EMIO Ductless

Comfort Where It Counts.

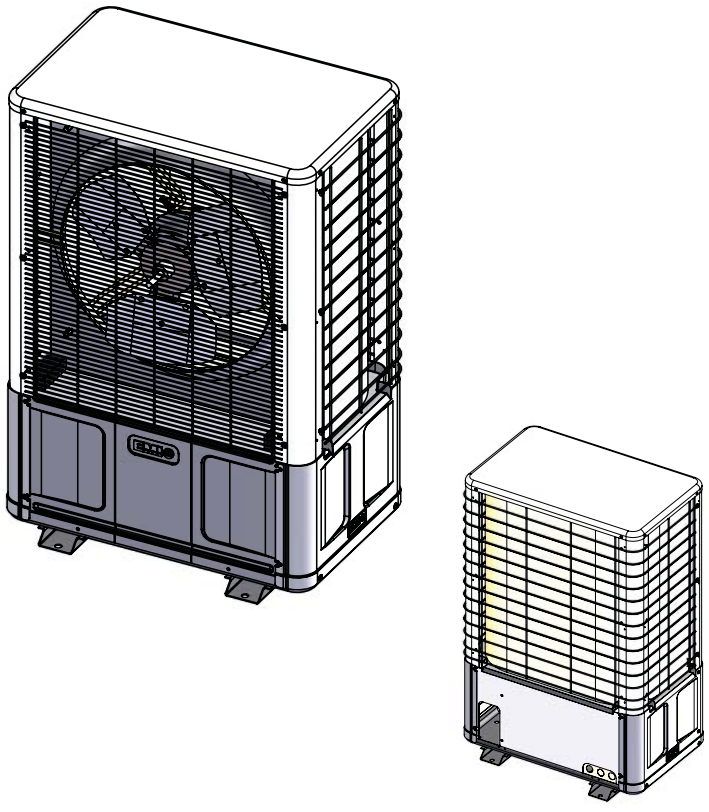
Everter

S1CV/S1HV Single-Zone

Variable Speed Ductless Split-System Condensing Units and Heat Pumps with R410A Refrigerant

Capacities — Single-Zone Applications					
S1CV or S1HV				Units	
9,000	12,000	18,000	24,000	Btuh	COOL
2.6	3.5	5.3	7.0	kW	
8,800	10,000	18,000	21,000	Btuh	HEAT
2.6	2.9	5.3	6.2	kW	

Installation, Operation and Maintenance Manual



ecr

An ISO 9001-2008 Certified Company

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Check our website frequently for updates: www.enviromaster.com

Information and specifications outlined in this manual in effect at the time of printing of this manual. Manufacturer reserves the right to discontinue, change specifications or system design at any time without notice and without incurring any obligation, whatsoever.

Shipping damage MUST be reported to the carrier IMMEDIATELY.
Examine exterior.

Remove cover and examine compressor and piping for signs of damage.

General Information

- S1CV / S1HV family of condensers are tested and certified by AHRI to AHRI standard 210/240-2008.
- S1CV / S1HV products are listed in the AHRI Directory of Certified Product Performance www.ahridirectory.org under residential listings Variable Speed Mini-Splits AC or HP as RCU-A-CB-O or HRCU-A-CB-O.
- S1CV / S1HV family is ETL listed, complying with UL-1995 safety standards.
- Installation shall be completed by qualified agency. Retain this manual and warranty for future reference.
- Installer review this manual to verify unit has been installed correctly. Run unit for one complete cycle to verify proper function.
- To obtain technical service or warranty assistance during or after installation, contact your local representative.

Visit our web site www.enviromaster.com for local representative listing.

For further assistance call 1-800-325-5479.

When calling for assistance, please have following information ready:

Model Number_____

Serial Number_____

Date of installation_____

All field wiring shall conform to requirements of authority having jurisdiction or in absence of such requirements:

- United States - National Electrical Code, ANSI/NFPA 70
- Canada - CSA C22.1 Canadian Electrical Code Part 1.

⚠ WARNING

Fire and electrical shock hazard. Improper assembly and/or installation could result in death or serious injury. Read this manual and understand all requirements before beginning installation.

Become Familiar With Symbols Identifying Potential Hazards.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING

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

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates information which should be followed to ensure proper installation and operation.

Safety Information

- Installation by qualified personnel.
- Turn off electrical supply before servicing unit.
- Inspect all parts for damage prior to installation and start-up.

Do not use unit if it has damaged wiring, is not working properly, or has been damaged or dropped.

- Connect to properly grounded electrical supply with proper voltage as stated on rating plate.
- Have proper over-current protection (i.e. time - delay fuse/HACR Breaker) as listed on Rating Plate.
- Connect unit to properly grounded electrical supply. Do not fail to properly ground this unit.
- Check the rating plate on the unit before installation to verify voltage shown is same as electric supply to the unit. Rating plate is located on top panel only.
- Tampering voids all warranties.

⚠ WARNING

Tampering with this unit is dangerous and could result in serious injury or death. Do not modify or change this unit.

Figure 1 - Dimensions, Openings And Knockouts

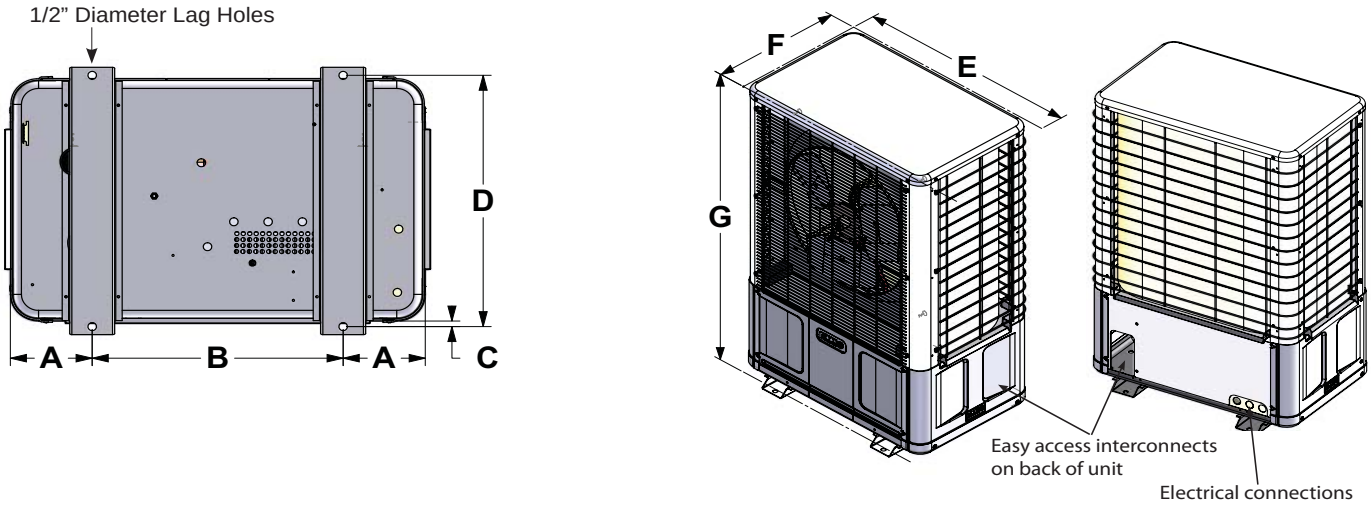


Table 1 - Dimensional Data, Sound Data And Shipping Weights

Model	Size	Mounting Dimensions Inches (mm)				Unit dimensions Inches (mm)			Sound level dBA (Low/High)	Shipping weight Lbs (kg)
		A	B	C	D	E	F	G		
S1CV/ S1HV9000	9	4 5/8 (117)	14 11/16 (373)	3 (76)	12 7/16 (316)	24 (610)	15 (381)	36 (914)	61/64	98
S1CV/ S1HV2000	12	4 5/8 (117)	14 11/16 (373)	3 (76)	12 7/16 (316)	24 (610)	15 (381)	36 (914)	61/64	98
S1CV/ S1HV8000	18	4 5/8 (117)	22 11/16 (570)	3 (76)	12 7/16 (316)	32 (813)	15 (381)	36 (914)	65/69	108
S1CV/ S1HV4000	24	4 5/8 (117)	22 11/16 (570)	3 (76)	12 7/16 (316)	32 (813)	15 (381)	40 (1016)	65/69	108

Product Description

- S1CV/S1HV condensing units are air-cooled, vertically-arranged side-discharge, variable speed units designed to exceed 13 SEER rating.
- S1CV Models 09–24 and S1HV Models 09–24 condensing units provide cooling and heating for single air handler. See Page 25 and Page 26.
- S1CV/S1HV are quiet units recommended for both commercial and residential applications.
- 24v control interconnection from air handler.
- Multiple units can be lined up in close proximity to exterior wall.
- Service valves are recessed to reduce tampering.
- All heat pump units are equipped with Duratec Performance Package includes oversized suction accumulator with surge baffles and enhanced oil management.
- Factory-installed crankcase heater is standard on S1HV 09 - 24 (thermostatically controlled) and is available as optional equipment on S1CV models.
- Heat Pump circuits include common suction and discharge port.
- Circuits include common discharge port.

Controls And Components (Factory-Installed Or Supplied)

- Low voltage terminal connections.
- H.P.S. (High pressure switch) with manual external reset.
- Cooling operation down to 32°F standard on all HP units. AC units require optional crank case heater.
- Heat pumps
  - —Large capacity suction accumulator
  - —Thermostatically-controlled crankcase heater (heat pump only)

Thermostatically-Controlled Crankcase Heater

Crankcase heater energizes only when needed.

Options

- Low ambient cooling operation down to 0°F. Standard heat pumps can operate down to 32°F.
- Optional field-installed kit for cooling operation down to 0°F. Kit includes louvers and wind baffle.
- Optional Crankcase Heater S1CV9000 - 4000. Field installed thermostatically controlled crankcase heater for straight cool units (S1CV) required for operation below 60°F, provides cooling to 32°F.

Installer-Supplied Items

- Power wiring and conduit
- Low Volt wiring (18 awg minimum) (4 cond - A/C & 6 cond - HP).
- Secure mounting pad or foundation.
- Refrigerant piping (available through EMI) both lines insulated.
- High volt disconnect.
- R410A refrigerant for charging interconnect piping. See Page 11.
- Bi-flow filter drier .
- Lag bolts (4) 1/2" x 2-1/2".

NOTICE

Low Ambient controls are required when system is asked to cool at outdoor temperatures below 32°F, may cause damage to compressor and coil. Field installed low-ambient kit allows operation down to 0°F.
Optional kits include louvers/wind baffle, crankcase heater.

Cooling	Cooling	STD	Add Crankcase Heater	Add Louvers
Heat Pump	S1CH	STD	STD	Add Louvers

Out Door Ambient 115°F 60°F 32°F 0°F

Installation Considerations

1. Locate unit as close to indoor section as possible. See Page 8.
2. Unit (S1CV) used for low ambient cooling down to 32°F requires crank case heater.
3. Avoid high traffic areas and prevailing wind locations.
4. Flat and level surface.
5. Mount unit above typical snow fall level. Important for heat pump applications (S1HV).
6. Insure free flow of air through unit.
7. Air must not recirculate from discharge to intake — air is drawn through coil and side discharged through fan grille.
8. Minimum 48" clearance is necessary for condenser discharge.
9. Minimum 12" clearance rear intake (coil side).
10. Plan layout of power source to unit.
11. Refrigerant piping should be direct line to indoor unit.

Site Preparation

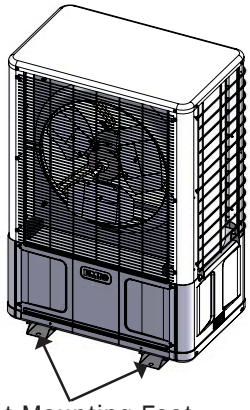
- Ground placement - place unit on flat concrete surface or pad.
- Roof mounting - use built up platform to avoid intake of hot air from roof.
- In areas of heavy snowfall, set condensers set above maximum anticipated snow line, 12" adequate for most locations.

Unit Mounting Instructions

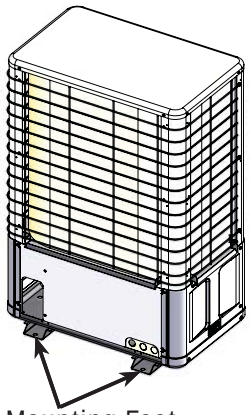
Example: Model S1CV

- Side-discharge permanent mounting using feet. Recommend due to vertical design of unit.
- No panels need to be removed when lagging unit to pad. See Figure 2.
- Insert lag bolts through holes in feet on front of unit. Tighten to secure.
- Insert lag bolts through holes in feet on back of unit. Tighten to secure. See Figure 2, Page 7.

Figure 2- Locate Mounting Feet



Front Mounting Feet



Rear Mounting Feet

Tubing specifications

System supports refrigerant runs to internal. See Table 2, Page 8. Units furnished with sweat connections, equipped with refrigerant valves and Schrader fittings for charging and taking pressure readings.

NOTICE

Install filter drier in liquid line at outdoor unit on all models.

Table 2 - S1CV/S1HV Tubing Specifications

Model	Max. Length Equivalent Feet	Max. Lift	Max. Trap Height	Liquid Line	Suction Line
		"H"	"P"	O.D.	O.D.
09	100' (30 m)	35' (11 m)	20' (6 m)	1/4"	1/2"
12				1/4"	1/2"
18				3/8"	* 5/8"
24				3/8"	* 5/8"

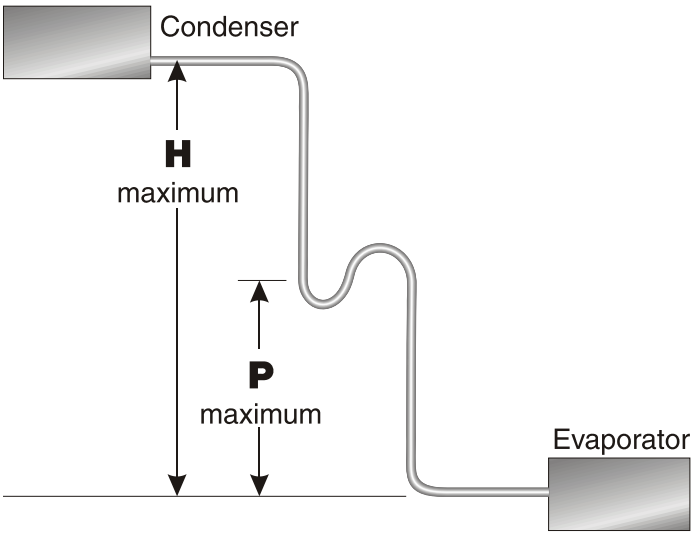
*Install 3/4" to 5/8" Bushing @ Air Handler

P-Trap Installation

- Recommend a P-trap when suction riser P is equal to or greater than that shown in Figure 3 and Table 2.
- Condenser installed above air handler, P-trap is required. Facilitates return of oil back to compressor. Locate trap at midpoint of rise
- Fabricate P-trap using 2 street elbows and 2 regular elbows.

  Or
- Purchase prefabricated trap from wholesaler or distributor. Trap should be shallow as with 3 elbow configuration.
- Each elbow is approximately two (2) equivalent feet.
- One P-trap is equal to approximately 12 equivalent feet.
- P-traps are not required at foot of hot gas risers due to increased oil flow at higher temperatures.

Figure 3 - P-Trap Placement (See Table 2 for Dimensions H & P)



Piping Preparation

- Avoid piping on wet and rainy days.
- Use only clean, refrigeration-grade copper tubing.
- Use tubing benders to guard against kinking.
- Verify no burrs remain on fittings.
- Cap ends of lines until ready for connections. Verify plastic end caps remain in place when inserting through wall openings.
- Insulate both lines.
- Isolate tubing from transmitting vibration to building or unit and avoid contact with sharp edges.
- Wrap refrigeration valves with wet rag “heat sink” to protect valves while brazing. (See Figure 31, Page 51.)

Refrigerant Piping

1. Clean ends of tubing and insert into fittings. See Figure 4.
2. Protect valves by wrapping with wet rag “heat sink” before brazing. See Figure 6.
3. Use shield to protect paint as shown in Figure 5. (Shield can be made from scrap metal.)
4. Braze tubing into fittings.

Figure 4 - Clean Ends Of Tubing

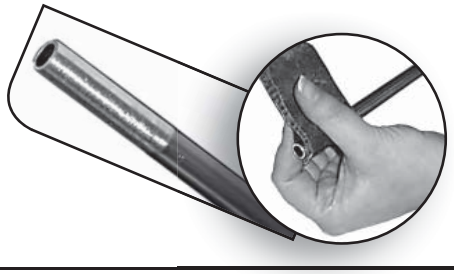


Figure 5- Common Suction, Common Discharge, & High Pressure Switch

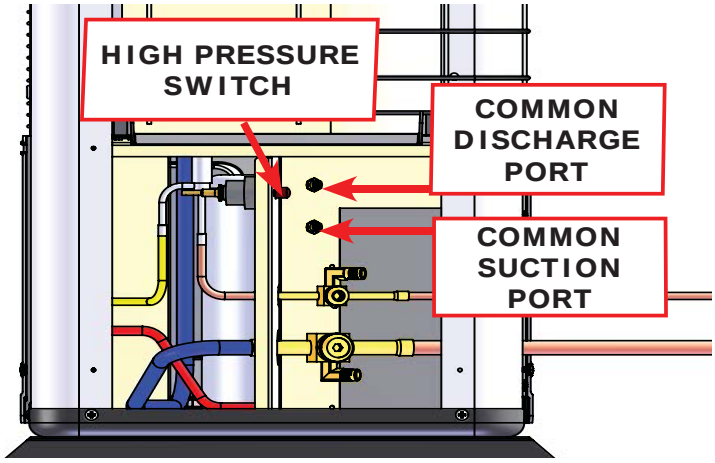
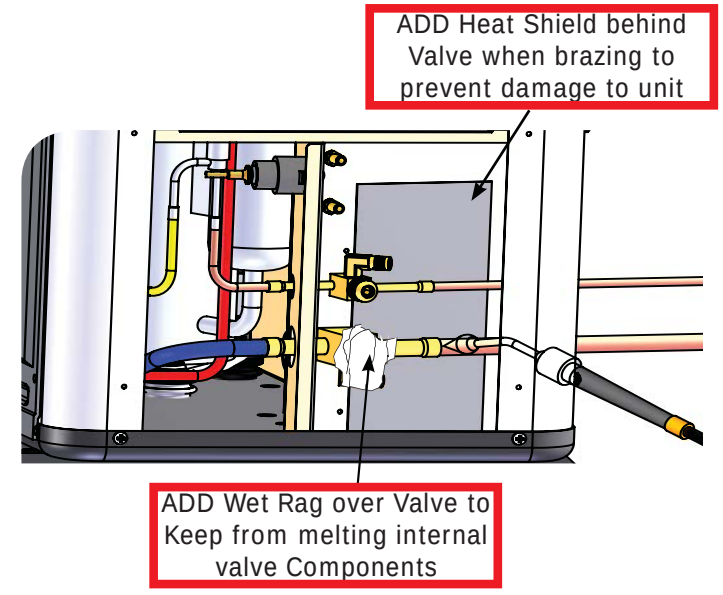


Figure 6 - Wet Rag, Heat Shield Over Valves



Refrigerant Processing

1. Attach manifold set, vacuum pump, & Micron Gauge. See Figure 8.
2. Evacuate line to 500 microns or less to insure all moisture has been removed and there are no leaks. (Figure 21, page 19)
   A. Evacuate
   B. Pressurize with 100psi N2 or Nitrogen
   C. Evacuate again
   D. Charge with R410A
3. Verify evacuation and leak free joints. Back-seat valves (counter-clockwise) to open and allow factory charge to fill lines and indoor unit. See Figure 9.

Refer to refrigerant charge table for specified charge.

4. Charge to proper weight. Charge based on feet of interconnect. **Only add/remove R410A in liquid form**. See Table 4, Page 11.
5. Install all panels removed to this point. Panels are required for proper air flow.

All systems require field charge adjustments. Refer to "Refrigerant Charge Tables" for proper weight charge and Operation Charts for proper system pressures and temperatures at different outdoor conditions. Sub-cool should be used for final system charge.

Charge with dial-a-charge or weighed in with scale.

NOTICE

It is illegal to discharge refrigerant into the atmosphere. Use proper reclaiming methods & equipment when installing or servicing this unit.

Units are delivered pre-charged with refrigerant for condenser coil and air handler. Charging of field installed piping is required. Refer to refrigerant charge table for proper amount to be added for applications interconnect piping. Unit service valves are solid brass, for sweat connections.

Pressure test all field installed piping with nitrogen. Use vacuum pump to evacuate tubing and indoor unit to 500 microns or less, with service valves remaining front seated (closed).

Before releasing refrigerant from condenser, insure manifold gauge set is closed so as not to lose vacuum when shutting down the pump.

Figure 7 - Manifold Set Connections At Unit

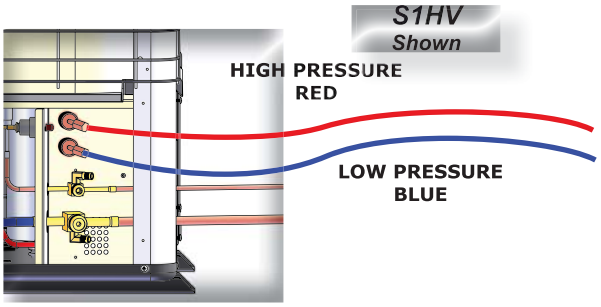
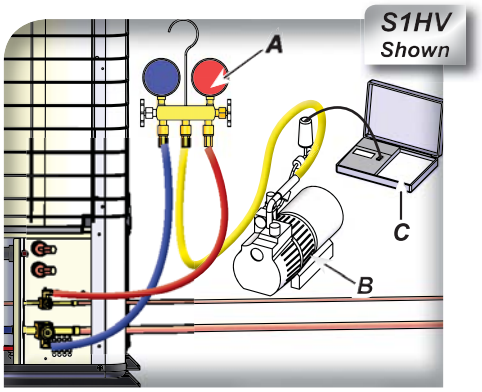
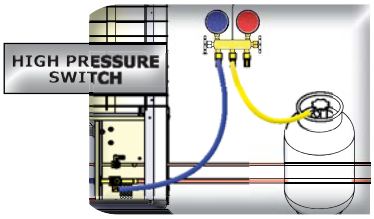


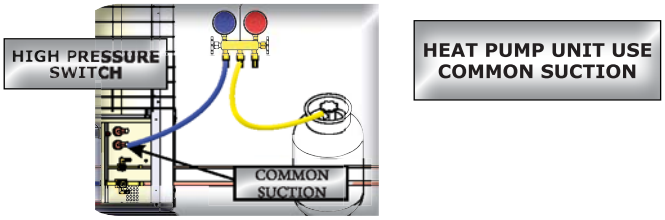
Figure 8 - Manifold Set Up For Evacuation



A Manifold B Vacuum pump
C Micron gage

Figure 9 - Charging





Use following example to find charge adjustment and system charge for any air handles and tubing length.

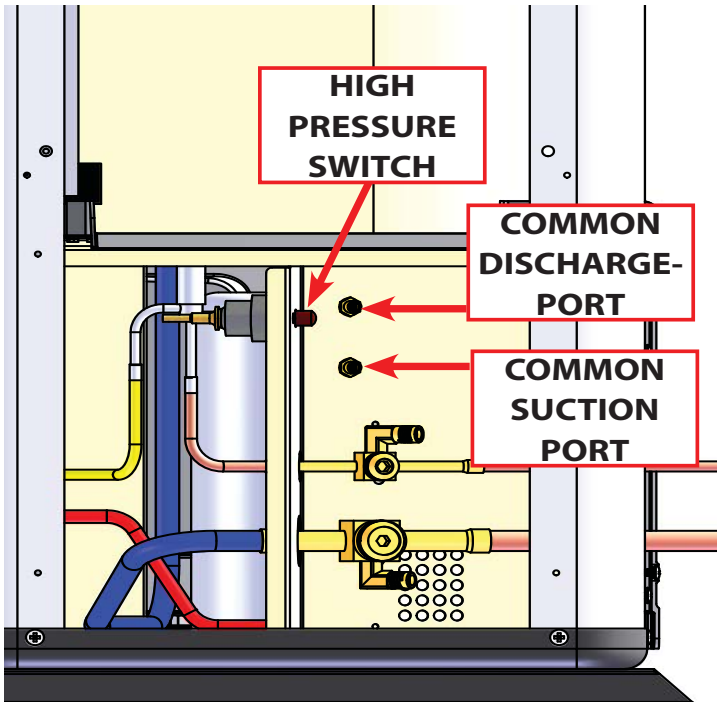
Line Adjustment = (Line Charge/FT) x Line Length
System Total = Factory Charge + Line Adjustment

Round to nearest ounce and allow for gauges and hoses.

Table 4 - S1CV / S1HV Refrigerant Charge Table

Condenser	Line Charge Per Foot	Factory Charge	Condenser	Line Charge Per Foot	Factory Charge
S1CV9000	.25 oz/ft (23 g/m)	39.5oz (1120g)	S1HV9000	.25 oz/ft (23 g/m)	39.5oz (1120g)
S1CV2000	.25 oz/ft (23 g/m)	39.5oz (1120g)	S1HV2000	.25 oz/ft (23 g/m)	39.5oz (1120g)
S1CV8000	.64 oz/ft (59 g/m)	54.0oz (1531g)	S1HV8000	.64 oz/ft (59 g/m)	54.0oz (1531g)
S1CV4000	.64 oz/ft (59 g/m)	54.0oz (1531g)	S1HV4000	.64 oz/ft (59 g/m)	54.0oz (1531g)

Figure 10 - Common Suction Port & Discharge Ports



Site Preparation For Wiring

Electrical wiring must be in accordance with all electrical codes. In absence of such requirements to the National Electrical Code (NEC).

⚠ WARNING

Electrical shock hazard. Turn OFF electrical power supply before making electrical connections. Failure to do so could result in death or serious injury.

1. Refer to unit rating plate for voltage, minimum circuit ampacity and over current protection requirements. See Figure 11, Page 12.
2. Use HACR type breakers or time delay fuses. Select wire size according to ampacity rating.
3. Electrical connections and wiring diagram see Figure 12, Page 12.
   A. Remove screws on panel covering electrical box. Box is located on back side of unit and is denoted with electrical connections.
   B. Remove back panel to access high/low electrical connections and wire diagram.
   C. Add water-tight strain relief fitting to high volt side before wiring. Split grommet fitting factory installed in low volt side. See Figure 15, Page 13.
4. Power runs to weather proof disconnect box within 3 feet of unit.
5. From disconnect box run power through 7/8" hole on back of unit and into electrical box. See Figure 15, Page 13 .
6. Run wires to high volt terminal strip in control box and attach L1 and L2 connections. Run green wire to ground lug.
7. Check wiring diagram for required number of low voltage wires to run between indoor and outdoor sections. (4 conductor - A/C & 6 conductor - HP)
8. Connect 24 volt wiring matching terminal to terminal. Refer to the wiring diagram on the inside panel of condenser, and wiring diagram on indoor unit. Low volt interconnect should be at least 18 awg. Figure 16, Page 13.
9. See Figure 16, Page 13 for completed wiring of S1CV examples.
10. Replace back panel.
11. Fasten all remaining loose screws.

Figure 11- Rating Plate Location

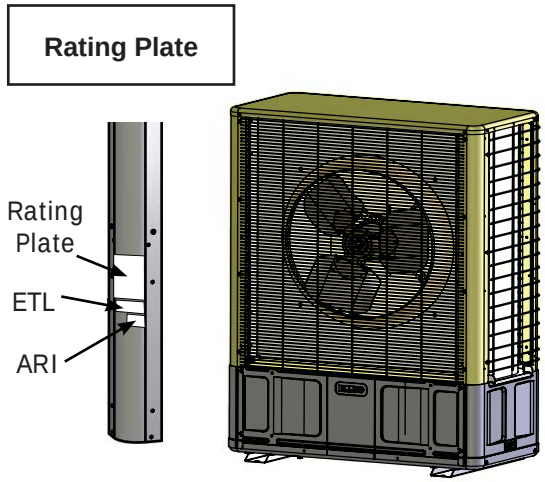


Figure 12 - Remove Back Panel Screws

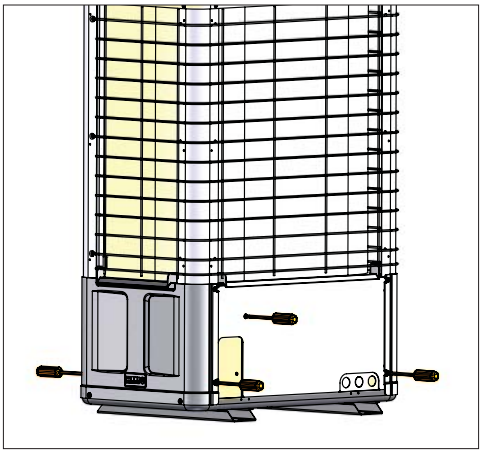
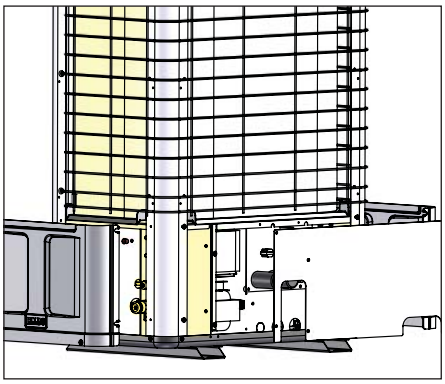


Figure 13 - Remove Back Panel



Following air handlers are equivalent in electrical specifications and system combinations.

WLH09	=	UNH09
WLH12	=	UNH12
WLH18	=	UNH18
WLH24	=	UNH24

Figure 14 - Power Entrances

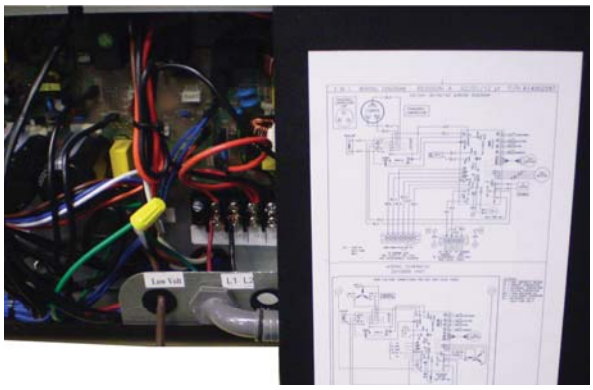


Figure 15 - High Voltage Connections

Figure 16 - Low Voltage Connections

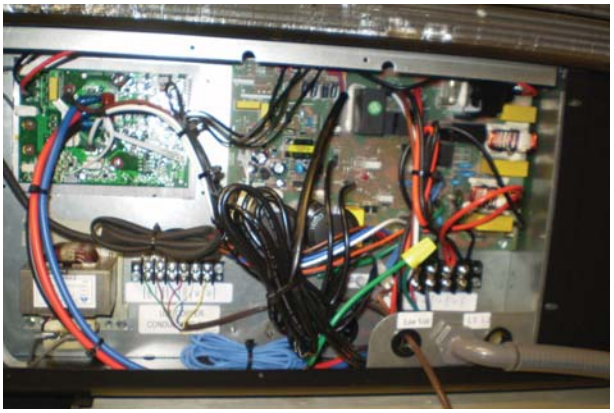
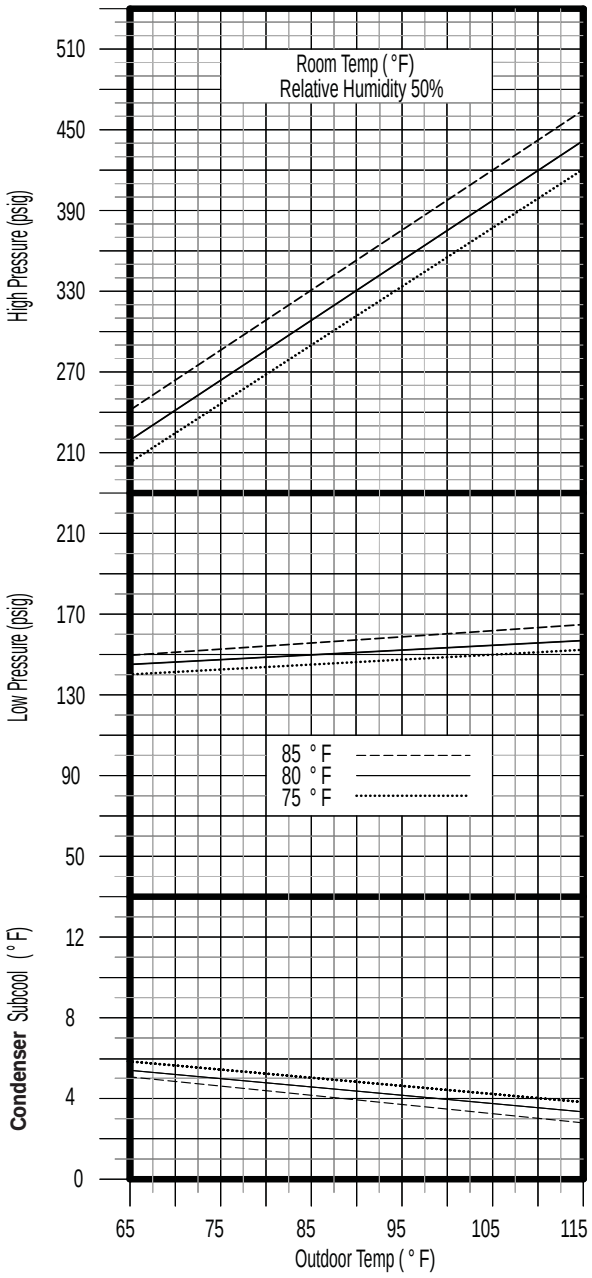


Figure 17 - Replacing Control Cover

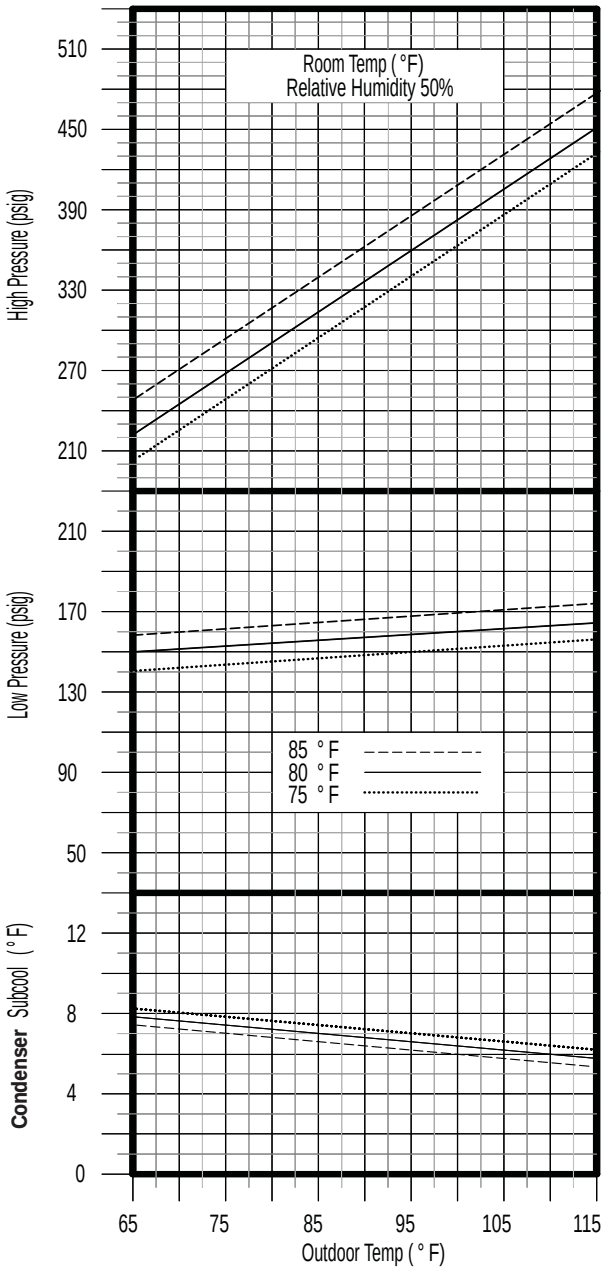
Figure 18 - Fasten Loose Screw

Figure 19 - Line Set Access

Model S1CV9000 & S1HV9000
with WLHV09 or UNHV09 (R-410A Ref.)

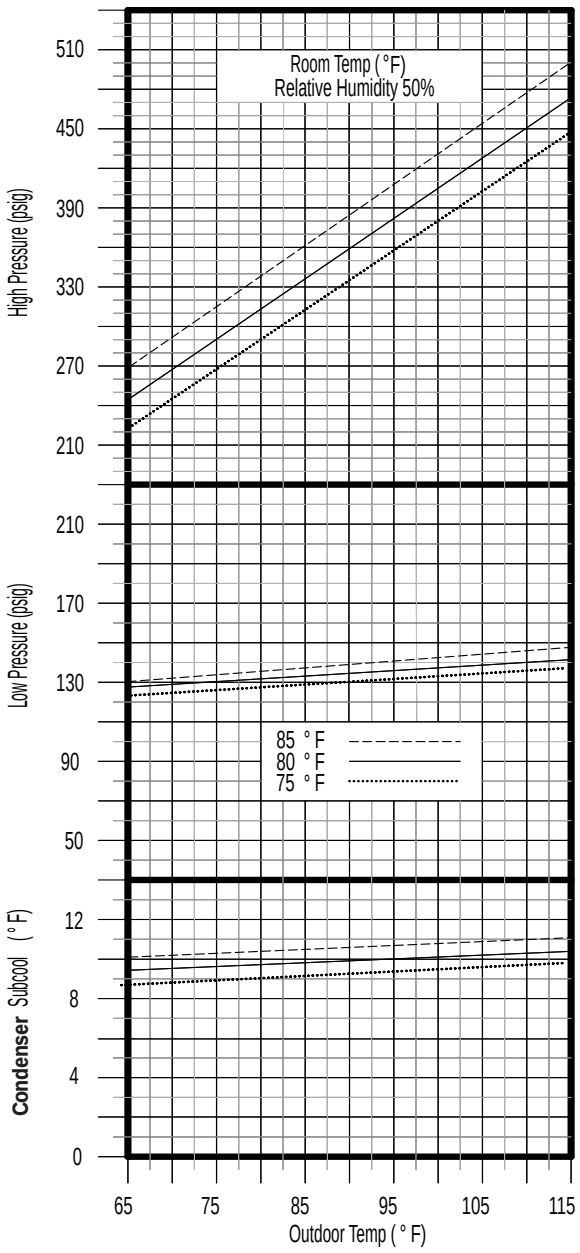


Cooling Cycle
Model S1CV9000 & S1HV9000
with CAHV09 (R-410A Ref.)

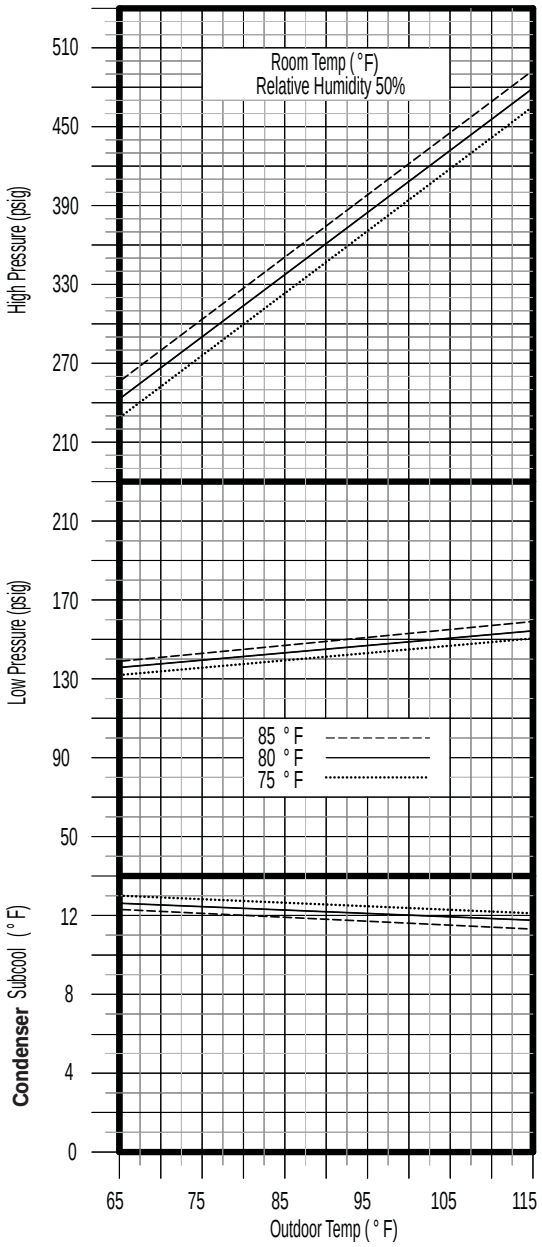


Heat Pump use Common Suction Port - Straight Cool only use Common Discharge Port.

Cooling Cycle
Model S1CV2000 & S1HV2000
with WLHV12 or UNHV12 (R-410A Ref.)

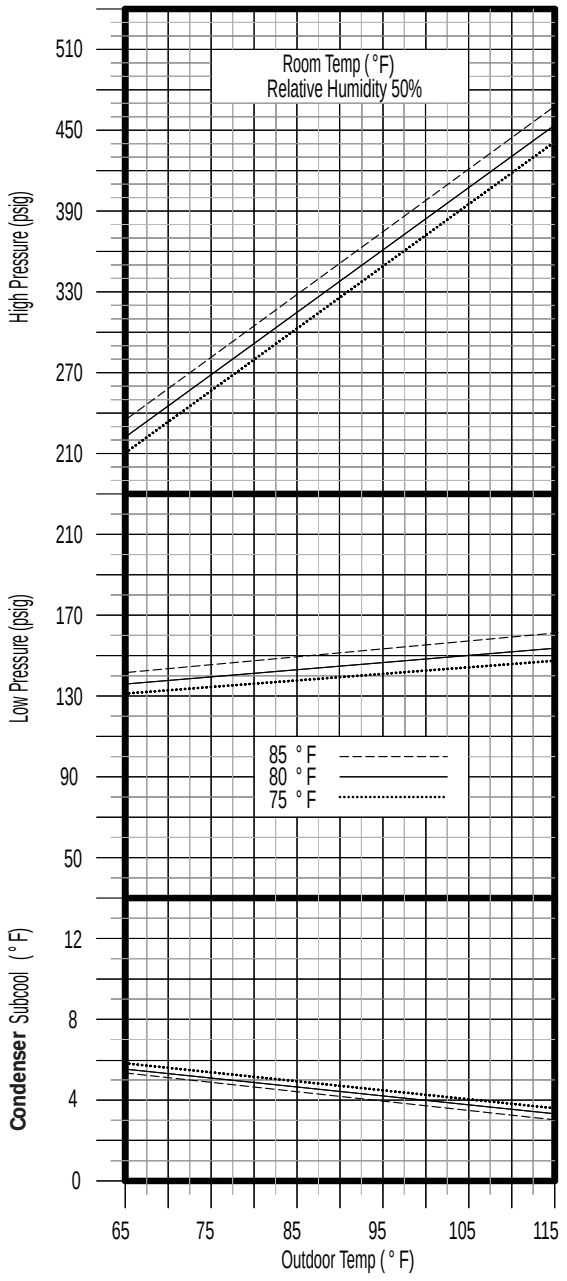


Cooling Cycle
Model S1CV2000 & S1HV2000
with CAHV12 (R-410A Ref.)

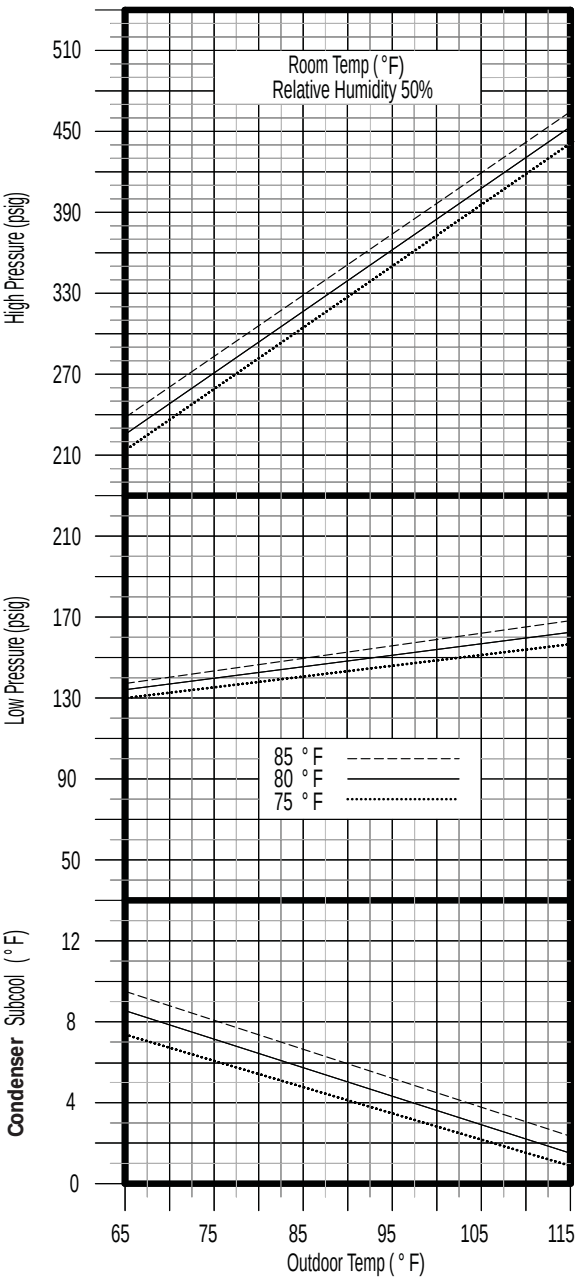


Heat Pump use Common Suction Port - Straight Cool only use Common Discharge Port.

Cooling Cycle
Model S1CV8000 &S1HV8000
with WLHV18 or UNHVG18 (R-410A Ref.)



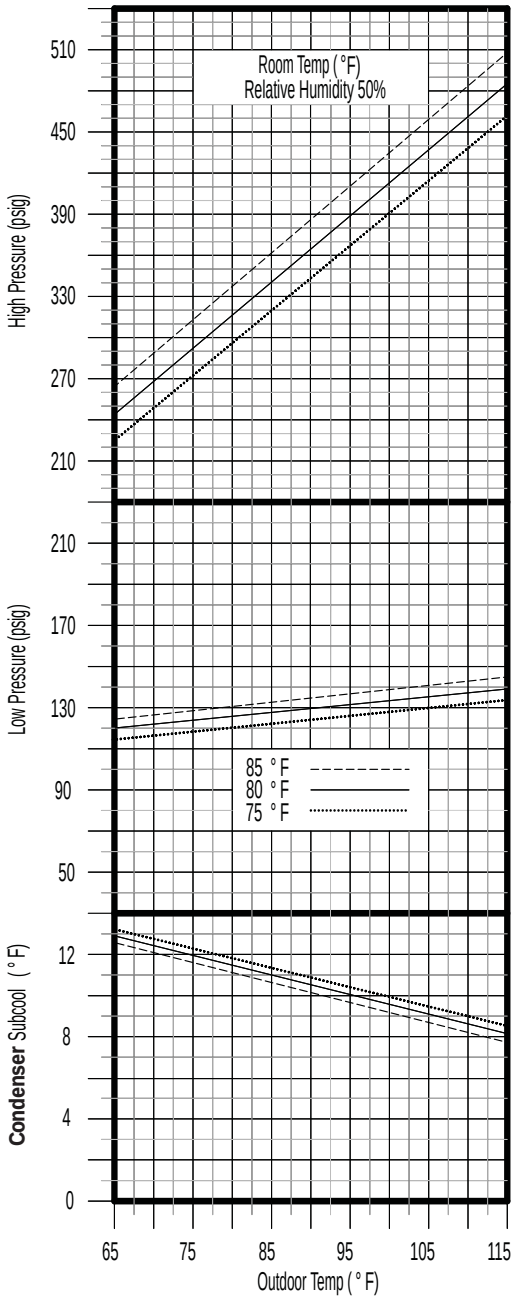
Cooling Cycle
Model S1CV8000 & S1HV8000
with CAHV18 (R-410A Ref.)



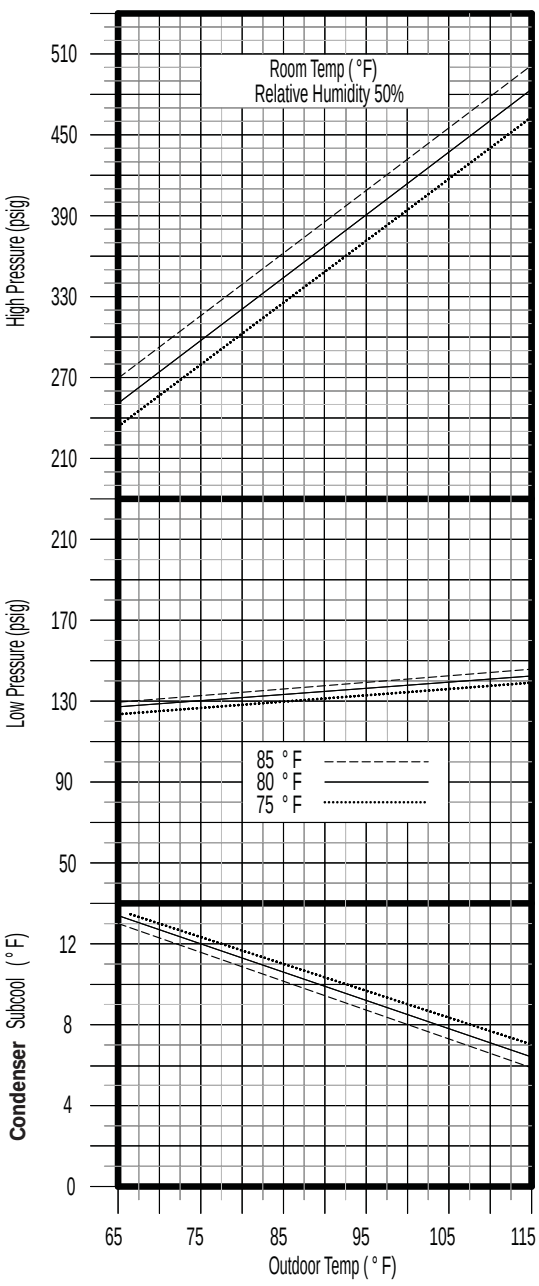
Heat Pump use Common Suction Port - Straight Cool only use Common Discharge Port.

Performance data listed is subject to change without notice. For most current unit/system performance data, refer to EMI listing of VSMS certified products in the AHRI directory, at www.ahridirectory.org.

Cooling Cycle
Model S1CV4000 & S1HV4000
with WLHV24 or UNHV24 (R-410A Ref.)

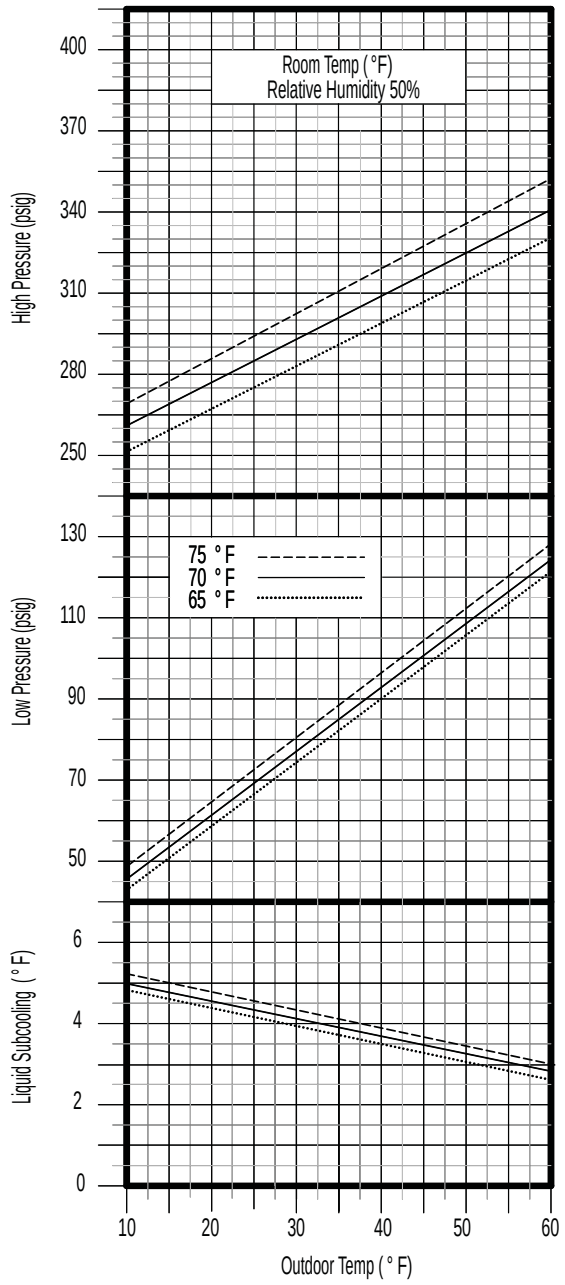


Cooling Cycle
Model S1CV4000 & S1HV4000
with CAHV24 (R-410A Ref.)

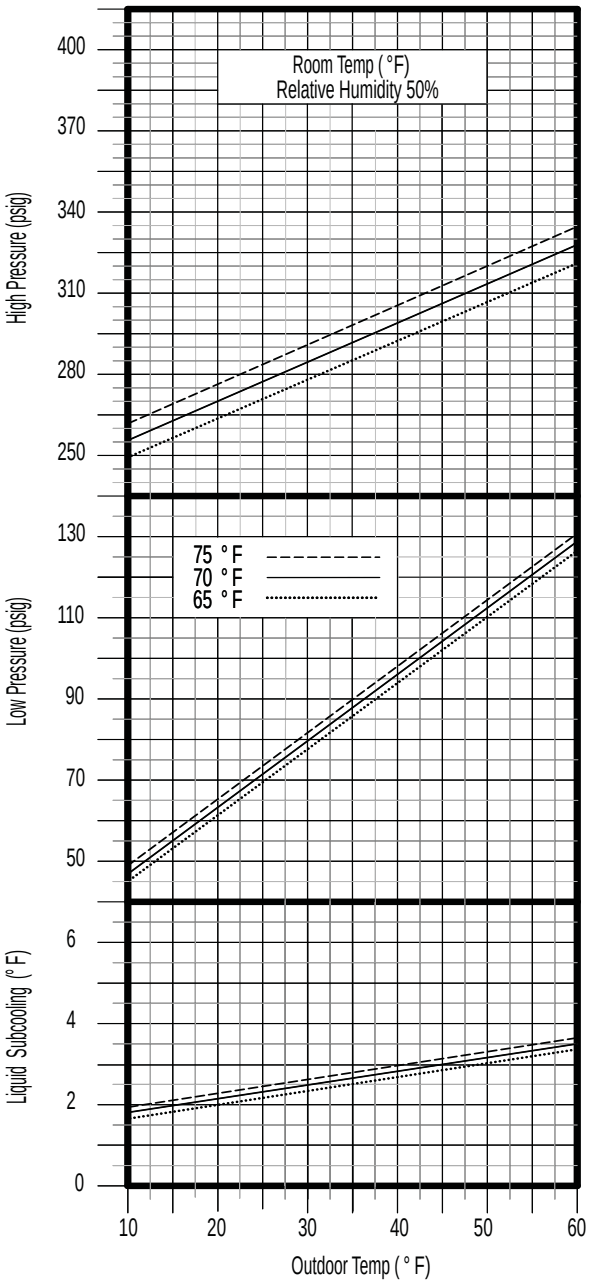


Heat Pump use Common Suction Port - Straight Cool only use Common Discharge Port.

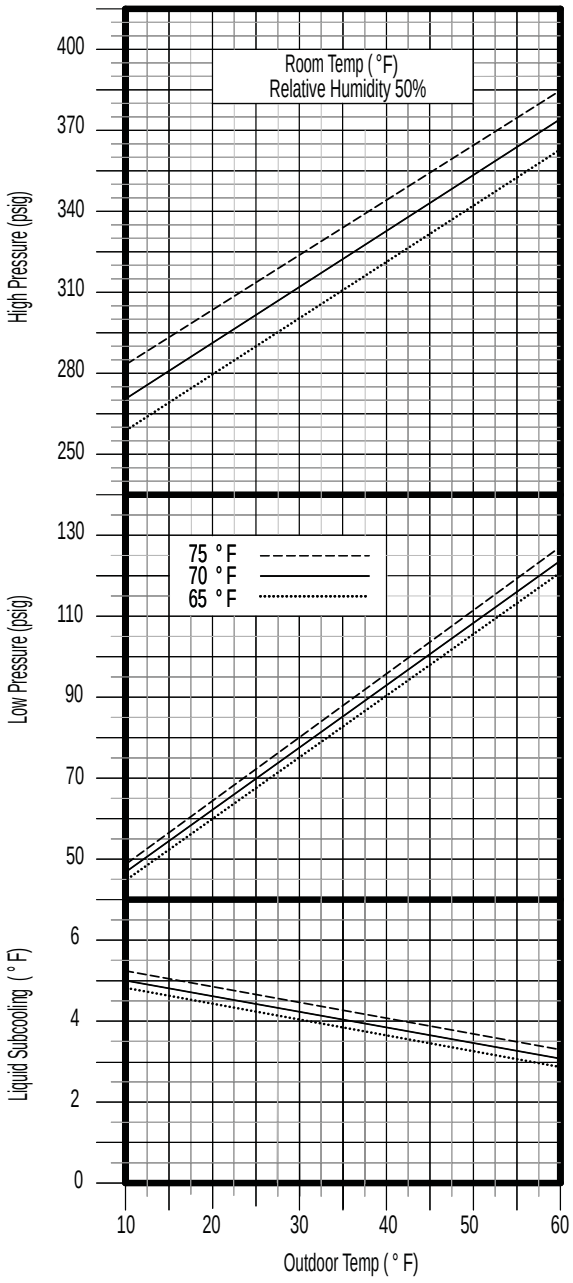
Heating Cycle
Model S1HV9000
with WLHV09 or UNHV09 (R-410A Ref.)



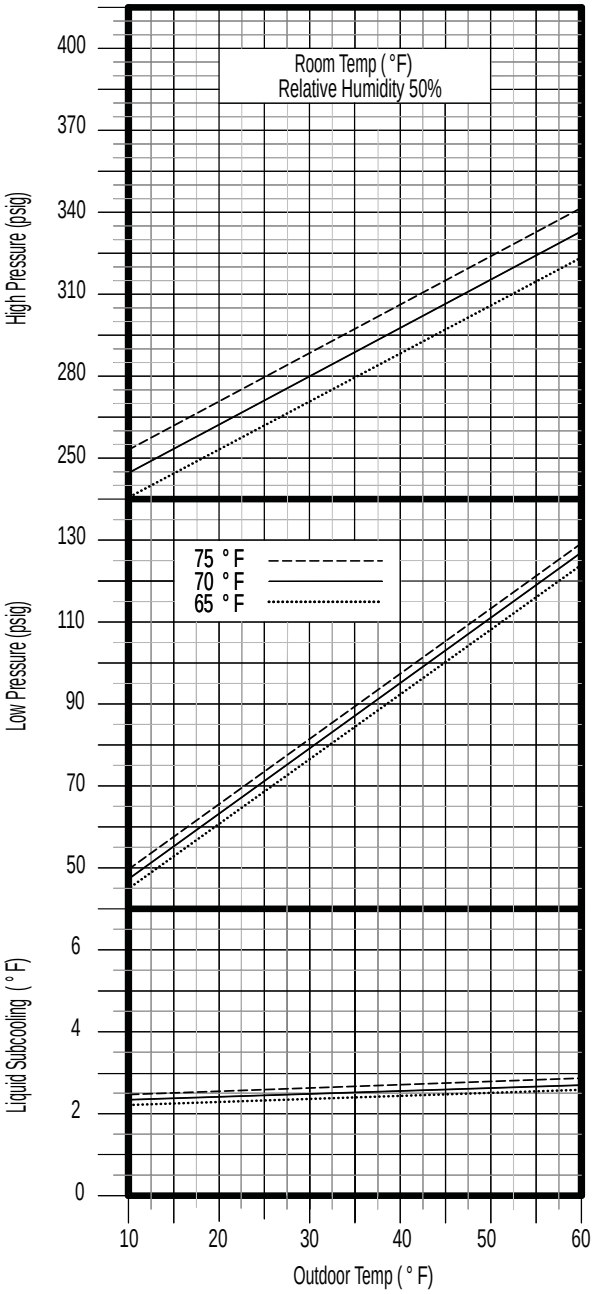
Heating Cycle
Model S1HV9000
with CAHV09 (R-410A Ref.)



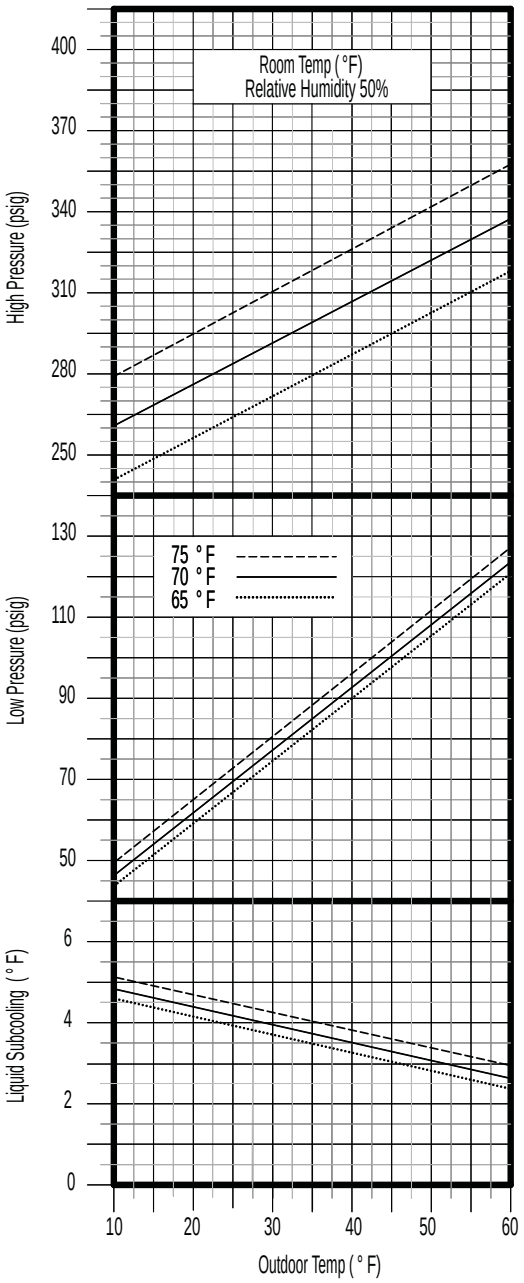
Heating Cycle
Model S1HV2000
with WLHV12 or UNHV12 (R-410A Ref.)



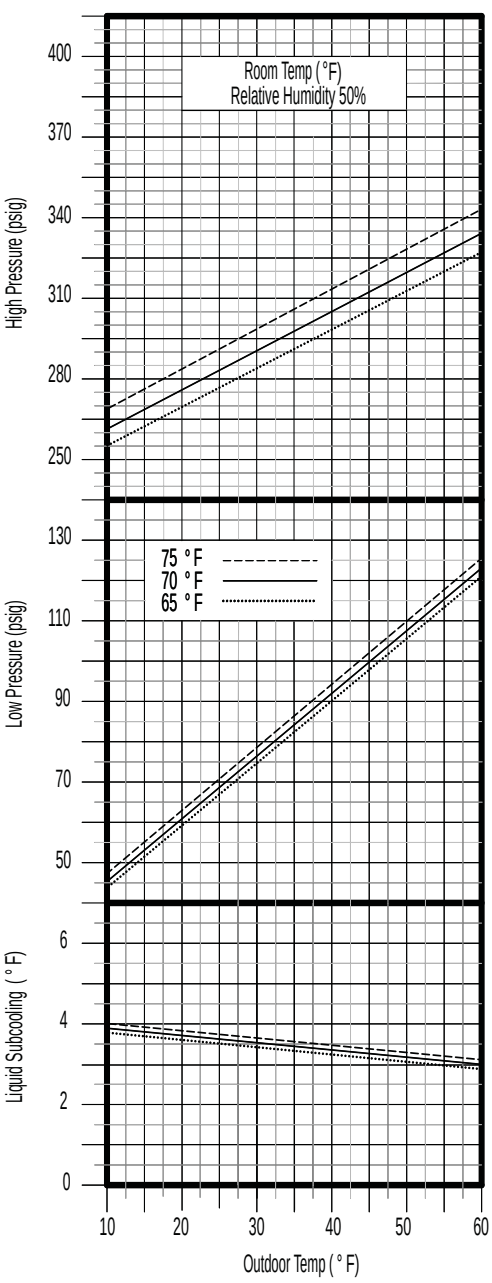
Heating Cycle
Model S1HV2000
with CAHV12 (R-410A Ref.)



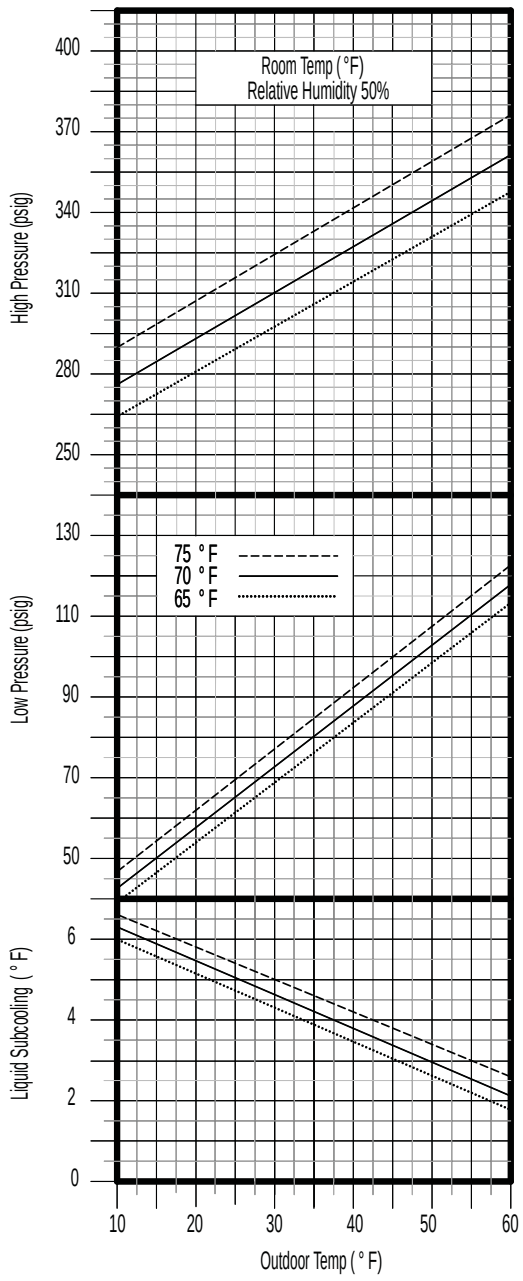
Heating Cycle
Model S1HV8000
with WLHV18 or UNHV18 (R-410A Ref.)



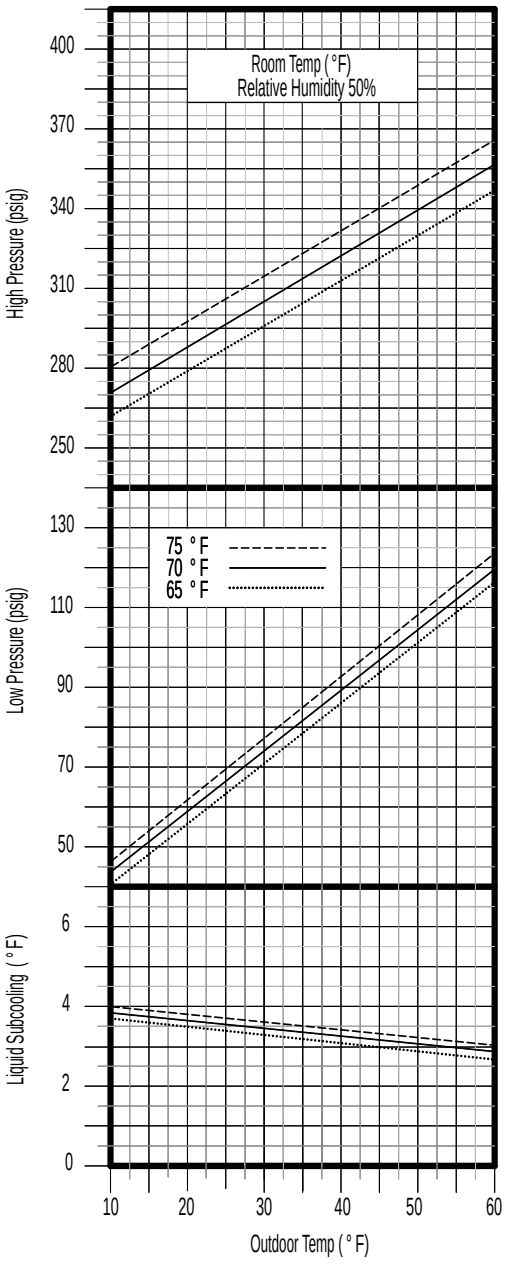
Heating Cycle
Model S1HV8000
with CAHV18 (R-410A Ref.)



Heating Cycle
Model S1HV4000
with WLHV24 or UNHV24 (R-410A Ref.)



Heating Cycle
Model S1HV4000
with CAHV24 (R-410A Ref.)



Initial Start Up
Low ambient cooling, with installed crankcase heater, power system 24 hours before attempting to start unit in cool weather (below 60°F).

Test Unit Data Sheet
After final system check using Operation Charts. See pages 14-21.
Record results on Test Unit Data Sheet page 26.

Final Inspection Before Start Up
- Remove gauge set, install caps.
- Mount all access panels and verify they are properly secured.
- Verify all schrader caps have O-rings.
- Make final visual inspection and repair any deficiencies.

Operation
S1CV / S1HV outdoor sections are compressor bearing units of system.

Operation is at command of indoor section or room thermostat. System operation is described in the indoor section manuals.

⚠ WARNING

Electrical shock hazard. Turn OFF electrical power supply before preforming the following maintenance procedures. Have a qualified service agency perform system maintenance. Failure to do so could result in death or serious injury.

Maintenance
- Have service performed by a qualified service agency.
- Turn off all power to the unit.
- Regularly inspect for free air passage into and through the coil.
- Clean air coil of debris by “back-flushing” with spray of water or vacuuming.
- Outdoor units may be cleaned or waxed. Use non-abrasive car wax on metal surfaces only.
- Unit is equipped with permanently lubricated motor. Adding few drops of oil through oiling ports twice yearly will extend life of motor. Do not over oil.

⚠ WARNING

Electrical shock hazard. Do not operate unit without all panels in place and secured.

- Panels should remain on the unit at all times.

S1CV / S1HV IOM’s Sequence of Operation
- EMI Ductless Series condensers are designed to operate with EMI Series air handlers.
- System can be configured for single source or double source power.
  Note - Single source power is for NON-Electric heat systems only.
- See unit name plate for correct breaker type and size.
- Outdoor and indoor units are connected to each other through low volt interconnect wiring. 24V transformer located in indoor unit provides low volt power.
- Indoor set point temperature range is adjustable between 55° and 90ºF (13 – 32ºC) in one degree increments.

1. Straight cool condensers are designed to operate as single stage DX (Direct Expansion) cooling unit.
2. Heat pump condensers are designed to operate as single stage cooling and heating system.
3. Two stage heating operation indoor unit must be equipped with Heat Pump and optional electric heater.
4. Proper system operation requires condenser to be matched with appropriate indoor unit using either standard hand held remote or optional wired wall thermostat.

S1CV / S1HV Condenser Operation
Heat pump condensers utilize reversing valve to provide reverse cycle (heating) operation.
Outdoor unit acts as either condenser or evaporator providing cooling or heating to indoor space based on mode of operation and ambient conditions.
Reversing valve is energized for Cooling Mode operation. Should reversing valve fail to actuate, system will default to Heating Mode of operation.

- When indoor control is placed in Cooling Mode, with set point temperature below room temperature, compressor, outdoor fan, and indoor blower energize.
- Anti-short cycle timer (ASCT) prevents compressor from re-starting for three minutes.
- When indoor control is placed in Heating Mode, with set point temperature above room temperature, compressor, outdoor fan and indoor blower energize. Anti-short cycle timer (ASCT) prevents compressor from re-starting for three minutes.
- Heat pump defrost control is designed to keeping outdoor coil free from frost and ice buildup. Through control of reversing valve, compressor speed, outdoor fan speed, and indoor optional electric heat. Defrost is initiated when outdoor coil sensor has accumulated 90 minutes of compressor run time with coil operating below 30ºF (-1.1ºC). When coil sensor reaches 60ºF (15.5ºC), due to either defrost cycle or increase in ambient temperature, timer is reset to zero (0) minutes.

- Upon defrost initiation, reversing valve shifts to Cooling Mode with outdoor fan Off, indoor blower and optional electric heat (if available) On. Hot gas from compressor melts frost and ice on outdoor coil and electric heat tempers indoor air, until outdoor coil sensor reaches 60ºF (15.5ºC) or 10 minutes has elapsed. System reverts to normal heat pump operation. Defrost times vary depending on outdoor temperature, wind, and moisture conditions.
- In Cooling Mode reversing valve is energized at all times. When air handler calls for cooling, if compressor is not in ASCT, it will start softly then increase speed as necessary to balance indoor cooling load with outdoor ambient, while minimizing number of compressor starts and stops. Actual compressor speed is based on room temperature differential, indoor fan speed, and compressor rated frequency parameters. Minimum compressor run times and indoor coil freeze protection are in place whenever compressor runs in Cooling Mode. Condenser mounted Electronic Expansion Valve (EXV) continuously adjusts refrigerant flow to maintain 15ºF (8.3ºC) superheat at compressor. Expanded refrigerant vapor travels through small diameter tube of line set to air handler where heat is transferred into refrigerant. Once refrigerant evaporates, super-heated vapor returns to condenser via large diameter tube. Refrigerant expansion occurs in outdoor unit, both tubes in line set require insulation.
- As temperature of indoor space moves closer to set point compressor, indoor, and outdoor motors adjust speeds to reduce rate of indoor temperature change and avoid passing set point. As temperature of indoor space moves farther from set point compressor, indoor, and outdoor motors adjust to increase rate of indoor temperature change and remain close to set point. System tries to remain running, minimizing the number of start / stop cycles. This provides the most uniform space conditioning comfort levels and best overall system efficiency.

- In Heating Mode reversing valve is de-energized, except during defrost. When air handler calls for heating, if compressor is not in ASCT, it will start softly then increase in speed as necessary to balance indoor heating load with outdoor ambient, while minimizing compressor starts and stops. Actual compressor speed is based on room temperature differential, indoor fan speed, and compressor rated frequency parameters. Minimum compressor run times and outdoor coil defrost are in place whenever compressor runs in Heating Mode. Condenser mounted Electronic Expansion Valve (EXV) continuously adjusts refrigerant flow to maintain 15ºF (8.3ºC) superheat at compressor. Refrigerant vapor travels through large diameter tube of line set to air handler where heat is transferred into air. Once refrigerant is condensed, sub-cooled liquid returns to condenser via small diameter tube.
- As temperature of indoor space moves closer to set point compressor, indoor, and outdoor motors adjust speeds to reduce rate of indoor temperature change and avoid passing set point. As temperature of indoor space moves farther from set point compressor, indoor, and outdoor motors adjust to increase rate of indoor temperature change and remain close to set point. If system has optional electric heat, and heat pump alone (stage 1) can not reduce set point differential, optional electric heat energizes (stage 2) of heat. System tries to remain running, minimizing number of start / stop cycles. Providing uniform space conditioning levels and best overall system efficiency.

Defrost Controls With Short Cycle Protection (Heat Pumps Only)

Unit is equipped with logic control circuit designed to keep system operating at peak efficiency.
24v circuit provides control to indoor and outdoor systems including three minute, anti-short cycle timer (ASCT) compressor protection.
Defrost control circuit is designed to keep condenser coil free from frost and ice during heating mode. This is accomplished through precise switching sequence of outdoor fan, reversing valve and optional indoor electric heater.

Defrost Initiation

1. Defrost-sensor is located on end plate or return bend of condenser coil.
2. Defrost cycle initiates after sensor closes (approximately 30°F) and remains closed for 90 minutes of compressor run time.
3. At start of defrost cycle
   A. Reversing valve changes from heating to cooling mode. Condenser fan switches **Off** allowing pressure and temperature to rise within condenser coil to melt any ice build-up.
   B. At same time unit switches **On** optional indoor electric strip heater to temper cold air being discharged from air handler.
   C. Continues until defrost-sensor opens (approximately 60°F) or 10 minute maximum cycle time has elapsed.
   D. Defrost times vary depending on outdoor temperature and moisture conditions.
4. When defrost cycle is complete unit returns to normal heating operation.

Table 5 - S1CV Electrical Specifications

Model #	Volts/HZ/PH	OD Fan Motor		ID Fan Motor		Compressor		Total Amps	Min Volt	M.C.A.	HACR BRKR
		AMPS	HP	AMPS	HP	RLA	LRA				
S1CV9000D	208/230/60/1	0.65	0.11	0.4	0.10	4.2	12	5.25	197	6.3	15
S1CV2000D	208/230/60/1	0.65	0.11	0.4	0.10	7.9	12	8.95	197	10.9	15
S1CV8000D	208/230/60/1	0.65	0.11	0.6	0.125	9.9	15	11.15	197	13.6	20
S1CV4000D	208/230/60/1	0.65	0.11	0.6	0.125	8.0	15	14.25	197	17.5	30

S1CV performance data: Matched with EMI Ductless Series Indoor Units

Table 6 - Cooling Systems With Wall Units

Condenser	Wall Unit	Btuh	SEER	SHR	EER	Ref.
S1CV9000	**WLHV09**	9,000	16.7	0.75	13.5	R410A
S1CV2000	**WLHV12**	12,000	17.0	0.66	12.0	R410A
S1CV8000	**WLHV18**	18,000	17.0	0.73	13.0	R410A
S1CV4000	**WLHV24**	24,000	17.0	0.67	11.0	R410A

WLHV

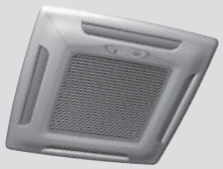
Table 7 - Cooling Systems With Universal Units

Condenser	Universal	Btuh	SEER	SHR	EER	Ref.
S1CV9000	**UNHV09**	9,000	16.7	0.75	13.5	R410A
S1CV2000	**UNHV12**	12,000	17.0	0.66	12.0	R410A
S1CV8000	**UNHV18**	18,000	17.0	0.73	13.0	R410A
S1CV4000	**UNHV24**	24,000	17.0	0.67	11.0	R410A

UNHV

Table 8 - Cooling Systems With Cassette Units

Condenser	Cassette	Btuh	SEER	SHR	EER	Ref.
S1CV9000	**CAHV9**	9,000	15.0	0.79	13.0	R410A
S1CV2000	**CAHV12**	12,000	15.8	0.69	12.0	R410A
S1CV8000	**CAHV18**	18,000	17.0	0.74	13.0	R410A
S1CV4000	**CAHV24**	24,000	17.0	0.66	11.0	R410A



CACV / CAHV

Table 9 - S1HV Electrical Specifications

Model #	Volts/HZ/PH	OD Fan motor		ID Fan motor		Compressor		Total amps	Min volt	M.C.A.	HACR BRKR
		AMPS	HP	AMPS	HP	RLA	LRA				
S1HV9000D	208/230/60/1	0.65	0.11	0.4	0.10	4.2	12	5.25	197	6.3	15
S1HV2000D	208/230/60/1	0.65	0.11	0.4	0.10	7.9	12	8.95	197	10.9	15
S1HV8000D	208/230/60/1	0.65	0.11	0.6	0.125	9.9	415	11.15	197	13.6	20
S1HV4000D	208/230/60/1	0.65	0.11	0.6	0.125	13.0	15	14.25	197	17.5	30

S1HV performance data: Matched with EMI Ductless Series Indoor Units

Table 10 - Heat Pump Systems With Wall Units

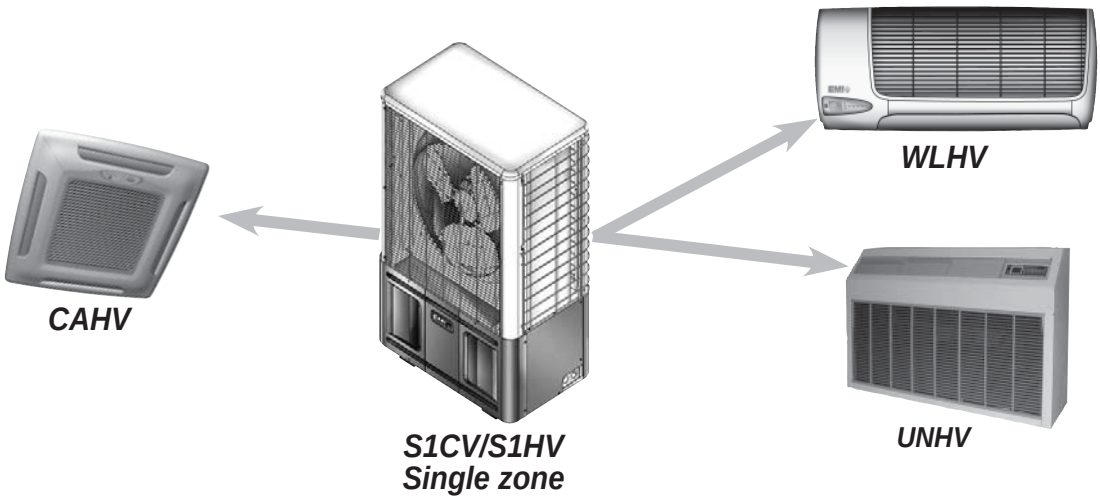
Condenser	Wall unit	Cooling Btuh	Heating Btuh	SEER	HSPF	SHR	EER	COP	Ref.
S1HV9000	WLHV09	9,000	8,800	16.7	8.2	0.75	13.5	3.2	R410A
S1HV2000	WLHV12	12,000	10,000	17.0	8.5	0.66	12.0	3.0	R410A
S1HV8000	WLHV18	18,000	18,000	17.0	9.5	0.73	13.0	3.5	R410A
S1HV4000	WLHV24	24,000	21,000	17.0	9.0	0.66	11.0	3.0	R410A

Table 11 - Heat Pump Systems With Universal Units

Condenser	Universal	Cooling Btuh	Heating Btuh	SEER	HSPF	SHR	EER	COP	Ref.
S1HV9000	UNHV09	9,000	8,800	16.7	8.2	0.75	13.5	3.2	R410A
S1HV2000	UNHV12	12,000	10,000	17.0	8.5	0.66	12.0	3.0	R410A
S1HV8000	UNHV18	18,000	18,000	17.0	9.5	0.93	13.0	3.5	R410A
S1HV4000	UNHV24	24,000	21,000	17.0	9.0	0.66	11.0	3.0	R410A

Table 12 - Heat Pump Systems With Cassette Units

Condenser	Cassette	Cooling Btuh	Heating Btuh	SEER	HSPF	SHR	EER	COP	Ref.
S1HV9000	CAHV9	9,000	8,400	15.0	7.7	0.79	13.0	3.0	R410A
S1HV2000	CAHV12	12,000	8,800	15.8	7.7	0.69	12.0	3.0	R410A
S1HV8000	CAHV18	18,000	17,000	17.0	9.0	0.74	13.0	3.1	R410A
S1HV4000	CAHV24	24,000	19,000	17.0	9.0	0.66	11.0	3.0	R410A



NOTICE

Test Unit Performance Data sheet is provided for use by qualified service professional in event there is concern with unit. For our Technical Service Department to better serve you, please complete. Have this information ready when calling.
It is important to include Model Number, Serial Number, and Date of installation.
Call Technical Support Department
@ 1-800-228-9364.

Model Number		Date:	
		Technician:	
Serial Number		Mode:	
Indoor Section		Notes	
Air handlers Entering Air – DB			
Air handlers Entering Air – WB			
Air handlers Leaving Air – DB			
Air handlers Leaving Air – WB			
Outdoor Section			
Entering Air			
Leaving Air			
Temperature Split			
Operating Pressures			
Compressor Suction – PSIG			
Compressor Discharge – PSIG			
Power Input			
Compressor – Volts			
Compressor – Amps			
OD Fan Motor – Volts			
OD Fan Motor – Amps			
ID Fan Motor – Volts			
ID Fan Motor – Amps			
Total Volts			
Total Amps			
Temperatures – Degrees F			
Compressor Suction			
Compressor Discharge			
Liquid Out Cond.			
Liquid before Expansion			
Suction out Air handlers			
Capacity Calculations			
DB – Temp Split at Air handlers			
Test Summary			
Compressor Superheat			
Sub Cooling			

NOTES

EMIO Ductless

Comfort Where It Counts.

Phone: 1-800-228-9364
Fax: 1-800-232-9364

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