the United States or Canada, or has been removed from the place where it was originally installed.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, OBLIGATIONS OR LIABILITIES, EXPRESSED OR IMPLIED BY EMPLOYEES OR REPRESENTATIVES OF JOHNSON CONTROLS. ALL STATUTORY, EXPRESSED OR IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY NEGATED AND EXCLUDED. ANY CLAIMS FOR INCIDENTAL AND CONSEQUENTIAL DAMAGES, OR ANY OTHER DAMAGES OR EXPENSES BEYOND THE TERMS OF THIS LIMITED WARRANTY ARE HEREBY EXPRESSLY NEGATED AND EXCLUDED.

# NOTES