CLIMATEMASTER®

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RESIDENTIAL

TRILOGY® 47 (SV) VARIABLE CAPACITY SERIES

INSTALLATION, OPERATION & MAINTENANCE MANUAL

Part#: 97B0144N01 | Revised: August 27, 2026

Models: SV 0930-1872

60Hz – R-454B

Models:
SV
0930-1872

Table of Contents

Model Nomenclature

Models:
SV
0930-1872

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
S	V	T	1	8	7	2	A	G	E	R	2	S	V	S

MODEL
S = R-454B Refrigerant

MODEL TYPE
V = Variable Capacity Series

SUPPLY & RETURN CONFIGURATIONS

Horizontal Configuration		
	Left	Right
Straight	L	R
Back	B	P
Down Flow Configuration		
	Left	Right
Down	D	N
Vertical Configuration		
	Left	Right
Top	T	K

SIZE
0930
1248
1872

REVISION
A = Current

STANDARD
S = Standard

BLOWER MOTOR
V = Constant Volume (CV) EC

HEAT EXCHANGER OPTIONS
S = Microchannel Air Coil

WATER OPTIONS[1]
2 = Internal Flow Controller - High Head

CABINET
R = Residential

CONTROLS
E = EXM

VOLTAGE
G = 208/230-1-60
J = 208/230-1-60 Refrigerant Detection System

NOTES:
1. Flow controller comes standard with variable speed pump with check valve, flushing valve, and expansion tank.

Models:
SV
0930-1872

Attentions, Cautions, and Warnings

SAFETY

Warnings, cautions, and notices appear throughout this manual. Read these items carefully before attempting any installation, service, or troubleshooting of the equipment.

DANGER: Indicates an immediate hazardous situation, which if not avoided will result in death or serious injury. DANGER labels on unit access panels must be observed.

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

CAUTION: Indicates a potentially hazardous situation or an unsafe practice, which if not avoided could result in minor or moderate injury or product or property damage.

ATTENTION: Notification of installation, operation, or maintenance information, which is important, but which is not hazard-related.

⚠ WARNING

Disconnect power supply(ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!

⚠ WARNING

To avoid the release of refrigerant into the atmosphere, the refrigerant circuit of this unit must be serviced only by technicians who meet local, state, and federal proficiency requirements.

⚠ WARNING

The installation of water-source heat pumps and all associated components, parts, and accessories which make up the installation shall be in accordance with the regulations of ALL authorities having jurisdiction and MUST conform to all applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

⚠ WARNING

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).

⚠ WARNING

If unit connected via an air duct system to one or more rooms with R-454B is installed in a room with an area less than A_{min} or has an Effective Dispersal Volume less than minimum, that room shall be without continuously operating open flames or other POTENTIAL IGNITION SOURCES. A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest.

⚠ WARNING

All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state, and federal statutes for the recovery and disposal of refrigerants. If a compressor is removed from this unit, refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, refrigerant lines of the compressor must be sealed after it is removed.

⚠ WARNING

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.

⚠ WARNING

An unventilated area where the appliance using FLAMMABLE REFRIGERANTS is installed shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

⚠ WARNING

Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 1,292°F (700°C)

⚠ WARNING

An unventilated area where a water-source heat pump is installed and surpasses a R-454B refrigerant charge of 62 oz (1.76 kg), shall be without continuously operating open flames (for example an operating gas appliance) or other POTENTIAL IGNITION SOURCES (for example, an operating electric heater, hot surfaces).

⚠ WARNING

Only auxiliary electric heaters approved by the manufacturer shall be installed in connecting ductwork. The installation of any other auxiliary devices is beyond the manufacturer's responsibility.

⚠ WARNING

For mechanical ventilation, the lower edge of the air extraction opening where air is exhausted from the room shall not be more than 3.94 inches (100 mm) above the floor. The location where the mechanical ventilation air extracted from the space is discharged shall be separated by a sufficient distance, but not less than 9.84 feet (3 m), from mechanical ventilation air intake openings, to prevent recirculation to the space.

⚠ WARNING

Children being supervised are NOT to play with the appliance.

⚠ WARNING

Do not pierce or burn.

⚠ WARNING

Be aware that refrigerants may not contain odor.

⚠ WARNING

- Risk of electric shock.
- Can cause injury or death: System contains oversized protective earthing (grounding) terminal which shall be properly connected.

Attentions, Cautions, and Warnings

⚠ CAUTION

DO NOT store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g., attics, garages, rooftops, etc.). Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life. Always move and store units in an upright position. Tilting units on their sides will cause equipment damage.

⚠ CAUTION

CUT HAZARD - Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing heat pumps.

⚠ CAUTION

To avoid equipment damage, DO NOT use these units as a source of heating or cooling during the construction process. The mechanical components and filters can quickly become clogged with construction dirt and debris, which may cause system damage and void product warranty.

⚠ CAUTION

All three phase scroll compressors must have direction of rotation verified at startup. Verification is achieved by checking compressor Amp draw. Amp draw will be substantially lower compared to nameplate values. Additionally, reverse rotation results in an elevated sound level compared to correct rotation. Reverse rotation will result in compressor internal overload trip within several minutes. Verify compressor type before proceeding.

⚠ ATTENTION

Servicing shall be performed only as recommended by the manufacturer.

⚠ ATTENTION

REFRIGERANT SENSORS for REFRIGERANT DETECTION SYSTEMS shall only be replaced with sensors specified by the appliance manufacturer.

⚠ ATTENTION

An unconditioned attic is not considered natural ventilation.

⚠ ATTENTION

LEAK DETECTION SYSTEM installed. Unit must be powered except for service.

Models:
SV
0930-1872

General Information

INSPECTION

Upon receipt of the equipment, carefully check the shipment against the bill of lading. Make sure all units have been received. Inspect the packaging of each unit, and inspect each unit for damage. Ensure that the carrier makes proper notation of any shortages or damage on all copies of the freight bill and completes a common carrier inspection report. Concealed damage not discovered during unloading must be reported to the carrier within 15 days of receipt of shipment. If not filed within 15 days, the freight company can deny the claim without recourse.

NOTE: It is the responsibility of the purchaser to file all necessary claims with the carrier. Notify your equipment supplier of all damage within 15 days of shipment.

STORAGE

Equipment should be stored in its original packaging in a clean, dry area. Store units in an upright position at all times. You may stack vertical configurations a maximum of two units high and horizontal configurations a maximum of three units high.

UNIT PROTECTION

Cover units on the job site with either the original packaging or an equivalent protective covering. Cap the open ends of pipes stored on the job site. In areas where painting, plastering, and/or spraying has not been completed, all due precautions must be taken to avoid physical damage to the units and contamination by foreign material. Physical damage and contamination may prevent proper startup and may result in costly equipment cleanup.

Examine all pipes, fittings, and valves before installing any of the system components. Remove any dirt or debris found in or on these components.

PRE-INSTALLATION

Installation, Operation, and Maintenance instructions are provided with each unit. Horizontal equipment is designed for installation above false ceiling or in a ceiling plenum. Other unit configurations are typically installed in a mechanical room. The installation site chosen should include adequate service clearance around the unit. Before unit startup, read all manuals and become familiar with the unit and its operation. Thoroughly check the system before operation.

PREPARE UNITS FOR INSTALLATION AS FOLLOWS

1. Compare the electrical data on the unit nameplate with ordering and shipping information to verify that the correct unit has been shipped
2. Keep the cabinet covered with the original packaging until installation is complete and all plastering, painting, etc. is finished
3. Verify refrigerant tubing is free of kinks or dents and that it does not touch other unit components
4. Inspect all electrical connections. Connections must be clean and tight at the terminals
5. Remove any blower support packaging (water-to-air units only)
6. Some airflow patterns are field convertible (horizontal units only). Locate the airflow conversion section of this IOM
7. Locate and verify any hot water generator (HWG), hanger, or other accessory kit located in the compressor section or blower section

CHECKS TO THE AREA

Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the REFRIGERATING SYSTEM, these steps shall be completed prior to conducting work on the system.

General Information

Work Procedure

Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.

General Work Area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

Checking for Presence of Refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

Presence of Fire Extinguisher

If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

No Ignition Sources

No person carrying out work in relation to a REFRIGERATION SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.

Ventilated Area

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

Checks to the Refrigeration Equipment

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

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

Checks to Electrical Devices

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

Initial safety checks shall include:

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

Models:
SV
0930-1872

General Information

REPAIR TO INTRINSICALLY SAFE COMPONENTS

Intrinsically safe components must be replaced.

CABLING

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

REQUIRED AREA FOR INSTALLATION

The minimum room area of the space (A_{min}) or a minimum room area of conditioned space (TA_{min}) shall be corrected for unit's location altitude by multiplying A_{min} or TA_{min} by the applicable altitude adjustment factor (AF) for building ground-level altitude (H_{alt}) in feet or meters, as shown in the **Altitude Adjustment** table.

NOTE:

- You can use Imperial or Metric measurements to calculate A_{min} or TA_{min}.
- The maximum allowable altitude of installation for this product is 6,561 ft (2,000 m).

Altitude Adjustment

H_{alt} ft (m)	AF
0 (0)	1.00
656 (200)	1.00
1,312 (400)	1.00
1,968 (600)	1.00
2,624 (800)	1.02
3,280 (1,000)	1.05
3,937 (1,200)	1.07
4,593 (1,400)	1.10
5,249 (1,600)	1.12
5,905 (1,800)	1.15
6,561 (2,000)	1.18

Refrigerant System Servicing

Models:
SV
0930-1872

REFRIGERANT SYSTEM

Verify that air- and water-flow rates are at proper levels before servicing the refrigerant circuit. To maintain sealed-circuit integrity, do not install service gauges unless unit operation appears abnormal. Reference the operating charts for pressures and temperatures.

Removal and Evacuation

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

- Safely remove refrigerant following local and national regulations
- Evacuate
- Purge the circuit with Nitrogen
- Evacuate
- Continuously flush or purge with Nitrogen when using flame to open circuit
- Open the circuit

The refrigerant charge shall be recovered into the correct recovery cylinders as venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for FLAMMABLE REFRIGERANT). This process shall be repeated until no refrigerant is remains in the system (optional for FLAMMABLE REFRIGERANT). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

Charging Procedures

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

- Ensure that contamination of different refrigerants does not occur when using charging equipment
- Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them
- Cylinders shall be kept in an appropriate position according to the instructions to ensure charging with liquid refrigerant
- Ensure that the REFRIGERATION SYSTEM is grounded prior to charging the system with refrigerant
- Label the system when charging is complete (if not already):
  - For packaged units, the data plate dictates the charge level
  - For split systems, write the charge level on the data plate
- Extreme care shall be taken not to overfill the REFRIGERATION SYSTEM

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

Leak Detection

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

The following leak detection methods are deemed acceptable for all refrigerant systems.

A2L-Compliant electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. Detection equipment shall be calibrated in a refrigerant-free area. Ensure that the detector is not a potential source of Ignition and is suitable for the refrigerant used.

Models:
SV
0930-1872

Refrigerant System Servicing

Leak-detection equipment shall be set at a percentage of the lower flammability limit of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

Leak-detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE:
Examples of leak detection fluids are:

- Bubble method
- Fluorescent method agents

If a leak is suspected, all naked flames shall be removed/extinguished.

If a refrigerant leak that requires brazing is identified, all of the refrigerant shall be recovered from the system, or isolated (by means of shutoff valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to Removal and Evacuation section.

DECOMMISSIONING

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

1. Become familiar with the equipment and its operation
2. Isolate system electrically
3. Before attempting the procedure, ensure that:
   - Mechanical-handling equipment is available, if required, for handling refrigerant cylinders
   - All personal protective equipment is available and being used correctly
   - The recovery process is supervised at all times by a competent person
   - Recovery equipment and cylinders conform to the appropriate standards
4. Pump down refrigerant system, if possible
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system
6. Ensure that cylinder is situated on the scales before recovery takes place
7. Start the recovery machine and operate in accordance with instructions
8. Do not overfill cylinders (no more than 80% volume liquid charge)
9. Do not exceed the maximum working pressure of the cylinder, even temporarily
10. When the cylinders have been filled correctly and the process completed, ensure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off
11. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked

Refrigerant System Servicing

Labeling - Upon decommissioning, equipment shall be labeled stating that is has been decommissioned and emptied of refrigerant. The label shall be dated and signed.

RECOVERY

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shutoff valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

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

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

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

Models:
SV
0930-1872

Physical Data

Model	0930	1248	1872
Compressor (1 Each)	Rotary	Scroll	Scroll
Factory Charge HFC/HFO-454B - (oz.)	32	56	58
Refrigerant Leak Detection System	O	O	O
Number of Sensors	2	2	2
EC Motor and Blower			
Fan Motor, hp [W]	1/2 [373]	3/4 [559]	1 [746]
Blower Wheel Size (Dia x W), in [mm]	9 x 7 [229 x 178]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
Loop Water Connection Size			
Swivel - Residential Class	1"	1"	1"
Vertical Upflow			
Air Coil Dimensions (H x W), in [mm]	28 x 20 [711 x 542]	32 x 25 [813 x 635]	32 x 25 [813 x 635]
Standard Filter - 2" [25.4mm] Pleated MERV11 Throwaway, in [mm]	28 x 24 [712 x 610]	32 x 29.5 [813 x 749]	32 x 29.5 [813 x 749]
Weight - Operating, lbs [kg]	230 [104]	319 [145]	322 [146]
Weight - Packaged, lbs [kg]	240 [109]	329 [149]	332 [151]
Horizontal			
Air Coil Dimensions (H x W), in [mm]	18 x 31 [457 x 787]	20 x 40 [508 x 1,016]	20 x 40 [508 x 1,016]
Standard Filter - 2" [25.4mm] Pleated MERV11 Throwaway, in [mm]	2 - 18 x 18 [457 x 457]	1 - 18 x 20 [457 x 508]	1 - 18 x 20 [457 x 508]
		1 - 20 x 24 [508 x 610]	1 - 20 x 24 [508 x 610]
Weight - Operating, lbs [kg]	248 [112]	357 [162]	361 [164]
Weight - Packaged, lbs [kg]	258 [117]	367 [166]	371 [168]

Notes:
- All dimensions displayed above are in inches unless otherwise marked.
- All units have electronic expansion device (EEV) and ½-inch and ¾-inch electrical knockouts.
- The Stainless Steel Condensate Drain Connection is ¾-inch MPT.
- FPT = Female Pipe Thread, MPT = Male Pipe Thread
- O = Optional, R = Required

Horizontal Installation

Models:
SV
0930-1872

HORIZONTAL UNIT LOCATION

Units are not designed for outdoor installation. Locate the unit in an INDOOR area that allows enough space for service personnel to perform typical maintenance or repairs without removing unit from the ceiling. Horizontal units are typically installed above a false ceiling or in a ceiling plenum. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air). During installation, consider accessibility for filter and access panel removal. Provide sufficient room to make water, electrical, and duct connection(s).

If the unit is located in a confined space, such as a closet, make provisions for return air to freely enter the space by means of a louvered door, etc. Remove any access panel screws that are difficult to remove after the unit is installed prior to setting the unit. Refer to the **Typical Horizontal Unit Installation** figure for an example of a typical installation. Refer to product catalog or engineering design guide for dimensional data.

Conform to the following guidelines when selecting unit location:

1. Provide a hinged access door in concealed-spline or plaster ceilings. Provide removable ceiling tiles in T-bar or lay-in ceilings. Refer to horizontal unit dimensions for specific series and model in the product catalog. Size the access opening to accommodate the service technician during the removal or replacement of the compressor, control, or blower assembly.
2. Provide access to hanger brackets, water valves, and fittings. Provide screwdriver clearance to access panels, discharge collars and all electrical connections.
3. DO NOT obstruct the space beneath the unit with piping, electrical cables, and other items that prohibit future removal of components or the unit itself.
4. Use a manual portable jack/lift to lift and support the weight of the unit during installation and servicing.

The installation of water-source heat pump units and all associated components, parts and accessories that make up the installation shall be in accordance with the regulations of ALL authorities having jurisdiction and MUST conform to all applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

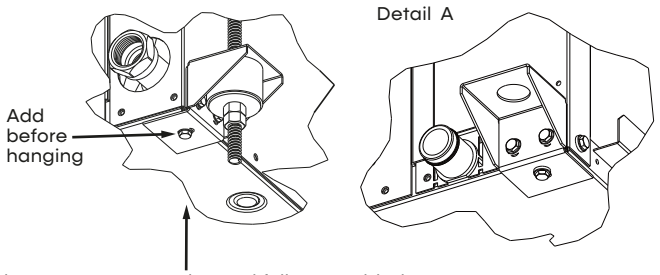
NOTE: Minimum clearances for installation are the same as the minimum required service clearances. Consult the Horizontal Installation Service Access diagram for more information.

MOUNTING HORIZONTAL UNITS

Horizontal units have four hanger brackets partially attached at the factory; one at each corner. Enclosed within the unit, there is a hanger kit hardware bag containing vibration isolation grommets, washers, screws, and a hanger installation instruction page. Add one screw from the hardware bag to each hanger bracket before unit installation. Tighten each screw to 75 in-lbs (8.5 Nm). See the **Hanger Bracket** figure for more information. Refer to the hanger installation instruction page contained in the hardware bag for details of final hanger bracket attachment and unit suspension.

Use four field-supplied threaded rods and factory-provided vibration isolators to suspend the unit. Safely lift the unit into position supporting the bottom of the unit. Ensure the top of the unit is not in contact with any external objects. Connect the top end of the four all-thread rods, slide rods through the brackets and grommet then assemble washers and double nuts at each rod. Ensure that the unit is approximately level and that the threaded rod extends past the nuts.

Hanger Bracket

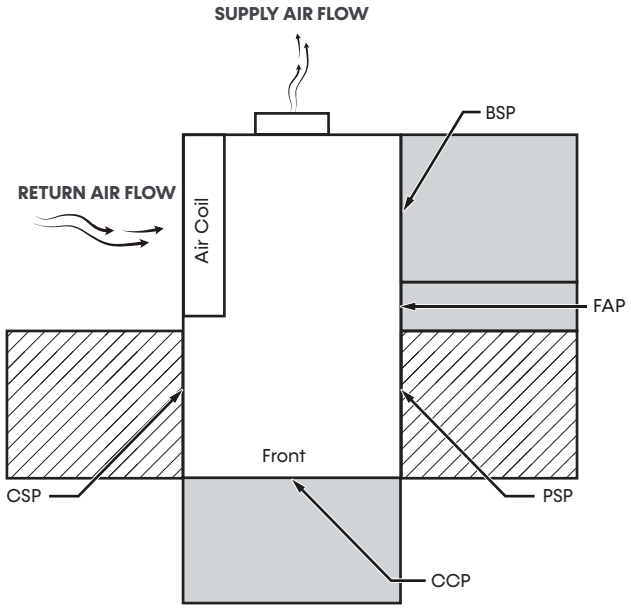


View: Water connection end fully assembled
(Unit pictured for hanger bracket reference)
(Water hardware may vary per unit model)

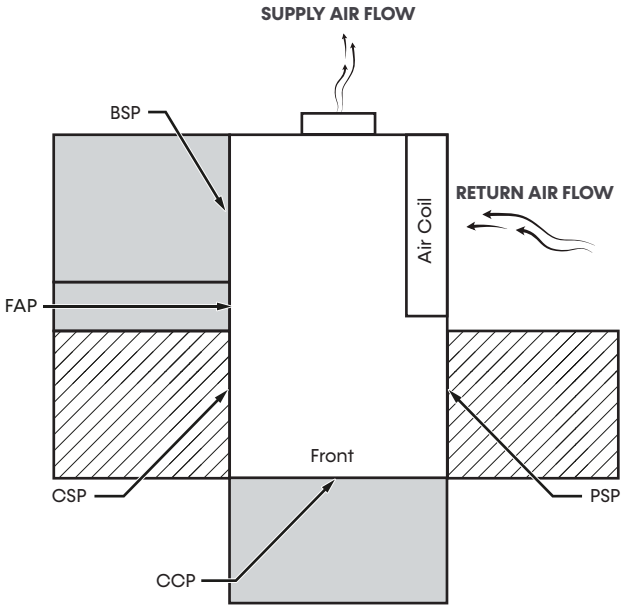
Models:
SV
0930-1872

Horizontal Installation Service Access

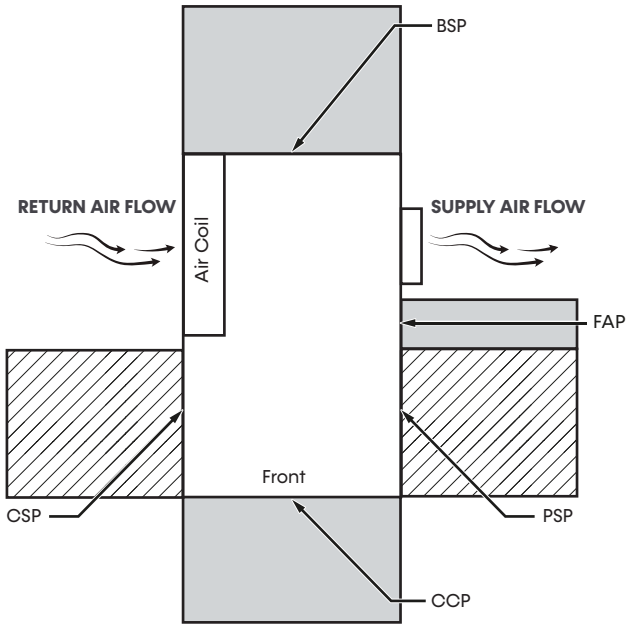
LEFT RETURN BACK DISCHARGE



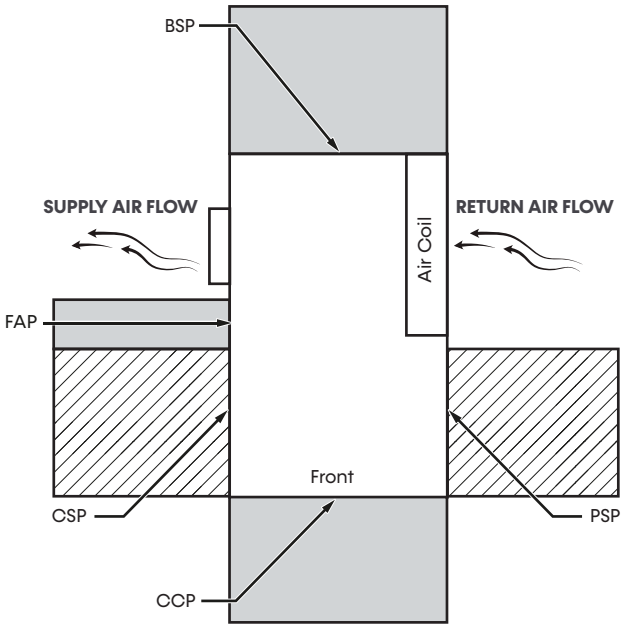
RIGHT RETURN BACK DISCHARGE



LEFT RETURN STRAIGHT DISCHARGE



RIGHT RETURN STRAIGHT DISCHARGE



NOTES

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. CCP and BSP requires 2-feet of service access.
3. Blower service access is through back panel on straight discharge units or through panel opposite air coil on back discharge units.
4. OSP are removable panels that provide additional access to the units interior. Clear access to OSP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.

= Mandatory Service Access 2-foot (61 cm)

= Optional Service Access 2-foot (61 cm)

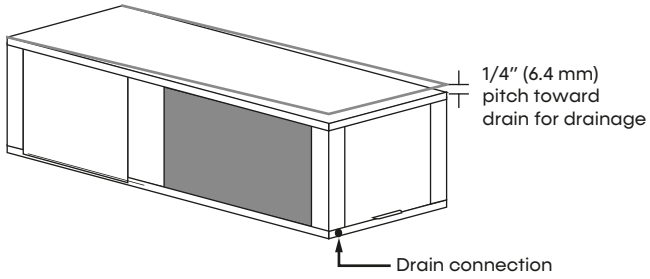
LEGEND

BSP = BLOWER SERVICE PANEL
CCP = CONTROL/COMPRESSOR ACCESS PANEL
CSP = COMPRESSOR SERVICE PANEL
FAP = FILTER DRIER ACCESS PANEL
PSP = PUMP AND FLOW METER SERVICE PANEL

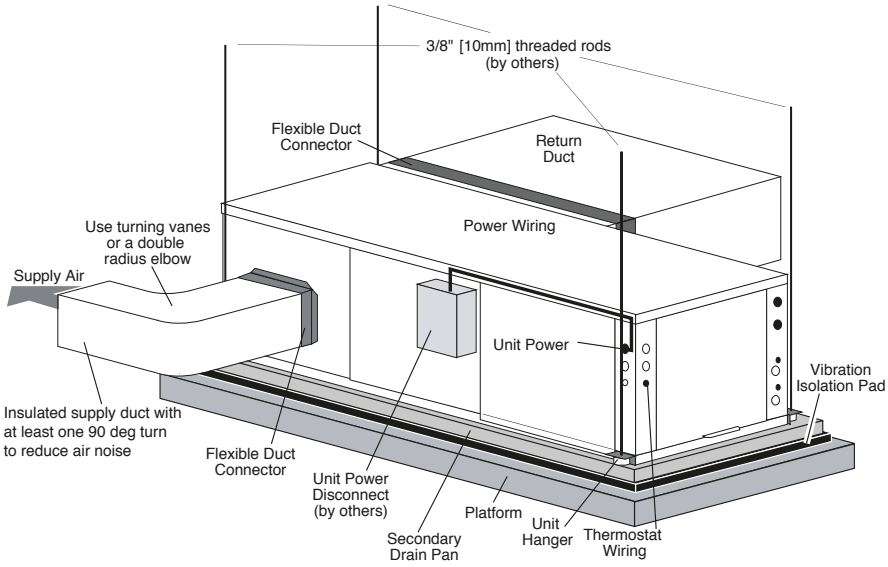
Horizontal Installation
Condensate and Water Connection

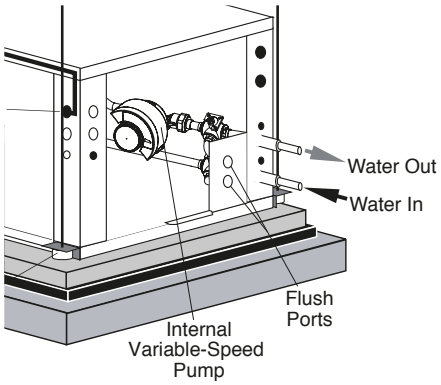
Models:
SV
0930-1872

Horizontal Unit Pitch



Typical Horizontal Unit Installation





AIR COIL

To obtain maximum performance, clean the air coil before startup. Use a 10% solution of dishwasher detergent and water for both sides of the coil. Follow with a thorough water rinse. **Do not use ultraviolet-based antibacterial systems.**

⚠ ATTENTION

Installation Note - Ducted Return: Many horizontal WSHPs are installed in a return air ceiling plenum application (above ceiling). Vertical WSHPs are commonly installed in a mechanical room with free return (e.g. louvered door). Filter rails are the industry standard and are included on commercial heat pumps only for holding the filter. For ducted return applications, the filter rail must be removed and replaced with a duct flange or filter frame. Canvas or flexible connectors should also be used to minimize vibration between the unit and ductwork.

Models:
SV
0930-1872

Horizontal Installation
Condensate and Water Connection

CONDENSATE PIPING

A condensate drain line must be installed and pitched away for the unit to allow for proper drainage. This connection must meet all local plumbing/building codes.

Pitch the unit toward the drain as shown in the **Horizontal Unit Pitch** figure to improve the condensate drainage. On small units (less than 2.5 tons/8.8 kW), ensure that unit pitch does not cause condensate leaks inside the cabinet.

Install the condensate trap at each unit with the top of the trap positioned below the unit condensate drain connection as shown in the **Horizontal Condensate Connection** figure. Design the depth of the trap (water seal) based upon the amount of ESP capability of the blower (where 2-inches [51 mm] of ESP capability requires 2-inches [51 mm] of trap depth). As a general rule, 1½-inch (38 mm) trap depth is the minimum.

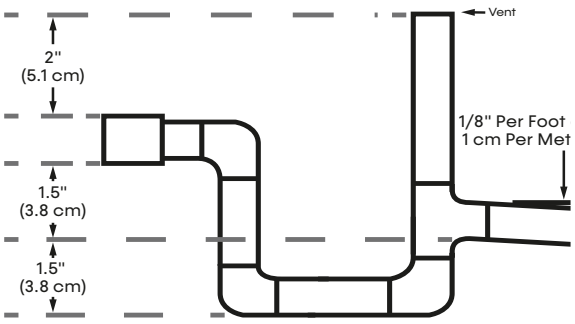
Install each unit with its own individual trap and connection to the condensate line (main) or riser. Provide a means to flush or blow out the condensate line. DO NOT install units with a common trap and/or vent.

Always vent the condensate line when dirt or air can collect in the line or a long horizontal drain line is required. Also vent when large units are working against higher external static pressure than other units connected to the same condensate main since this may result in poor drainage for all units on the line. **WHEN A VENT IS INSTALLED IN THE DRAIN LINE, IT MUST BE LOCATED AFTER THE TRAP IN THE DIRECTION OF THE CONDENSATE FLOW.**

STAINLESS STEEL DRAIN PANS

The condensate connection is ¾-inch MPT. A field-provided female adapter is required for the condensate drain connection.

Horizontal Condensate Connection



⚠ CAUTION

Ensure condensate line is pitched toward drain ⅛ inch per foot (11 mm per m) of run.

Duct System Installation

Models:
SV
0930-1872

DUCT SYSTEM INSTALLATION

Proper duct sizing and design is critical to the performance of the unit. The duct system should be designed to allow adequate and even airflow through the unit during operation. Airflow through the unit MUST be at or above the minimum rated airflow for a given unit size to avoid equipment damage. Design duct systems for quiet operation. Refer to the following horizontal and vertical duct system example figures:

- **Typical Horizontal Unit Installation**
- **Typical Vertical Unit Installation Using Ducted Return Air**

A flexible connector is recommended for both discharge and return air duct connections on metal duct systems to eliminate the transfer of vibration to the duct system. To maximize sound attenuation of the unit blower, include internal fiberglass duct liner in the supply and return plenums or construct them using ductboard for the first few feet. Using the unit with uninsulated ductwork in an unconditioned space is not recommended, as the unit's performance may be adversely affected.

Include at least one 90-degree elbow in the supply duct to reduce air noise. If air noise or excessive air flow is a problem, adjust the blower speed. For airflow charts, consult the product catalog for the series and model of the specific unit.

Before a unit is connected to existing ductwork, check to ensure that the ductwork has the capacity to handle the airflow required for the unit. If ducting is too small, as in the replacement of a heating only system, install larger ductwork. Check all existing ductwork for leaks and repair as necessary.

For units installed with a ClimaZone communicating zoning system, please refer to the *ClimaZone IOM* for more information on ductwork configuration, zone sizing, and configuration.

An unventilated area where water source heat pump is installed and surpasses a R-454B refrigerant charge of 62 oz (1.76 kg), shall be without continuously operating open flames (for example an operating gas appliance) or other POTENTIAL IGNITION SOURCES (for example an operating electric heater, hot surfaces).

Only auxiliary electric heaters approved by the manufacturer shall be installed in connecting ductwork. The installation of any other auxiliary devices is beyond the manufacturer's responsibility.

For duct-connected units, false ceilings or drop ceilings may be used as a return air plenum as long as the manufacturer's RDS is installed as shown in the **RDS Installation** figure in the *Refrigerant Detection System* section.

⚠ WARNING

Ducts connected to an appliance shall not contain a POTENTIAL IGNITION SOURCE.

⚠ WARNING

Keep any required ventilation openings clear of obstruction.

⚠ WARNING

For mechanical ventilation, the lower edge of the air extraction opening where air is exhausted from the room shall not be more than 3.94 inches (100 mm) above the floor. The location where the mechanical ventilation air extracted from the space is discharged shall be separated by a sufficient distance, but not less than 9.84 feet (3 m), from mechanical ventilation air intake openings, to prevent recirculation to the space.

Models:
SV
0930-1872

Field Conversion of Air Discharge

OVERVIEW

Convert horizontal unit blower assembly between side (straight) and back (end) discharge using the instructions below.

NOTE: It is not possible to field convert return air between left or right return models due to the necessity of refrigeration copper piping changes.

PREPARATION

Convert the unit's discharge configuration on the ground before hanging. If the unit is already hung, take it down for field conversion. If the unit to be converted includes a factory-installed RDS, see the *Move the RDS Sensor After Field Conversion* section.

SIDE-TO-BACK DISCHARGE CONVERSION

1. Place unit in well lit area. Remove the screws as shown in the **Left Return – Side-to-Back** figure to free top panel and discharge panel.
2. Lift out the access panel and set aside. Lift and rotate the discharge panel to the other position as shown, being careful with the blower wiring.
3. Check blower wire routing and connections for tension or contact with sheet metal edges. Re-route if necessary.
4. Check refrigerant tubing for contact with other components.
5. Reinstall the top panel and screws noting that the location for some screws have changed.
6. Manually spin the fan wheel to ensure that the wheel is not rubbing or obstructed.
7. Replace access panels.

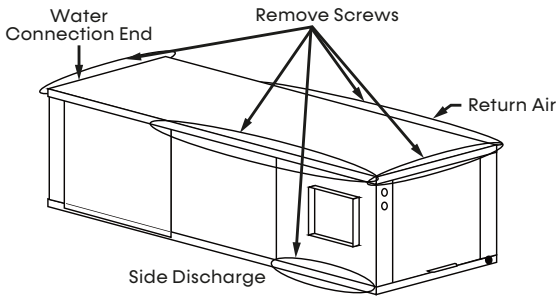
BACK-TO-SIDE DISCHARGE CONVERSION

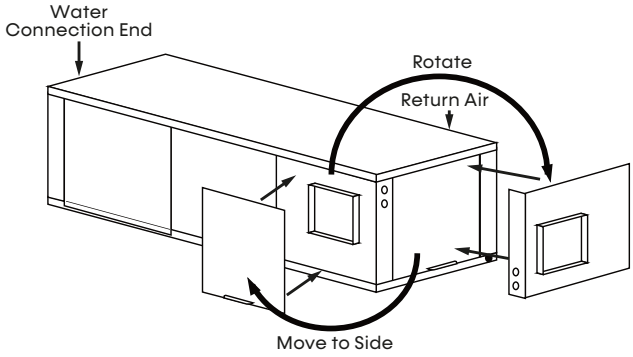
If the discharge is changed from back to side, use above instruction noting that illustrations are reversed.

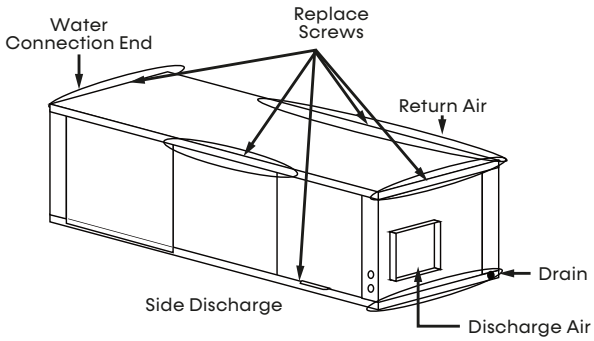
LEFT VERSUS RIGHT RETURN

The conversion process of side-to-back or back-to-side discharge for either right or left return configuration is the same. In some cases, it is possible to rotate the entire unit 180 degrees if the return air connection needs to be on the opposite side. **NOTE: rotating the unit moves the piping to the other end of the unit.**

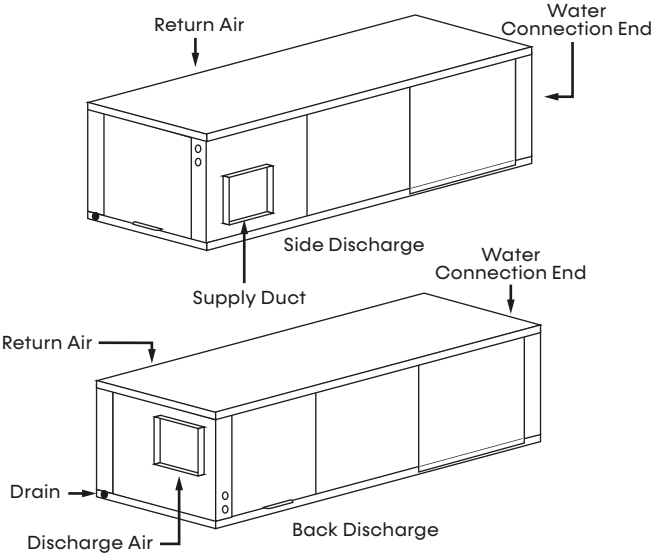
Left Return – Side-to-Back







Right Return – Side-to-Back



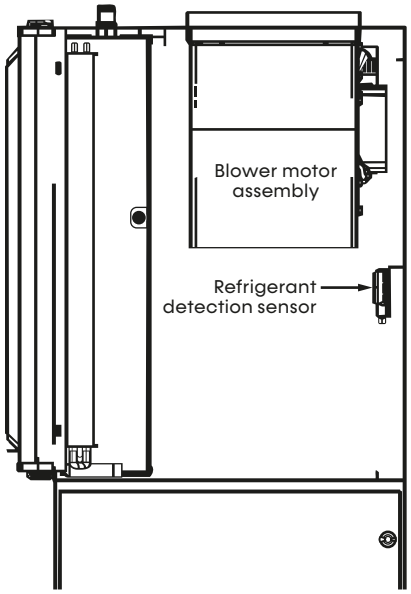
Move the RDS Sensor After Field Conversion

Models:
SV
0930-1872

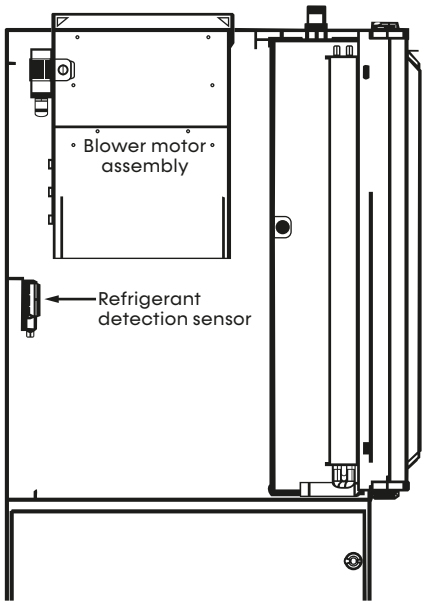
REFRIGERANT DETECTION SYSTEM SENSOR LOCATIONS

After field converting air discharge on units with a factory-installed Refrigerant Detection System (RDS), move the RDS sensor to the location the unit configuration requires. The following examples detail RDS sensor location per return and discharge configuration.

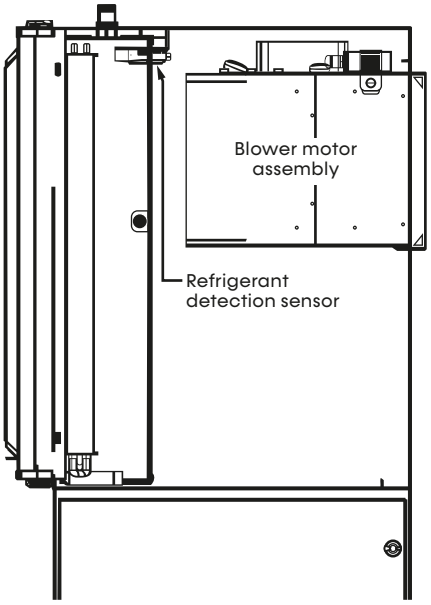
Left Return Back Discharge
Sensor on the Right Side of the Unit



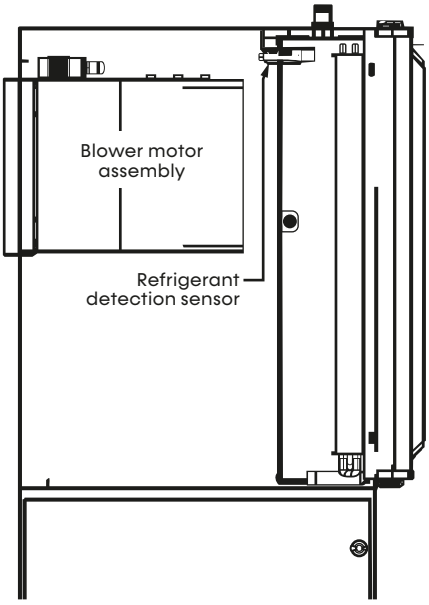
Right Return Back Discharge
Sensor on the Left Side of the Unit



Left Return Straight Discharge
Sensor on the Back Side of the Unit



Right Return Straight Discharge
Sensor on the Back Side of the Unit



Models:
SV
0930-1872

Vertical Installation

VERTICAL UNIT LOCATION

Units are not designed for outdoor installation. Locate the unit in an INDOOR area that allows enough space for service personnel to perform typical maintenance or repairs without removing unit from the mechanical room/closet. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air). Allow for access for easy removal of the filter and access panels. Provide sufficient room to make water, electrical, and duct connection(s). **NOTE: Minimum clearances for installation are the same as the minimum required service clearances. Consult the service clearances for reference of installation clearances.**

If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Remove any access panel screws that may be difficult to remove after the unit is installed prior to setting the unit. Refer to submittal data or the engineering design guide for dimensional data. Use the following example figures for typical vertical installation references:

- **Vertical Unit Mounting**
- **Typical Vertical Unit Installation Using Ducted Return Air**

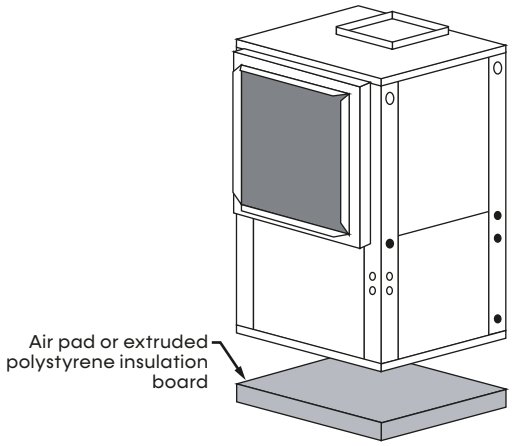
1. For optimal sound performance, install the unit on a piece of rubber, neoprene, or other mounting pad material for sound isolation. The pad should be at least ⅜-inch (10 mm) to ½-inch (13 mm) in thickness. The vibration isolation pad should cover the entire base of the unit and slightly extend past all four edges of the base.
2. Provide adequate clearance for filter replacement and drain pan cleaning. Do not block filter access with piping, conduit, or other materials.
3. Provide access for fan and fan motor maintenance and for servicing the compressor and coils without removing the unit.

⚠ ATTENTION

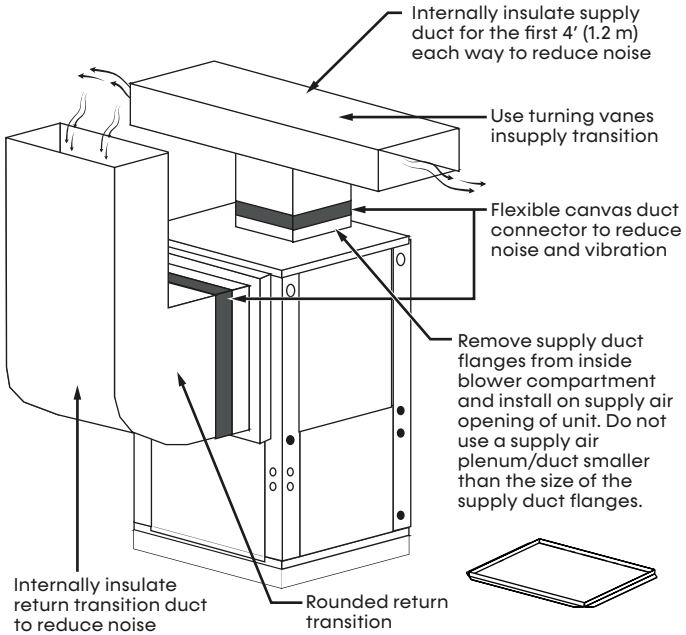
Installation Note - Ducted Return: Many horizontal WSHPs are installed in a return air ceiling plenum application (above ceiling). Vertical WSHPs are commonly installed in a mechanical room with free return (e.g. louvered door). Filter rails are the industry standard and are included on commercial heat pumps only for holding the filter. For ducted return applications, the filter rail must be removed and replaced with a duct flange or filter frame. Canvas or flexible connectors should also be used to minimize vibration between the unit and ductwork.

4. Provide an unobstructed path to the unit within the closet or mechanical room. Space should be sufficient to allow removal of the unit, if necessary.
5. In limited side access installations, pre-removal of the control box side mounting screws will allow control box removal for future servicing.
6. Provide access to water valves and fittings and screwdriver access to the unit side panels, discharge collar and all electrical connections.

Vertical Unit Mounting



Typical Vertical Unit Installation Using Ducted Return Air



Vertical Installation

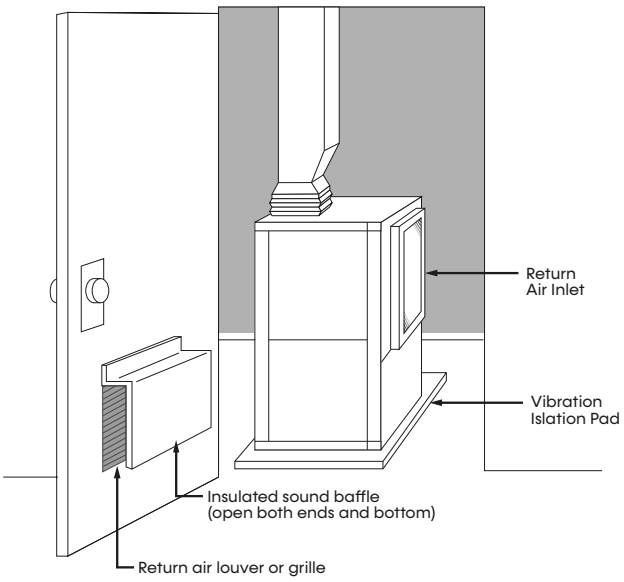
Models:
SV
0930-1872

SOUND ATTENUATION FOR VERTICAL UNITS

Sound attenuation is achieved by enclosing the unit within a small mechanical room or a closet. Additional measures for sound control include the following:

1. Mount the unit so that the return air inlet is 90 degrees to the return air grille. Use the **Vertical Sound Attenuation** figure for reference. Install a sound baffle as illustrated to reduce line-of-sight sound transmitted through return air grilles.
2. Mount the unit on a rubber or neoprene isolation pad to minimize vibration transmission to the building structure.

Vertical Sound Attenuation



CONDENSATE PIPING FOR VERTICAL UNITS

A condensate line must be installed and pitched away from the unit to allow for proper drainage. This connection must meet all local plumbing and building codes.

Install condensate traps at each unit with the top of the trap positioned below the unit condensate drain connection. Design the depth of the trap (water-seal) based on the amount of ESP capability of the blower, where 2-inches (51 mm) of ESP capability requires 2-inches (51 mm) of trap depth. As a general rule, 1½-inches (38 mm) of trap depth is the minimum.

Always vent the condensate line when dirt or air can collect in the line or a long horizontal drain line is required. Also vent when large units are working against higher external static pressure than other units connected to the same condensate main since this may cause poor drainage for all units on the line. **WHEN A VENT IS INSTALLED IN THE DRAIN LINE, IT MUST BE LOCATED AFTER THE TRAP IN THE DIRECTION OF THE CONDENSATE FLOW.**

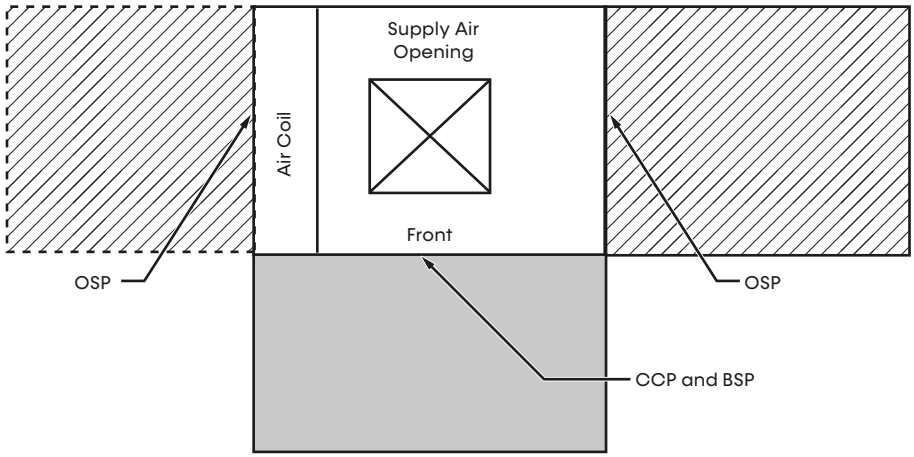
Each unit must be installed with its own individual vent (where necessary) and a means to flush or blow out the condensate drain line. Do not install units with a common trap and/or vent.

Condensate drain connection is a ¾-inch MPT that couples to ¾-inch FPT schedule 40/80 PVC. If the connection is not secure, the connection may leak.

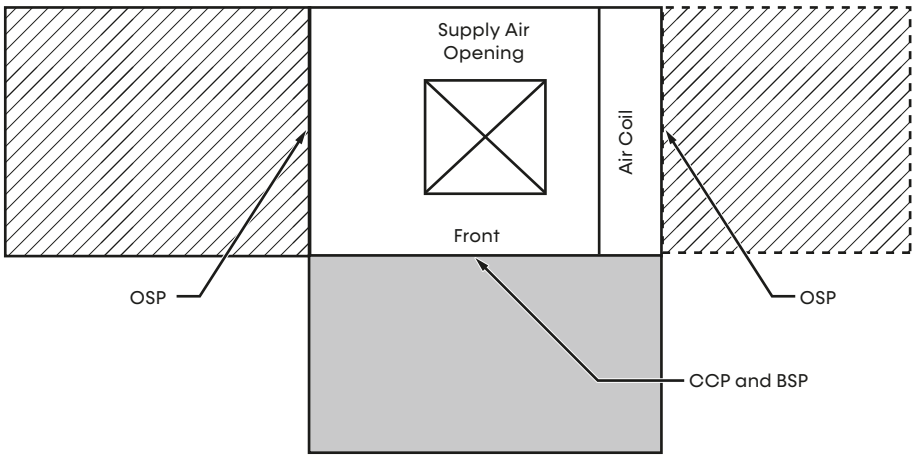
Models:
SV
0930-1872

Vertical Installation
Service Access

LEFT RETURN



RIGHT RETURN



NOTES

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Front and side access is preferred for service access. However, all components may be serviced from the front access panel if side access is not available.
3. OSP are removable panels that provide additional access to the units interior. Clear access to OSP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.
4. Top supply air is shown, the same clearances apply to bottom supply air units.

= Mandatory Service Access 2 feet (61 cm)

= Optional Service Access 2 feet (61 cm)

LEGEND

CCP = CONTROL/COMPRESSOR ACCESS
BSP = BLOWER SERVICE PANEL
OSP = OPTIONAL SERVICE PANEL (NOT REQUIRED)

Piping Installation

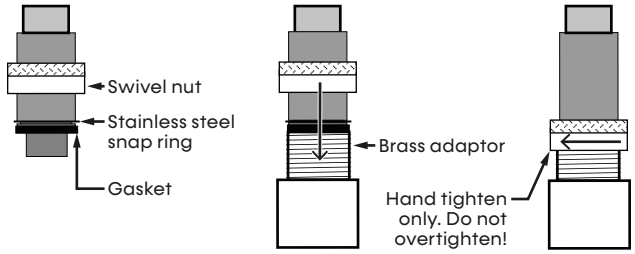
Models:
SV
0930-1872

WATER CONNECTIONS

Swivel piping fittings are used for water connections that are rated for 145 psi (1,000 kPa) operating pressure. The connections have a rubber gasket seal similar to a garden hose gasket, which when mated to the flush end of most 1-inch threaded male pipe fittings provides a leak-free seal without the need for thread sealing tape or joint compound. However, due to selected options, unit maximum operating pressure may be lower. Use the **Unit Maximum Working Pressure** table to verify working pressures for all options. Check for burrs and ensure that the rubber seal is in the swivel connector prior to attempting any connection (rubber seals are shipped attached to the swivel connector). **DO NOT OVERTIGHTEN** or leaks may occur.

The female locking ring is threaded onto the pipe threads which holds the male pipe end against the rubber gasket, and seals the joint. **HAND TIGHTEN ONLY! DO NOT OVERTIGHTEN!**

Water Connection



⚠ WARNING

You must use strainers on both load and source sides. 20 Mesh minimum. Failure to use strainers voids your warranty.

The unit should be installed with a 20 mesh strainer on the loop-in side of the unit. Install strainer prior to operating the unit to avoid potential damage to the brazed-plate heat exchangers. Failure to do so will void the warranty.

Models:
SV
0930-1872

Applications
Closed Loop Heat Pump with vFlow

vFlow is a revolutionary new, intelligent, and efficient way to circulate water (or water plus antifreeze) using internal, variable-speed water flow control. The factory-installed high-efficiency variable-speed pumps uses almost half the wattage of a traditional fixed-speed pump. vFlow technology improves the life expectancy of the unit by reducing the amount of energy required to optimize the flow of water throughout the system and also reduces the space, cost, and labor required to install external water flow control mechanisms (flow controllers, solenoid, and flow-control valves).

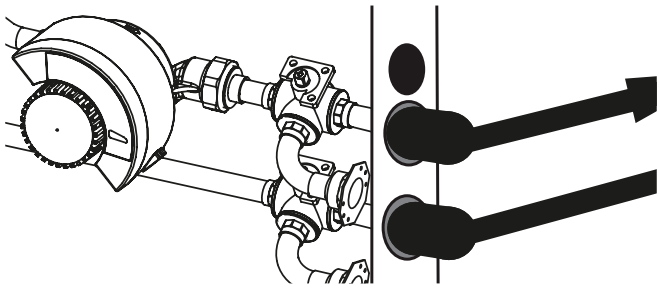
INTERNAL FLOW CONTROLLER FOR CLOSED LOOP APPLICATIONS

This is the most common configuration for closed loops. With this factory-installed option, the unit is built with an internal variable-speed pump and other components to flush and operate the unit correctly (including an expansion tank, flush ports, and flushing valves). The pump speed is controlled by the EXM based on the difference in entering and leaving water temperatures (dT). The internal flow controller pump includes an internal check valve for multi-unit installations. A copper water coil is standard with this option.

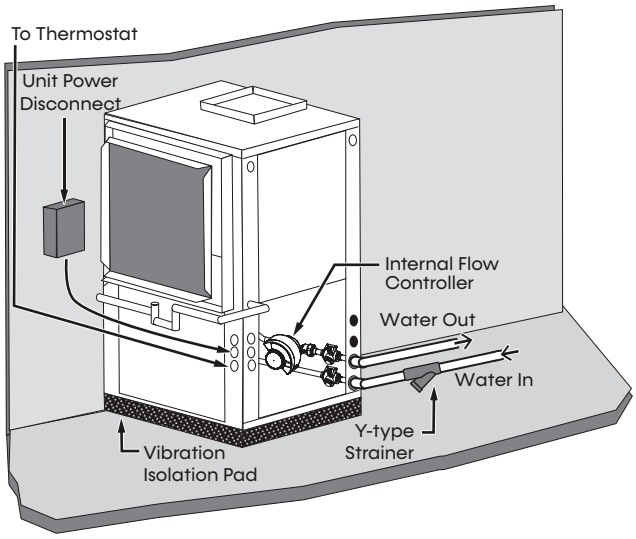
Note: Internal flow controllers are also suitable for multi-unit installations depending on pump performance requirements.

Variable-speed pumps or motorized modulating valves deliver variable water flow, controlled by EXM, based on loop water dT.

Internal Flow Controller



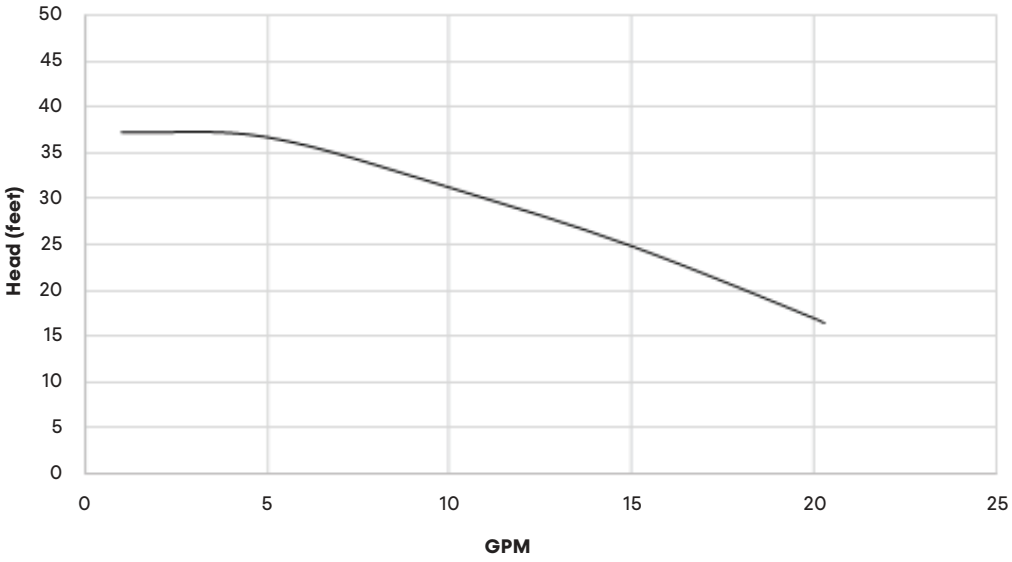
Typical Closed Loop Application



Applications
Closed Loop Heat Pump with vFlow

Models:
SV
0930-1872

High Head Variable Pump with Check Valve Performance



Models:
SV
0930-1872

Applications
Ground-Loop Heat-Pump

⚠ CAUTION

The following instructions represent industry accepted installation practices for closed-loop earth-coupled heat-pump systems. Instructions are provided to assist the contractor in installing trouble-free ground loops. These instructions are recommendations only. State/provincial and local codes MUST be followed and installation MUST conform to ALL applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

⚠ CAUTION

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

PRE-INSTALLATION

Prior to installation, locate and mark all existing underground utilities, piping, etc. Install loops for new construction before sidewalks, patios, driveways, and other construction has begun. During construction, accurately mark all ground-loop piping on the plot plan as an aid in avoiding potential future damage to the installation.

PIPING INSTALLATION

Limit all ground-loop piping materials to polyethylene fusion only for in-ground sections of the loop. Do not use galvanized or steel fittings at any time due to their tendency to corrode. Do not use any plastic-to-metal threaded fittings due to their potential to leak in earth-coupled applications. Use flanged fittings as a substitute. Use P/T plugs for easy flow measurement using the pressure drop of the unit heat exchanger.

Ground-loop temperatures can range between 25 and 110°F (-4 to 43°C). Flow rates between 2.25 and 3 GPM (2.41 to 3.23 l/m per kW) of cooling capacity is recommended in these applications.

Test individual horizontal loop circuits before backfilling. Test vertical U-bends and pond loop assemblies prior to installation. Use pressures of at least 100 psi (689 kPa) when testing. Do not exceed the pipe pressure rating. Test the entire system when all loops are assembled.

FLUSHING THE GROUND LOOP

After system installation and testing is complete, flush the system to remove all foreign objects and purge to remove all air. For more information, see Ground-Loop Cleaning and Flushing section.

ANTIFREEZE

For operation when water is used instead of an antifreeze solution, you must calculate the leaving water temperature (LWT). In areas where minimum entering loop temperatures drop below 40°F [4.4°C] or where piping will be routed through areas subject to freezing, antifreeze is needed. Alcohols and glycols are commonly used as antifreeze solutions. Consult your local sales office to determine the antifreeze best suited to your area. Maintain freeze protection to 15°F (9°C) below the lowest expected entering loop temperature. For example, if 30°F (-1°C) is the minimum expected entering loop temperature, the leaving loop temperature is 22 to 25°F (-6 to -4°C) and freeze protection is at 15°F (-10°C).

Calculation is as follows:

30°F - 15°F = 15°F [-1°C - 9°C = -10°C]

Premix and pump all alcohols from a reservoir outside of the building when possible. If an outside reservoir is not available, introduce alcohol under the water level to prevent fumes. Calculate the total volume of fluid in the piping system, then use the **Antifreeze Percentages by Volume** table to determine the amount of antifreeze needed. Check antifreeze concentration from a homogenized sample using a hydrometer or refractometer to measure specific gravity.

Ground Loop Cleaning and Flushing

Models:
SV
0930-1872

After piping is complete between the unit and the ground loop, final purging and charging of the loop is required.

A flush cart with at least a 1.5 hp (1.1 kW) pump is required to achieve adequate flow velocity in the loop to purge air and dirt particles from the loop. Antifreeze solution is used in most areas to prevent freezing. Remove all air and debris from the earth loop piping system before operation. Flush the loop with a high volume of water at 2 fps (0.6 m/s) in all piping.

A fine-mesh (20 micron) or similar filter cartridge is required in the loop return line of the flush cart to eliminate all debris from the loop system. Failure to protect the brazed-plate heat exchangers can lead to product damage and loss of warranty. See the **Minimum Flow** table for the flow rate required to attain 2 fps (0.6 m/s). Follow the steps below for proper flushing.

Minimum Flow (Required to Achieve 2 feet/sec)

PE Pipe Size	Flow GPM (L/M per kW)
3/4"	4 (4.3)
1"	6 (6.5)
1-1/4"	10 (10.8)
1-1/2"	13 (14.0)
2"	21 (22.6)

Units with internal variable-speed pumps include a check valve internal to the pump. It is not possible to flush backwards through this pump. Take care to connect the flush cart hoses so that the flush cart discharge is connected to the water in flushing valve of the heat pump.

LOOP FILL

Fill the loop with water from a garden hose through flush cart before using flush cart pump to ensure an even fill and increase flushing speed (see the **Valve Position A – Loop Fill/Flush** figure). When water consistently returns back to the flush reservoir, switch to valve position B (see the **Valve Position B – Unit Fill/Flush** figure).

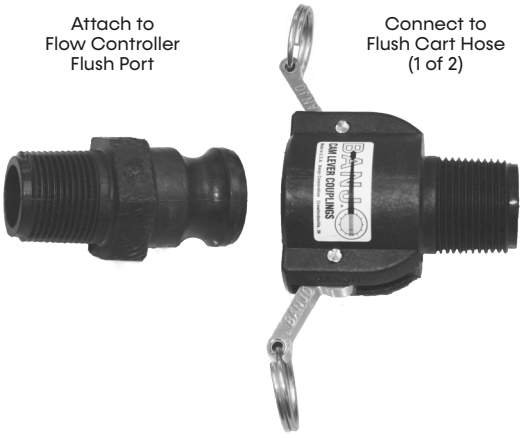
Isolate the expansion tank for this flushing procedure using the ball valve. During dead heading of flush cart pump, isolation prevents compression of the bladder in the expansion tank, and prevents the flush cart fluid level from dropping below available capacity.

⚠ WARNING

DISCONNECT ELECTRICAL POWER SOURCE TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK.

Typical Cleanable Flush Cart Strainer (100 mesh [0.149 mm])

Cam Fittings for Flush Cart Hoses



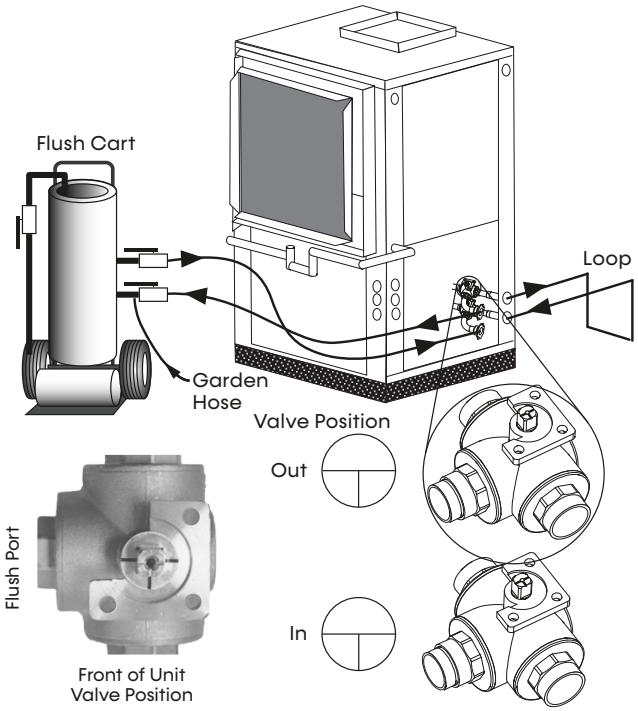
⚠ ATTENTION

A hydrostatic pressure test is required on ALL piping, especially underground piping before final backfill per IGSHPA and the pipe manufacturers recommendations.

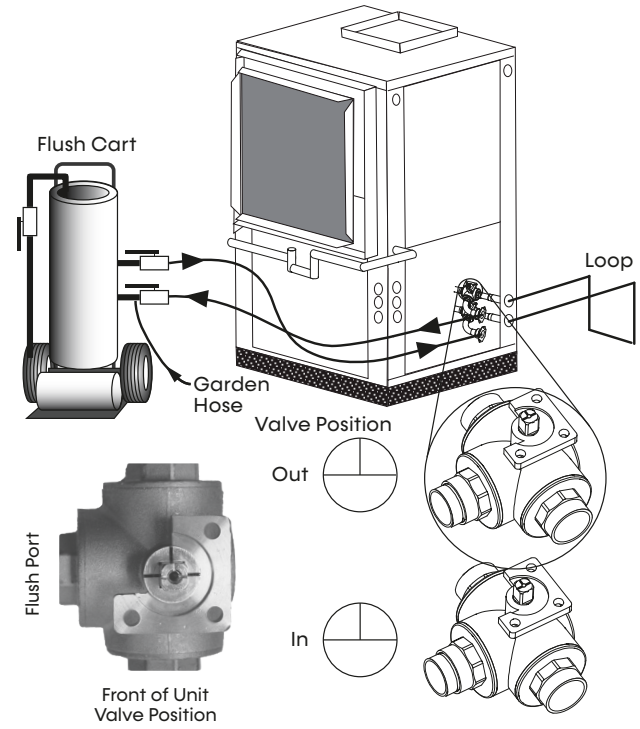
Models:
SV
0930-1872

Ground Loop Cleaning and Flushing

Valve Position A – Loop Fill/Flush



Valve Position B – Unit Fill



UNIT FILL

Switch the unit fill valves to Position B while flush cart is pumping to fill the unit heat exchanger. Maintain Position B until water is consistently returned into the flush reservoir.

LOOP FLUSH

Switch to valve Position A. Shut off the supply water and turn on the flush cart to begin flushing. Once the flush reservoir is full, do not allow the water level in the flush cart tank to drop below the pump inlet line or air can be pumped out to the earth loop. Try to maintain a fluid level in the tank above the return tee so that air cannot be continuously mixed back into the fluid. Use surges of 50 psi (345 kPa) to help purge air pockets by shutting off the flush cart return valve going into the flush cart reservoir. This process 'dead heads' the pump to 50 psi (345 kPa). To dead head the pump until maximum pumping pressure is reached, open the valve.

Pressure surges through the loop to purge air pockets from the piping system. Notice the drop in fluid level in the flush cart tank. If all air is purged from the system, the level only drops ⅜ inch in a 10-inch (25.4 cm) diameter PVC flush tank (about a half gallon [1.9 liters]) since liquids are incompressible. If the level drops more than this level, continue flushing until air is not being compressed in the loop fluid. Do this a number of times to ensure all air is purged.

⚠ ATTENTION

Actual flushing time required varies for each installation due to piping length, configuration, and flush cart pump capacity. 3/8-inch or less fluid level drop is the ONLY indication that flushing is complete.

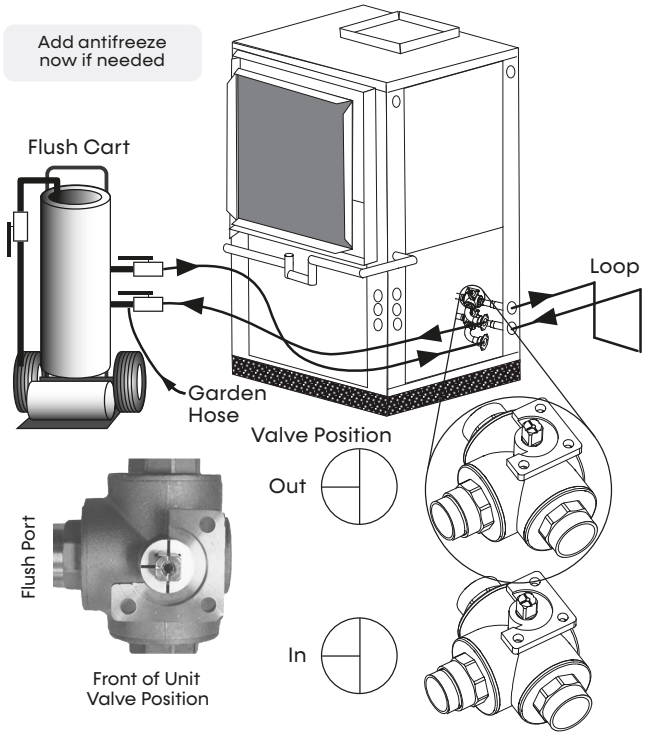
Switch valves to Position B to flush the unit. Use caution when opening the valve to the unit. Slowly open/throttle the flush cart valve to gradually introduce flow through the unit and prevent a sudden pressure surge that could damage pressure sensors within the unit. Flush through the unit all air pockets are removed.

Refer to figure, **Valve Position C**, and switch valves to Position C. Switching both valves to Position C allows water to flow through the loop and the unit heat exchanger. Dead head again to check for air in the loop. Fluid level drop is your only indication of air in the loop.

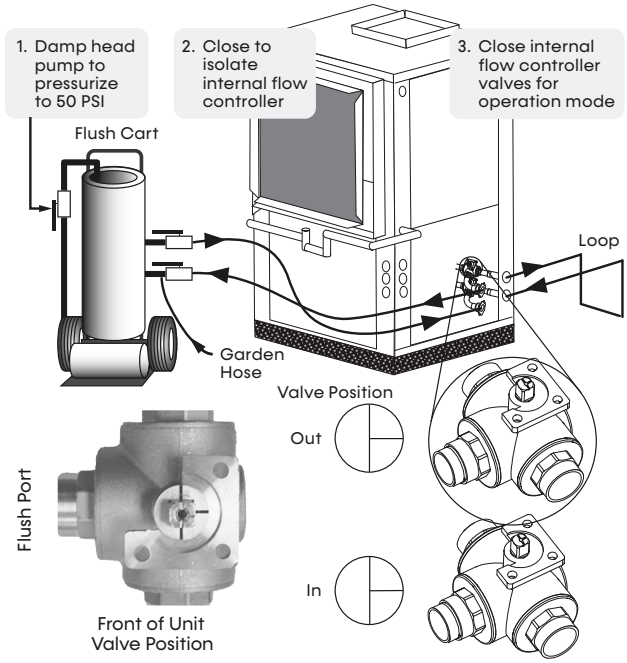
Ground Loop Cleaning and Flushing

Models:
SV
0930-1872

Valve Position C – Full Flush



Valve Position D – Pressurize and Operation



PRESSURIZE AND OPERATE

Close the flush cart return valve to pressurize the loop to at least 50 psi (345 kPa) as shown in the figure, **Valve Position D**. Do not exceed 75 psi (517 kPa). Open the isolation valve to the expansion tank and bleed air from the expansion tank piping using the Schrader valve located in front of the expansion tank. This allows loop pressure to compress the expansion tank bladder and charges the expansion tank with liquid.

After pressurizing, close the flush cart supply valve to isolate the flush cart. Move the flow controller valves to Position D.

Unhook the flush cart from the internal flow controller. Install flow controller caps to ensure that any condensation or leakage remains contained within the flow controller package.

After completely flushing, target a loop pressure between 50 and 75 psi (345 to 517 kPa) for sufficient pressure for all seasons.

Note: The loop's static pressure fluctuates seasonally with higher pressures in the winter months than during the cooling season. This fluctuation is normal and should be considered when charging the system for the first time.

⚠ ATTENTION

It is recommended to run the unit in the cooling, then heating mode for 15-20 minutes each to 'temper' the fluid temperature and prepare it for pressurization. This procedure helps prevent the periodic "flat" loop condition of no pressure.

Models:
SV
0930-1872

Ground-Loop Antifreeze Charging

GROUND-LOOP ANTIFREEZE CHARGING

It is highly recommended to utilize premixed antifreeze fluid where possible to ensure proper concentration levels.

The following procedure is based on pure antifreeze and can be implemented during the Full Flush procedure with three-way valves as shown in the **Valve Position C** figure. When using a premixed mixture of 15°F (-9.4°C) freeze protection, you can fill and flush the system with the premix directly to prevent handling pure antifreeze during installation.

⚠ WARNING

Always use properly marked vehicles (D.O.T. placards), and clean/suitable/properly identified containers for handling flammable antifreeze mixtures. Post and advise those on the job site of chemical use and potential dangers of handling and storage

⚠ WARNING

Always dilute alcohols with water (at least 50% solution) before using. Alcohol fumes are flammable and can cause serious injury or death if not handled properly.

When handling methanol (or any alcohol), always wear eye protection and rubber gloves as alcohols are easily absorbed through the skin.

⚠ CAUTION

Always obtain MSDS safety sheets for all chemicals used in ground loop applications including chemicals used as antifreeze.

⚠ ATTENTION

DO NOT use automotive windshield washer fluid as antifreeze. Washer fluid contains chemicals that cause foaming.

1. Flush the loop until all air is purged from system then pressurize to check for leaks before adding any antifreeze.
2. Run the discharge line to a drain and hook up an antifreeze drum to the suction side of the pump (if not adding below water level through approved container). Drain the flush cart reservoir down to the pump suction inlet so the reservoir can accept the volume of antifreeze.
3. Calculate the amount of antifreeze required by first calculating the total fluid volume of the loop using the **Minimum Flow** table. Next, calculate the amount of antifreeze needed using **Antifreeze Percentages by Volume** table to determine appropriate freeze-protection level. Many southern applications require freeze protection because of piping exposed to ambient conditions.
4. Isolate the unit and prepare to flush only through loop (see the **Valve Position A – Loop Fill/Flush** figure). Start the flush cart and gradually introduce the required amount of liquid to the flush cart tank until attaining the proper antifreeze protection. Always introduce alcohols under water or use suction of pump to draw in directly to prevent fuming. The rise in flush reservoir level indicates amount of antifreeze added (some carts are marked with measurements in gallons or liters). A 10-inch-diameter (25.4 cm) cylinder, 3-feet (91.4 cm) tall holds approximately 8-gallons (30.3 liters) of fluid, plus the hoses, approximately two gallons (7.6 liters), which equals about 10 gallons (37.9 liters) total. If more than one tank full is required, immediately drain the tank by opening the waste valve of the flush cart. Note the color of the discharge fluid. Add food coloring to the antifreeze to help indicate where the antifreeze is in the circuit and prevent the dumping of antifreeze out the waste port. Repeat if necessary.
5. Take care when handling methanol (or any alcohol). Always wear eye protection and rubber gloves. Alcohol fumes are flammable and care should be taken with all flammable liquids. Open flush valves to flush through both the unit and the loop, then flush until fluid is homogenous. It is recommended to run the unit in the heating and cooling mode for 15-20 minutes each to temper the fluid temperature and prepare it for pressurization. Use this period to clean the area. This procedure helps prevent the periodic "flat" loop condition.
6. Close the flush cart return valve then immediately close the flush cart supply valve, leaving a positive pressure in the loop of approximately 50 psi (345 kPa). Pressure check the system. Check the freeze protection of the fluid with the proper hydrometer to ensure that the correct amount of antifreeze is added to the system. Place the hydrometer into the flush reservoir then compare the reading to the following figures to determine the level of freeze protection:
   - **Methanol Specific Gravity**
   - **Propylene Glycol Specific Gravity**
   - **Ethanol Specific Gravity.**

Ground-Loop Antifreeze Charging

Models:
SV
0930-1872

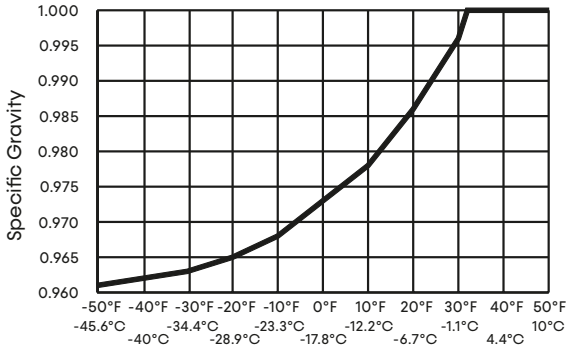
Do not antifreeze more than a +10°F (-12.2°C) freeze point. Specific gravity hydrometers are available in the residential price list. Repeat after reopening and flushing for a minute to ensure a good second sample of fluid. Inadequate antifreeze protection can cause nuisance low temperature lockouts during cold weather.

7. Close the flush cart return valve then immediately close the flush cart supply valve and shut off the flush cart, leaving a positive pressure in the loop of approximately 50-75 psi (345-517 kPa). Refer to the **Valve Position D – Pressurize and Operation** figure.

LOW WATER TEMPERATURE CUTOUT SETTING – EXM

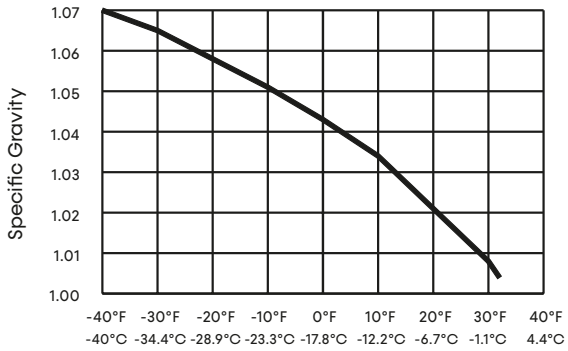
When antifreeze is used in the ground-loop heat exchanger, the unit configurations settings should be changed either through the myUplink Pro App or Wireless Service Tool. In the Options Configuration menu select YES for systems with antifreeze (10°F evaporator temperature), or NO for systems withantifreeze (30°F evaporator temperature).

Methanol Specific Gravity



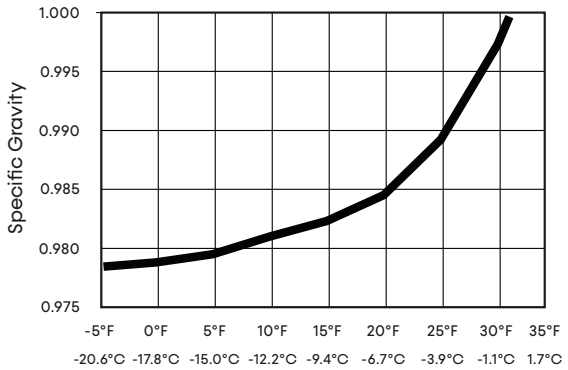
Low Temperature Protection

Propylene Glycol Specific Gravity



Low Temperature Protection

Ethanol Specific Gravity



Low Temperature Protection

Antifreeze Percentages by Volume

Type	Minimum Antifreeze Concentration % for Low Temperature Protection			
	10°F [-12.2°C]	15°F [-9.4°C]	20°F [-6.7°C]	25°F [-3.9°C]
Methanol	21%	17%	13%	9%
100% USP food grade Propylene Glycol	29%	24%	19%	12%
Ethanol[1]	28%	24%	18%	12%

1. Must not be denatured with any petroleum based product

Models:
SV
0930-1872

Multi-Unit Piping and Flushing

Often projects require more than one heat pump. Where possible, it is recommended to use a common ground loop with multiple units. Common ground loops with multiple units bring new challenges, including the need to avoid backward flow through inactive units, increase pumping requirements, and more complex flushing needs. Three types of multi-unit systems are described below with guidelines for installation of each type.

vFlow internal variable flow technology improves efficiency and longevity for multi-unit systems. vFlow is available in three different configurations:

1. Internal variable-speed pump
2. Internal modulating valve for closed loops
3. Internal modulating valve for open loops

Never use the high head internal modulating valve for open loops with closed loop systems.

The internal variable-speed pump version of vFlow includes an internal variable-speed circulator controlled by the EXM, internal three-way flushing valves, and an internal bladder type expansion tank. The pump curves for the internal circulator are shown in the figure, **High Head Variable Pump with Check Valve Performance**. The internal expansion tank operates as a pressure battery for the geothermal system. It absorbs fluid from the loop when loop pressure rises and injects fluid into the loop when loop pressure falls. This expansion tank helps to maintain constant loop pressure and avoids flat loops due to seasonal pressure changes in the loop.

When using the internal variable-speed pump as the loop pump in multi-unit installations, it is important to ensure that the variable-speed pump provides adequate flow through the heat pump against the loop head when all units are operating.

Do not combine units with the standard head pump with units with high head pumps on the same loop. Standard head pumps are best suited for small applications with a single unit.

It is possible to flush a multi-unit system through the unit's flushing valves with suitable equipment. Calculate the valve's flushing pressure drop to determine if it is acceptable. Find engineering data for the three-way flushing valves in the **Internal Three-Way Flushing Valve Data** table.

Internal Three-Way Flushing Valve Data

Model	Inlet Flushing Valve	Outlet Flushing Valve
SV0930	3/4" FPT	3/4" MPT
SV1248	3/4" FPT	3/4" MPT
SV1872	3/4" FPT	3/4" MPT

Valve Size	Straight Flow (Normal Operation) C_v	90° Flow (Flushing) C_v
3/4"	25	10.3
1"	58	14.5

For example, if a system includes two SV0930 units and four ¾-loop circuits we can calculate the flushing pressure drop as follows:

Using the data provided in the **Internal Three-Way Flushing Valve Data** table, 4 gpm is required to flush each ¾-inch circuit. If there is no provision to isolate the circuits for flushing, flush with a minimum of four circuits x 4 gpm/circuit = 16 gpm total. Verify the other pipe sizes used to ensure that 16 gpm total flow is sufficient to flush all piping.

Calculate pressure drop through the flushing valve using the following formula:

$\Delta P = (GPM/C_v)^2$ where,

ΔP = pressure drop in psi through the valve while flushing

GPM = flushing flow in gallons per minute

C_v = valve C_v in flushing mode

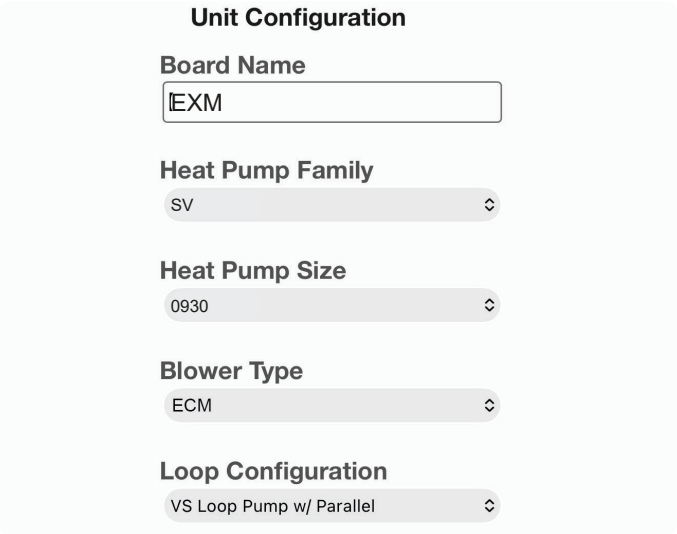
The **Internal Three-Way Flushing Valve Data** table details that the C_v for the flushing valve in a SQ0930 is 10.3 in the flushing mode (90° flow). Therefore, $\Delta P = (GPM/C_v)\ 2 = (16/10.3)\ 2 = 2.4$ psi (5.54 ft hd) per valve (there are two flushing valves). As long as the flushing pump is capable of providing 16 gpm at the flushing pressure drop of the loop plus the 2.4 x 2 valves = 4.8 psi (11.09 ft hd) of the flushing valves, use the internal flushing valves. If the flushing pump is not able to overcome the pressure drop of the internal flushing valves, use larger external flushing valves.

Multi-Unit Piping and Flushing

Models:
SV
0930-1872

UNIT CONFIGURATION

The VS PUMP PARALLEL configuration is required for multiple vFlow units with internal variable-speed flow controllers and check valves, or other external pump units, piped in parallel piped in parallel and sharing a common loop. Find and configure VS PUMP PARALLEL in the Wireless Service Tool's **Unit Configuration** menu:



MULTIPLE UNITS WITH INTERNAL FLOW CONTROLLERS

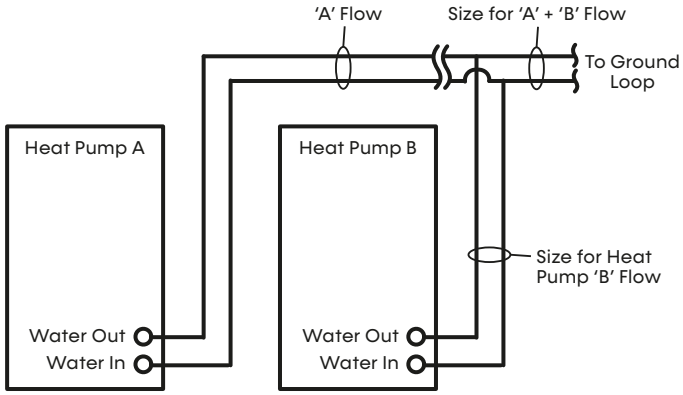
The simplest multi-unit systems consist of internal flow controllers without external pumps or external flushing valves. The units are piped in parallel and use the internal flushing valves for system flushing. The variable-speed pump includes an internal check valve to prevent back flow (short circuiting) through the units.

In this configuration, begin by flushing the unit farthest from the loop using the internal flushing valves. After the loop is flushed, change the internal flushing valves to flush the heat pump. Next, move the flushing cart to the next closest unit to the loop.

Flush the loop through the internal flushing valves. This is important as there may be air and debris in the lines from this unit to the common piping. After flushing starts, flush the air moved into the loop. After the loop is flushed through the second unit, change the flushing valves to flush the second unit. Repeat this process for additional units. Always begin with the unit farthest from the loop and end with the unit closest to the loop.

Use this flushing application for systems up to 12 tons, depending on loop design. It is important to perform appropriate calculations to confirm that the variable-speed pump provides adequate flow through all heat pumps.

Multiple Units with Internal Flow Controllers



MULTIPLE UNITS WITH INTERNAL FLOW CONTROLLERS AND EXTERNAL FLUSHING VALVES

When the number of units or flushing requirements reaches a point where it is no longer feasible to flush through the internal valves, install external flushing valves. In this configuration, use three-way flushing valves or install additional isolation valves to isolate the loop during flushing.

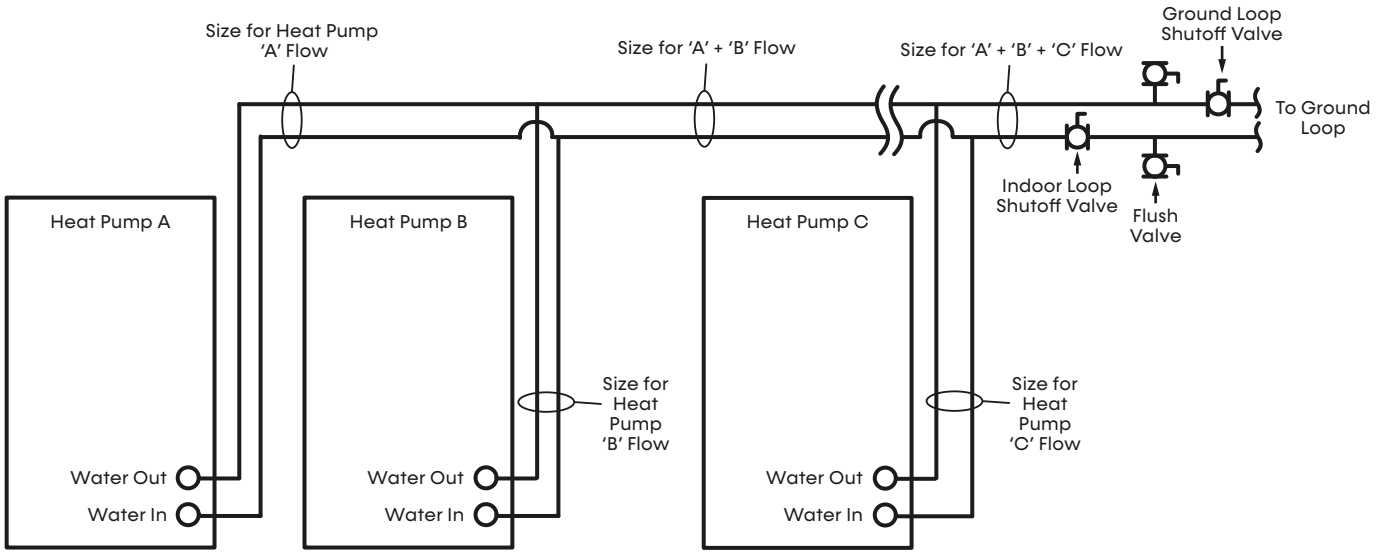
First, flush the ground loop. Close the indoor-loop shutoff valve (or the internal flushing valves in all units) and open the ground-loop shutoff valve to prevent flow through the indoor loop while flushing the ground loop.

After the ground loop is flushed, close the ground-loop shutoff valve and open the indoor-loop valve(s) to flush the units and indoor piping. Remember that there is an internal check valve in the variable-speed pump and that backward flow the unit is not possible.

Models:
SV
0930-1872

Multi-Unit Piping and Flushing

Multiple Units with Internal Flow Controllers and External Flushing Valves



Water Quality Requirements

Models:
SV
0930-1872

Water Quality Requirements

Clean water is essential to the performance and life span of water-source heat pumps. Contaminants, chemicals, and minerals all have the potential to cause damage to the water heat exchanger if not treated properly. All closed water loop systems should undergo water quality testing and be maintained to the water quality standards listed in this table.

Water Quality Requirements
For Closed-Loop and Open-Loop Systems

	Description	Symbol	Units	Heat Exchanger Type			
				Closed Loop Recirculating		Open Loop, Tower, Ground Source Well	
				All Heat Exchanger Types	Coaxial HX Copper Tube in Tube	Coaxial HX Cupronickel	Brazed-Plate HX 316 SS
Scaling Potential	pH - Chilled Water <85°F			7.0 to 9.0	7.0 to 9.0	7.0 to 9.0	7.0 to 9.0
	pH - Chilled Water >85°F			8.0 to 10.0	8.0 to 10.0	8.0 to 10.0	8.0 to 10.0
	Alkalinity	($HCO3^-$)	ppm - $CaC0_3$ equivalent	50 to 500	50 to 500	50 to 500	50 to 500
	Calcium	(Ca)	ppm	<100	<100	<100	<100
	Magnesium	(Mg)	ppm	<100	<100	<100	<100
	Total Hardness	(CaC03)	ppm - $CaC0_3$ equivalent	30 to 150	150 to 450	150 to 450	150 to 450
	Langelier Saturation Index	LSI		-0.5 to +0.5	-0.5 to +0.5	-0.5 to +0.5	-0.5 to +0.5
	Ryznar Stability Index	RSI		6.5 to 8.0	6.5 to 8.0	6.5 to 8.0	6.5 to 8.0
Corrosion Prevention	Total Dissolved Solids	(TDS)	ppm - $CaC0_3$ equivalent	<1000	<1000	<1000	<1000
	Sulfate	(SO_4^{2-})	ppm	<200	<200	<200	<200
	Nitrate	(NO_3^-)	ppm	<100	<100	<100	<100
	Chlorine (free)	(Cl)	ppm	<0.5	<0.5	<0.5	<0.5
	Chloride (water < 80°F)	(Cl^-)	ppm	<20	<20	<150	<150
	Chloride (water > 120°F)	(Cl^-)	ppm	<20	<20	<125	<125
	Hydrogen Sulfide[α]	(H_2S)	ppb	<0.5	<0.5	<0.5	<0.5
	Carbon Dioxide	(CO_2)	ppm	0	<50	10 to 50	10 to 50
	Iron Oxide	(Fe)	ppm	<1.0	<1.0	<1.0	<0.2
	Manganese	(Mn)	ppm	<0.4	<0.4	<0.4	<0.4
	Ammonia	(NH_3)	ppm	<0.05	<0.1	<0.1	<0.1
	Chloramine	(NH_2CL)	ppm	0	0	0	0
Fouling & Biological	Iron bacteria		cells/mL	0	0	0	0
	Slime-forming bacteria		cells/mL	0	0	0	0
	Sulfate-reducing bacteria		cells/mL	0	0	0	0
	Suspended Solids[β]	(TSS)	ppm	<10	<10	<10	<10
Electrolysis All HX types	Earth Ground Resistance[χ]		Ohms		Consult NEC and local electrical codes for grounding requirements		
	Electrolysis Voltage[δ]		mV		Measure voltage and internal water loop to HP ground		
	Leakage Current[δ]		mA		Measure current in water loop pipe		
	Building Primary Electrical Ground to unit, must meet local diameter and penetration length requirements. Do not connect heat pump to steel pipe unless dissimilar materials are separated by using Di-electric unions. Galvanic corrosion of heat pump water pipe will occur						

Models:
SV
0930-1872

Water Quality Requirements

1. The **Water Quality Requirements** table provides water quality requirements for coaxial and brazed-plate heat exchangers.
2. The water must be evaluated by an independent testing facility comparing site samples against this table. When water properties are outside of these parameters, the water must either be treated by a professional water treatment specialist to bring the water quality within the boundaries of this specification, or an external secondary heat exchanger must be used to isolate the heat pump water system from the unsuitable water. Failure to do so will void the warranty of the heat pump system and will limit liability for damage caused by leaks or system failure.
3. Regular sampling, testing and treatment of the water is necessary to assure that the water quality remains within acceptable levels thereby allowing the heat pump to operate at optimum levels.
4. If closed-loop systems are turned off for extended periods, water samples must be tested prior to operating the system.
5. For optimal performance, it is recommended that the closed-loop piping systems are initially filled with deionized water.
6. Well water with chemistry outside of these boundaries, and salt water or brackish water requires an external secondary heat exchanger. Surface/Pond water should not be used.
7. If water temperature is expected to fall below 40°F (4.4°C), antifreeze is required. Refer to the heat pump IOM for the correct solution ratios to prevent freezing.

α Hydrogen sulfide has an odor of rotten eggs. If this smell is detected, you must perform a test for H_2S. If H_2S is detected above the limit indicated, remediation is necessary. Consult with your water testing/treatment professional. If a secondary heat exchanger is required, use appropriate materials as recommended by the heat exchanger supplier.

β Suspended solids and particulates must be filtered to prevent fouling and failure of heat exchangers. Strainers or particulate filters must be installed to provide a maximum particle size of 600 micron (0.60 mm, 0.023 inch) using a 20 to 30 mesh screen size. When a loop is installed in areas with fine material such as sand or clay, further filtration is required to a maximum of 100 micron. Refer to the Strainer / Filter Sizing Chart to capture the particle sizes encountered on the site.

χ The WSHP piping system or other plumbing pipes must not be used as the building ground. An electrical grounding system using a dedicated ground rod meeting NEC and local electrical codes must be installed.

δ Refer to the **Antifreeze Percentages by Volume** table for instructions on measuring resistance and leakage currents within water loops.

Strainer / Filter Sizing

Mesh Size	Particle Size		
	Microns	Millimeter	Inch
20	840	0.840	0.0340
30	533	0.533	0.0210
60	250	0.250	0.0100
100	149	0.149	0.0060
150	100	0.100	0.0040
200	74	0.074	0.0029

- ppm = parts per million
- ppb = parts per billion

Antifreeze Percentages by Volume

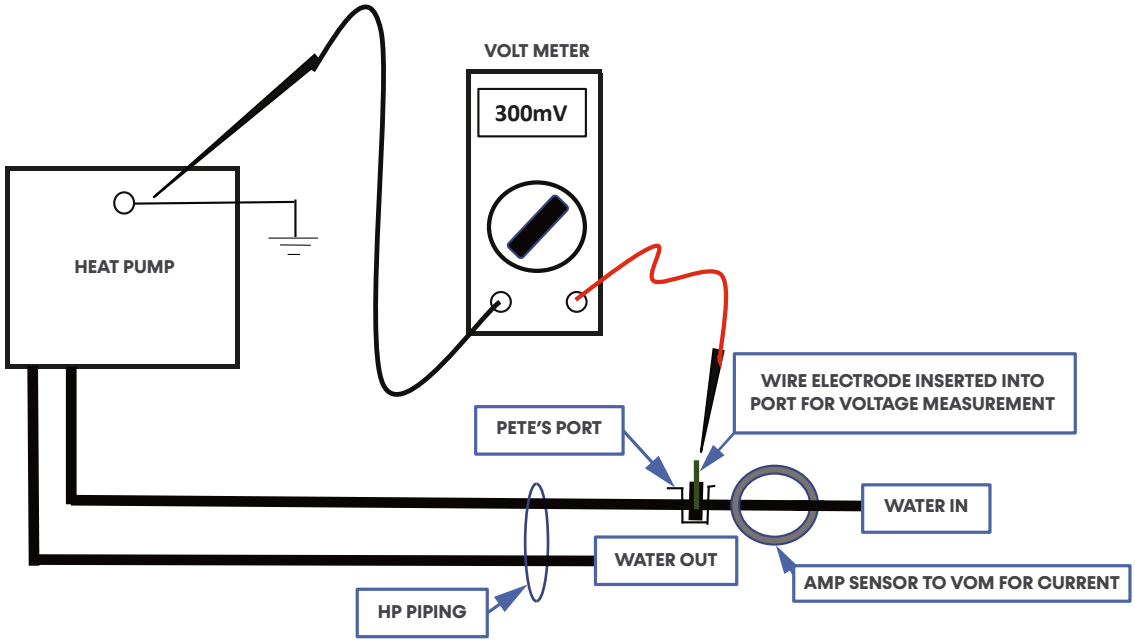
Type	Minimum Antifreeze Concentration % for Low Temperature Protection			
	10°F [-12.2°C]	15°F [-9.4°C]	20°F [-6.7°C]	25°F [-3.9°C]
Methanol	21%	17%	13%	9%
100% USP food grade Propylene Glycol	29%	24%	19%	12%
Ethanol[1]	28%	24%	18%	12%

1. Must not be denatured with any petroleum based product

Water Quality Requirements

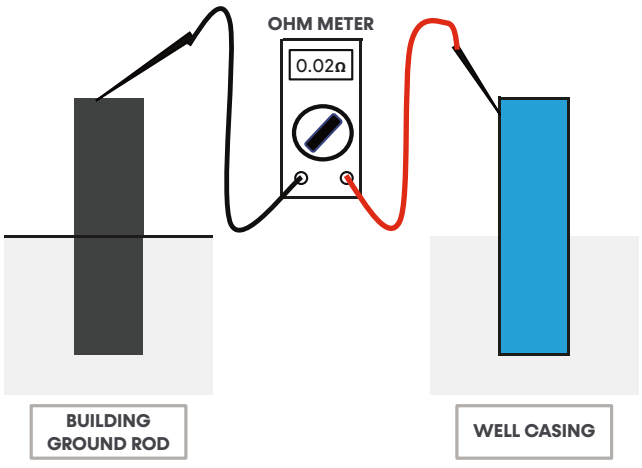
Models:
SV
0930-1872

Measuring Electrolysis, Voltage, and Current for Ground-Water Applications



- Measure the electrolysis voltage using a volt meter between the heat pump ground and a #14 AWG solid copper wire electrode inserted into the water using a Pete's style access port.
- The heat pump must be operating and the water stream flowing.
- The voltage measured should be less than 300mV (0.300V). If the voltage is higher than 500mV, electrolysis occurs resulting in corrosion.
- If voltage is measured, the cause is a high-resistance earth ground or current on the neutral conductor. Remedial measures should be performed.
- Measure the current flowing through the piping system by using an amp clamp probe on the water-in line. The heat pump must be operating and the water stream flowing.
- There should be zero amps measured. If current is present, there is leakage current to the plumbing system and it must be rectified to prevent pipe corrosion.

Measuring Earth Ground Resistance



- Measure the earth ground bond using an Ohm meter between the building's ground rod and the steel well casing.
- The resistance measured should be zero Ohms. The NEC allows a resistance to ground up to 20 Ohms. Any resistance above zero indicates a poor earth ground, which may be the result of a hot neutral line or that conductive water is present. Both of these may lead to electrolysis and corrosion of the heat pump piping. A check for both should be performed and resolved.

NOTE: If the well casing is plastic, create a conductive path by inserting a #6 AWG bare copper wire into the well water. Remove the temporary conductor when finished.

Models:
SV
0930-1872

Electrical Power Wiring

⚠ WARNING

To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

⚠ WARNING

Disconnect electrical power source to prevent injury or death from electrical shock.

⚠ CAUTION

Use only copper conductors for field installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

ELECTRICAL

Line Voltage - All field installed wiring, including electrical ground, must comply with NFPA 70: National Electrical Code (NEC), CSA C22.1: Canadian Electrical Code (CE Code), as well as applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections that must be made by the installing (or electrical) contractor. All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

Disconnects - Units with a factory-installed disconnect switch will provide full separation of **all poles** and disconnection from main line voltage. For units where factory disconnect is not selected as an option, the installer must incorporate the means to fully disconnect the line voltage in the fixed wiring in accordance with wiring rules and local electrical codes.

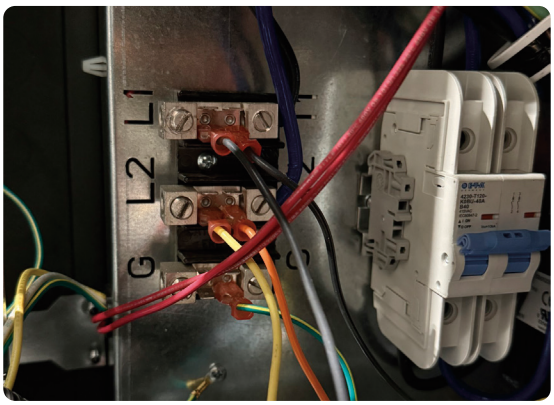
POWER CONNECTION

The line voltage connection is made by connecting the incoming line voltage wires to the "L" side of the contactor. See the electrical data tables for maximum fuse sizes.

GENERAL LINE VOLTAGE WIRING

Ensure the available power is the same voltage and phase shown on the unit serial plate. Line- and low-voltage wiring must be in accordance with local codes or the National Electric Code, whichever is applicable. Refer to the table, **SV Electrical Data for EC Motor with Internal Flow Controller** for minimum circuit amps and maximum breaker size.

Single Phase Line Voltage Field Wiring



PICTURED: UNIT POWER SUPPLY

TRANSFORMER

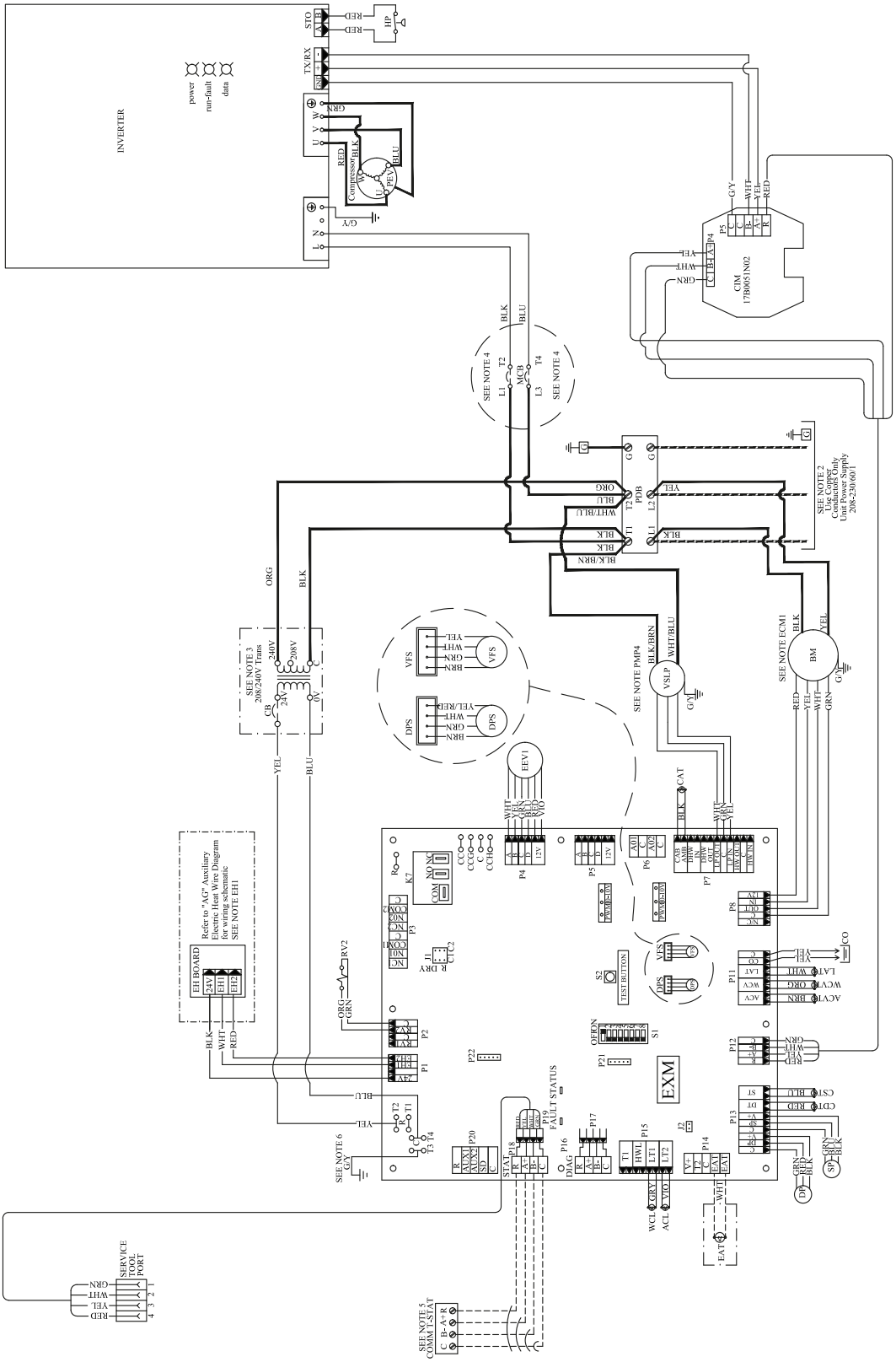
All 208/230V units are factory wired for 230V. If supply voltage is 208V, installer must rewire transformer. See wire diagram for connections.

SV Electrical Data for EC Motor with Internal Flow Controller

Model	Volt Code	Rated Voltage	Compressor			Ext Loop FLA	Fan Motor FLA	Total Unit FLA	Min Circ Amp	Max Fuse/ HACR
			RLA	LRA	Qty					
0930	G.J.	208/230-1-60	19.2	19.2	1	1.44	4.20	24.8	29.6	45
1248	G.J.	208/230-1-60	32.0	32.0	1	1.44	5.90	39.3	47.3	70
1872	G.J.	208/230-1-60	32.0	32.0	1	1.44	7.50	40.9	48.9	80

Electrical
Example Wiring Diagram

Models:
SV
0930-1872



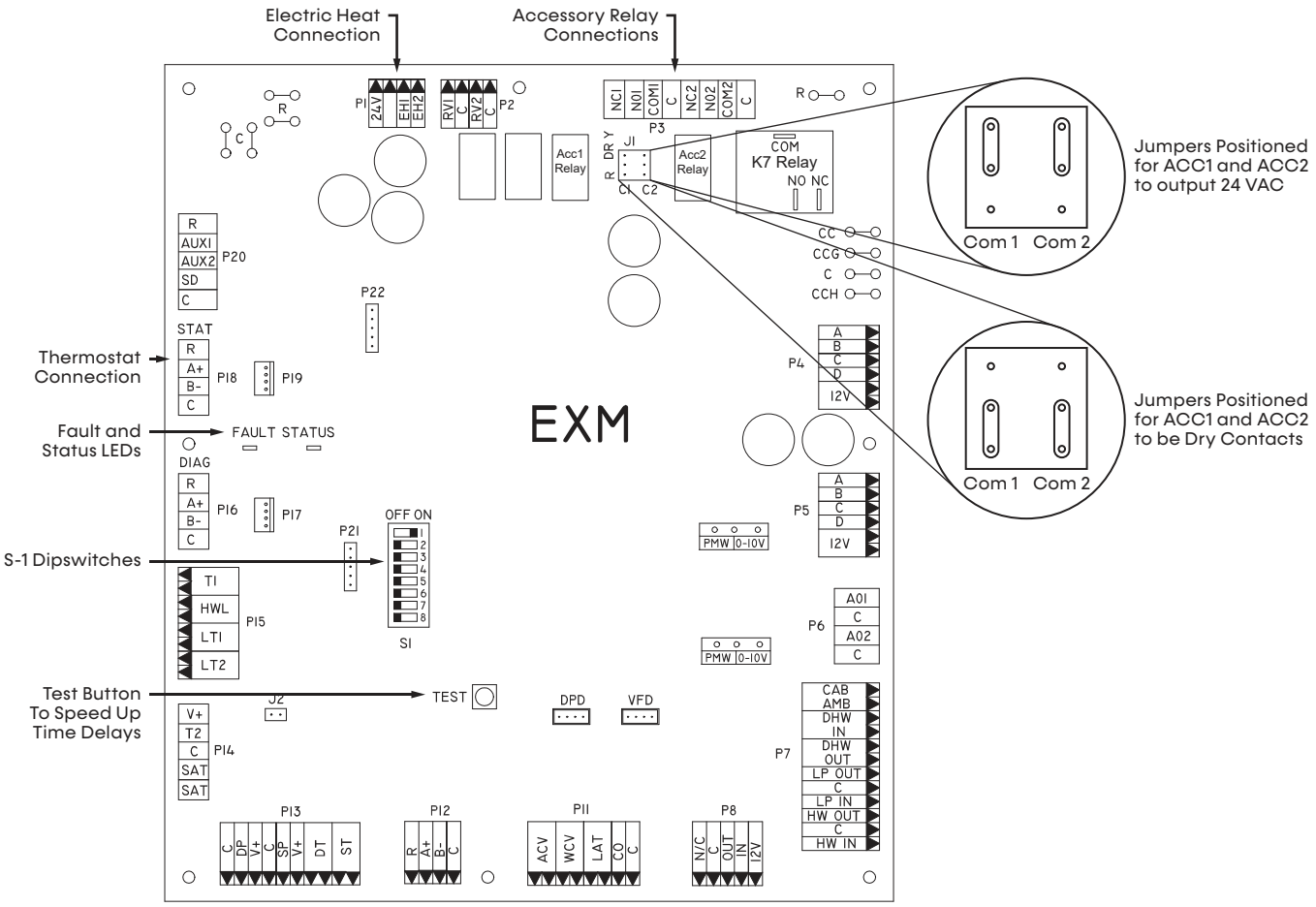
Models:
SV
0930-1872

Electrical
Low-Voltage Wiring

ACCESSORY CONNECTIONS

The EXM controller includes accessory relays. Each relay includes a normally open (NO) and a normally closed (NC) contact. Accessory relays may be configured to operate as shown in the table below.

EXM Layout and Connections

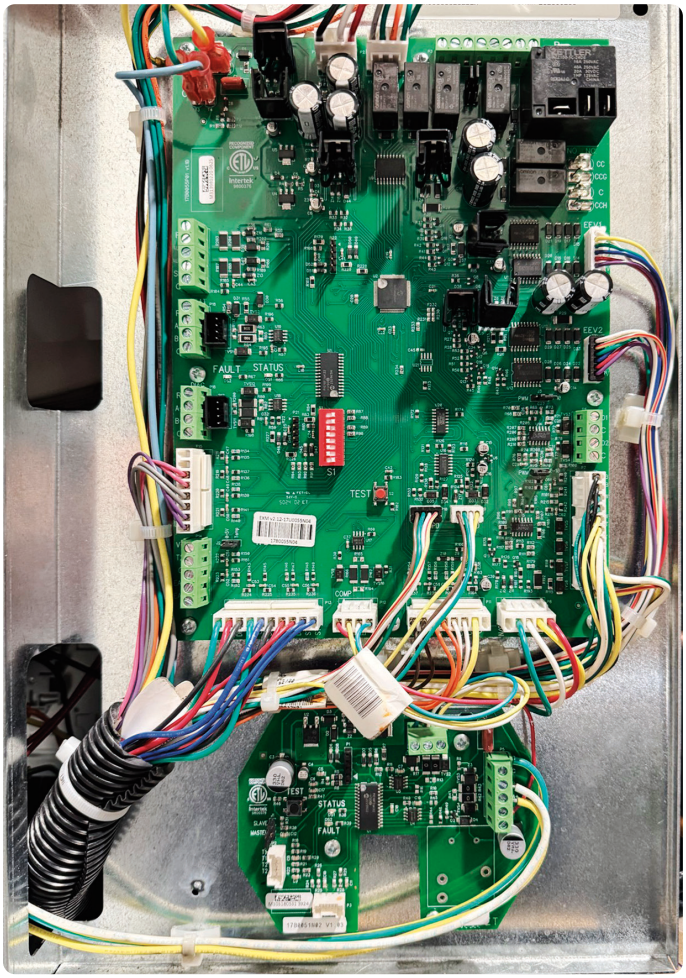


S1 DIP Switch	Accessory Relay	On	Off
S1-1	N/A	Modbus Leader	Modbus Follower
S1-2	N/A	Diagnostics Leader	Diagnostics Follower
S1-3	ACC1 (K3)	Tracks Compressor	Tracks Blower
S1-4	ACC2 (K4)	Tracks Compressor	Tracks Blower
S1-5	K7	Tracks Compressor	Tracks Blower

Electrical Low-Voltage Wiring

Models:
SV
0930-1872

Control Board for Units with Carel Inverter and Carel Interface Module (CIM)



Models:
SV
0930-1872

Electrical
Thermostat Wiring

IGATE 2 COMMUNICATING (AWC) THERMOSTAT

The Trilogy SV unit is designed to be used with the iGate 2 Communicating (AWC) Thermostat. Wire the thermostat as shown in the **Thermostat Wiring** figure to the low voltage terminal strip on the EXM control board. Refer to the iGate 2 Communicating (AWC) Thermostat IOM (Part #: 97B0132N01) for more detailed information.

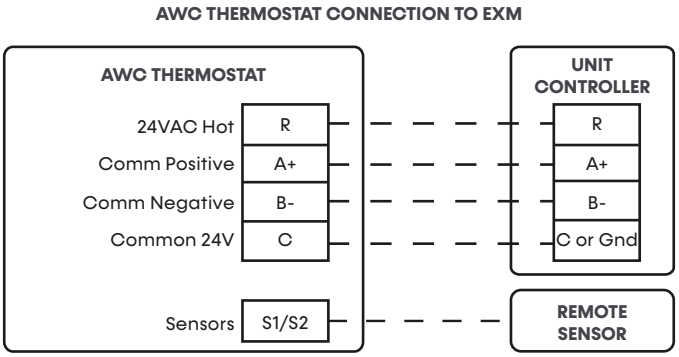
THERMOSTAT INSTALLATION

Install the thermostat on an interior wall in a larger room away from supply duct drafts. DO NOT locate the thermostat in areas subject to sunlight, drafts or on external walls. The wire access hole behind the thermostat may need to be sealed to prevent erroneous temperature measurement.

Position the thermostat back plate against the wall so that it appears level and so the thermostat wires protrude through the middle of the back plate. Mark the position of the back plate mounting holes and drill holes with a 3⁄16-inch (5 mm) bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWG wire.

For units installed with a ClimaZone communicating zoning system, please refer to the *ClimaZone IOM* for more information on thermostat wiring.

Thermostat Wiring



Electrical
Refrigerant Detection System

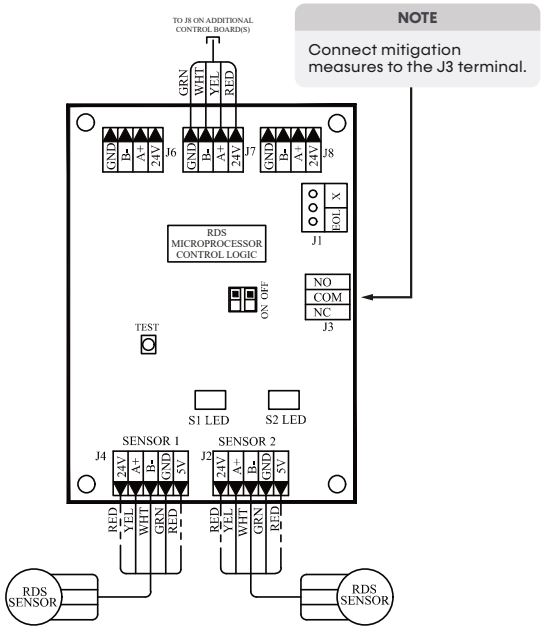
Models:
SV
0930-1872

REFRIGERANT DETECTION SYSTEM (RDS)

The function, operation, and required servicing measures for the RDS include the following:

- The RDS monitors the status of the refrigerant sensor(s) in the unit. If refrigerant is detected above the maximum threshold, the control enables the unit blower, disables the compressor(s), and enables the pilot relay on the RDS control board. You can use this relay to open external zoning dampers and/or activate external mechanical ventilation. The relay is normally closed (NC) and can control a signal with a maximum of 28VA @ 24VAC.
- A fault is enabled if the RDS control board loses communication with a refrigerant sensor, or if the main control board loses communication with the RDS board. See the *Troubleshooting* section for steps to troubleshoot the RDS.
- The End of Line (EoL) termination is used to prevent signal reflection issues in the communication network. When the EoL termination is enabled, it places a resistor at the end of the communication line, ensuring proper signal integrity and reducing potential communication errors. Add the EoL termination resistor when the RDS board is the end of a daisy-chain, and the total length of the wire is greater than 50 feet.

RDS Board



FIELD-INSTALLED RDS SYSTEM

If an RDS is optionally being field-installed, use the following guidelines to install the refrigerant detection sensor upstream of the unit's return air inlet:

1. The sensor must be located within 3 inches of the unit
2. The sensor must be on the same plane or lower than the unit
3. The sensor must be on the same side of the coil as the feeder tubes (feeder tubes are located near the electrical components)

Models:
SV
0930-1872

Electrical
RDS, WST, ClimaZone, and AWC Thermostat

Refrigerant Detection System

For detailed controller information, see the Refrigerant Detection System Application, Operation, and Maintenance (AOM) manual (part # 97B0152N01).

Wireless Service Tool

For detailed controller information, see the Wireless Service Tool Application, Operation, and Maintenance (AOM) manual (part # 97B0169N01). The Wireless Service Tool port is located on the corner post of most models.

ClimaZone

For detailed controller information, see the ClimaZone Installation, Operation, and Maintenance (IOM) manual (part # 97B0142N01).

iGate 2 Communicating (AWC) Thermostat

For detailed controller information, see the AWC Thermostat Installation, Operation, and Maintenance (IOM) manual (part # 97B0132N01).

EC Blower Motor Controls

Models:
SV
0930-1872

EC BLOWER MOTOR CONFIGURATION

The EC Blower Motor in the SV units is controlled by the EXM. The blower cfm will vary as the compressor speed varies and as configured for operation by the installer. The range of airflow available will be determined by the unit model capacities selected for Minimum Heating Capacity, Maximum Heating Capacity, Minimum Cooling Capacity, and Maximum Cooling Capacity.

SPECIAL NOTE FOR AHRI TESTING

To achieve rated airflow for AHRI testing purposes, it is necessary to change the CFM settings to rated airflow.

AIRFLOW CONFIGURATION

Range for the airflow settings will depend on model and capacity selection (in 25 cfm increments).

Configuration Setting	Description
Min Heating Airflow	Configures the unit airflow while operating at minimum capacity in the heating mode. The installer may wish to select a higher cfm than the nominal cfm for this setting to ensure proper air movement during low-capacity operation.
Max Heating Airflow	Configures the unit airflow while operating at maximum capacity in the heating mode. The installer may wish to select a lower cfm than the nominal cfm for this setting to avoid air velocity noise from the ductwork during maximum capacity operation.
Min Cooling Airflow	Configures the unit airflow while operating at minimum capacity in the cooling mode. The installer may wish to select a higher cfm than the nominal 400 cfm/ton for this setting to ensure proper air movement during low-capacity operation.
Max Cooling Airflow	Configures the unit airflow while operating at maximum capacity in the cooling mode. The installer may wish to select a lower cfm than the nominal 400 cfm/ton for this setting to avoid air velocity noise from the ductwork during maximum capacity operation.
Low Dehumidification Airflow	Configures the unit airflow while operating at minimum capacity in the dehumidification mode.
High Dehumidification Airflow	Configures the unit airflow while operating at maximum capacity in the dehumidification mode.
Emergency Heat Airflow	Configures the unit airflow during the emergency heat mode (if applicable).
Constant Fan Airflow	Configures the unit airflow while operating in the continuous fan mode.
Heat Off Delay	This setting determines whether (and how long) the blower will continue to operate after the compressor has cycled off at the end of each heating cycle (0 seconds to 255 seconds, in 5 second increments).
Cool Off Delay	This setting determines whether (and how long) the blower will continue to operate after the compressor has cycled off at the end of each cooling cycle (0 seconds to 255 seconds, in 5 second increments).

Models:
SV
0930-1872

Blower Performance
SV 0930

Blower Performance: CV EC Blower Motor Standard Unit

Model	Max ESP (in wg)	Fan Motor (hp)	Range	Capacity	Cooling Mode	Dehumid Mode	Heating Mode	Fan Only Mode	Aux Emergency Mode
0930	0.30 at 1125; 0.6 at 1000	1/2	Default	9,000	300	275	300	350	850
				12,000	425	375	425		
				15,000	500	450	500		
				18,000	600	525	600		
				21,000	700	600	700		
				24,000	775	675	775		
				27,000	875	750	875		
				30,000	950	800	950		
			Minimum	9,000	225	225	200	225	700
				12,000	275	275	250		
				15,000	325	325	300		
				18,000	425	425	375		
				21,000	500	500	450		
				24,000	575	575	525		
				27,000	650	650	600		
				30,000	750	750	700		
			Maximum	9,000	375	375	375	1,125	1,125
				12,000	500	500	500		
				15,000	625	625	625		
				18,000	750	750	750		
				21,000	850	850	850		
				24,000	975	975	975		
				27,000	1,075	1,075	1,075		
				30,000	1,125	1,125	1,125		

- Blower performance data is based on the lowest nameplate voltage setting.
- Blower performance is based on a wet coil with clean 1-inch filter.
- Blower performance is based on operating conditions of 80°F DB and 67°F WB.
- Airflow is controller within ±5% up to max ESP shown with wet coil.
- Cells in grey - option not available

Table continued on next page

Blower Performance SV 1248

Models: SV 0930-1872

Table continued from previous page

Model	Max ESP (in wg)	Fan Motor (hp)	Range	Capacity	Cooling Mode	Dehumid Mode	Heating Mode	Fan Only Mode	Aux Emergency Mode
1248	1.0 at 1800	3/4	Default	12,000	400	375	400	450	1,350
				16,000	525	475	525		
				20,000	650	575	650		
				32,000	1,025	900	1,025		
				36,000	1,200	1,000	1,200		
				40,000	1,275	1,075	1,275		
				44,000	1,400	1,175	1,400		
				48,000	1,525	1,275	1,525		
			Minimum	12,000	300	300	300	300	1,200
				16,000	375	375	375		
				20,000	475	475	450		
				32,000	775	775	725		
				36,000	875	875	825		
				40,000	975	975	925		
				44,000	1,075	1,075	1,000		
				48,000	1,175	1,175	1,100		
			Maximum	12,000	500	500	500	1,800	1,800
				16,000	650	650	650		
				20,000	825	825	825		
				32,000	1,250	1,250	1,250		
				36,000	1,400	1,400	1,400		
				40,000	1,550	1,550	1,550		
				44,000	1,675	1,675	1,675		
				48,000	1,800	1,800	1,800		

- Blower performance data is based on the lowest nameplate voltage setting.
- Blower performance is based on a wet coil with clean 1-inch filter.
- Blower performance is based on operating conditions of 80°F DB and 67°F WB.
- Airflow is controller within ±5% up to max ESP shown with wet coil.
- Cells in grey - option not available

Table continued on next page

Models:
SV
0930-1872

Blower Performance
SV 1872

Table continued from previous page

Model	Max ESP (in wg)	Fan Motor (hp)	Range	Capacity	Cooling Mode	Dehumid Mode	Heating Mode	Fan Only Mode	Aux Emergency Mode
1872	0.45 at 2250; 0.75 at 2000	1	Default	18,000	600	525	600	700	1,500
				24,000	775	675	775		
				30,000	975	825	975		
				36,000	1,150	1,000			
				42,000	1,325	1,150			
				48,000	1,525	1,325	1,525		
				54,000	1,700	1,475	1,700		
				60,000	1,875	1,625	1,875		
				66,000			2,000		
				72,000			2,000		
			Minimum	18,000	425	425	375	425	1,350
				24,000	575	575	525		
				30,000	725	725	675		
				36,000	875	875			
				42,000	1,025	1,025			
				48,000	1,200	1,200	1,075		
				54,000	1,350	1,350	1,225		
				60,000	1,500	1,500	1,375		
				66,000			1,650		
				72,000			1,800		
			Maximum	18,000	750	750	750	2,250	2,250
				24,000	975	975	975		
				30,000	1,175	1,175	1,175		
				36,000	1,400	1,400			
				42,000	1,600	1,600			
				48,000	1,825	1,825	1,825		
				54,000	2,025	2,025	2,025		
				60,000	2,250	2,250	2,250		
				66,000			2,250		
				72,000			2,250		

- Blower performance data is based on the lowest nameplate voltage setting.
- Blower performance is based on a wet coil with clean 1-inch filter.
- Blower performance is based on operating conditions of 80°F DB and 67°F WB.
- Airflow is controller within ±5% up to max ESP shown with wet coil.
- Cells in grey - option not available

System Configuration

Models:
SV
0930-1872

UNIT MANUAL OPERATION

Manual Operation mode allows the service technician to manually command operation for operating mode, any of the thermostat outputs, blower speed, as well as pump speed or valve position to aid in troubleshooting. Available data will depend on the unit/model installed.

Manual Setting	Description	Options
Field Test Mode		Enabled, Disabled
Operating Mode	Selects the manual mode of operation	Standby, Const Fan, Cooling, Heating, Aux Heat, EM Heat, Hot Water, Cooling/HW
EC Motor Target Airflow	Configures the target airflow during manual operation	Range will depend on unit model
EC Motor Blower Speed	Displays current EC motor rpm	--
Loop Pump Speed	Sets loop pump speed	0% to 100% Default - 41%
DHW Pump Speed	Sets DHW pump speed	0% to 100% Default - 0%
Compressor Actual Speed	Current compressor speed in rps (revolutions per second)	--

The ECM Airflow adjustment will not be present if the connected communicating control is not configured for **Blower type = ECM**

The Pump Speed adjustment will not be present if the connected communicating control is not configured for **Loop Configuration = Pump.**

Clear Fault History

Clear Fault history will clear all fault codes stored in the thermostat as well as the fault history in any connected communicating controls.

Operating Information

The Diagnostics data set allows the service technician to view the real time status of all physical inputs, switches, temperature sensor readings, as well as the operational status of the heat pump from the myUplink mobile app and web portal. Available data will depend on the unit/model installed.

DIAGNOSTICS

Compressor Diagnostics

Data	Unit	Description
Compressor Current	A	Current compressor amperage.
Compressor DC Voltage	V	Current DC bus voltage from the inverter.
Compressor Heat Sink	F	Current temperature of the inverter heat sink.
Compressor Inverter Current	A	Current amperage draw of the inverter.
Compressor Speed	rps	Current compressor speed.
Unit Capacity	%	Current operating capacity as a percentage of the max capacity.

Blower Diagnostics

Data	Unit	Description
ECM Blower Power	W	Instantaneous power consumption of the blower.
ECM Blower Speed	rpm	Current blower speed.
ECM Target Airflow	cfm	Current blower target airflow.
Entering Air Temperature	F	Current temperature of the air entering the unit.
Leaving Air Temperature	F	Current temperature of the air leaving the unit.

Loop Diagnostics

Data	Unit	Description
A1 Analog Output	V	Current voltage output at the configurable analog output. (Applies to Tranquility.)
A2 Analog Output	V	Current voltage output at the configurable analog output. (Applies to Tranquility.)
Entering Water Temperature	F	Current temperature of the water entering the source heat exchanger.
Leaving Water Temperature	F	Current temperature of the water leaving the source heat exchanger.
Loop Pump Feedback	%	Current feedback signal of the loop pump.
Loop Pump Flow Rate	gpm	Current source flow rate.
Loop Pump Power	W	Instantaneous power consumption of the loop pump.
Loop Pump Speed	%	Current speed of the loop pump.
Water Pressure	psi	Current pressure of the water as it leaves the source heat exchanger.

Models:
SV
0930-1872

System Configuration

Refrigerant Diagnostics

Data	Unit	Description
Air Coil Liquid Temperature	F	Current temperature of the refrigerant liquid line between the air coil and the electronic expansion valve.
Air Coil Vapor Temperature	F	Current temperature of the refrigerant vapor line between the heat/cool reversing valve and the air coil.
Compressor Discharge Pressure	psi	Current refrigerant discharge pressure.
Compressor Discharge Saturation Temperature	F	Current saturation temperature of the refrigerant discharge pressure.
Compressor Discharge Superheat Temperature	F	Current calculation of superheat temperature at the discharge of the compressor.
Compressor Discharge Temperature	F	Current temperature of the compressor discharge line.
Compressor Subcool Temperature	F	Current calculation of subcool temperature at the liquid line of the compressor.
Compressor Suction Pressure	psi	Current refrigerant suction pressure.
Compressor Suction Saturation Temperature	F	Current saturation temperature of the refrigerant suction pressure.
Compressor Suction Superheat Temperature	F	Current calculation of superheat at the suction to the compressor.
Compressor Suction Temperature	F	Current temperature of the compressor suction line.
Water Coil Liquid Temperature	F	Current temperature of the refrigerant liquid line between the source heat exchanger and the electronic expansion valve.
Water Coil Vapor Temperature	F	Current temperature of the refrigerant vapor line between the heat/cool reversing valve and the source heat exchanger.

Refrigerant Valve Diagnostics

Data	Description
RV2 Status	Status of the RV2 (heat/cool) reversing valve.
Water Coil EEV1 Status	Status of the heating electronic expansion valve.
Water Coil EEV1 Position	Current position of the heating electronic expansion valve in steps. (0=fully closed, 1040 = fully open)

Miscellaneous Diagnostics

Data	Unit	Description
Control Voltage	V	Unit's control voltage.
Cabinet Ambient Temperature	F	Ambient temperature in the unit's compressor section.
Heat of Extraction/ Rejection	Btu/hr	Current calculation of heat of extraction (heating) or heat of rejection (cooling) to/from the loop depending on mode of operation.

Dip Switch Settings

System Setting	Description	Range/Options	Default
Dip switch SW1-1	Modbus Communications	Modbus Leader, Modbus Follower	--
Dip switch SW1-2	Diagnostic Communications	Diagnostic Leader, Diagnostic Follower	--
Dip switch SW1-3	ACC K3 (ACC1) Relay Tracks.	Compressor, Blower	--
Dip switch SW1-4	ACC K4 (ACC2) Relay Tracks.	Compressor, Blower	--
Dip switch SW1-5	ACC K7 Tracks.	Compressor, Blower	--

Fault History

Fault History stores and displays the five most recent fault or warning codes for the connected communicating control.

Operating and Commissioning Limits

Models:
SV
0930-1872

OPERATING LIMITS

Environment – Units are designed for indoor installation only. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air).

Power Supply – Voltage utilization shall comply with AHRI Standard 110 or values provided in the *Electrical Data* section.

Three factors determine the operating limits of water-source heat pumps: return air temperature, water temperature, and ambient temperature. When any one of these factors is at minimum or maximum levels, the other two factors should be at normal levels to ensure proper unit operation. Extreme variations in temperature and humidity and/or corrosive water or air adversely affects unit performance, reliability, and service life.

COMMISSIONING CONDITIONS

Starting conditions vary depending upon model and are based upon the following notes:

NOTES:

1. Commissioning Conditions are not normal or continuous operating conditions. Minimum/maximum limits are startup conditions to bring the building space up to occupancy temperatures. Units are not designed to operate under these conditions on a regular basis.
2. Voltage utilization range complies with AHRI Standard 110.

Operating Limits

Operating Limits	Cooling	Heating
Air Limits		
Min. ambient air, DB	10°F (-12°C)[1]	10°F (-12°C)[1]
Max. ambient air, DB	130°F (54.4°C)	130°F (54.4°C)
Min. entering air, DB/WB	65/45°F (18/7°C)	50°F (10°C)
Max. entering air, DB/WB	90/72°F (32/22°C)	80°F (27°C)
Min/Max Airflow (CFM/Ton)	300 to 500 CFM/Ton[2]	
Water Limits		
Min. entering water	30°F (-1°C)[3]	20°F (-6.7°C)
Max. entering water	120°F (49°C)	90°F (32°C)
Water Flow Range	1.5 to 3.0 gpm/ton (1.6 to 3.2 l/m per kW)[4]	

Notes:
1. To prevent unit damage, the water loop should contain antifreeze to prevent freezing when not in operation.
2. Refer to specific blower tables for each model size
3. With unit flow-control automation.
4. Unless specified different on performance table for any model size

Commissioning Conditions

Commissioning Conditions	Cooling	Heating
Air Limits		
Min. ambient air, DB	10°F (-12°C)[1]	10°F (-12°C)[1]
Max. ambient air, DB	130°F (54.4°C)	130°F (54.4°C)
Min. entering air, DB/WB	65/45°F (18/7°C)	40°F (4.4°C)[6]
Max. entering air, DB/WB	100/75°F (38/24°C)[5]	80°F (27°C)
Min/Max Airflow (CFM/Ton)	300 to 500 CFM/Ton[2]	
Water Limits		
Min. entering water	20°F (-6.7°C)[3]	20°F (-6.7°C)
Max. entering water	120°F (49°C)	90°F (32°C)
Water Flow Range	1.5 to 3.0 gpm/ton (1.6 to 3.2 l/m per kW)[4]	

Notes:
1. To prevent unit damage, the water loop should contain antifreeze to prevent freezing when not in operation.
2. Refer to specific blower tables for each model size
3. With unit flow-control automation.
4. Unless specified different on performance table for any model size
5. Commission units for cooling at entering air temperatures of 100/75°F (38/24°C) only at rated water flow or 3 gpm/ton.
6. Commission units for heating at entering air temperature of 40°F (4.4°C) only at rated water flow or 3 gpm/ton.

Models:
SV
0930-1872

Unit and System Checkout

⚠ WARNING

Polyolester Oil, commonly known as POE oil, is a synthetic oil used in many refrigeration systems including those with R-454B refrigerant. POE oil, if it ever comes in contact with PVC or CPVC piping, may cause failure of the PVC/CPVC. PVC/CPVC piping should never be used as supply or return water piping with water-source heat pump products containing R-454B as system failures and property damage may result.

UNIT AND SYSTEM CHECKOUT

BEFORE POWERING SYSTEM, please check the following:

UNIT FEATURES

- ☐ **Balancing/shutoff valves:** Ensure all isolation valves are open and water control valves are wired.
- ☐ **Line voltage and wiring:** Verify that voltage is within an acceptable range for the unit and wiring and fuses/breakers are properly sized. Verify that low voltage wiring is complete.
- ☐ **Unit control transformer:** Ensure transformer has the properly selected voltage tap. Residential 208-230V units are factory wired for 230V operation unless specified otherwise.
- ☐ **Loop/water piping:** Ensure loop or water piping is complete and purged of air. Water/piping is clean.
- ☐ **Antifreeze:** Has been added if necessary.
- ☐ **Entering water and air:** Ensure entering water and air temperatures are within operating limits the range detailed in the **Operating Limits** and **Commissioning Conditions** tables..
- ☐ **Unit fan:** Manually rotate fan to verify free rotation and ensure blower wheel is secured to the motor shaft. Be sure to remove any shipping supports if needed. DO NOT oil motors upon startup. Fan motors are pre-oiled at the factory. Check unit fan CFM selection and compare to design requirements.
- ☐ **Condensate line:** Verify condensate line is open and properly pitched toward drain.
- ☐ **Unit air coil and filters:** Ensure filter is clean and accessible. Clean air coil of all manufacturing oils.
- ☐ **Unit controls:** Verify EXM field selection options are properly set. Low-voltage wiring is complete.
- ☐ Blower CFM and Water ΔT is set on an AWC Thermostat or Wireless Service Tool.
- ☐ Service/access panels are in place.

SYSTEM CHECKOUT

- ☐ **System water temperature:** Check water temperature for proper range. Verify heating and cooling set points for proper operation.
- ☐ **System pH:** Check and adjust water pH if necessary to maintain a level between 6 and 8.5. Proper pH promotes longevity of hoses and fittings in the **Water Quality Requirements** table.
- ☐ **System flushing:** Verify all hoses are connected end-to-end when flushing to ensure that debris bypasses the unit heat exchanger, water valves and other components. Water used in the system must be potable quality initially and clean of dirt, piping slag, and strong chemical cleaning agents. Verify all air is purged from the system. Air in the system can cause poor operation or system corrosion.
- ☐ **Internal Flow Controller:** Verify that it is purged of air and in operating condition.
- ☐ **System controls:** Verify system controls function and operate in the proper sequence.
- ☐ **Low water temperature cutout:** Verify low water temperature cut-out controls are provided for the outdoor portion of the loop. (LT1)
- ☐ **Miscellaneous:** Note any questionable aspects of the installation.

⚠ CAUTION

Verify that ALL water control valves are open and allow water flow prior to engaging the compressor. Freezing of the heat exchanger or water lines can permanently damage the heat pump.

⚠ CAUTION

To avoid equipment damage, DO NOT leave system filled in a building without heat during the winter unless antifreeze is added to the water loop. Heat exchangers never fully drain by themselves and will freeze unless winterized with antifreeze.

Unit Startup Procedure

Models:
SV
0930-1872

UNIT STARTUP PROCEDURE

1. Ensure all valves are adjusted to their full open position. Ensure line power to the heat pump is on.
2. Room temperature should be within the minimum-maximum ranges of listed in the unit IOM. During start-up checks, loop water temperature entering the heat pump should be between 30°F [-1°C] and 95°F [35°C].
3. It is recommended that Trilogy units be first started in the heating mode, when possible. This will allow liquid refrigerant to flow through the filter-drier before entering the EEV, allowing the filter-drier to catch any debris that might be in the system before it reaches the EEV.
4. Place the unit in Manual Operation mode with the Wireless Service Tool.
5. While in the manual operation mode, turn on the blower by setting the EC motor target airflow to a nominal amount.
   A. Verify the blower is running and that air is moving appropriately through the duct system.
   B. Verify that the loop pump is running.
   C. Set the unit operating mode to Heating

      NOTE: The compressor will not start if the blower and pump are not operating at appropriate levels.

   D. Check for vibration, noise, and water leaks
   E. Check for warm air delivery at the supply air grilles within a few minutes after the unit has begun to operate and that the loop water temperature drop is within normal range.
   F. Allow unit to run 15 minutes so that it reaches a semi-steady state.

   NOTE: Allow three (3) minutes between tests for pressure to equalize before beginning cooling test.
6. Finally, set the unit to the Cooling Mode
   A. Verify that the compressor is on and that the water temperature rise (cooling mode) is within normal range.
   B. Check for cool air delivery at the supply air grilles within a few minutes after the unit has begun to operate.
   C. Check the elevation and cleanliness of the condensate lines. Dripping may be a sign of a blocked line. Check that the condensate trap is filled to provide a water seal.

Water Temperature Change Through Heat Exchanger

Water Flow, gpm (l/m)	Rise, Cooling °F	Drop, Heating °F
For Closed Loop: Ground Source or Closed Loop Systems at 3 gpm per ton (3.9 l/m per kw)	9 - 12	4 - 8

7. If unit fails to operate properly, perform troubleshooting analysis (see troubleshooting section in this manual). If the check described fails to reveal the problem and the unit still does not operate, contact a trained service technician to insure proper diagnosis and repair of the equipment.
8. When testing is complete, exit the Manual Operation Menu and set thermostat to maintain desired comfort level for normal operation.
9. BE CERTAIN TO FILL OUT AND RETURN ALL WARRANTY REGISTRATION PAPERWORK.

NOTE: If performance during any mode appears abnormal, refer to the EXM section or troubleshooting section of this manual. To obtain maximum performance, the air coil should be cleaned before startup. A 10% solution of dishwasher detergent and water is recommended.

⚠ WARNING

When the disconnect switch is closed, high voltage is present in some areas of the electrical panel. Exercise caution when working with energized equipment.

⚠ CAUTION

Verify that ALL water control valves are open and allow water flow prior to engaging the compressor. Freezing of the heat exchanger or water lines can permanently damage the heat pump.

⚠ CAUTION

Many units are installed with a factory or field supplied manual or electric shutoff valve. DAMAGE WILL OCCUR if shutoff valve is closed during unit operation. A high pressure switch must be installed on the heat pump side of any field provided shutoff valves and connected to the heat pump controls in series with the built-in refrigerant circuit high pressure switch to disable compressor operation if water pressure exceeds pressure switch setting. The field installed high pressure switch shall have a cut-out pressure of 300 psig and a cut-in pressure of 250 psig.

Models:
SV
0930-1872

Unit Operating Conditions

SV Series Typical Unit Operating Pressures and Temperatures

Operating Pressure/Temperature tables include the following notes:

- Airflow is at nominal (rated) conditions
- Entering air is based upon 70°F (21°C) DB in heating and 80/67°F (27/19°C) in cooling
- Subcooling is based upon head pressure at compressor service port
- Cooling air and water values can vary greatly with changes in humidity level

SV 0930	Cooling							Heating						
Entering Water Temp °F	dT	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat °F	Subcooling °F	Water Flow GPM	Air Temp Drop °F DB	dT	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat °F	Subcooling °F	Water Flow GPM	Air Temp Rise°F DB
30[1]								11	56-76	310-330	15-19	3-9	5.4-6.4	25-31
								8	61-81	310-330	14-18	3-9	5.4-6.4	25-31
								5	66-86	310-330	14-18	3-9	5.4-6.4	25-31
50	20	122-142	189-209	21-25	3-9	5.5-6.5	16-22	12	89-109	310-330	12-16	3-9	5.4-6.4	25-31
	15	122-142	173-193	23-27	3-9	5.5-6.5	16-22	9	95-115	310-330	11-15	3-9	5.4-6.4	25-31
	10	122-142	159-179	25-29	3-9	5.5-6.5	16-22	6	101-121	310-330	11-15	3-9	5.4-6.4	25-31
70	20	122-142	260-280	15-19	2-8	5.5-6.5	16-22	13	128-148	310-330	9-13	3-9	5.4-6.4	25-31
	15	122-142	240-260	16-20	3-9	5.5-6.5	16-22	10	134-154	310-330	8-12	3-9	5.4-6.4	25-31
	10	122-142	222-242	17-21	3-9	5.5-6.5	16-22	7	141-161	310-330	8-12	3-9	5.4-6.4	25-31
90	20	122-142	346-366	13-17	2-8	5.5-6.5	16-22	14	170-190	310-330	6-10	3-9	5.4-6.4	25-31
	15	122-142	323-343	13-17	2-8	5.5-6.5	16-22	11	177-197	310-330	5-9	3-9	5.4-6.4	25-31
	10	122-142	301-321	13-17	2-8	5.5-6.5	16-22	8	184-204	310-330	5-9	3-9	5.4-6.4	25-31
110	20	122-142	448-468	13-17	2-8	5.5-6.5	16-22							
	15	122-142	421-441	13-17	2-8	5.5-6.5	16-22							
	10	122-142	395-415	13-17	2-8	5.5-6.5	16-22							

1. Based on 20% methanol antifreeze solution

SV 1248	Cooling							Heating						
Entering Water Temp °F	dT	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat °F	Subcooling °F	Water Flow GPM	Air Temp Drop °F DB	dT	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat °F	Subcooling °F	Water Flow GPM	Air Temp Rise°F DB
30[1]								11	52-72	301-321	8-12	12-18	8.5-9.5	24-30
								8	59-79	301-321	8-12	11-17	8.5-9.5	24-30
								5	65-85	302-322	8-12	11-17	8.5-9.5	24-30
50	20	132-152	185-205	8-12	5-11	8.6-9.6	17-23	12	92-112	302-322	8-12	8-14	8.4-9.4	24-30
	15	132-152	170-190	8-12	5-11	8.6-9.6	17-23	9	99-119	302-322	8-12	8-14	8.4-9.4	24-30
	10	132-152	155-175	8-12	4-10	8.6-9.6	17-23	6	105-125	302-322	8-12	7-13	8.4-9.4	24-30
70	20	130-150	257-277	10-14	7-13	8.5-9.5	17-23	13	132-152	303-323	8-12	5-11	8.4-9.4	25-31
	15	131-151	238-258	10-14	6-12	8.6-9.6	17-23	10	139-159	303-323	8-12	4-10	8.4-9.4	25-31
	10	131-151	219-239	10-14	6-12	8.6-9.6	17-23	7	145-165	303-323	8-12	4-10	8.4-9.4	25-31
90	20	129-149	345-365	12-16	8-14	8.5-9.5	17-23	14	173-193	304-324	8-12	1-7	8.4-9.4	25-31
	15	130-150	322-342	11-15	8-14	8.5-9.5	17-23	11	179-199	304-324	8-12	1-7	8.4-9.4	25-31
	10	130-150	299-319	11-15	7-13	8.5-9.5	17-23	8	185-205	304-324	8-12	1-7	8.4-9.4	25-31
110	20	128-148	449-469	13-17	9-15	8.5-9.5	17-23							
	15	128-148	421-441	13-17	9-15	8.5-9.5	17-23							
	10	129-149	395-415	12-16	9-15	8.5-9.5	17-23							

1. Based on 20% methanol antifreeze solution

Unit Operating Conditions

Models:
SV
0930-1872

SV 1872	Cooling							Heating						
Entering Water Temp °F	dT	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat °F	Subcooling °F	Water Flow GPM	Air Temp Drop °F DB	dT	Suction Pressure PSIG	Discharge Pressure PSIG	Superheat °F	Subcooling °F	Water Flow GPM	Air Temp Rise°F DB
30[1]								11	44-64	309-329	8-12	20-26	11.4-12.4	25-31
								8	49-69	309-329	8-12	19-25	11.4-12.4	25-31
								5	54-74	309-329	8-12	18-24	11.4-12.4	25-31
50	20	124-144	189-209	8-12	7-13	11.6-12.6	17-23	12	78-98	308-328	8-12	14-20	11.4-12.4	25-31
	15	124-144	173-193	8-12	6-12	11.6-12.6	17-23	9	84-104	308-328	8-12	13-19	11.4-12.4	25-31
	10	125-145	158-178	8-12	6-12	11.6-12.6	17-23	6	91-111	308-328	8-12	12-18	11.4-12.4	25-31
70	20	121-141	261-281	8-12	8-14	11.6-12.6	16-22	13	119-139	307-327	8-12	8-14	11.4-12.4	25-31
	15	122-142	241-261	8-12	7-13	11.6-12.6	16-22	10	126-146	307-327	8-12	7-13	11.4-12.4	25-31
	10	122-142	223-243	8-12	7-13	11.6-12.6	16-22	7	133-153	307-327	8-12	6-12	11.4-12.4	25-31
90	20	119-139	349-369	8-12	8-14	11.5-12.5	16-22	14	166-186	306-326	8-12	2-8	11.4-12.4	25-31
	15	119-139	325-345	8-12	8-14	11.5-12.5	16-22	11	174-194	305-325	8-12	1-7	11.4-12.4	25-31
	10	120-140	303-323	8-12	8-14	11.5-12.5	16-22	8	182-202	305-325	8-12	1-7	11.4-12.4	25-31
110	20	116-136	452-472	8-12	9-15	11.5-12.5	16-22							
	15	117-137	424-444	8-12	9-15	11.5-12.5	16-22							
	10	118-138	398-418	8-12	9-15	11.5-12.5	16-22							

1. Based on 20% methanol antifreeze solution

Models:
SV
0930-1872

Performance Data Legend of Terms

Performance Data Legend of Terms

Abbreviations	Descriptions
CFM/T	Airflow, cubic feet per minute per ton
COP	Coefficient of performance = BTU output/BTU input
dT	Temperature difference
dTL	Temperature difference (load)
dTS	Temperature difference (source)
EAT	Entering air temperature, Fahrenheit (dry bulb/wet bulb)
EER	Energy efficient ratio = BTU output/Watt input
ESP	External static pressure, inches w.g.
EWT	Entering water temperature, °F
EWTL	Entering water temperature (load)
EWTS	Entering water temperature (source)
GPM	Water flow in U.S., gallons per minute
HC	Heating capacity, Mbtuh
HE	Total heat of extraction, Mbtuh
HR	Total heat of rejection, Mbtuh
HW	Hot water (potable)
HWC	Hot water capacity, Mbtuh
Hz	Compressor, hertz
kW	Total power unit input, kilowatts
LAT	Leaving air temperature, °F
LC	Latent cooling capacity, Mbtuh
LWT	Leaving water temperature, °F
LWTL	Leaving water temperature (load)
LWTS	Leaving water temperature (source)
SC	Sensible cooling capacity, Mbtuh
S/T	Sensible to total cooling ratio
TC	Total cooling capacity, Mbtuh
WPD	Water coil pressure drop (ft hd)

Performance Data
SV 0930 Cooling

Models:
SV
0930-1872

EWT °F	dT	TC					SC					S/T					kW					HR				
		Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
		30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100
20	45	9.0	12.0	18.0	24.0	30.0	6.6	8.5	12.4	16.4	20.5	0.73	0.71	0.69	0.68	0.68	0.13	0.20	0.40	0.68	1.04	9.4	12.7	19.4	26.3	33.5
30	40	9.0	12.0	18.0	24.0	30.0	6.6	8.5	12.4	16.4	20.5	0.73	0.71	0.69	0.68	0.68	0.24	0.30	0.49	0.78	1.17	9.8	13.0	19.7	26.7	34.0
	35	9.0	12.0	18.0	24.0	30.0	6.6	8.5	12.4	16.4	20.5	0.73	0.71	0.69	0.68	0.68	0.13	0.20	0.40	0.68	1.04	9.4	12.7	19.4	26.3	33.5
40	30	9.0	12.0	18.0	24.0	30.0	6.6	8.5	12.4	16.4	20.5	0.73	0.71	0.69	0.68	0.68	0.24	0.30	0.49	0.78	1.17	9.8	13.0	19.7	26.7	34.0
	25	9.0	12.0	18.0	24.0	30.0	6.6	8.5	12.4	16.4	20.5	0.73	0.71	0.69	0.68	0.68	0.13	0.20	0.40	0.68	1.04	9.4	12.7	19.4	26.3	33.5
50	20	9.0	12.0	18.0	24.0	30.0	6.6	8.5	12.4	16.4	20.5	0.73	0.71	0.69	0.68	0.68	0.24	0.30	0.49	0.78	1.17	9.8	13.0	19.7	26.7	34.0
	15	9.0	12.0	18.0	24.0	30.0	6.6	8.5	12.4	16.4	20.5	0.73	0.71	0.69	0.68	0.68	0.13	0.20	0.40	0.68	1.04	9.4	12.7	19.4	26.3	33.5
60	20	9.0	12.0	18.0	24.0	30.0	6.5	8.5	12.4	16.5	20.5	0.73	0.71	0.69	0.69	0.68	0.41	0.47	0.67	1.00	1.45	10.4	13.6	20.3	27.4	34.9
	10	9.0	12.0	18.0	24.0	30.0	6.6	8.5	12.4	16.4	20.5	0.73	0.71	0.69	0.68	0.68	0.24	0.30	0.49	0.78	1.17	9.8	13.0	19.7	26.7	34.0
70	20	9.0	12.0	18.0	24.0	30.0	6.5	8.5	12.4	16.5	20.6	0.72	0.71	0.69	0.69	0.69	0.54	0.60	0.85	1.25	1.80	10.8	14.1	20.9	28.3	36.2
	10	9.0	12.0	18.0	24.0	30.0	6.5	8.5	12.4	16.5	20.5	0.73	0.71	0.69	0.69	0.68	0.41	0.47	0.67	1.00	1.45	10.4	13.6	20.3	27.4	34.9
80	20	9.0	12.0	18.0	24.0	30.0	6.5	8.5	12.4	16.5	20.6	0.72	0.70	0.69	0.69	0.69	0.66	0.75	1.06	1.56	2.25	11.2	14.5	21.6	29.3	37.7
	10	9.0	12.0	18.0	24.0	30.0	6.5	8.5	12.4	16.5	20.6	0.72	0.71	0.69	0.69	0.69	0.54	0.60	0.85	1.25	1.80	10.8	14.1	20.9	28.3	36.2
90	20	9.0	12.0	18.0	24.0	30.0	6.5	8.4	12.5	16.5	20.7	0.72	0.70	0.69	0.69	0.69	0.79	0.92	1.34	1.98	2.83	11.7	15.1	22.6	30.7	39.7
	10	9.0	12.0	18.0	24.0	30.0	6.5	8.5	12.4	16.5	20.6	0.72	0.70	0.69	0.69	0.69	0.66	0.75	1.06	1.56	2.25	11.2	14.5	21.6	29.3	37.7
100	20	9.0	12.0	18.0	24.0	29.7	6.4	8.4	12.5	16.6	20.5	0.71	0.70	0.69	0.69	0.69	0.98	1.16	1.72	2.52	3.51	12.3	16.0	23.9	32.6	41.7
	10	9.0	12.0	18.0	24.0	30.0	6.5	8.4	12.5	16.5	20.7	0.72	0.70	0.69	0.69	0.69	0.79	0.92	1.34	1.98	2.83	11.7	15.1	22.6	30.7	39.7
110	20	9.0	12.0	18.0	24.0	26.2	6.4	8.4	12.5	16.6	18.1	0.71	0.70	0.69	0.69	0.69	1.24	1.50	2.22	3.22	3.66	13.2	17.1	25.6	35.0	38.7
	10	9.0	12.0	18.0	24.0	29.7	6.4	8.4	12.5	16.6	20.5	0.71	0.70	0.69	0.69	0.69	0.98	1.16	1.72	2.52	3.51	12.3	16.0	23.9	32.6	41.7
120	20	9.0	12.0	18.0	22.6	22.6	6.4	8.4	12.5	15.6	15.6	0.71	0.70	0.69	0.69	0.69	1.62	1.96	2.88	3.79	3.79	14.5	18.7	27.8	35.6	35.6
	10	9.0	12.0	18.0	24.0	26.2	6.4	8.4	12.5	16.6	18.1	0.71	0.70	0.69	0.69	0.69	1.24	1.50	2.22	3.22	3.66	13.2	17.1	25.6	35.0	38.7

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Table continued on next page

Models:
SV
0930-1872

Performance Data
SV 0930 Cooling

Table continued from previous page

EWT °F	EER					Hz					LWT (°F)					GPM					WPD (ft. hd)				
	Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100
20	69.1	59.8	44.9	35.3	28.9	24	34	54	72	89	65	65	65	65	65	0.4	0.6	0.9	1.2	1.6	*	*	*	*	*
30	37.4	39.8	36.4	30.7	25.7	28	38	56	74	91	70	70	70	70	70	0.5	0.7	1.0	1.4	1.8	*	*	*	*	*
	69.1	59.8	44.9	35.3	28.9	24	34	54	72	89	65	65	65	65	65	0.6	0.8	1.2	1.6	2.0	*	*	*	*	*
40	37.4	39.8	36.4	30.7	25.7	28	38	56	74	91	70	70	70	70	70	0.7	0.9	1.4	1.9	2.4	*	*	*	*	*
	69.1	59.8	44.9	35.3	28.9	24	34	54	72	89	65	65	65	65	65	0.8	1.1	1.6	2.2	2.8	*	*	*	*	1.1
50	37.4	39.8	36.4	30.7	25.7	28	38	56	74	91	70	70	70	70	70	1.0	1.4	2.1	2.8	3.6	*	*	*	1.1	1.5
	69.1	59.8	44.9	35.3	28.9	24	34	54	72	89	65	65	65	65	65	1.3	1.8	2.7	3.7	4.7	*	*	1.0	1.6	2.2
60	21.9	25.8	26.9	24.1	20.7	34	43	60	78	95	80	80	80	80	80	1.1	1.4	2.1	2.9	3.7	*	*	*	1.1	1.5
	37.4	39.8	36.4	30.7	25.7	28	38	56	74	91	70	70	70	70	70	2.1	2.7	4.1	5.6	7.1	*	1.0	1.8	2.8	4.1
70	16.7	19.9	21.3	19.2	16.6	38	47	64	81	100	90	90	90	90	90	1.1	1.5	2.2	3.0	3.8	*	*	*	1.0	1.5
	21.9	25.8	26.9	24.1	20.7	34	43	60	78	95	80	80	80	80	80	2.2	2.9	4.3	5.8	7.4	*	1.0	1.8	2.8	4.1
80	13.7	16.1	17.0	15.3	13.3	41	50	67	86	107	100	100	100	100	100	1.2	1.5	2.3	3.1	4.0	*	*	*	1.0	1.5
	16.7	19.9	21.3	19.2	16.6	38	47	64	81	100	90	90	90	90	90	2.3	3.0	4.4	6.0	7.6	*	1.0	1.8	2.8	4.2
90	11.3	13.0	13.4	12.1	10.6	44	53	72	94	117	110	110	110	110	110	1.2	1.6	2.4	3.3	4.2	*	*	*	1.0	1.5
	13.7	16.1	17.0	15.3	13.3	41	50	67	86	107	100	100	100	100	100	2.4	3.1	4.6	6.2	8.0	*	*	1.8	2.9	4.3
100	9.2	10.3	10.5	9.5	8.5	48	58	79	104	130	120	120	120	120	120	1.3	1.7	2.5	3.5	4.5	*	*	*	1.1	1.6
	11.3	13.0	13.4	12.1	10.6	44	53	72	94	117	110	110	110	110	110	2.5	3.2	4.8	6.6	8.4	*	*	1.8	3.0	4.6
110	7.2	8.0	8.1	7.5	7.2	54	65	90	118	130	130	130	130	130	130	1.4	1.8	2.8	3.8	4.2	*	*	*	1.1	1.3
	9.2	10.3	10.5	9.5	8.5	48	58	79	104	130	120	120	120	120	120	2.6	3.4	5.1	7.0	8.9	*	1.0	1.9	3.2	4.9
120	5.6	6.1	6.3	6.0	6.0	63	76	105	130	130	140	140	140	140	140	1.6	2.0	3.0	3.9	3.9	*	*	*	1.1	1.1
	7.2	8.0	8.1	7.5	7.2	54	65	90	118	130	130	130	130	130	130	2.9	3.7	5.5	7.6	8.4	*	1.1	2.0	3.5	4.2

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Performance Data
SV 0930 Heating

Models:
SV
0930-1872

EWT °F	dT	TC					kW					HE					COP				
		Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
		30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100
20	6	9.0	12.0	18.0	24.0	26.2	1.2	1.4	1.8	2.4	2.7	4.9	7.3	11.7	15.7	17.1	2.2	2.5	2.9	2.9	2.9
30	12	9.0	12.0	18.0	24.0	27.8	1.1	1.3	1.8	2.3	2.7	5.1	7.5	12.0	16.1	18.4	2.3	2.7	3.0	3.0	3.0
	6	9.0	12.0	18.0	24.0	30.0	1.1	1.2	1.6	2.1	2.8	5.4	7.8	12.4	16.7	20.5	2.5	2.9	3.2	3.3	3.2
40	12	9.0	12.0	18.0	24.0	30.0	1.0	1.2	1.5	2.0	2.6	5.6	8.1	12.7	17.0	21.0	2.6	3.1	3.4	3.5	3.3
	6	9.0	12.0	18.0	24.0	30.0	0.9	1.0	1.4	1.9	2.4	5.9	8.4	13.2	17.6	21.7	2.9	3.4	3.7	3.8	3.6
50	13	9.0	12.0	18.0	24.0	30.0	0.9	1.0	1.3	1.8	2.3	6.1	8.6	13.4	17.9	22.0	3.1	3.5	3.9	3.9	3.8
	7	9.0	12.0	18.0	24.0	30.0	0.8	0.9	1.2	1.6	2.1	6.4	9.0	13.9	18.4	22.7	3.5	4.0	4.4	4.3	4.1
60	13	9.0	12.0	18.0	24.0	30.0	0.7	0.8	1.1	1.5	2.0	6.6	9.2	14.2	18.8	23.2	3.8	4.3	4.7	4.6	4.4
	7	9.0	12.0	18.0	24.0	30.0	0.6	0.7	1.0	1.4	1.8	7.0	9.6	14.6	19.3	23.8	4.4	4.9	5.2	5.1	4.8
70	13	9.0	12.0	18.0	24.0	30.0	0.5	0.6	0.9	1.3	1.7	7.2	9.8	14.8	19.6	24.2	4.9	5.4	5.7	5.5	5.2
	7	9.0	12.0	18.0	24.0	30.0	0.4	0.6	0.8	1.1	1.5	7.5	10.1	15.2	20.1	24.8	5.9	6.3	6.4	6.1	5.7
80	13	9.0	12.0	18.0	24.0	30.0	0.4	0.5	0.8	1.1	1.4	7.6	10.3	15.4	20.4	25.1	6.7	7.0	7.0	6.6	6.2
	7	9.0	12.0	18.0	24.0	30.0	0.3	0.4	0.7	1.0	1.3	7.9	10.5	15.7	20.8	25.6	8.1	8.2	7.9	7.4	6.8
90	13	9.0	12.0	18.0	24.0	30.0	0.3	0.4	0.6	0.9	1.2	8.0	10.7	15.9	21.0	25.9	9.3	9.2	8.6	7.9	7.3
	7	9.0	12.0	18.0	24.0	30.0	0.2	0.3	0.6	0.8	1.1	8.2	10.9	16.1	21.3	26.3	11.3	10.6	9.6	8.7	8.1
100	17	9.0	12.0	18.0	24.0	30.0	0.2	0.3	0.6	0.8	1.1	8.2	10.9	16.1	21.3	26.3	11.3	10.6	9.6	8.7	8.1
110	27	9.0	12.0	18.0	24.0	30.0	0.2	0.3	0.6	0.8	1.1	8.2	10.9	16.1	21.3	26.3	11.3	10.6	9.6	8.7	8.1
120	37	9.0	12.0	18.0	24.0	30.0	0.2	0.3	0.6	0.8	1.1	8.2	10.9	16.1	21.3	26.3	11.3	10.6	9.6	8.7	8.1

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Table continued on next page

Models:
SV
0930-1872

Performance Data
SV 0930 Heating

Table continued from previous page

EWT °F	Hz					LWT (°F)					GPM					WPD (ft. hd)				
	Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100
20	74	84	104	123	130	14	14	14	14	14	1.7	2.6	4.2	5.6	6.1	*	1.2	2.2	3.3	3.8
30	71	80	99	118	130	18	18	18	18	18	0.9	1.3	2.1	2.8	3.3	*	*	*	1.3	1.6
	65	74	93	111	129	24	24	24	24	24	1.9	2.8	4.4	5.9	7.2	*	1.2	2.3	3.5	4.7
40	61	70	88	106	123	28	28	28	28	28	1.0	1.4	2.2	3.0	3.7	*	*	*	1.3	1.8
	55	64	81	98	115	34	34	34	34	34	2.1	3.0	4.6	6.2	7.6	*	1.3	2.4	3.6	5.0
50	52	61	78	95	111	37	37	37	37	37	1.0	1.4	2.2	2.9	3.6	*	*	*	1.2	1.6
	46	54	71	87	103	43	43	43	43	43	1.9	2.7	4.2	5.6	6.8	*	1.1	2.0	3.0	4.1
60	42	50	67	83	98	47	47	47	47	47	1.1	1.5	2.3	3.0	3.8	*	*	*	1.2	1.6
	36	44	61	76	91	53	53	53	53	53	2.1	2.9	4.4	5.8	7.2	*	1.1	2.0	3.1	4.2
70	33	41	57	72	86	57	57	57	57	57	1.2	1.6	2.4	3.2	3.9	*	*	*	1.2	1.7
	28	36	51	66	79	63	63	63	63	63	2.2	3.0	4.6	6.0	7.4	*	1.2	2.0	3.1	4.3
80	25	33	48	62	76	67	67	67	67	67	1.2	1.7	2.5	3.3	4.1	*	*	*	1.2	1.7
	22	29	44	58	71	73	73	73	73	73	2.4	3.2	4.7	6.2	7.7	*	1.2	2.1	3.1	4.4
90	20	27	42	55	68	77	77	77	77	77	1.3	1.7	2.6	3.4	4.2	*	*	*	1.2	1.7
	18	25	39	52	64	83	83	83	83	83	2.5	3.3	4.9	6.4	7.9	*	1.1	2.0	3.1	4.4
100	18	25	39	52	64	83	83	83	83	83	1.0	1.4	2.0	2.6	3.3	*	*	*	*	1.1
110	18	25	39	52	64	83	83	83	83	83	0.6	0.9	1.3	1.7	2.1	*	*	*	*	*
120	18	25	39	52	64	83	83	83	83	83	0.5	0.6	0.9	1.2	1.5	*	*	*	*	*

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Performance Data
SV 1248 Cooling

Models:
SV
0930-1872

EWT °F	dT	TC					SC					S/T					kW					HR				
		Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
		25	40	60	80	100	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100
20	45	12.0	19.2	28.8	38.4	48.0	8.6	14.1	21.3	28.1	34.7	0.72	0.74	0.74	0.73	0.72	0.18	0.26	0.47	0.80	1.24	12.6	20.1	30.4	41.1	52.2
30	40	12.0	19.2	28.8	38.4	48.0	8.6	14.1	21.2	28.1	34.8	0.71	0.73	0.74	0.73	0.72	0.24	0.33	0.56	0.93	1.42	12.8	20.3	30.7	41.6	52.8
	35	12.0	19.2	28.8	38.4	48.0	8.6	14.1	21.3	28.1	34.7	0.72	0.74	0.74	0.73	0.72	0.18	0.26	0.47	0.80	1.24	12.6	20.1	30.4	41.1	52.2
40	30	12.0	19.2	28.8	38.4	48.0	8.6	14.1	21.2	28.1	34.8	0.71	0.73	0.74	0.73	0.72	0.24	0.33	0.56	0.93	1.42	12.8	20.3	30.7	41.6	52.8
	25	12.0	19.2	28.8	38.4	48.0	8.6	14.1	21.3	28.1	34.7	0.72	0.74	0.74	0.73	0.72	0.18	0.26	0.47	0.80	1.24	12.6	20.1	30.4	41.1	52.2
50	20	12.0	19.2	28.8	38.4	48.0	8.6	14.1	21.2	28.1	34.8	0.71	0.73	0.74	0.73	0.72	0.24	0.33	0.56	0.93	1.42	12.8	20.3	30.7	41.6	52.8
	15	12.0	19.2	28.8	38.4	48.0	8.6	14.1	21.3	28.1	34.7	0.72	0.74	0.74	0.73	0.72	0.18	0.26	0.47	0.80	1.24	12.6	20.1	30.4	41.1	52.2
60	20	12.0	19.2	28.8	38.4	48.0	8.5	14.1	21.2	28.1	34.8	0.71	0.73	0.74	0.73	0.72	0.36	0.48	0.77	1.23	1.84	13.2	20.8	31.4	42.6	54.3
	10	12.0	19.2	28.8	38.4	48.0	8.6	14.1	21.2	28.1	34.8	0.71	0.73	0.74	0.73	0.72	0.24	0.33	0.56	0.93	1.42	12.8	20.3	30.7	41.6	52.8
70	20	14.0	19.2	28.8	38.4	48.0	10.1	14.1	21.2	28.1	34.8	0.72	0.73	0.74	0.73	0.72	0.52	0.65	1.03	1.59	2.34	15.8	21.4	32.3	43.8	56.0
	10	14.0	19.2	28.8	38.4	48.0	10.1	14.1	21.2	28.1	34.8	0.72	0.73	0.74	0.73	0.72	0.38	0.48	0.77	1.23	1.84	15.3	20.8	31.4	42.6	54.3
80	20	15.0	19.2	28.8	38.4	48.0	10.8	14.0	21.2	28.1	34.8	0.72	0.73	0.74	0.73	0.73	0.70	0.85	1.34	2.04	2.94	17.4	22.1	33.4	45.3	58.0
	10	15.0	19.2	28.8	38.4	48.0	10.8	14.1	21.2	28.1	34.8	0.72	0.73	0.74	0.73	0.72	0.54	0.65	1.03	1.59	2.34	16.8	21.4	32.3	43.8	56.0
90	20	16.0	19.2	28.8	38.4	48.0	11.6	14.0	21.2	28.2	34.8	0.72	0.73	0.74	0.73	0.73	0.94	1.09	1.71	2.56	3.65	19.2	22.9	34.6	47.2	60.5
	10	16.0	19.2	28.8	38.4	48.0	11.6	14.0	21.2	28.1	34.8	0.72	0.73	0.74	0.73	0.73	0.73	0.85	1.34	2.04	2.94	18.5	22.1	33.4	45.3	58.0
100	20	16.0	19.2	28.8	38.4	48.0	11.5	14.0	21.2	28.2	34.9	0.72	0.73	0.74	0.73	0.73	1.19	1.39	2.16	3.19	4.48	20.1	23.9	36.2	49.3	63.3
	10	16.0	19.2	28.8	38.4	48.0	11.6	14.0	21.2	28.2	34.8	0.72	0.73	0.74	0.73	0.73	0.94	1.09	1.71	2.56	3.65	19.2	22.9	34.6	47.2	60.5
110	20	16.0	19.2	28.8	38.4	48.0	11.5	14.0	21.2	28.2	34.9	0.72	0.73	0.74	0.73	0.73	1.50	1.74	2.69	3.92	5.44	21.1	25.2	38.0	51.8	66.6
	10	16.0	19.2	28.8	38.4	48.0	11.5	14.0	21.2	28.2	34.9	0.72	0.73	0.74	0.73	0.73	1.19	1.39	2.16	3.19	4.48	20.1	23.9	36.2	49.3	63.3
120	20	16.0	19.2	28.8	38.4	48.0	11.5	14.0	21.2	28.2	34.9	0.72	0.73	0.74	0.73	0.73	1.86	2.17	3.31	4.76	6.53	22.4	26.6	40.1	54.6	70.3
	10	16.0	19.2	28.8	38.4	48.0	11.5	14.0	21.2	28.2	34.9	0.72	0.73	0.74	0.73	0.73	1.50	1.74	2.69	3.92	5.44	21.1	25.2	38.0	51.8	66.6

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- Above performance is based on 80°F db / 67°F wb entering air conditions.
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- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Table continued on next page

Models:
SV
0930-1872

Performance Data
SV 1248 Cooling

Table continued from previous page

EWT °F	EER					Hz					LWT (°F)					GPM					WPD (ft. hd)				
	Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100
20	65.1	72.8	61.0	48.1	38.6	16	25	37	50	64	65	65	65	65	65	0.6	0.9	1.4	1.9	2.4	*	*	*	*	*
30	49.3	57.9	51.1	41.4	33.8	17	25	37	51	66	70	70	70	70	70	0.7	1.1	1.6	2.2	2.8	*	*	*	*	*
	65.1	72.8	61.0	48.1	38.6	16	25	37	50	64	65	65	65	65	65	0.8	1.2	1.8	2.5	3.1	*	*	*	*	*
40	49.3	57.9	51.1	41.4	33.8	17	25	37	51	66	70	70	70	70	70	0.9	1.4	2.2	2.9	3.7	*	*	*	*	*
	65.1	72.8	61.0	48.1	38.6	16	25	37	50	64	65	65	65	65	65	1.1	1.7	2.6	3.5	4.4	*	*	*	*	1.3
50	49.3	57.9	51.1	41.4	33.8	17	25	37	51	66	70	70	70	70	70	1.3	2.1	3.2	4.4	5.6	*	*	*	1.2	1.9
	65.1	72.8	61.0	48.1	38.6	16	25	37	50	64	65	65	65	65	65	1.8	2.8	4.3	5.8	7.3	*	*	1.2	2.0	3.1
60	33.3	40.1	37.2	31.3	26.1	17	26	39	53	69	80	80	80	80	80	1.4	2.2	3.3	4.5	5.7	*	*	*	1.2	1.9
	49.3	57.9	51.1	41.4	33.8	17	25	37	51	66	70	70	70	70	70	2.7	4.3	6.5	8.7	11.1	*	1.2	2.4	4.2	6.5
70	27.0	29.6	28.0	24.1	20.5	21	28	41	57	73	90	90	90	90	90	1.7	2.3	3.4	4.6	5.9	*	*	*	1.2	1.9
	36.4	40.1	37.2	31.3	26.1	20	26	39	53	69	80	80	80	80	80	3.2	4.4	6.6	9.0	11.4	*	1.1	2.4	4.2	6.7
80	21.4	22.6	21.5	18.9	16.3	24	30	44	61	78	100	100	100	100	100	1.8	2.3	3.5	4.8	6.1	*	*	*	1.2	1.9
	27.8	29.6	28.0	24.1	20.5	22	28	41	57	73	90	90	90	90	90	3.6	4.5	6.8	9.3	11.8	*	1.1	2.4	4.3	6.9
90	17.0	17.6	16.8	15.0	13.1	27	32	48	65	85	110	110	110	110	110	2.0	2.4	3.7	5.0	6.4	*	*	*	1.2	2.0
	21.8	22.6	21.5	18.9	16.3	25	30	44	61	78	100	100	100	100	100	3.9	4.7	7.1	9.6	12.3	*	1.1	2.5	4.5	7.3
100	13.4	13.8	13.4	12.0	10.7	30	35	52	71	92	120	120	120	120	120	2.1	2.6	3.9	5.3	6.8	*	*	*	1.3	2.1
	17.0	17.6	16.8	15.0	13.1	27	32	48	65	85	110	110	110	110	110	4.1	4.9	7.4	10.0	12.9	*	1.1	2.6	4.7	7.7
110	10.7	11.0	10.7	9.8	8.8	33	39	58	78	101	130	130	130	130	130	2.3	2.7	4.1	5.6	7.2	*	*	*	1.3	2.2
	13.4	13.8	13.4	12.0	10.7	30	35	52	71	92	120	120	120	120	120	4.3	5.1	7.8	10.6	13.6	*	1.2	2.7	5.0	8.3
120	8.6	8.8	8.7	8.1	7.4	37	43	64	86	111	140	140	140	140	140	2.4	2.9	4.4	5.9	7.6	*	*	*	1.4	2.4
	10.7	11.0	10.7	9.8	8.8	33	39	58	78	101	130	130	130	130	130	4.6	5.4	8.2	11.2	14.4	*	1.2	2.9	5.4	9.1

* Pressure drop is less than 1 ft

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- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
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Performance Data
SV 1248 Heating

Models:
SV
0930-1872

EWT °F	dT	TC					kW					HE					COP				
		Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
		25	40	60	80	100	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100
20	6	14.0	19.2	28.8	38.4	46.4	1.3	1.7	2.6	3.8	4.9	9.5	13.3	19.8	25.6	29.9	3.1	3.3	3.2	3.0	2.8
30	12	14.0	19.2	28.8	38.4	48.0	1.2	1.6	2.5	3.5	4.8	9.8	13.7	20.4	26.4	31.7	3.3	3.5	3.4	3.2	3.0
	6	14.0	19.2	28.8	38.4	48.0	1.1	1.5	2.2	3.2	4.3	10.1	14.1	21.1	27.5	33.3	3.6	3.8	3.8	3.5	3.3
40	12	12.0	19.2	28.8	38.4	48.0	1.0	1.4	2.1	3.0	4.0	8.7	14.4	21.6	28.2	34.3	3.6	4.0	4.0	3.8	3.5
	6	12.0	19.2	28.8	38.4	48.0	0.9	1.3	1.9	2.7	3.6	8.9	14.9	22.3	29.2	35.6	3.9	4.4	4.4	4.2	3.9
50	13	12.0	19.2	28.8	38.4	48.0	0.9	1.2	1.8	2.6	3.4	9.1	15.1	22.6	29.7	36.3	4.1	4.7	4.7	4.4	4.1
	7	12.0	19.2	28.8	38.4	48.0	0.8	1.1	1.6	2.3	3.1	9.3	15.5	23.2	30.6	37.5	4.5	5.1	5.2	4.9	4.6
60	13	12.0	19.2	28.8	38.4	48.0	0.7	1.0	1.5	2.1	2.9	9.5	15.7	23.6	31.1	38.2	4.8	5.5	5.5	5.3	4.9
	7	12.0	19.2	28.8	38.4	48.0	0.7	0.9	1.4	1.9	2.6	9.7	16.0	24.1	31.9	39.2	5.3	6.1	6.2	5.9	5.5
70	13	12.0	19.2	28.8	38.4	48.0	0.6	0.9	1.3	1.8	2.4	9.9	16.3	24.5	32.3	39.9	5.8	6.5	6.6	6.3	5.9
	7	12.0	19.2	28.8	38.4	48.0	0.5	0.8	1.1	1.6	2.1	10.2	16.6	24.9	33.0	40.8	6.6	7.3	7.4	7.1	6.6
80	13	12.0	19.2	28.8	38.4	48.0	0.5	0.7	1.1	1.5	2.0	10.3	16.8	25.2	33.4	41.3	7.3	8.0	8.0	7.6	7.2
	7	12.0	19.2	28.8	38.4	48.0	0.4	0.6	0.9	1.3	1.7	10.6	17.1	25.6	33.9	42.0	8.7	9.1	8.9	8.5	8.0
90	13	12.9	19.2	28.8	38.4	48.0	0.4	0.6	0.9	1.2	1.6	11.6	17.3	25.8	34.2	42.5	10.0	10.1	9.7	9.2	8.7
	7	13.6	19.2	28.8	38.4	48.0	0.3	0.5	0.8	1.1	1.4	12.6	17.6	26.2	34.7	43.1	12.8	11.9	10.9	10.3	9.7
100	17	13.6	19.2	28.8	38.4	48.0	0.3	0.5	0.8	1.1	1.4	12.6	17.6	26.2	34.7	43.1	12.8	11.9	10.9	10.3	9.7
110	27	13.6	19.2	28.8	38.4	48.0	0.3	0.5	0.8	1.1	1.4	12.6	17.6	26.2	34.7	43.1	12.8	11.9	10.9	10.3	9.7
120	37	13.6	19.2	28.8	38.4	48.0	0.3	0.5	0.8	1.1	1.4	12.6	17.6	26.2	34.7	43.1	12.8	11.9	10.9	10.3	9.7

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Table continued on next page

Models:
SV
0930-1872

Performance Data
SV 1248 Heating

Table continued from previous page

EWT °F	Hz					LWT (°F)					GPM					WPD (ft. hd)				
	Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100
20	41	54	78	101	120	14	14	14	14	14	3.4	4.7	7.0	9.1	10.6	*	1.7	3.4	5.2	6.9
30	39	51	73	95	117	18	18	18	18	18	1.7	2.4	3.6	4.7	5.6	*	*	1.1	1.6	2.2
	35	47	67	88	107	24	24	24	24	24	3.6	5.0	7.5	9.7	11.7	*	1.8	3.6	5.7	8.1
40	29	44	63	83	101	28	28	28	28	28	1.5	2.5	3.8	5.0	6.0	*	*	1.1	1.7	2.4
	26	40	58	75	93	34	34	34	34	34	3.1	5.2	7.8	10.3	12.5	*	1.9	3.8	6.2	8.8
50	25	38	55	72	89	37	37	37	37	37	1.5	2.4	3.7	4.8	5.9	*	*	*	1.6	2.2
	23	35	50	66	81	43	43	43	43	43	2.8	4.7	7.0	9.2	11.3	*	1.5	3.0	4.9	7.1
60	21	32	47	62	77	47	47	47	47	47	1.5	2.5	3.8	5.0	6.2	*	*	1.0	1.6	2.3
	19	29	43	57	70	53	53	53	53	53	2.9	4.8	7.3	9.6	11.8	*	1.5	3.1	5.1	7.5
70	18	28	40	53	66	57	57	57	57	57	1.6	2.6	4.0	5.2	6.5	*	*	1.0	1.7	2.4
	17	25	37	49	61	63	63	63	63	63	3.1	5.0	7.5	9.9	12.3	*	1.5	3.1	5.3	7.8
80	16	24	35	46	57	67	67	67	67	67	1.7	2.7	4.1	5.4	6.7	*	*	1.0	1.7	2.5
	15	22	32	43	53	73	73	73	73	73	3.2	5.1	7.7	10.2	12.7	*	1.5	3.2	5.4	8.1
90	15	21	31	41	51	77	77	77	77	77	1.9	2.8	4.2	5.6	6.9	*	*	*	1.7	2.5
	15	20	29	38	48	83	83	83	83	83	3.8	5.3	7.9	10.5	13.0	*	1.5	3.2	5.4	8.3
100	15	20	29	38	48	83	83	83	83	83	1.6	2.2	3.3	4.3	5.4	*	*	*	*	1.5
110	15	20	29	38	48	83	83	83	83	83	1.0	1.4	2.1	2.7	3.4	*	*	*	*	*
120	15	20	29	38	48	83	83	83	83	83	0.7	1.0	1.5	2.0	2.5	*	*	*	*	*

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Performance Data
SV 1872 Cooling

Models:
SV
0930-1872

EWT °F	dT	TC					SC					S/T					kW					HR				
		Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
		30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100
20	45	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.8	33.6	40.9	0.73	0.73	0.72	0.70	0.68	0.29	0.34	0.66	1.30	2.24	19.0	25.2	38.3	52.4	67.6
30	40	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.9	33.7	41.0	0.73	0.73	0.72	0.70	0.68	0.37	0.43	0.78	1.43	2.40	19.3	25.5	38.6	52.9	68.2
	35	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.8	33.6	40.9	0.73	0.73	0.72	0.70	0.68	0.29	0.34	0.66	1.30	2.24	19.0	25.2	38.3	52.4	67.6
40	30	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.9	33.7	41.0	0.73	0.73	0.72	0.70	0.68	0.37	0.43	0.78	1.43	2.40	19.3	25.5	38.6	52.9	68.2
	25	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.8	33.6	40.9	0.73	0.73	0.72	0.70	0.68	0.29	0.34	0.66	1.30	2.24	19.0	25.2	38.3	52.4	67.6
50	20	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.9	33.7	41.0	0.73	0.73	0.72	0.70	0.68	0.37	0.43	0.78	1.43	2.40	19.3	25.5	38.6	52.9	68.2
	15	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.8	33.6	40.9	0.73	0.73	0.72	0.70	0.68	0.29	0.34	0.66	1.30	2.24	19.0	25.2	38.3	52.4	67.6
60	20	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.9	33.7	41.1	0.73	0.73	0.72	0.70	0.68	0.53	0.63	1.06	1.79	2.84	19.8	26.1	39.6	54.1	69.7
	10	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.9	33.7	41.0	0.73	0.73	0.72	0.70	0.68	0.37	0.43	0.78	1.43	2.40	19.3	25.5	38.6	52.9	68.2
70	20	18.0	24.0	36.0	48.0	60.0	13.1	17.5	25.9	33.8	41.2	0.73	0.73	0.72	0.70	0.69	0.71	0.86	1.41	2.26	3.42	20.4	27.0	40.8	55.7	71.7
	10	18.0	24.0	36.0	48.0	60.0	13.2	17.5	25.9	33.7	41.1	0.73	0.73	0.72	0.70	0.68	0.53	0.63	1.06	1.79	2.84	19.8	26.1	39.6	54.1	69.7
80	20	18.0	24.0	36.0	48.0	60.0	13.1	17.5	25.9	33.9	41.3	0.73	0.73	0.72	0.71	0.69	0.92	1.15	1.85	2.85	4.17	21.1	27.9	42.3	57.7	74.2
	10	18.0	24.0	36.0	48.0	60.0	13.1	17.5	25.9	33.8	41.2	0.73	0.73	0.72	0.70	0.69	0.71	0.86	1.41	2.26	3.42	20.4	27.0	40.8	55.7	71.7
90	20	18.0	24.0	36.0	48.0	60.0	13.1	17.5	26.0	33.9	41.4	0.73	0.73	0.72	0.71	0.69	1.16	1.49	2.38	3.57	5.08	22.0	29.1	44.1	60.2	77.3
	10	18.0	24.0	36.0	48.0	60.0	13.1	17.5	25.9	33.9	41.3	0.73	0.73	0.72	0.71	0.69	0.92	1.15	1.85	2.85	4.17	21.1	27.9	42.3	57.7	74.2
100	20	18.0	24.0	36.0	48.0	60.0	13.1	17.5	26.0	34.0	41.5	0.73	0.73	0.72	0.71	0.69	1.45	1.89	3.01	4.43	6.16	22.9	30.5	46.3	63.1	81.0
	10	18.0	24.0	36.0	48.0	60.0	13.1	17.5	26.0	33.9	41.4	0.73	0.73	0.72	0.71	0.69	1.16	1.49	2.38	3.57	5.08	22.0	29.1	44.1	60.2	77.3
110	20	18.0	24.0	36.0	48.0	60.0	13.0	17.5	26.0	34.1	41.6	0.72	0.73	0.72	0.71	0.69	1.79	2.36	3.75	5.43	7.43	24.1	32.1	48.8	66.5	85.3
	10	18.0	24.0	36.0	48.0	60.0	13.1	17.5	26.0	34.0	41.5	0.73	0.73	0.72	0.71	0.69	1.45	1.89	3.01	4.43	6.16	22.9	30.5	46.3	63.1	81.0
120	20	18.0	24.0	36.0	48.0	60.0	13.0	17.5	26.1	34.1	41.7	0.72	0.73	0.72	0.71	0.70	2.19	2.92	4.60	6.59	8.88	25.5	33.9	51.7	70.5	90.3
	10	18.0	24.0	36.0	48.0	60.0	13.0	17.5	26.0	34.1	41.6	0.72	0.73	0.72	0.71	0.69	1.79	2.36	3.75	5.43	7.43	24.1	32.1	48.8	66.5	85.3

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Table continued on next page

Models:
SV
0930-1872

Performance Data
SV 1872 Cooling

Table continued from previous page

EWT °F	EER					Hz					LWT (°F)					GPM					WPD (ft. hd)				
	Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100	30	40	60	80	100
20	61.6	71.0	54.4	37.1	26.8	19	24	36	52	71	65	65	65	65	65	0.9	1.2	1.8	2.5	3.2	*	*	*	*	1.3
30	49.0	56.3	46.4	33.5	25.0	19	24	37	52	71	70	70	70	70	70	1.0	1.3	2.0	2.8	3.6	*	*	*	1.2	1.5
	61.6	71.0	54.4	37.1	26.8	19	24	36	52	71	65	65	65	65	65	1.1	1.5	2.3	3.2	4.1	*	*	*	1.3	1.8
40	49.0	56.3	46.4	33.5	25.0	19	24	37	52	71	70	70	70	70	70	1.4	1.8	2.7	3.7	4.8	*	*	1.1	1.6	2.2
	61.6	71.0	54.4	37.1	26.8	19	24	36	52	71	65	65	65	65	65	1.6	2.1	3.2	4.4	5.7	*	*	1.4	2.0	2.7
50	49.0	56.3	46.4	33.5	25.0	19	24	37	52	71	70	70	70	70	70	2.0	2.7	4.1	5.6	7.2	*	1.1	1.8	2.6	3.7
	61.6	71.0	54.4	37.1	26.8	19	24	36	52	71	65	65	65	65	65	2.7	3.5	5.4	7.4	9.5	1.1	1.5	2.5	3.9	5.5
60	34.1	38.3	34.1	26.8	21.1	20	25	38	54	72	80	80	80	80	80	2.1	2.8	4.2	5.7	7.3	*	1.1	1.8	2.6	3.7
	49.0	56.3	46.4	33.5	25.0	19	24	37	52	71	70	70	70	70	70	4.1	5.4	8.1	11.1	14.3	1.7	2.5	4.4	6.9	10.2
70	25.4	27.7	25.5	21.2	17.5	21	27	41	57	76	90	90	90	90	90	2.2	2.8	4.3	5.9	7.6	*	1.1	1.8	2.7	3.7
	34.1	38.3	34.1	26.8	21.1	20	25	38	54	72	80	80	80	80	80	4.2	5.5	8.3	11.4	14.7	1.7	2.5	4.4	7.0	10.4
80	19.6	20.9	19.5	16.8	14.4	23	30	44	62	81	100	100	100	100	100	2.2	3.0	4.5	6.1	7.8	*	1.2	1.8	2.7	3.8
	25.4	27.7	25.5	21.2	17.5	21	27	41	57	76	90	90	90	90	90	4.3	5.7	8.6	11.8	15.1	1.8	2.5	4.4	7.1	10.6
90	15.5	16.1	15.1	13.4	11.8	25	33	49	68	88	110	110	110	110	110	2.3	3.1	4.7	6.4	8.2	*	1.2	1.9	2.8	3.9
	19.6	20.9	19.5	16.8	14.4	23	30	44	62	81	100	100	100	100	100	4.5	5.9	9.0	12.2	15.7	1.8	2.5	4.5	7.3	11.0
100	12.4	12.7	12.0	10.8	9.7	27	36	54	75	97	120	120	120	120	120	2.5	3.3	4.9	6.7	8.7	*	1.2	1.9	2.8	4.1
	15.5	16.1	15.1	13.4	11.8	25	33	49	68	88	110	110	110	110	110	4.7	6.2	9.4	12.8	16.5	1.8	2.6	4.7	7.6	11.6
110	10.1	10.2	9.6	8.8	8.1	29	39	60	83	107	130	130	130	130	130	2.6	3.5	5.2	7.2	9.2	*	1.3	2.0	3.0	4.3
	12.4	12.7	12.0	10.8	9.7	27	36	54	75	97	120	120	120	120	120	4.9	6.5	9.9	13.5	17.4	1.9	2.7	4.9	8.0	12.3
120	8.2	8.2	7.8	7.3	6.8	31	43	67	92	119	140	140	140	140	140	2.8	3.7	5.6	7.7	9.8	1.0	1.3	2.1	3.1	4.5
	10.1	10.2	9.6	8.8	8.1	29	39	60	83	107	130	130	130	130	130	5.2	6.9	10.5	14.4	18.4	1.9	2.8	5.2	8.6	13.2

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Performance Data
SV 1872 Heating

Models:
SV
0930-1872

EWT °F	dT	TC					kW					HE					COP				
		Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
		25	40	60	80	100	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100
20	6	18.0	28.8	43.2	57.6	58.0	1.6	2.5	4.0	5.8	5.9	12.5	20.1	29.4	37.7	38.0	3.3	3.3	3.1	2.9	2.9
30	12	18.0	28.8	43.2	57.6	61.8	1.5	2.4	3.8	5.5	6.0	12.8	20.6	30.2	38.8	41.1	3.5	3.5	3.3	3.1	3.0
	6	18.0	28.8	43.2	57.6	68.0	1.4	2.2	3.5	5.1	6.4	13.2	21.2	31.2	40.3	46.4	3.7	3.8	3.6	3.3	3.1
40	12	18.0	28.8	43.2	57.6	72.0	1.3	2.1	3.3	4.8	6.5	13.4	21.7	31.9	41.3	49.8	3.9	4.0	3.8	3.5	3.2
	6	18.0	28.8	43.2	57.6	72.0	1.2	1.9	3.0	4.4	6.0	13.8	22.3	32.9	42.7	51.6	4.3	4.4	4.2	3.9	3.5
50	13	18.0	28.8	43.2	57.6	72.0	1.2	1.8	2.9	4.2	5.7	14.0	22.6	33.3	43.3	52.5	4.5	4.6	4.4	4.0	3.7
	7	18.0	28.8	43.2	57.6	72.0	1.1	1.7	2.6	3.8	5.2	14.3	23.1	34.2	44.6	54.2	4.9	5.1	4.8	4.4	4.0
60	13	18.0	28.8	43.2	57.6	72.0	1.0	1.6	2.5	3.6	4.9	14.5	23.5	34.8	45.4	55.2	5.2	5.4	5.1	4.7	4.3
	7	18.0	28.8	43.2	57.6	72.0	0.9	1.4	2.2	3.3	4.5	14.8	24.0	35.6	46.5	56.7	5.7	5.9	5.6	5.2	4.7
70	13	18.0	28.8	43.2	57.6	72.0	0.9	1.3	2.1	3.1	4.2	15.0	24.3	36.0	47.2	57.7	6.0	6.4	6.0	5.5	5.0
	7	18.0	28.8	43.2	57.6	72.0	0.8	1.2	1.9	2.8	3.8	15.3	24.7	36.7	48.1	59.0	6.7	7.0	6.7	6.1	5.5
80	13	18.0	28.8	43.2	57.6	72.0	0.7	1.1	1.8	2.6	3.6	15.5	25.0	37.1	48.8	59.8	7.1	7.5	7.1	6.5	5.9
	7	18.0	28.8	43.2	57.6	72.0	0.7	1.0	1.6	2.3	3.2	15.7	25.4	37.7	49.6	60.9	7.9	8.4	7.9	7.2	6.5
90	13	18.0	28.8	43.2	57.6	72.0	0.6	0.9	1.5	2.2	3.0	15.9	25.6	38.1	50.1	61.6	8.5	9.0	8.4	7.7	6.9
	7	19.5	28.8	43.2	57.6	72.0	0.6	0.8	1.4	2.0	2.8	17.5	25.9	38.6	50.8	62.6	9.7	10.0	9.3	8.5	7.6
100	17	19.5	28.8	43.2	57.6	72.0	0.6	0.8	1.4	2.0	2.8	17.5	25.9	38.6	50.8	62.6	9.7	10.0	9.3	8.5	7.6
110	27	19.5	28.8	43.2	57.6	72.0	0.6	0.8	1.4	2.0	2.8	17.5	25.9	38.6	50.8	62.6	9.7	10.0	9.3	8.5	7.6
120	37	19.5	28.8	43.2	57.6	72.0	0.6	0.8	1.4	2.0	2.8	17.5	25.9	38.6	50.8	62.6	9.7	10.0	9.3	8.5	7.6

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Table continued on next page

Models:
SV
0930-1872

Performance Data
SV 1872 Heating

Table continued from previous page

EWT °F	Hz					LWT (°F)					GPM					WPD (ft. hd)				
	Compressor Speed %					Compressor Speed %					Compressor Speed %					Compressor Speed %				
	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100	25	40	60	80	100
20	39	61	90	119	120	14	14	14	14	14	4.4	7.1	10.4	13.4	13.5	2.2	4.2	7.3	10.6	10.7
30	37	57	85	112	120	18	18	18	18	18	2.3	3.6	5.3	6.9	7.3	*	1.7	2.8	3.9	4.2
	33	52	77	102	120	24	24	24	24	24	4.6	7.5	11.0	14.2	16.4	2.3	4.4	7.7	11.4	14.1
40	31	49	73	96	119	28	28	28	28	28	2.4	3.8	5.6	7.3	8.8	*	1.7	2.9	4.1	5.4
	29	45	66	87	108	34	34	34	34	34	4.8	7.8	11.6	15.0	18.2	2.3	4.5	8.0	12.0	16.3
50	27	43	63	83	103	37	37	37	37	37	2.3	3.7	5.4	7.0	8.5	*	1.6	2.7	3.8	5.0
	25	39	58	76	94	43	43	43	43	43	4.3	7.0	10.3	13.4	16.3	2.0	3.7	6.5	9.8	13.4
60	23	37	54	71	88	47	47	47	47	47	2.3	3.8	5.6	7.3	8.9	*	1.6	2.7	3.9	5.2
	21	34	50	65	80	53	53	53	53	53	4.5	7.2	10.7	14.0	17.1	2.0	3.8	6.7	10.2	14.0
70	20	32	47	61	75	57	57	57	57	57	2.4	3.9	5.8	7.6	9.3	*	1.7	2.8	4.0	5.4
	18	29	43	56	69	63	63	63	63	63	4.6	7.4	11.0	14.5	17.7	2.0	3.8	6.8	10.5	14.6
80	17	28	41	53	65	67	67	67	67	67	2.5	4.0	6.0	7.9	9.7	*	1.7	2.8	4.1	5.5
	16	26	38	49	60	73	73	73	73	73	4.7	7.6	11.4	14.9	18.3	2.0	3.8	6.9	10.7	15.0
90	15	24	36	47	57	77	77	77	77	77	2.6	4.2	6.2	8.1	10.0	1.0	1.7	2.8	4.1	5.6
	15	23	34	44	53	83	83	83	83	83	5.3	7.8	11.6	15.3	18.9	2.3	3.8	7.0	10.8	15.4
100	15	23	34	44	53	83	83	83	83	83	2.2	3.2	4.8	6.3	7.8	*	1.3	2.0	2.8	3.7
110	15	23	34	44	53	83	83	83	83	83	1.4	2.0	3.0	4.0	4.9	*	*	1.2	1.6	2.0
120	15	23	34	44	53	83	83	83	83	83	1.0	1.5	2.2	2.9	3.6	*	*	*	1.1	1.4

* Pressure drop is less than 1 ft

- Interpolation is permissible, extrapolation is not.
- Above performance is measured in MBH.
- Above performance is based on 400CFM per ton.
- Above performance is based on 80°F db / 67°F wb entering air conditions.
- Above performance is based on 15% methanol.
- Table does not include fan or pump power corrections for AHRI/ISO conditions.

Performance Data Correction Tables

Models:
SV
0930-1872

Cooling Correction

Entering Air WB °F	Total Capacity	Sensible Cooling Capacity Multipliers - Entering DB °F							Power	Heat of Rejection
		65	70	75	80	80.6	85	90		
50.0	0.850	1.174	*	*	*	*	*	*	0.953	0.870
55.0	0.880	0.902	1.115	*	*	*	*	*	0.964	0.896
60.0	0.922	0.646	0.875	1.103	1.329	*	*	*	0.977	0.932
65.0	0.975		0.639	0.869	1.096	1.123	1.320	*	0.993	0.979
66.2	0.990		0.582	0.812	1.039	1.066	1.262	*	0.997	0.991
67.0	1.000		0.545	0.774	1.000	1.027	1.223	1.444	1.000	1.000
70.0	1.040			0.630	0.853	0.880	1.075	1.297	1.011	1.035
75.0	1.117				0.601	0.627	0.821	1.046	1.033	1.101

Notes:
- AHRI/ISO/ASHRAE 13256-1 uses entering air conditions of Cooling - 80.6°F (27°C) DB/ 66.2°F (19°C) WB, and Heating 68°F (20°C) DB/ 59°F (15°C) WB entering air temperature.
- Asterisks indicate that no correction factor is needed, Total Capacity equals Sensible capacity.
- Entering DB temperature range is based on operating limits, not on commissioning limits.
- Cooling and heating air corrections based on rated airflow.

Heating Correction

Entering Air DB °F	Heating Capacity	Power	Heat of Rejection
50	1.035	0.841	1.084
55	1.027	0.877	1.065
60	1.019	0.915	1.045
65	1.010	0.957	1.023
68	1.004	0.982	1.01
70	1.000	1.000	1.000
75	0.989	1.045	0.974
80	0.976	1.093	0.946

Airflow Correction

Airflow	Cooling				Heating		
% of Rated	Total Capacity	Sensible Capacity	Power	Heat of Rejection	Heating Capacity	Power	Heat of Extraction
60%	0.920	0.781	0.959	0.927	0.946	1.241	0.881
69%	0.942	0.832	0.964	0.946	0.960	1.163	0.915
75%	0.956	0.867	0.696	0.959	0.969	1.115	0.937
81%	0.969	0.901	0.975	0.970	0.978	1.076	0.956
88%	0.981	0.934	0.982	0.981	0.986	1.043	0.973
94%	0.991	0.967	0.990	0.991	0.993	1.018	0.988
100%	1.000	1.000	1.000	1.000	1.000	1.000	1.000
106%	1.007	1.033	1.011	1.008	1.006	0.990	1.010
113%	1.013	1.065	1.023	1.015	1.012	0.986	1.017
119%	1.018	1.098	1.036	1.021	1.017	0.983	1.024
125%	1.021	1.131	1.051	1.026	1.021	0.981	1.030
130%	1.023	1.159	1.063	1.030	1.024	0.979	1.034

Models:
SV
0930-1872

Preventative Maintenance

WATER COIL MAINTENANCE (WATER LOOP APPLICATIONS)

Generally water coil maintenance is not needed for closed-loop systems. However, if the piping is known to have high dirt or debris content, it is best to establish a periodic maintenance schedule with the owner so the water coil is checked regularly. Dirty installations are typically the result of deterioration of iron or galvanized piping or components in the system. Open cooling towers requiring heavy chemical treatment and mineral buildup through water use can also contribute to higher maintenance. If periodic coil cleaning is needed, use standard coil cleaning procedures that are compatible with both the heat exchanger material and copper water lines. Generally, the more water flowing through the unit, the less chance for scaling. However, flow rates over 3 GPM per ton (3.9 l/m per kW) can produce water (or debris) velocities that can erode the heat exchanger wall and ultimately produce leaks.

FILTERS

Filters must be clean to obtain maximum performance. Filters should be inspected every month under normal operating conditions and be replaced when necessary. Never operate units without a filter.

REFRIGERANT SYSTEM

To maintain sealed circuit integrity, do not install service gauges unless unit operation appears abnormal. Reference the operating charts for pressures and temperatures. Verify that air and water flow rates are at proper levels before servicing the refrigerant circuit.

CONDENSATE DRAIN

In areas where airborne bacteria may produce a slimy substance in the drain pan, it may be necessary to treat the drain pan chemically with an algaecide approximately every three months to minimize the problem. The condensate pan may also need to be cleaned periodically to ensure indoor air quality. The condensate drain can pick up lint and dirt, especially with dirty filters. Inspect the drain twice a year to avoid the possibility of plugging and eventual overflow.

AIR COIL

The air coil must be cleaned to obtain maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum clean. Take care to avoid damaging the aluminum fins while cleaning.

⚠ CAUTION

Fin edges are sharp and may cause injury.

CABINET

Do not allow water to stay in contact with the cabinet for long periods of time to prevent corrosion of the cabinet sheet metal. Generally, vertical cabinets are set up from the floor a few inches (7 - 8 cm) to prevent water from entering the cabinet. The cabinet can be cleaned using a mild detergent.

REPAIRS TO SEALED COMPONENTS

Sealed electrical components shall be replaced.

Troubleshooting

Models:
SV
0930-1872

GENERAL

If operational difficulties are encountered, perform the preliminary checks below before referring to the troubleshooting charts.

- Verify that the unit is receiving electrical supply power
- Make sure the fuses in the fused disconnect switches are intact

After completing the preliminary checks described above, inspect for other obvious problems such as leaking connections, broken or disconnected wires, etc. If everything appears to be in order, but the unit still fails to operate properly, refer to the **Functional Troubleshooting** chart

SENSOR INPUTS

All sensor inputs are 'paired wires' connecting each component to the board. Therefore, continuity on pressure switches, for example can be checked at the board connector. The thermistor resistance should be measured with the connector removed so that only the impedance of the thermistor is measured.

Nominal resistance at various temperatures

Temp (°C)	Temp (°F)	Resistance (kOhm)
-17.8	0.0	85.34
-17.5	0.5	84.00
-16.9	1.5	81.38
-12	10.4	61.70
-11	12.2	58.40
-10	14.0	55.30
-9	15.8	52.38
-8	17.6	49.64
-7	19.4	47.05
-6	21.2	44.61
-5	23.0	42.32
-4	24.8	40.15
-3	26.6	38.11
-2	28.4	36.18
-1	30.2	34.37
0	32.0	32.65
1	33.8	31.03
2	35.6	29.50
3	37.4	28.05
4	39.2	26.69
5	41.0	25.39
6	42.8	24.17
7	44.6	23.02
8	46.4	21.92
9	48.2	20.88
10	50.0	19.90
11	51.8	18.97
12	53.6	18.09
13	55.4	17.26
14	57.2	16.46
15	59.0	15.71
16	60.8	15.00
17	62.6	14.32
18	64.4	13.68
19	66.2	13.07
20	68.0	12.49
21	69.8	11.94
22	71.6	11.42
23	73.4	10.92
24	75.2	10.45
25	77.0	10.00
26	78.8	9.57
27	80.6	9.16
28	82.4	8.78
29	84.2	8.41
30	86.0	8.06
31	87.8	7.72
32	89.6	7.40
33	91.4	7.10
34	93.2	6.81
35	95.0	6.53
36	96.8	6.27
37	98.6	6.01
38	100.4	5.77
39	102.2	5.54
40	104.0	5.33
41	105.8	5.12
42	107.6	4.92
43	109.4	4.72
44	111.2	4.54
45	113.0	4.37
46	114.8	4.20
47	116.6	4.04
48	118.4	3.89
49	120.2	3.74
50	122.0	3.60
51	123.8	3.47
52	125.6	3.34
53	127.4	3.22
54	129.2	3.10
55	131.0	2.99
56	132.8	2.88
57	134.6	2.77
58	136.4	2.67
59	138.2	2.58
60	140.0	2.49
61	141.8	2.40
62	143.6	2.32
63	145.4	2.23
64	147.2	2.16
65	149.0	2.08
66	150.8	2.01
67	152.6	1.94
68	154.4	1.88
69	156.2	1.81
70	158.0	1.75
71	159.8	1.69
72	161.6	1.64
73	163.4	1.58
74	165.2	1.53
75	167.0	1.48
76	168.8	1.43
77	170.6	1.39
78	172.4	1.34
79	174.2	1.30
80	176.0	1.26
81	177.8	1.22
82	179.6	1.18
83	181.4	1.14
84	183.2	1.10
85	185.0	1.07
86	186.8	1.04
87	188.6	1.01
88	190.4	0.97
89	192.2	0.94
90	194.0	0.92
91	195.8	0.89
92	197.6	0.86
93	199.4	0.84
94	201.2	0.81
95	203.0	0.79
96	204.8	0.76
97	206.6	0.74
98	208.4	0.72
99	210.2	0.70
100	212.0	0.68
101	213.8	0.66
102	215.6	0.64
103	217.4	0.62
104	219.2	0.60
105	221.0	0.59
106	222.8	0.57
107	224.6	0.55
108	226.4	0.54
109	228.2	0.52
110	230.0	0.51
111	231.8	0.50
112	233.6	0.48
113	235.4	0.47
114	237.2	0.46
115	239.0	0.44
116	240.8	0.43
117	242.6	0.42
118	244.4	0.41
119	246.2	0.40
120	248.0	0.39
121	249.8	0.38
122	251.6	0.37
123	253.4	0.36

Models:
SV
0930-1872

Functional Troubleshooting

Code	Fault	Mode	Possible Cause	Solution
2	High Discharge Pressure	CL	Reduced or no water flow	Check loop pump operation.
		CL	Reduced or no water flow	Check water flow and adjust to proper flow rate.
		CL	Water temp out of range	Bring water temp within design parameters.
		HT	Reduced or no airflow	Check for dirty air filter. Clean or replace.
		HT	Reduced or no airflow	Check fan motor operation and airflow restrictions.
		HT	Reduced or no airflow	Dirty air coil.
		HT	Reduced or no airflow	External static is too high? Correct duct work.
		HT	Air temp out of range	Bring air temp within design parameters.
		ALL	Overcharged	Check superheat and subcooling vs. manual mode operating condition table.
		ALL	Faulty discharge transducer	Check transducer.
3	Low Suction Pressure	ALL	Insufficient charge	Check for refrigerant leaks.
		HT	Incorrect loop configuration	Check freeze protection trip point setting.
		HT	Reduced or no water flow	Check loop pump operation.
		HT	Reduced or no water flow	Check water flow and adjust to proper flow rate.
		CL	Reduced or no airflow	Check for dirty air filter. Clean or replace.
		CL	Reduced or no airflow	Check fan motor operation and air flow restrictions.
		CL	Reduced or no airflow	Dirty air coil.
		CL	Reduced or no airflow	External static is too high? Correct duct work.
		HT	Improperly functioning EEV1	Check coil windings with ohmmeter. WHITE/RED, GREEN/RED, YELLOW/VIOLET, and BLUE/VIOLET should each read between 36 and 44 ohms.
		HT	Improperly functioning EEV1	Check output signal from EXM.
		HT	Water temp out of range	Bring water temp within design parameters.
		CL	Air temp out of range	Bring air temp within design parameters.
		ALL	Faulty suction transducer	Check transducer.
		ALL	Faulty check valve	Check different operational modes to isolate valve.
		ALL	Restriction after the EEV	Check for temperature drop at various sections along refrigerant circuit. i.e., across filter-dryer, etc.
6	Condensate Overflow	ALL	Blocked drain	Check for blockage and clean drain.
		ALL	Improper trap	Check trap dimensions and location ahead of vent.
		CL	Poor drainage	Check for piping slope away from unit.
		CL	Poor drainage	Check slope of unit towards outlet.
		CL	Poor drainage	Poor venting? Check vent location.
		CL	Moisture on sensor	Check for moisture shorting to air coil.
		ALL	Plugged air filter	Clean or replace air filter.
		ALL	Restricted return airflow	Find and eliminate restriction. Increase return duct and/or grille size.
7	Over/Under Voltage	ALL	Under voltage	Check power supply and 24Vac before and during operation.
		ALL	Under voltage	Check power supply wires.
		ALL	Under voltage	Check 24Vac transformer tap for correct power supply voltage.
		ALL	Over voltage	Check power supply and 24Vac before and during operation.
		ALL	Over voltage	Check 24Vac transformer tap for correct power supply voltage.

Table continued on next page

Functional Troubleshooting

Models:
SV
0930-1872

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
10	EC Motor Low RPM	ALL	Blower does not operate	Check blower line voltage.
		ALL	Blower does not operate	Check blower low voltage wiring.
		ALL	Blower operating with incorrect airflow	Wrong unit size selected? Check unit configuration.
		ALL	Blower operating with incorrect airflow	Wrong unit family selected? Check unit configuration.
		ALL	Blower operating with incorrect airflow	Incorrect motor size.
		ALL	Blower operating with incorrect airflow	Incorrect blower selection.
11	Low Air Coil Pressure	CL	Low return air temp	Bring air temp within design parameters.
		CL	Plugged air filter	Clean or replace air filter.
		CL	Bad suction pressure transducer	If supply voltage at BLK and GND wires reads 4.5-5.5 VDC but signal at GND and RED is not between 0.5-4.5 VDC, replace sensor.
		CL	Insufficient charge	Check for refrigerant leaks.
12	Control Fault	ANY	EXM not properly programmed	Reprogram EXM using service tool.
		ANY	Bad EXM	Replace EXM.
13	Low Pump Flow	ALL	Flat loop	Flush and repressurize loop.
		ALL	Air pocket	Flush and repressurize loop.
		ALL	System setup for single and not parallel pumping.	Change unit loop pump configuration.
		ALL	Pump failure	Check pump.
		ALL	Bad flow sensor	Check flow sensor.
14	High Discharge Temp	ALL	Insufficient charge	Check for refrigerant leaks.
		HT	Water temp out of range	Bring water temp within design parameters.
		CL	Air temp out of range	Bring air temp within design parameters.
		ALL	Faulty EEV	Check EEV operation, superheat will be high as well.
		ALL	Fouled heat exchanger	Clean appropiate coil.
15	Discharge Pressure Sensor	ALL	Bad transducer	If supply voltage at BLK and GND wires reads 4.5-5.5 VDC but signal at GND and RED is not between 0.5-4.5 VDC, replace sensor.
		ALL	Bad wiring harness	Check harness.
		ALL	Bad EXM	If supply voltage across BLK and GND doesn't read 4.5-5.5 VDC replace EXM.
		ALL	Bad EXM	If voltage across GND and RED reads between 0.5-4.5 VDC but fault still exists, replace EXM.
16	Suction Pressure Sensor	ALL	Bad transducer	If supply voltage at BLK and GND wires reads 4.5-5.5 VDC but signal at GND and BLU is not between 0.5-4.5 VDC, replace sensor.
		ALL	Bad wiring harness	Check harness.
		ALL	Bad EXM	If supply voltage across BLK and GND doesn't read 4.5-5.5 VDC replace EXM.
		ALL	Bad EXM	If voltage across GND and BLU reads between 0.5-4.5 VDC but fault still exists, replace EXM.
17	Space Temp Sensor	ALL	Bad thermostat	Check thermostat to ensure that it is operating.
		ALL	Bad EXM	Use T-Stat service mode to check other temp values as well as space humidity. If not, replace EXM.
		ALL	Bad wiring	Check wiring between the thermostat and EXM.
		ALL	Incorrect master/slave setting	Check that DIP switch 1 is set to the ON position.
18	Space Humidity Sensor	ALL	Bad thermostat	Check thermostat to ensure that it is operating.
		ALL	Bad EXM	Use T-Stat service mode to check other temp values as well as space temp. If not, replace EXM.
		ALL	Bad wiring	Check wiring between the thermostat and EXM.
		ALL	Incorrect leader/follower setting	Check that DIP switch 1 is set to the ON position.

Table continued on next page

Models:
SV
0930-1872

Functional Troubleshooting

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
19	Low Refrigerant Pressure Differential	ALL	Stuck RV	Replace improperly functioning RV.
		ALL	Bad compressor	Check compressor to ensure it is operating.
20	EC Motor Configuration Fault (any)	ALL	Incorrect unit configuration	Check unit size.
		ALL	Incorrect motor size	Check motor size.
21	High Blower Static	ALL	Plugged air filter	Clean or replace air filter.
		ALL	Bad duct work	Correct duct work.
22	Grundfos Flow Sensor	ALL	Bad transducer	If supply voltage across BRN and WHT wires reads 4.75-5.25 VDC but a signal is not present, replace sensor.
		ALL	Bad wiring harness	Check harness.
		ALL	Bad EXM	If supply voltage across BRN and WHT doesn't read 4.75-5.25 VDC replace EXM.
23	Grundfos Pressure Sensor	ALL	Bad transducer	If supply voltage across BRN and WHT wires reads 4.75-5.25 VDC but a signal is not present, replace sensor.
		ALL	Bad wiring harness	Check harness.
		ALL	Bad EXM	If supply voltage across BRN and WHT doesn't read 4.75-5.25 VDC replace EXM.
24	Leaving Air Temp Sensor	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine, board is bad. Replace EXM.
25	High EWT Warning	ALL	High EWT	Bring water temp within design parameters.
26	Low EWT Warning	ALL	Low EWT	Bring water temp within design parameters.
27	Cabinet Temp Sensor	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine, board is bad. Replace EXM.
28	No Loop Pump Feedback	ALL	No line voltage	Check power cable or unit voltage.
		ALL	Control signal cable	Check signal cable and verify that voltage is between 3-4 VDC with the pump OFF and between 0-2 VDC with the pump ON.
		ALL	Bad EXM	If a feedback signal is present but the EXM doesn't read it properly the board is damaged. Replace the EXM.
29	Low Loop Pump Voltage	ALL	Low pump voltage	Check line voltage to the pump and increase.
30	Loop Pump Locked Rotor	ALL	Contaminants or trash in the pump impeller	Remove the pump head, clean out contaminants and flush system.
		ALL	Seized impeller	Replace pump.
31	Loop Pump Voltage Shutdown	ALL	Low pump voltage	Check line voltage to the pump.
32	Loop Pump Sensor	ALL	Bad RPM sensor	Replace pump if the line voltage and control signal is present at the pump but it doesn't operate.
38	Suction Temp Sensor	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine board is bad, replace EXM.
39	Discharge Temp Sensor	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine board is bad, replace EXM.
42	Air Coil Liquid Temp Sensor	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine board is bad, replace EXM.
43	Air Coil Vapor Temp Sensor	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine board is bad, replace EXM.

Table continued on next page

Functional Troubleshooting

Models:
SV
0930-1872

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
44	Water Coil Liquid Temp Sensor	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine board is bad, replace EXM.
45	Water Coil Vapor Temp Sensor	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine board is bad, replace EXM.
47	Spare Temp 1 Sensor Fault	ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Bad wiring harness	Check wiring harness.
		ALL	Bad EXM	If harness and sensor are fine board is bad, replace EXM.
51	High Suction Pressure Warning	ALL	Overcharged	Check superheat and subcooling vs. typical operating condition table.
		ALL	Faulty discharge transducer	Check transducer.
		CL	High EWT	Bring water temp within design parameters.
		HT	High EAT	Bring air temp within design parameters.
52	Low Suction Pressure Warning	HT	Low LWT	Bring water temp within design parameters.
		ALL	Insufficient charge	Check for refrigerant leaks.
		HT	Incorrect loop configuration	Check freeze protection trip point setting.
		HT	Reduced or no water flow	Check loop pump operation.
		HT	Reduced or no water flow	Check water flow and adjust to proper flow rate.
		CL	Reduced or no airflow	Check for dirty air filter. Clean or replace.
		CL	Reduced or no airflow	Check fan motor operation and airflow restrictions.
		CL	Reduced or no airflow	Dirty air coil.
		CL	Reduced or no airflow	External static is too high? Correct duct work.
		ALL	Improperly functioning EEV	Check coil windings with ohmmeter. WHITE/RED, GREEN/RED, YELLOW/VIOLET, and BLUE/VIOLET should each read between 36 and 44 ohms.
		ALL	Improperly functioning EEV	Check output signal from EXM.
		HT	Water temp out of range	Bring water temp within design parameters.
		CL	Air temp out of range	Bring air temp within design parameters.
		ALL	Faulty suction transducer	Check transducer.
		ALL	Faulty check valve	Check different operational modes to isolate valve.
		ALL	Restriction after the EEV	Check for temperature drop at various sections along refrigerant circuit. i.e., across filter-dryer, etc.
53	Low Discharge Pressure Warning	CL	Low EWT	Bring water temp within design parameters.
		HT	Low EAT	Bring air temp within design parameters.
57	Low Discharge Superheat	ALL	Faulty EEV	Check EEV operation.
		ALL	Bad discharge pressure transducer	Troubleshoot transducer.
		ALL	Bad discharge temp sensor	Check temp vs. resistance curve per calculator.
		ALL	Improperly installed discharge temp sensor	Check location and position of temp sensor.
58	Low Suction Superheat	ALL	Faulty EEV	Check EEV operation.
		ALL	Bad suction pressure transducer	Troubleshoot transducer.
		ALL	Bad suction temp sensor	Check temp vs. resistance curve per calculator.
		ALL	Improperly installed suction temp sensor	Check location and position of temp sensor.

Table continued on next page

Models:
SV
0930-1872

Functional Troubleshooting

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
59	High Suction Superheat	ALL	Faulty EEV	Check EEV operation.
		ALL	Low charge	Check unit capacity in mode check.
		ALL	Bad suction pressure transducer	Troubleshoot transducer.
		ALL	Bad suction temp sensor	Check temp vs. resistance curve per calculator.
		ALL	Improperly installed suction temp sensor	Check location and position of temp sensor.
60	General Compressor Fault	Mitsubishi Inverter SV1872		
		ALL	Check compressor sub faults	See Low Level sub-faults (codes 61-71, 75 and 76).
		Carel Inverter SV0930		
		ALL	Data reception failure	Check the serial connection. Switch the drive off and back on again. In case of persistence, call for assistance.
		ALL	Execution of reset parameter default command; Parameters user setting corrupted	Set parameters.
		ALL	Wrong parameters values or unsuited load	Switch the drive off and back on again. Check the parameters values. Check the motor load.
		ALL	Refer to class A alarm 13	Refer to class A alarm 13.
61	High Temp Shutdown	Mitsubishi Inverter SV1872		
		ALL	Improper contact with heat sink	Check heat sink contact with inverter board.
		ALL	Damaged thermistor	Replace inverter board if reading coming back from board is higher than 200°F. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
		Carel Inverter SV0930		
		ALL	The temperature inside the drive has exceeded the maximum level allowed.	Check that the quantity and flow of cooling air ar regular. Check that there is not dust in the heat sink. Check the environment temperature. Ensure that the switching frequency is not too high with respect to the environment temperature and the motor load.
		ALL	The temperature of the drive is lower than the minimum level allowed.	Warm up the ambient where the drive is installed.
		ALL	• Blockage in the cooling system • Minimum distance for inverter positioning not respected (see manual) • Cooling system not working properly	Check quality (dirt) and quantity of cooling air. Check ambient temperature.
		ALL	• Cooling system not working properly • Unsuitable environment	Check ambient temperature.
		ALL	PFC overcurrent	Reset alarm. In case of persistence, call for assistance.
62	High Current At Start Up	ALL	Low input voltage	Check input voltage.
		ALL	Incorrect compressor wiring	Check wiring from inverter to compressor.
		ALL	Defective compressor	Check compressor.
		ALL	Damaged inverter board	Remove wiring check if there is short circuit between P2-U, P2-V, P2-W, N2-U, N2-V, and N2-W. If so, replace inverter board. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
		ALL	Incorrect inverter Board	Check inverter board to ensure it is the correct size. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**

Table continued on next page

Functional Troubleshooting

Models:
SV
0930-1872

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
63	High Current Shutdown		Mitsubishi Inverter SV1872	
		ALL	Low input voltage	Check input voltage.
		ALL	Incorrect compressor wiring	Check wiring from inverter to compressor.
		ALL	Defective compressor	Check compressor.
		ALL	Damaged inverter board	Remove wiring check if there is short circuit between P2-U, P2-V, P2-W, N2-U, N2-V, and N2-W. If so, replace inverter board. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
		ALL	Incorrect inverter Board	Check inverter board to ensure it is the correct size. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
			Carel Inverter SV0930	
		ALL	The drive has detected a current supplied that is too high due to: • Sudden strong load increase • Acceleration that is too high • Wrong parameters values or inadequate motor	Check the load, the dimension of the motor and the cables. Decrease acceleration. Check the motor parameters.
		ALL	The drive has detected an instantaneous current supplied that is too high due to: • Sudden strong load increase • Motor cables short circuit • Wrong parameters values or inadequate motor	Check the load, the dimension of the motor and the cables. Check the motor parameters.
		ALL	Refer to alarms 7 and 25 (redundancy) 1. Excessive compressor current draw. (compressor fault)	Refer to alarm 7 and 25 (redundancy). 1. Compressor fault (measure winding resistance, etc.). *****WARNING - Suitable instrumentation is required for high-displacement compressors (Example: compressors above 55 cc have phase-to-phase winding resistances lower than 1 ohm).**
64	High DC Voltage Shutdown		Mitsubishi Inverter SV1872	
		ALL	High input voltage	Check input voltage.
		ALL	Damaged inverter board	If DC bus voltage stays above 400V, replace inverter board. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
			Carel Inverter SV0930	
		ALL	The DC voltage of the intermediate circuit has exceeded the limits envisioned due to: • Deceleration that is too high • High over-voltage peaks on the power supply network	Decrease deceleration.

Table continued on next page

Models:
SV
0930-1872

Functional Troubleshooting

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
65	Current Sensor Warning		Mitsubishi Inverter SV1872	
		ALL	Damaged inverter board	Replace inverter board. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
			Carel Inverter SV0930	
		ALL	Loss of data in memory	Reset alarm. In case of persistence, call for assistance.
		ALL	Overload CPU	Reset alarm. In case of persistence, call for assistance.
		ALL	Loss of data in memory	Reset alarm. In case of persistence, call for assistance.
		ALL	Irreparable damage to the internal "redundancy" circuit of the STO function	Permanent damage, contact service for replacement.
		ALL	Driver electronics damaged	Permanent damage, contact service for replacement.
		ALL	Driver electronics damaged	Permanent damage, contact service for replacement.
		ALL	Malfunction/internal fault	Reset alarm. In case of persistence, call for assistance.
		ALL	Irreparable damage to the internal circuit	Permanent damage, contact service for replacement.
		ALL	Current measurement chain damaged (sensors, op amps, shunts, ..)	Permanent damage, contact service for replacement.
		ALL	DCbus current measurement chain damaged (sensors, op amps, ..)	Permanent damage, contact service for replacement.
66	Heat Sink Thermistor Error	ALL	Damaged inverter board	Replace inverter board.
67	Current Sensor Error	ALL	Damaged inverter board	Replace inverter board.
68	Lack of Inverter COMM / Initialization	ALL	Faulty control cable CN4	Check continuity on harness between inverter interface module and CN4.
		ALL	Faulty control cable CN2	Check continuity on harness between inverter interface module and CN2.
		ALL	Faulty 5V power supply on inverter interface module	Check C and OUT for 4.75-5.25 VDC.
		ALL	Faulty 15V power supply on inverter interface module	Check GND and 15V for 14.25-15.75 VDC.
		ALL	Faulty 18V power supply on inverter interface module	Check GND and 18V for 17.50-19.00 VDC.
		ALL	Damaged inverter board	Replace inverter board. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
69	Low Voltage Shutdown - Inverter		Mitsubishi Inverter SV1872	
		ALL	Low input voltage	Check input voltage.
		ALL	Incorrect compressor wiring	Check wiring from drive to compressor.
		ALL	Incorrect wiring between CN2 and inverter interface module	Check wiring from drive to inverter interface module.
		ALL	Damaged inverter board	If DC bus voltage stays below 200V, replace drive board. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
			Carel Inverter SV0930	
		ALL	The DC voltage of the intermediate circuit is below the limits envisioned due to: • Insufficient power supply voltage • Fault inside the drive	In the event of temporary cut-off of the power supply, reset the alarm and re-start the drive. Check the power supply voltage.

Table continued on next page

Functional Troubleshooting

Models:
SV
0930-1872

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
70	Power Supply Sync Warning	Mitsubishi Inverter SV1872		
		ALL	Bad input voltage	Check input voltage.
		Carel Inverter SV0930		
		ALL	Too high AC power supply voltage	Check input power supply and if inductive load generating overvoltage are connected to the line.
		ALL	Too low AC power supply voltage	Check input power supply and cables.
		ALL	Refer to alarm 115	Refer to alarm 115.
71	Converter Over Current Shutdown	ALL	Low input voltage	Check input voltage.
72	Protect Operation - Compressor Current	Mitsubishi Inverter SV1872		
		ALL	Internal dragging of compressor	Check compressor and if all looks normal and problem is still present, replace compressor.
		ALL	High compressor load	Reduce maximum operating speed of the system.
		ALL	Incorrect inverter board	Check board to ensure it is the correct size.
		ALL	Damaged inverter board	If DC bus voltage stays below 200V, replace drive board.
		Carel Inverter SV0930		
		ALL	• STO open (activation of an external protector, ..) • Wiring errors	Check external protection devices.
73	Protect Operation - Heat Sink Temp	ALL	Improper inverter contact with heat sink	Check heat sink contact with inverter board. **WARNING - Inverter board capacitors maintain high voltage for up to 15 minutes before fully discharging.**
74	Protect Operation - Input Current	ALL	Low input voltage	Check input voltage.
		ALL	High compressor load	Reduce maximum operating speed of the system.
		CL	Water temp at range limit	Decrease loop temp.
		CL	Water temp at range limit	Decrease pump DT.
		HT	Air temp at range limit	Decrease entering air temp.
		HT	Air temp at range limit	Increase airflow setpoint.
75	Lack of Inverter Interface Module Communications	ALL	Faulty control cable	Check continuity on harness between EXM and inverter interface module.
		ALL	Damaged inverter interface module	Replace inverter interface module.
		ALL	Damaged EXM	Replace EXM

Table continued on next page

Models:
SV
0930-1872

Functional Troubleshooting

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
76	Low Voltage Shutdown		Mitsubishi Inverter SV1872	
		ALL	Under voltage	Check power supply and 24Vac before and during operation.
		ALL		Check power supply wires.
		ALL		Check 24Vac transformer tap for correct power supply voltage.
			Carel Inverter 1860	
		ALL	Input power supply phase loss, three-phase power supply unbalance	Check the input power supply phases to the drive, reduce motor power (speed).
		ALL	Motor cable disconnected	Check the connections of the motor cable.
		ALL	The drive has detected a ground current too high	Check ground insulation of the motor and wires.
		ALL	• It indicates a small earth fault on the motor • The current measurement chain (sensors, op amps, shunts, ..) is damaged	Check tightness/wiring of the inverter/compressor cables. If properly wired, then permanent damage to the motor.
		ALL	Excessive external load (e.g. fans) connected to the DCbus	Check external loads connected to the DCbus terminal; especially when the external load starts.
		ALL	Excessive external load (e.g. fans) connected to the DCbus	Check external loads connected to the DCbus terminal; especially when the external load starts.
		ALL	Incompatibility between compressor uSafety parameters that characterize the inverter as a PEC and the inverter size	Check that the compressor uSafety parameters are adequate. Check the compressor-inverter combination. Inverter probably too small.
77	Low Leaving Air Temp	ALL	Low EAT	Bring EAT into range.
		ALL	Check unit capacity	Run mode to check unit capacity.
		ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Incorrect airflow	Check airflow and reduce if necessary.
		ALL	Improperly installed airflow sensor	Check installation.
78	High Leaving Air Temp	ALL	High SAT	Bring SAT into range.
		ALL	Low airflow	Increase airflow.
		ALL	Bad thermistor	Check temp vs. resistance curve per calculator.
		ALL	Improperly installed airflow sensor	Check installation.
79	Low Subcooling	ALL	Low charge	Check unit capacity in mode check.
80	EC Blower Motor Fault	ALL	High level fault condition	See low level faults (81-86).
81	EC Motor Lost Rotor Fault	ALL	Check blower assembly	Blower wheel set screw loose.
		ALL	Check blower assembly	Blower wheel dragging.
		ALL	Check blower assembly	Blower wheel locked.
82	EC Motor Current Trip Fault	ALL	Low input voltage	Check input voltage.
		ALL	Bad EC Motor	Replace motor.
83	EC Motor Temp Limit Fault	ALL	High ambient motor temp	Reduce cabinet temp.
		ALL	Dirty motor housing	Clean motor.
84	EC Motor Locked Rotor Fault	ALL	Debris in blower assembly	Check blower and clean assembly.
		ALL	Blower wheel dragging	Check blower assembly.
		ALL	Bad motor bearing	Replace motor.
85	EC Motor Over Voltage Fault	ALL	High input voltage	Check input voltage.
		ALL	Bad EC Motor	If nothing is found from other solutions, replace motor.

Table continued on next page

Functional Troubleshooting

Models:
SV
0930-1872

Table continued from previous page

Code	Fault	Mode	Possible Cause	Solution
86	EC Motor Under Voltage Fault	ALL	Low input voltage	Check input voltage.
		ALL	Power cable	Check power cable.
		ALL	Bad EC Motor	If nothing is found from other solutions, replace motor.
87	EC Motor Blocked Inlet Fault	ALL	Low input voltage	Check input voltage to ensure it is a rated nominal voltage.
		ALL	Dirty air filter	Clean or replace.
		ALL	Dirty air coil	Clean air coil.
		ALL	External static is too high	Correct duct work.
88	EC Motor Power Limit Warning	ALL	Low input voltage	Check input voltage to ensure it is a rated nominal voltage.
		ALL	Dirty air filter	Clean or replace.
		ALL	Dirty air coil	Clean air coil.
		ALL	External static is too high	Correct duct work.
89	EC Motor Temp Limit Warning	ALL	High ambient motor temp	Reduce cabinet temp.
		ALL	Dirty motor housing	Clean motor.
90	EC Motor No Communications Fault	ALL	Control signal cable	Check cable.
		ALL	Bad EC Motor	If cable is OK, replace motor.
		ALL	Bad EXM	If cable and motor are OK, replace EXM.
		ALL	No input voltage	Check input voltage.
91	EC Motor Horsepower Configuration Fault	ALL	Incorrect motor	Check motor size.
		ALL	Incorrect unit configuration	Check unit configuration.
92	EC Motor Bad Parameter Fault	ALL	Incorrect HP motor detected	Check motor size.
		ALL	Incorrect unit configuration	Check unit configuration.
97	Pressure Sensor Calibration Fault	ANY	Unit not equalized	With unit mode OFF, wait appropriate period for transducers to equalize.
		OFF	Bad discharge pressure transducer	Troubleshoot transducer.
		OFF	Bad suction pressure transducer	Troubleshoot transducer.
98	Loop Flow w/o Loop Pump Warning	OFF	Loop pump check valve stuck open	Remove internal check valve and clean. System should also be flushed using a 100 mesh strainer to remove particles from system.
99	Excessive Transition Mode Operation	ANY	Stuck reversing valve	Run system in service mode to verify operation or perform magnet test.
		ANY	Bad compressor	Check compressor operation.
100	Low Loop Pressure Warning	ANY	Low loop pressure	Check loop pressure.
		ANY	Bad pressure (DPD) sensor	Check sensor.
		ANY	Improperly installed (DPD) sensor	Remove sensor and reinstall.

Models:
SV
0930-1872

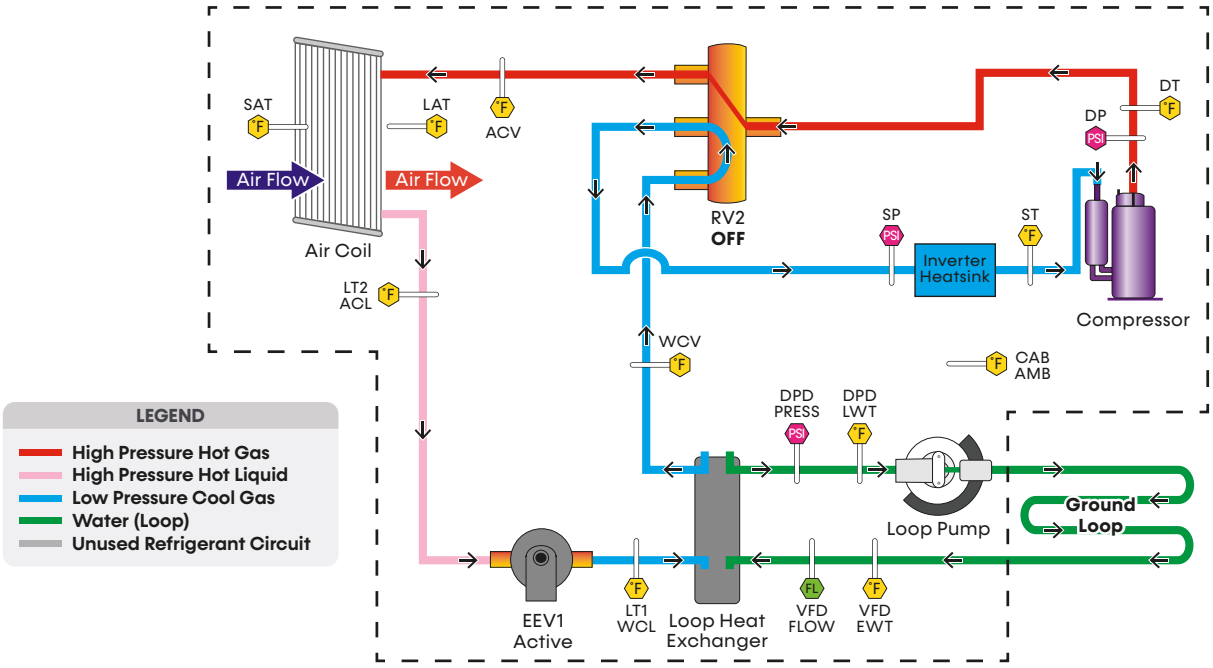
Refrigeration Troubleshooting Form Heating

Customer:		**Startup Date:**	
Model #:		**Product Series:**	SV Heating
Serial #:		**Antifreeze:**	Type: %:
Complaint:			

Description	Value	Notes
1. Voltage		
2. Compressor Current		
3. Inverter Current		
4. Compressor Speed		
5. Fan CFM		
6. Fan RPM		
7. EEV1 Position		
8. Suction Pressure (SP)		
9. Suction Saturation Temp		
10. Suction Superheat		
11. Discharge Temp (DT)		
12. Discharge Pressure (DP)		
13. Discharge Saturation Temp		
14. Discharge Superheat		

Description	Value	Notes
15. Subcooling		
16. Air Coil Liquid Temp (ACL)		
17. Air Coil Vapor Temp (ACV)		
18. Water Coil Liquid Temp (WCL)		
19. Water Coil Vapor Temp (WCV)		
20. HR / HE		
21. Supply Air Temp (SAT)		
22. Leaving Air Temp (LAT)		
23. Loop EWT		
24. Loop LWT		
25. Loop GPM		
26. Loop Pressure		
27. Loop Pump Speed		
28. Loop Pump Feedback		

Variable GSHP Heating, SV Unit



Refrigeration Troubleshooting Form Cooling

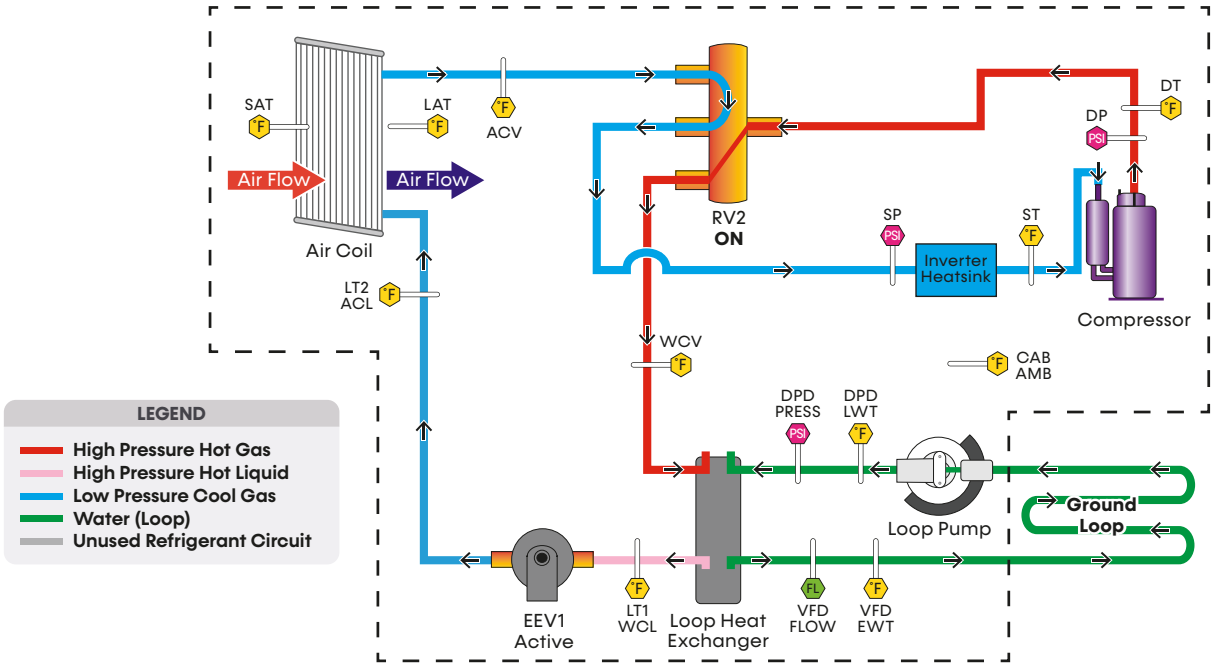
Models:
SV
0930-1872

Customer:		**Startup Date:**	
Model #:		**Product Series:**	SV Cooling
Serial #:		**Antifreeze:**	Type: %:
Complaint:			

Description	Value	Notes
1. Voltage		
2. Compressor Current		
3. Inverter Current		
4. Compressor Speed		
5. Fan CFM		
6. Fan RPM		
7. EEV1 Position		
8. Suction Pressure (SP)		
9. Suction Saturation Temp		
10. Suction Superheat		
11. Discharge Temp (DT)		
12. Discharge Pressure (DP)		
13. Discharge Saturation Temp		
14. Discharge Superheat		

Description	Value	Notes
15. Subcooling		
16. Air Coil Liquid Temp (ACL)		
17. Air Coil Vapor Temp (ACV)		
18. Water Coil Liquid Temp (WCL)		
19. Water Coil Vapor Temp (WCV)		
20. HR / HE		
21. Supply Air Temp (SAT)		
22. Leaving Air Temp (LAT)		
23. Loop EWT		
24. Loop LWT		
25. Loop GPM		
26. Loop Pressure		
27. Loop Pump Speed		
28. Loop Pump Feedback		

Variable GSHP Cooling, SV Unit



Models:
SV
0930-1872

Startup Log Sheet

7300 S.W. 44th Street, Oklahoma City, OK 73179 • Phone: 1-800-299-9747

Installer: Complete *Unit and System Checkout* and follow *Unit Startup Procedures* in the IOM. Use this form to record unit information, temperatures, and pressures during startup. Keep this form for reference.

Job Name:

Street Address:

Model Number: **Serial Number:**

Unit Location in Building:

Date: **Sales Order Number:**

In order to minimize troubleshooting and costly system failures, complete the following checks and data entries before the system is put into full operation.

Fan Motor	Description	Value
CV EC	CFM Setting	

Temperatures (check one): ☐ °F ☐ °C Antifreeze: _____ %

Pressures (check one): ☐ PSIG ☐ kPa Type: _____

	Cooling Mode		Heating Mode
Entering Fluid Temperature			
Leaving Fluid Temperature			
Fluid Temperature Differential			
Return-Air Temperature	DB	WB	DB
Supply-Air Temperature	DB	WB	DB
Air Temperature Differential			
Water Coil Heat Exchanger (Water Pressure IN)			
Water Coil Heat Exchanger (Water Pressure OUT)			
Pressure Differential			
Flow Rate GPM (l/s)			
Compressor			
Amps			
Volts			
Discharge Line Temperature			
Motor			
Amps			
Volts			

NOTES:
1. Allow unit to run 15 minutes in each mode before taking data.
2. Never connect refrigerant gauges during startup procedures.
3. Conduct water-side analysis using P/T ports to determine water flow and temperature difference.
4. If water-side analysis shows poor performance, refrigerant troubleshooting may be required.
5. Connect refrigerant gauges as a last resort.

CLIMATE MASTER, INC.
LIMITED EXPRESS WARRANTY AND LIMITATION OF LIABILITY AND REMEDIES FOR RESIDENTIAL CLASS PRODUCTS WITH LABOR ALLOWANCE

This Limited Express Warranty And Limitation Of Liability And Remedies Affects Your Legal Rights And Should Be Read Carefully In Its Entirety.

Subject to the terms and conditions below, Climate Master, Inc. ("CM") extends a limited warranty ("Limited Warranty") for Residential Class heating and cooling equipment manufactured or sold by CM ("Products"), that was purchased on or after May 1, 2010 (this would generally include CM Units with serial numbers beginning with "N118" and higher), and installed in a one or two family residential dwelling, for personal, household or family purposes in the United States of America or Canada, ("Application"), to be free from defects and workmanship under normal use and maintenance. If you are unsure if this Limited Warranty applies to a Product you have purchased, contact CM at the phone number or address reflected below.

This Limited Warranty DOES NOT cover commercial applications of the Products. Commercial applications include any application other than installation in a one or two family residential dwelling for personal, household or family purposes. Refer to ClimateMaster Commercial Limited Express Warranty for details. Full copies are available for download at ClimateMaster.com .

This Limited Warranty provides a complete statement of CM's responsibilities to purchasers of the Products. No oral or written statement made by CM, any person or entity associated with CM or by any person or entity claiming to be associated with CM, including but not limited to statements made in sales literature, catalogs, or agreements to purchase or install the Products, is intended to provide an express or implied warranty of any kind and does not form a part of the basis of the bargain. Further, no such statement shall operate to extend, alter or modify the scope or terms of this Limited Warranty.

EXCEPT AS SPECIFICALLY SET FORTH HEREIN, THERE IS NO EXPRESS WARRANTY AS TO ANY OF CM'S PRODUCTS. CM MAKES NO WARRANTY AGAINST LATENT DEFECTS, OF MERCHANTABILITY OF THE PRODUCTS OR OF THE PRODUCTS FOR ANY PARTICULAR PURPOSE..

TERM: This Limited Warranty shall commence on the earliest to occur of the following dates: (i) proof of date of first occupancy; (ii) proof of date of start-up of the Product by a qualified and trained HVAC contractor; or (iii) six (6) months from the shipment date of the Product from CM if items (i) or (ii) are not available ("Warranty Inception Date"). The Limited Warranty shall extend as follows:

Costs of Repair or Replacement of Covered Product Parts

(1) Ten (10) years from the Warranty Inception date for air conditioning, heating and/or heat pump units built or sold by CM ("CM Units");
(2) Ten (10) years from the Warranty Inception Date for thermostats, auxiliary electric heaters, water storage tanks, and geothermal pumping modules built or sold by CM, when installed with CM Units;
(3) One (1) year from the date of shipment from CM for any other accessories or parts built or sold by CM, when installed with CM Units; and
(4) Ninety (90) days from the date of shipment from CM for all repair or replacement parts that are not supplied under this warranty.

Costs of Labor to Install Repaired or Replaced Covered Product Parts

(1) Five (5) years from the Warranty Inception Date for CM Units;
(2) Five years from the Warranty Inception Date for thermostats, auxiliary electric heaters, water storage tanks, and geothermal pumping modules built or sold by CM, when installed with CM Units

This Limited Warranty does not cover labor costs for installation of other accessories or parts built or sold by CM or any repaired or replacement parts that are not supplied under this Limited Warranty.

WHO IS COVERED: This Limited Warranty is provided only to the original owner of the one or two family residential dwelling in which the Products are first installed. This Limited Warranty is not transferrable. CM reserves the right to request any documentation necessary in its sole discretion to determine the date of purchase and occupancy of the residential dwelling or the date of installation and start-up of the Product(s). For the avoidance of any doubt, this Limited Warranty shall not extend to, and shall provide no remedies whatsoever for, any distributor or installer of the Products.

CLAIM PROCESS: To make a claim under this warranty, the Product or parts must be returned to CM in Oklahoma City, Oklahoma, freight prepaid, no later than ninety (90) days after the date of the failure of the part. If CM determines the Product or part to be defective and covered by this Limited Warranty, CM will either repair or replace the Product or part and send it to a CM-recognized distributor, dealer or service organization, F.O.B. CM, Oklahoma City, Oklahoma, freight prepaid. The Limited Warranty on any Product or part repaired or replaced under this Limited Warranty extends only through the original warranty period.

WHAT IS COVERED: Subject to the Term, this Limited Express Warranty covers the: (i) the cost of repair or replacement of any covered Product or Product parts; and (ii) the cost of labor incurred by CM authorized service personnel in connection with the installation of a repaired or replaced covered Product or Product part.

If a Product part is not available, CM will, at its option, provide a free suitable substitute part or provide a credit in the amount of the then factory selling price for a new suitable substitute part to be used by the claimant towards the retail purchase price of a new CM product. All labor costs are subject and limited to amounts specifically set forth in the then existing labor allowance\ schedule provided by CM's Warranty Department. Actual labor costs are not covered by this Limited Warranty to the extent they: (i) exceed the amount allowed under the allowance schedule; (ii) are not specifically provided for in the allowance schedule; (iii) are not performed by CM authorized service personnel; (iv) are incurred in connection installation of a part not covered by this Limited Warranty; or (v) are incurred outside the Term.

WHAT IS NOT COVERED: This Limited Warranty does not cover and does not apply to: (1) air filters, fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) any portion or component of any system that is not supplied by CM, regardless of the cause of the failure of such portion or component; (4) Products on which the unit identification tags or labels, or rating labels, have been removed or defaced; (5) Products on which payment to CM, or to the owner's seller or installing contractor, is in default; (6) Products which have not been installed and maintained by a qualified and trained HVAC contractor; (7) Products installed in violation of applicable building codes or regulations including but not limited to wiring or voltage conditions; (8) Products subjected to accident, misuse, negligence, abuse, fire, flood, freezing, lightning, unauthorized alteration, misapplication, contaminated or corrosive air or liquid supply, operation at abnormal air or liquid temperatures or flow rates, or opening of the refrigerant circuit by unqualified personnel; (9) mold, fungus or bacteria damages; (10) corrosion or abrasion of the Product; (11) products supplied by others; (12) Products that have been operated in a manner contrary to CM's printed instructions; (13) Products which have insufficient performance as a result of improper system design, sizing or the improper application, installation, or use of CM's products; (14) electricity or fuel costs, or any increases or unrealized savings in same, for any reason whatsoever; or (15) operating any water storage tanks when they are empty or partially empty (i.e. dry firing), at temperatures exceeding the maximum setting of the operating or high limit controls, at pressures greater than those shown on the rating label, with non-potable water, with alterations or attachments (including energy savings devises) not specifically authorized in writing by CM, or without the free circulation of water. CM may request written documentation showing compliance with the above limitations.

In connection with repair or replacement of covered Product parts, CM is not responsible for: (1) the costs of any fluids, refrigerant or system components supplied by others, or associated labor to repair or replace the same, which is incurred as a result of repair or replacement of a covered Product part; (2) the costs of labor, refrigerant, materials or service incurred in diagnosis and removal of a covered Product part subject to repair or replacement under this Limited Warranty; (3) shipping costs incurred in sending a claimed defective part from the installation site to CM; (4) shipping costs to return a claimed defective part from CM to the installation site if the part is not covered by this Limited Warranty; (5) removal or disposal costs associated with the repair or replacement of covered Product Parts; or (6) the costs of normal maintenance.

OTHER WARRANTY LIMITATION: This Limited Warranty is given in lieu of all other warranties express or implied, in law or in fact. If, notwithstanding the disclaimers contained herein, it is determined that other warranties apply, any such warranty, including without limitation any express warranties or any implied warranties of fitness for particular purpose and merchantability, shall be limited in time to the Term of this Limited Warranty

LIMITATION OF REMEDIES: In the event of a breach of the Limited Warranty, a claimant's remedies will be limited to repair or replacement of a part or unit, or to furnish a new or rebuilt part or unit in exchange for the part or unit which has failed. If after written notice to CM's factory in Oklahoma City, Oklahoma of each defect, malfunction or other failure, and a reasonable number of attempts by CM to correct the defect, malfunction or other failure, the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CM. THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER OR THEIR PURCHASER AGAINST CM FOR ANY ACTION FOR BREACH OF CONTRACT, BREACH OF ANY WARRANTY, PATENT INFRINGEMENT, OR FOR CM'S NEGLIGENCE OR IN STRICT LIABILITY. NO ACTION ARISING OUT OF ANY CLAIMED BREACH OF THIS LIMITED WARRANTY MAY BE BROUGHT MORE THAN ONE (1) YEAR AFTER THE CAUSE OF ACTION HAS ARISEN.

LIMITATION OF LIABILITY: CM shall have no liability for any damages if CM's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to: any war, civil unrest, government restrictions or restraints, strikes, or work stoppages, fire, flood, accident, shortages of transportation, fuel, material, or labor, acts of God or any other reason beyond the sole control of CM.

CM EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL AND/OR PUNITIVE DAMAGES BASED ON ANY THEORY IN CONTRACT, BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, PATENT INFRINGEMENT, OR IN TORT, WHETHER FOR CM's NEGLIGENCE OR AS STRICT LIABILITY AND REGARDLESS OF WHETHER CM IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

OBTAINING WARRANTY PERFORMANCE: Normally, the dealer or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CM recognized distributor, dealer or service organization. If assistance is required in obtaining warranty performance, write or call:

Climate Master, Inc. • Customer Service • 7300 SW 44th Street • Oklahoma City, Oklahoma 73179 • (405) 745-6000 • e-service@climatemaster.com

NOTE: Some states or Canadian provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages for certain products supplied to consumers, or the limitation of liability for personal injury, so the above limitations and exclusions may be limited in their application to you. When the implied warranties are not allowed to be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights, which may vary depending on local law. IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS DETERMINED TO BE A "CONSUMER PRODUCT" UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. §2301, ET SEQ.) OR OTHER APPLICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY FOR THE SAME TERM SET FORTH ABOVE (ONE YEAR) AS PROVIDED UNDER APPLICABLE LAW. The portions of this Limited Warranty and limitation of liability shall be considered fully severable, and all portions which are not disallowed by applicable law shall remain in full force and effect.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and from Canadian province to Canadian province. Refer to your local laws for your specific rights under this Limited Warranty.

Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Rev.: 3/20
Part No.: RP851

Models:
SV
0930-1872

Sample Warranties
Optional 10-Year Labor Coverage

CLIMATE MASTER, INC.
LIMITED EXPRESS WARRANTY AND LIMITATION OF LIABILITY AND REMEDIES FOR RESIDENTIAL CLASS PRODUCTS WITH EXTENDED LABOR ALLOWANCE

This Limited Express Warranty And Limitation Of Liability And Remedies Affects Your Legal Rights And Should Be Read Carefully In Its Entirety.

Subject to the terms and conditions below, Climate Master, Inc. ("CM") extends a limited warranty ("Limited Warranty") for Residential Class heating and cooling equipment manufactured or sold by CM ("Products"), that was purchased on or after May 1, 2010 (this would generally include CM Units with serial numbers beginning with "N118" and higher), and installed in a one or two family residential dwelling, for personal, household or family purposes in the United States of America or Canada, ("Application"), to be free from defects and workmanship under normal use and maintenance. If you are unsure if this Limited Warranty applies to a Product you have purchased, contact CM at the phone number or address reflected below.

This Limited Warranty DOES NOT cover commercial applications of the Products. Commercial applications include any application other than installation in a one or two family residential dwelling for personal, household or family purposes. Refer to ClimateMaster Commercial Limited Express Warranty for details. Full copies are available for download at ClimateMaster.com .

This Limited Warranty provides a complete statement of CM's responsibilities to purchasers of the Products. No oral or written statement made by CM, any person or entity associated with CM or by any person or entity claiming to be associated with CM, including but not limited to statements made in sales literature, catalogs, or agreements to purchase or install the Products, is intended to provide an express or implied warranty of any kind and does not form a part of the basis of the bargain. Further, no such statement shall operate to extend, alter or modify the scope or terms of this Limited Warranty.

EXCEPT AS SPECIFICALLY SET FORTH HEREIN, THERE IS NO EXPRESS WARRANTY AS TO ANY OF CM'S PRODUCTS. CM MAKES NO WARRANTY AGAINST LATENT DEFECTS, OF MERCHANTABILITY OF THE PRODUCTS OR OF THE PRODUCTS FOR ANY PARTICULAR PURPOSE.

TERM: This Limited Warranty shall commence on the earliest to occur of the following dates: (i) proof of date of first occupancy; (ii) proof of date of start-up of the Product by a qualified and trained HVAC contractor; or (iii) six (6) months from the shipment date of the Product from CM if items (i) or (ii) are not available ("Warranty Inception Date"). The Limited Warranty shall extend as follows:

Costs of Repair or Replacement of Covered Product Parts

(1) Ten (10) years from the Warranty Inception date for air conditioning, heating and/or heat pump units built or sold by CM ("CM Units");
(2) Ten (10) years from the Warranty Inception Date for thermostats, auxiliary electric heaters, water storage tanks, and geothermal pumping modules built or sold by CM, when installed with CM Units;
(3) One (1) year from the date of shipment from CM for any other accessories or parts built or sold by CM, when installed with CM Units; and
(4) Ninety (90) days from the date of shipment from CM for all repair or replacement parts that are not supplied under this warranty.

Costs of Labor to Install Repaired or Replaced Covered Product Parts

(1) Ten (10) years from the Warranty Inception Date for CM Units;
(2) Ten years from the Warranty Inception Date for thermostats, auxiliary electric heaters, water storage tanks, and geothermal pumping modules built or sold by CM, when installed with CM Units

This Limited Warranty does not cover labor costs for installation of other accessories or parts built or sold by CM or any repaired or replacement parts that are not supplied under this Limited Warranty.

WHO IS COVERED: This Limited Warranty is provided only to the original owner of the one or two family residential dwelling in which the Products are first installed. This Limited Warranty is not transferrable. CM reserves the right to request any documentation necessary in its sole discretion to determine the date of purchase and occupancy of the residential dwelling or the date of installation and start-up of the Product(s). For the avoidance of any doubt, this Limited Warranty shall not extend to, and shall provide no remedies whatsoever for, any distributor or installer of the Products.

CLAIM PROCESS: To make a claim under this warranty, the Product or parts must be returned to CM in Oklahoma City, Oklahoma, freight prepaid, no later than ninety (90) days after the date of the failure of the part. If CM determines the Product or part to be defective and covered by this Limited Warranty, CM will either repair or replace the Product or part and send it to a CM-recognized distributor, dealer or service organization, F.O.B. CM, Oklahoma City, Oklahoma, freight prepaid. The Limited Warranty on any Product or part repaired or replaced under this Limited Warranty extends only through the original warranty period.

WHAT IS COVERED: Subject to the Term, this Limited Express Warranty covers the: (i) the cost of repair or replacement of any covered Product or Product parts; and (ii) the cost of labor incurred by CM authorized service personnel in connection with the installation of a repaired or replaced covered Product or Product part.

If a Product part is not available, CM will, at its option, provide a free suitable substitute part or provide a credit in the amount of the then factory selling price for a new suitable substitute part to be used by the claimant towards the retail purchase price of a new CM product. All labor costs are subject and limited to amounts specifically set forth in the then existing labor allowance\ schedule provided by CM's Warranty Department. Actual labor costs are not covered by this Limited Warranty to the extent they: (i) exceed the amount allowed under the allowance schedule; (ii) are not specifically provided for in the allowance schedule; (iii) are not performed by CM authorized service personnel; (iv) are incurred in connection installation of a part not covered by this Limited Warranty; or (v) are incurred outside the Term.

WHAT IS NOT COVERED: This Limited Warranty does not cover and does not apply to: (1) air filters, fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) any portion or component of any system that is not supplied by CM, regardless of the cause of the failure of such portion or component; (4) Products on which the unit identification tags or labels, or rating labels, have been removed or defaced; (5) Products on which payment to CM, or to the owner's seller or installing contractor, is in default; (6) Products which have not been installed and maintained by a qualified and trained HVAC contractor; (7) Products installed in violation of applicable building codes or regulations including but not limited to wiring or voltage conditions; (8) Products subjected to accident, misuse, negligence, abuse, fire, flood, freezing, lightning, unauthorized alteration, misapplication, contaminated or corrosive air or liquid supply, operation at abnormal air or liquid temperatures or flow rates, or opening of the refrigerant circuit by unqualified personnel; (9) mold, fungus or bacteria damages; (10) corrosion or abrasion of the Product; (11) products supplied by others; (12) Products that have been operated in a manner contrary to CM's printed instructions; (13) Products which have insufficient performance as a result of improper system design, sizing or the improper application, installation, or use of CM's products; (14) electricity or fuel costs, or any increases or unrealized savings in same, for any reason whatsoever; or (15) operating any water storage tanks when they are empty or partially empty (i.e. dry firing), at temperatures exceeding the maximum setting of the operating or high limit controls, at pressures greater than those shown on the rating label, with non-potable water, with alterations or attachments (including energy savings devises) not specifically authorized in writing by CM, or without the free circulation of water. CM may request written documentation showing compliance with the above limitations.

In connection with repair or replacement of covered Product parts, CM is not responsible for: (1) the costs of any fluids, refrigerant or system components supplied by others, or associated labor to repair or replace the same, which is incurred as a result of repair or replacement of a covered Product part; (2) the costs of labor, refrigerant, materials or service incurred in diagnosis and removal of a covered Product part subject to repair or replacement under this Limited Warranty; (3) shipping costs incurred in sending a claimed defective part from the installation site to CM; (4) shipping costs to return a claimed defective part from CM to the installation site if the part is not covered by this Limited Warranty; (5) removal or disposal costs associated with the repair or replacement of covered Product Parts; or (6) the costs of normal maintenance.

OTHER WARRANTY LIMITATION: This Limited Warranty is given in lieu of all other warranties express or implied, in law or in fact. If, notwithstanding the disclaimers contained herein, it is determined that other warranties apply, any such warranty, including without limitation any express warranties or any implied warranties of fitness for particular purpose and merchantability, shall be limited in time to the Term of this Limited Warranty

LIMITATION OF REMEDIES: In the event of a breach of the Limited Warranty, a claimant's remedies will be limited to repair or replacement of a part or unit, or to furnish a new or rebuilt part or unit in exchange for the part or unit which has failed. If after written notice to CM's factory in Oklahoma City, Oklahoma of each defect, malfunction or other failure, and a reasonable number of attempts by CM to correct the defect, malfunction or other failure, the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CM. THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER OR THEIR PURCHASER AGAINST CM FOR ANY ACTION FOR BREACH OF CONTRACT, BREACH OF ANY WARRANTY, PATENT INFRINGEMENT, OR FOR CM'S NEGLIGENCE OR IN STRICT LIABILITY. NO ACTION ARISING OUT OF ANY CLAIMED BREACH OF THIS LIMITED WARRANTY MAY BE BROUGHT MORE THAN ONE (1) YEAR AFTER THE CAUSE OF ACTION HAS ARISEN.

LIMITATION OF LIABILITY: CM shall have no liability for any damages if CM's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to: any war, civil unrest, government restrictions or restraints, strikes, or work stoppages, fire, flood, accident, shortages of transportation, fuel, material, or labor, acts of God or any other reason beyond the sole control of CM.

CM EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL AND/OR PUNITIVE DAMAGES BASED ON ANY THEORY IN CONTRACT, BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, PATENT INFRINGEMENT, OR IN TORT, WHETHER FOR CM's NEGLIGENCE OR AS STRICT LIABILITY AND REGARDLESS OF WHETHER CM IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

OBTAINING WARRANTY PERFORMANCE: Normally, the dealer or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CM recognized distributor, dealer or service organization. If assistance is required in obtaining warranty performance, write or call:

Climate Master, Inc. • Customer Service • 7300 SW 44th Street • Oklahoma City, Oklahoma 73179 • (405) 745-6000 • e-service@climatemaster.com

NOTE: Some states or Canadian provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages for certain products supplied to consumers, or the limitation of liability for personal injury, so the above limitations and exclusions may be limited in their application to you. When the implied warranties are not allowed to be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights, which may vary depending on local law. IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS DETERMINED TO BE A "CONSUMER PRODUCT" UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. §2301, ET SEQ.) OR OTHER APPLICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY FOR THE SAME TERM SET FORTH ABOVE (ONE YEAR) AS PROVIDED UNDER APPLICABLE LAW. The portions of this Limited Warranty and limitation of liability shall be considered fully severable, and all portions which are not disallowed by applicable law shall remain in full force and effect.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and from Canadian province to Canadian province. Refer to your local laws for your specific rights under this Limited Warranty.

Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Rev.: 3/20
Part No.: RP852

Notes

Models:
SV
0930-1872

Models:
SV
0930-1872

Revision History

Date	Section	Description
08/27/26	All	First Published

A NIBE GROUP MEMBER

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