Liebert® SRC™

User Manual—Mini-Split Cooling System

EMERSON
Network Power

Table of Content

List of Figures

List of Tables

Important Safety Instructions

SAVE THESE INSTRUCTIONS

Do not throw away, destroy or lose this manual. Please read carefully and store in a safe place for future reference. Content familiarity required for proper installation.

The instructions included in this manual must be followed to prevent product malfunction, property damage, injury, or death to the user or other people. Incorrect operation due to ignoring any instructions will cause harm or damage.

For more technical materials such as submittals, engineering databooks and catalogs,

WARNING

Risk of improper unit installation and/or removal. Can cause water and/or refrigerant leakage, electric shock, smoke, fire and explosion resulting in building and equipment damage, serious injury or death. Do not install, remove, or re-install the unit by yourself (customer). Ask the dealer or an authorized technician to install the unit. For replacement of an installed unit, always contact an authorized Liebert service provider.

WARNING

Risk of explosive discharge of high pressure gas. Can cause serious injury. The unit is shipped with refrigerant and the service valves closed. Do not open service valves on the unit until all non-condensibles have been removed from the piping system and authorization to do so has been obtained from the commissioning agent.

WARNING

Risk of excessive refrigerant pressure. Can cause equipment damage, serious injury or death. Do not run the compressor with the service valves closed.

WARNING

Arc flash and electric shock hazard. Can cause serious injury or death. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is off and wear personal protective equipment per NFPA 70E before working within the electric control enclosure. All electric work must be performed by a licensed electrician and conform to all applicable national, state and local electrical codes Replace and securely fasten all control box and panel covers immediately after working on the unit to protect the operator from the hazards above and prevent the intrusion of dust, water and animals that may cause additional hazards to develop.

WARNING

Risk of contact with sharp edges, nails, splinters, and other packaging materials and improper disposal of plastic bags. Can cause injury or death. Wear gloves and arm protection when unpacking the unit and and Dispose the packing materials safely.

Cut the plastic packaging bag into small pieces or dispose of securely to eliminate the risk of suffocation and death from improperly wearing the plastic bag as a head cover.

WARNING

Risk of improper installation. Can cause equipment and building damage, injury or death. Utilize a structural engineer to evaluate the mounting surface and environmental risks and recommend the safest fastening method.

WARNING

Risk of protective safety devices not operating properly. Can cause electrical short circuit, electric shock, explosion, fire, injury or death. Do not change the settings of the protection devices and only use replacement parts that are specified by Liebert.

WARNING

Risk of improper installation, operation and maintenance. Can cause building and equipment damage, injury or death from electric shock, fire, explosion, or scalding. When using this product, follow basic precautions, including but not limited to:

- Read and follow all instructions in this manual.
- Installation and or repairs must only be completed made by unauthorized Liebert trained and qualified HVAC technicians.
- Installation MUST conform to the local building codes or, in the absence of local codes, the National Electrical Code NFPA 70/ANSI C1-1003 or current edition and Canadian Electrical Code Part1 CSA C.22. 1 as applicable and appropriate.
- The information contained in the manual is intended for use only by Liebert trained and a qualified service technicians who are familiar with the appropriate safety procedures and equipped with the proper tools and test instruments.
- Power cord replacement must only be be performed by authorized personnel using only Liebert specified replacement parts.
- This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.

WARNING

Risk of improper installation location. Can cause serious injury or death. Install the unit in a safe location where nobody can step on or fall onto it. Utilize a structural engineer to verify that the mounting surface and method is secure.

WARNING

Arc flash and electric shock hazard. Can cause serious injury or death. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is off and wear personal protective equipment per NFPA 70E before working within the electric control enclosure. Verify that the input power wiring is properly sized and grounded per applicable national, state and local electric codes.

Properly size all and circuit breakers or fuses protecting the input power wiring.

Do not operate the disconnect switch with wet hands.

WARNING

Risk of electric shock. Can cause injury or death. Secure all hazardous voltage field wiring connections with appropriate wire strain relief.

Improperly secured wires will create excessive stress on electrical power connection lugs. Improper or loose connections may generate excessive heat and cause smoke and fire.

WARNING

Risk of damaged electrical components and short circuits. Can cause building and equipment damage, smoke, fire, injury and death. Do not provide power to or operate the unit if it is flooded or submerged.

WARNING

Risk of unit mounting base deterioration and collapse. Can cause building and equipment damage, injury or death. Periodically verify the equipment mounts have not deteriorated.

WARNING

Risk of electric shock and contact with high speed moving parts. Can cause serious injury or death. Do not operate the unit with the panel(s) or protective cover(s) removed; keep fingers and clothing away from moving parts. Do not open the inlet grille of the unit during operation. Do not insert hands or other objects through the inlet or outlet when the unit is plugged in. Do not touch the electrostatic filter, if the unit includes one.

WARNING

Risk of electric shock. Can cause injury or death. Periodically, check power cord and plug for damage. Damaged power cords must be replaced by the manufacturer, its service agent, or similar Liebert-trained and qualified persons.

CAUTION

Risk of exposure to refrigerant gas. Can cause injury or illness. Always check for system refrigerant leaks after the unit has been installed or serviced.

CAUTION

Risk of contact with sharp edges. Can cause injury. Wear protective gloves when handling equipment.

CAUTION

Risk of exposure to excessive refrigerant concentration and oxygen depletion. Can cause illness or injury. If the unit is installed in a small improperly or non-ventilated space, take measures to prevent the refrigerant concentration from exceeding safety limits in the event of a refrigerant leak.

Consult the latest edition of ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) Standard 15.

CAUTION

Risk of contact with extremely hot and cold surfaces. Can cause injury. Refrigerant piping is extremely hot or cold during unit operation. Do not touch the refrigerant piping during or after operation. Wear thermally insulated gloves and arm protection or allow the piping to cool or warm to a safe handling temperature before working on the piping.

CAUTION

Risk of improper lifting and moving of a heavy unit. Can cause building and equipment damage and injury. Be very careful when transporting the product.

- Do not attempt to carry the product without assistance. Some products use polypropylene bands for packaging. Do not use polypropylene bands to lift the unit.
- Suspend the unit from the base at specified positions.
- Support the unit a minimum of four points to avoid slippage from rigging apparatus.

Verify that all lifting apparatus is rated for the weight of the unit. See XREF TABLE for indoor and outdoor unit weights.

CAUTION

Risk of contact with sharp edges, and extremely hot or cold components. Can cause injury. Wear OSHA approved head and eye protection, thermally insulated gloves and arm protection or allow the unit to reach a safe for contact temperature and use caution when cleaning or servicing the unit.

NOTICE

Risk of exposure to corrosive environments. Can cause equipment damage. Don't install the unit where it's directly exposed to ocean winds.

Ocean winds may cause corrosion, particularly on the condenser and evaporator fins, which, in turn could cause product malfunction or inefficient performance.

NOTICE

Risk of water damage and abnormal vibration. Can cause equipment damage

When installing the unit in a low-lying area, or a location that is not level, use a raised concrete pad or concrete blocks to provide a solid, level foundation.

NOTICE

Risk of excessive condensation. Can cause building and equipment damage.

Properly insulate all cold surfaces to prevent "sweating." Cold surfaces such as uninsulated piping can generate condensate that may drip and cause a slippery floor condition and/or water damage to walls.

NOTICE

Risk of exposure to excessive Electro-Magnetic Interference. Can cause equipment malfunction.

When installing the unit in a hospital, mechanical room, or similar electromagnetic field (EMF) sensitive environment, provide sufficient protection against electrical noise.

Inverter equipment, power generators, high-frequency medical equipment, or radio communication equipment may cause the unit to operate improperly. The unit may also affect such equipment by creating electrical noise that disturbs medical treatment or image broadcasting.

NOTICE

Risk of using the wrong refrigerant. Can cause equipment damage

Do not make refrigerant substitutions. Use R410A only.

If a different refrigerant is used, or air mixes with original refrigerant, the unit will malfunction and be damaged.

NOTICE

Risk of excessive vibration and water leakage. Can cause building and equipment damage

Keep the unit upright during installation to avoid compressor, piping and component damage.

NOTICE

Risk of improper refrigerant piping practices. Can cause refrigerant leaks resulting in building and equipment damage

When connecting refrigerant tubing, remember to allow for pipe expansion. Improper piping may cause refrigerant leaks and system malfunction.

NOTICE

Risk of an improper installation location. Can cause equipment damage

Install the unit in a safe location where nobody can step on or fall onto it. Do not install the unit on a defective stand. Periodically check that the outdoor frame is not damaged

NOTICE

Risk of leaking water. Can cause building and equipment damage.

Install the drain hose as specified in this manual to ensure adequate drainage and periodically check for damage, obstruction and leaks.

NOTICE

Risk of leaking refrigerant. Can cause equipment malfunction and damage.

Always check for system refrigerant leaks after the unit has been installed or serviced. Low refrigerant levels may cause product failure.

NOTICE

Risk of cold compressor at startup. Can cause equipment damage.

Provide power to the compressor crankcase heaters at least six (6) hours before operation begins.

Starting operation with a cold compressor sump(s) may result in severe bearing damage to the compressor(s). Keep the power switch on during the operational season.

NOTICE

Risk of blocked inlet and outlet air vents. Can cause equipment malfunction and damage. Do not block the inlet or outlet. Unit may malfunction.

NOTE

Do not install the unit in a noise sensitive area.

NOTE

Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R410A refrigerant according to applicable U.S. Environmental Protection Agency (EPA) rules.

NOTE

Don't store or use flammable gas / combustibles near the unit. There is risk of product failure.

NOTE

Clean up the site after installation is finished, and check that no metal scraps, screws, or bits of wiring have been left inside or surrounding the unit.

NOTE

Do not use this equipment in mission critical or special purpose applications such as preserving foods, works of art, wine coolers or refrigeration. The equipment is designed to provide cooling and heating for electronic and telecommunications equipment.

Oil, steam, sulfuric smoke, etc., can significantly reduce the performance of the unit, or damage its parts.

NOTE

- *If the leaking battery fluid has been swallowed, wash off the inside of the mouth thoroughly and consult a doctor.*
- *Do not drink the water drained from the unit.*
- *Do not use the product for special purposes, such as preserving foods, works of art, and etc. It is an unit for consumer purposes, not a precision refrigeration system. There is risk of damage or loss of property.*
- *Do not recharge or disassemble the batteries.*

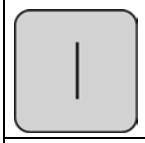
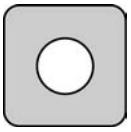
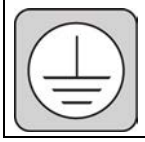
NOTE

Maintenance

- *Never touch the metal parts of the unit when removing the air filter.*
- *Use a sturdy stool or ladder when cleaning, maintaining, or repairing the unit at a height.*
- *Never use strong cleaning agents or solvents when cleaning the unit or spray water.*
- *Use a smooth cloth.*

Safety Symbols

The following symbols may appear within the documentation or on the product.

Symbol	Meaning
	**High Temperature** Alerts the user where the enclosure temperature may exceed 158°F (70°C) while operating under high-ambient temperature and at maximally rated load.
	**Instructions** Signifies the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.
	**Dangerous Voltage** Warns about the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	**Power On** Indicates the principal On/Off switch is in the On position.
	**Power Off** Indicates the principal On/Off switch is in the Off position.
	**Protective Grounding Terminal** Indicates a terminal that must be connected to earth ground before any other connections to the equipment may be made.

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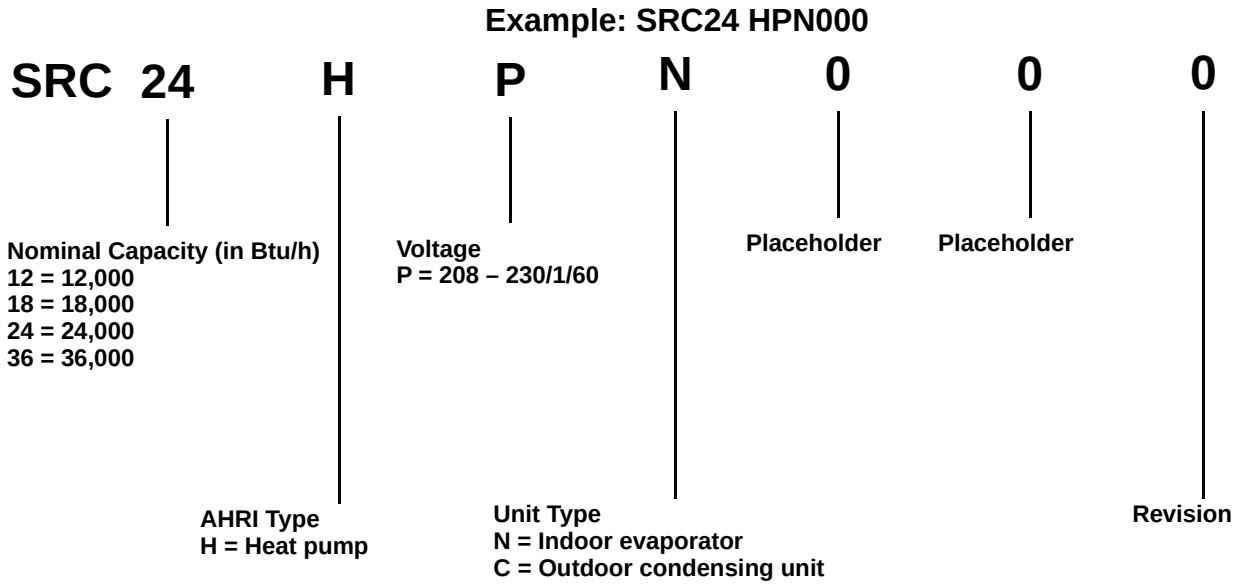
1.0 Model Number and Nomenclature

Figure 1-1 Product Nomenclature



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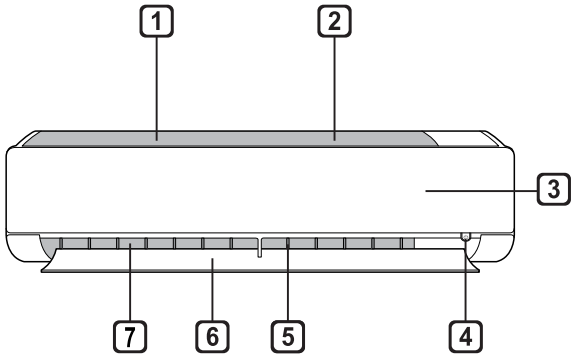
2.0 Product Introduction

Suggestions for Energy Saving when Operating the Liebert SRC:

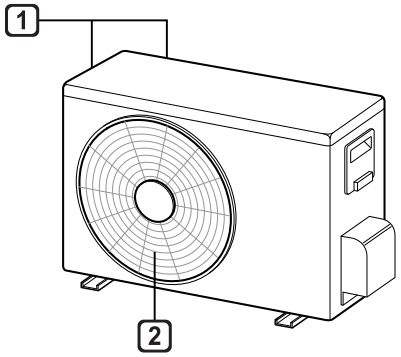
- Do not cool excessively indoors. This may be harmful for your health and may consume more electricity.
- Block sunlight with blinds or curtains while you are operating the unit.
- Keep doors or windows closed tightly while you are operating the unit.
- Adjust the direction of the air flow vertically or horizontally to circulate indoor air.
- Speed up the fan to cool or warm indoor air quickly, within a short period of time.
- Open windows regularly for ventilation. The indoor air quality may deteriorate if the unit is used for long durations.
- Clean the air filter once every 2 weeks. Dust and impurities collected in the air filter may block the air flow or weaken the cooling / dehumidifying functions.

Figure 2-1 Indoor Unit Parts and Functions



No.	Description	No.	Description
1	Air filter (under the panel)	5	Air deflector (vertical louver)
2	Air intake	6	Air deflector (horizontal vane)
3	Front cover	7	Air outlet
4	On/Off button		

Figure 2-2 Outdoor Unit Parts and Functions



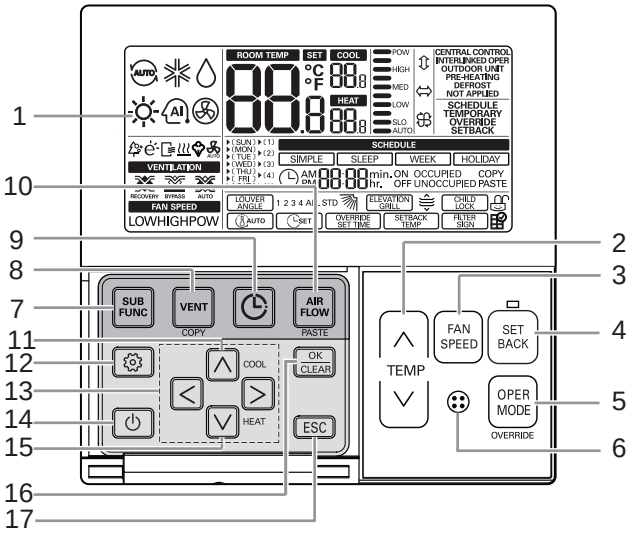
No.	Description
1	Air intake vents
2	Air outlet vents

NOTE

The number and location of operation lamps may vary by unit model.

The features may vary by model.

Figure 2-3 Thermostat parts and functions



No.	Description	No.	Description
1	Operation indication	10	Air-flow button
2	Set temperature button	11	Cooling temperature setpoint
3	Fan speed button	12	Function setting button
4	Set back button	13	Up, down, left and right buttons
5	Operation-mode select button	14	On/Off button
6	Wireless thermostat receiver (not included on some models)	15	Heating temperature setpoint
7	Sub function button	16	Set/Cancel button
8	Ventilation button	17	Exit button
9	Reservation button		

NOTE

Some functions may not be available or displayed depending on unit type.

Figure 2-4 Accessories

Connection Cable (1EA,32ft (10m))

Screw (4 EA)

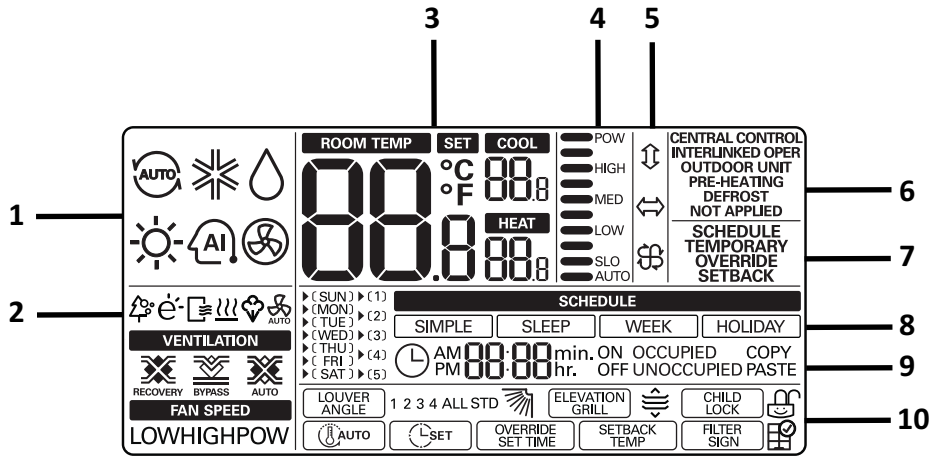
Installation & Operation Manual

No.	Description	No.	Description
1	Connection cable, 1 each, 32 ft (10 m)	3	User Manual
2	Screw, 4 each		

NOTE

Some options and functions may not be displayed or the menu name may be different depending on your system and model.

Figure 2-5 Icon descriptions and functions



Section	Icon	Description
1 Operating Mode		Auto—change to cooling or heating mode automatically.
		Operating in cooling mode.
		Operating in dehumidification mode.
		Operating in heating mode.
		Operating in fan-only mode.
2 Sub functions		Plasma purification filter is operating.
		Energy-saving cooling mode, operating in limited temperature range.
		Automatic drying is operating.
		Electric heater is operating in heater mode.
		Humidifier is operating.
		Automatic fan function on indoor unit. The fan doesn't operate in the indoor unit when the compressor is off.

Section	Icon	Description
3 Temperature		Current temperature.
		Cooling temperature setpoint.
		Heating temperature setpoint.
4 Fan Speed		Fan-speed settings.
5 Air-flow/Louvers		Swing louvers up/down.
		Swing louvers left/right.
		Swing louvers for “swirl” (paired, opened cross swing).
6 Controller Modes	SCHEDULE	Operate in schedule mode.
	TEMPORARY	Temporarily operate in a mode.
	OVERRIDE	Override schedule (occupied/unoccupied).
	SETBACK	Operate in set-back mode.
7 State Monitoring	CENTRAL CONTRO	Command received from central controller or outdoor unit.
	INTERLINKED OPE	Slave indoor unit to a heat-pump system. Prevents changing to a mode that is incompatible with the current mode of the outdoor unit.
	OUTDOOR UNIT	Outdoor unit is operating.
	PRE-HEATING	Indoor unit is pre-heating.
	DEFROST	Defrost is operating.
	NOT APPLIED	Function is not applied.
8 Schedule	SIMPLE	Simple schedule is in use.
	SLEEP	Sleep schedule is in use.
	WEEK	Weekly schedule is in use.
	HOLIDAY	Holiday schedule is in use.

Section	Icon	Description
9 Schedule Set-up	SUN MON TUE WED THU FRI SAT	Day of Week: • SUN = Sunday • MON = Monday • TUE = Tuesday • WED = Wednesday • THU = Thursday • FRI = Friday • SAT = Saturday
	1 2 3 4 5	Number of the weekly-schedule event.
	AM PM	Schedule time AM/PM.
	88:88	Schedule time hour/minute.
	min. hr.	min. = minute. hr. = hour.
	OCCUPIED UNOCCUPIED	Weekly schedule occupied/un-occupied state.
	COPY PASTE	Copy/Paste schedule data.

Section	Icon	Description
10 Function Settings	LOUVER ANGLE	Louver set-up.
	1 2 3 4 ALL STD	1, 2, 3, 4, All = louver number. STD = standard louver angle setting.
		Angle of the louver.
	ELEVATION GRILL	Elevation grill set-up.
		Grill up.
		Grill closed.
		Grill down.
	CHILD LOCK	Display lock set-up
		Display is locked.
		Display is not locked.
	AUTO	Set-up minimum-difference value between cooling and heating setpoints.
	SET	Set current time.
	OVERRIDE SET TIME	Set timer for schedule override.
	SETBACK TEMP	Set-up default setback for cooling/heating temperature setpoints.
	FILTER SIGN	Clear the air-filter cleaning alarm.
		Check the indoor-unit air filter and clean if necessary.

2.1 Electrical Data

Table 2-1 Unit electrical data

Model	Nom. Tons	Compressor Qty.	Compressor (A) Cool/Heat	Fan Qty.	ODU Fan (A)	IDU Fan (A)	MCA (A)	MOP (A)
SRC18	1-1/2	1	14.6/14.6	1	0.25	0.40	19	25
SRC24	1-3/4	1	17.3/17.3	1	0.25	0.5	23	35
SRC36	2-3/4	1	17.3/17.3	1	0.25	0.5	23	35

2.2 R410A Refrigerant

R410A refrigerant has a higher operating pressure in comparison to R22 refrigerant and, therefore, all piping-system materials installed must have a higher resisting pressure that the materials traditionally used in R22 systems.

R410A refrigerant is an azeotrop of R32 and R125, mixed at 50:50, so the ozone depletion potential (ODP) is zero. Many countries have approved-of and encouraged R410A for use as an alternate refrigerant.

WARNING

Risk of piping ruptures and refrigerant leaks. Can cause equipment damage, illness, serious injury and death from suffocation. Do not use piping that is not approved for use in high-pressure refrigerant systems. Refrigerant leaks in non-ventilated spaces could cause oxygen depletion levels that are dangerous to humans. Follow accepted safety practices for refrigerant storage, discharging and charging.

NOTE

- *Piping wall thickness must comply with the applicable local, state, and federal codes for the 551-psi design pressure of R410A.*
- *Because R410A is a combination of R32 and R125, the required additional refrigerant must be charged in its liquid state. If the refrigerant is charged in its gaseous state, its composition changes and the system will not work properly.*

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3.0 Installation

3.1 Selecting the Location for the Outdoor Unit

WARNING

Risk of improper installation. Can cause serious injury or death.

- To avoid the possibility of fire, do not install the unit in an area where combustible gas may generate, flow, stagnate, or leak.
- Do not install the unit in a location where acidic solution and spray (sulfur) are often used.
- Do not use the unit in environments where oil, steam, or sulfuric gas are present.

NOTICE

Risk of unauthorized access to the unit. Can cause equipment malfunction or damage.

Install a fence to prevent vermin from crawling into the unit or unauthorized individuals from accessing it.

Select a location for installing the outdoor unit that will meet the following conditions:

- Where the unit will not be subjected to direct thermal radiation from other heat sources.
- Where operating sound from the unit will not disturb inhabitants of surrounding buildings.
- Where the unit will not be exposed to direct, strong winds.
- Where there is enough strength to bear the weight of the unit.
- Include space for drainage to ensure condensate flows properly out of the unit when it is in heating mode.
- Include enough space for air flow and for service access.

To ensure that the outdoor unit operates properly, certain measures are required in locations where there is a possibility of heavy snowfall or severe wind chill or cold.

1. Prepare for severe winter wind chills and heavy snowfall, even in areas of the country where these are unusual phenomena.
2. Position the outdoor unit so that its airflow fans are not buried by direct, heave snowfall. If snow piles up and blocks the airflow, the system may malfunction.
3. Remove any snow that has accumulated 3-15/16 inches or more on the top of the outdoor unit.
4. Place the outdoor unit on a raised platform at least 19-11/16 inches higher than the average annual snowfall for the area. In environments where there is a possibility of heavy snow, the frame height must be more than 2 times the amount of average annual snowfall, and should not exceed the width of the outdoor unit. If the frame width is wider than the outdoor unit, snow may accumulate.
5. Install a snow-protection hood.
6. To prevent snow and heavy rain from entering the outdoor unit, install the suction and discharge ducts facing away from direct winds.
7. Additionally6, the following conditions should be taken into consideration when the unit operates in defrost mode:
   - If the outdoor unit is installed in a highly-humid environment (near an ocean, lake, etc.), ensure that the site is well-ventilated and has a lot of natural light. (For example: Install on a rooftop.)
   - Sidewalks or parking lots near the outdoor unit may accumulate moisture after unit operates in defrost mode that can turn into ice.

Installation location of the outdoor unit can affect indoor-unit operation. The indoor unit may take longer to provide heat, or heating performance will be reduced in winter in the outdoor unit is installed:

- In a narrow, shady location.
- Near a location that has a lot of ground moisture.
- In a highly-humid environment.
- In an area in which condensate does not drain properly.

3.1.1 Ambient air conditions

NOTICE

Risk of exposure to improper environmental conditions. Can cause equipment damage.

- Avoid exposing the outdoor unit to steam, combustible gases, or other corrosive elements.
- Avoid exposing the unit to discharge from boiler stacks, chimneys, steam relief ports, other air-conditioning units, kitchen vents, plumbing vents, or substances that may degrade performance or cause damage to the unit.
- When installing multiple outdoor units, avoid placing the units where discharge of one outdoor unit will blow into the inlet side of an adjacent unit.

3.1.2 Oceanside Applications

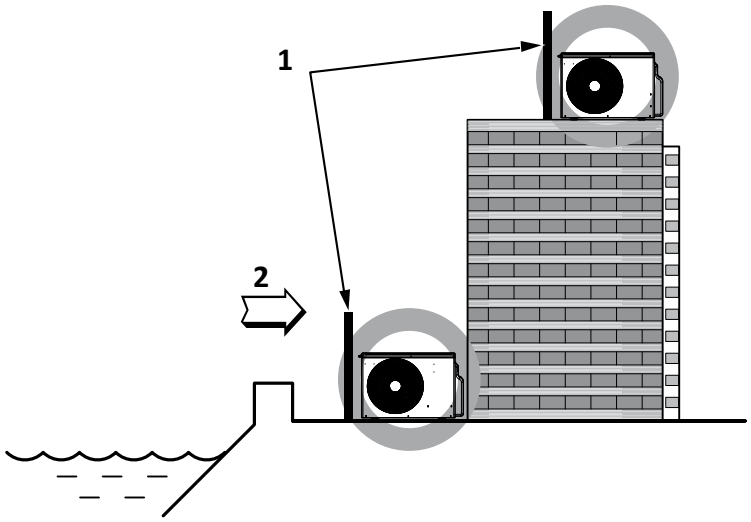
Using a Windbreak to Shield the Unit from Sea Wind

NOTE

Ocean winds may cause corrosion, particularly on the condenser and evaporator fins, which, in turn could cause product malfunction or inefficient performance.

- Avoid installing the unit where it would be directly exposed to ocean winds.
- Install the outdoor unit on the side of the building opposite from direct ocean winds.
- Select a location with good drainage.
- Periodically clean dust or salt particles off of the heat exchanger with water.
- If the outdoor unit must be placed in a location where it would be subjected to direct ocean winds, install a concrete windbreak strong enough to block any winds, see **Figure 3-1** for windbreak location.
- The windbreak should be more than 150% of the outdoor unit's height. There must be 2 to 3-1/2 inches of clearance between the outdoor unit and the windbreak for purposes of flow.

Figure 3-1 Oceanside placement using a windbreak

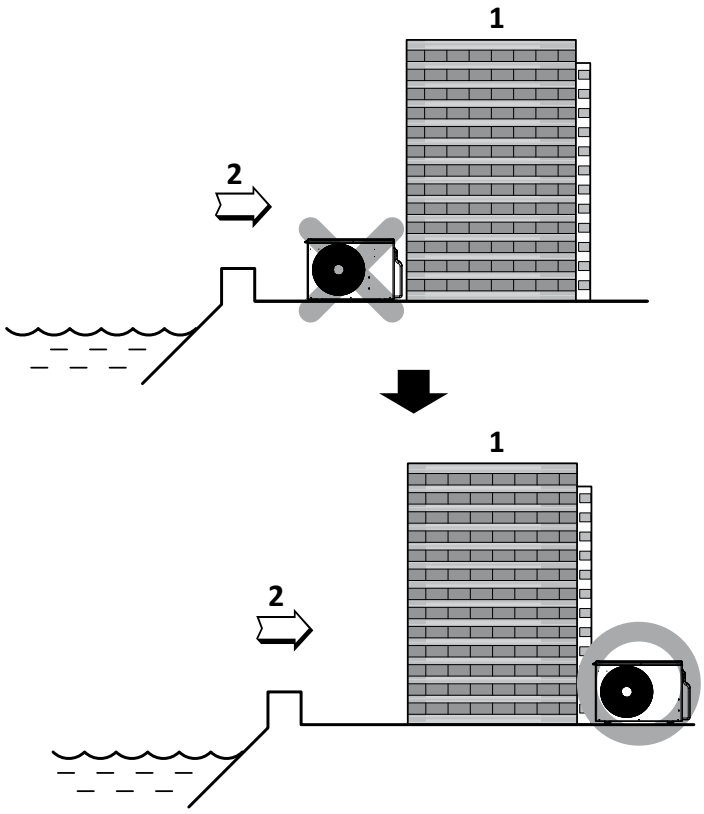


No.	Description
1	Windbreak
2	Sea wind

Using a Building to Shield the Unit from Sea Wind

If a windbreak is not possible, a building or larger structure must be used to shield the outdoor unit from direct exposure to the sea wind. The unit should be placed on the side of the building directly opposite to the direction of the wind as shown in **Figure 3-2**.

Figure 3-2 Oceanside placement using a building



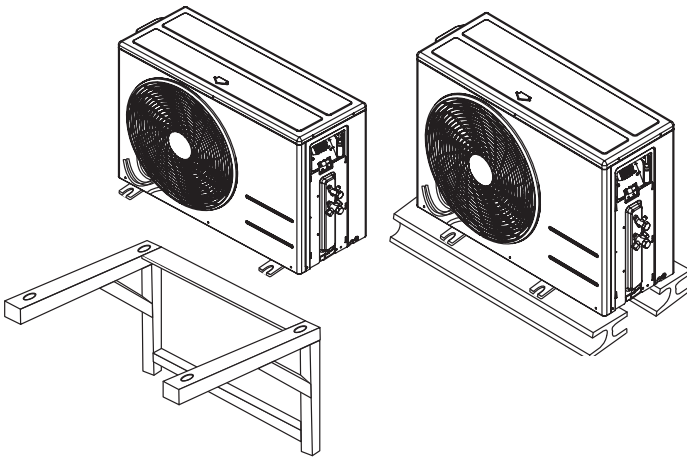
No.	Description
1	Building
2	Sea wind

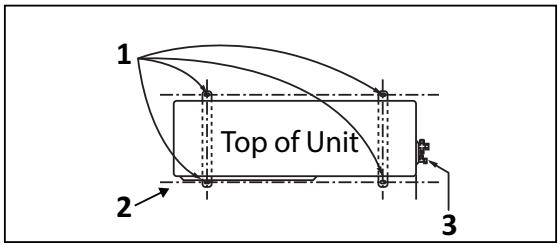
3.2 Mounting the Outdoor Unit

Securely attach the outdoor unit to a condenser pad, base rails, or another mounting platform that is securely anchored to the ground or building structure. Attach the outdoor unit with a bolt and nut on a concrete or rigid mount. See **Figure 3-3**. Follow applicable local codes for clearance, mounting, anchor and vibrations attenuation requirements.

NOTE
All referenced materials are field-supplied. Images are not to scale.

Figure 3-3 Outdoor unit mounting methods





No.	Description	No.	Description
1	Bolt placement and Anti-vibration pad	3	Piping connection
2	Foundation		

3.2.1 Mounting Platform

The underlying structure or foundation must be designed to support the weight of the unit. Avoid placing the unit in a low-lying area where water may accumulate. When installing the outdoor unit on the wall or roof top, anchor the mounting base securely to account for wind, earthquake or vibration.

3.2.2 Tie-downs and Wind Restraints

The strength of the inverter system frame is adequate to be used with field-provided wind restraint tie-downs. The overall tie-down configuration must be approved by a local, professional engineer.

NOTE
Always refer to local code when designing a wind-restraint system.

3.2.3 Snow and Ice Conditions

In climates that experience snow build-up, place the unit on a raised platform to ensure condenser air flow. The raised support platform must be high enough to allow the unit to remain above possible snow drifts. Mount the unit on a field-provided snow stand at a minimum height that is equal to the average annual snowfall plus 20 inches. Design the mount base to prevent snow accumulation on the platform in front or back of the unit case. If necessary, provide a field fabricated hood to keep snow and ice and/or drifting snow from accumulating on the coil surfaces. Use inlet and discharge duct or hoods to prevent snow or rain from accumulating on the fan inlet and outlet guards. Best practice prevents snow from accumulating on top of the unit. Consider the tie-down requirements in case of high winds or where required by local codes.

CAUTION

Risk of run-off water freezing on sidewalks and driveways. Can cause falls and injuries. When selecting the location for the outdoor unit, be sure to choose an area where run-off from defrost will not accumulate and freeze on sidewalks or driveways.

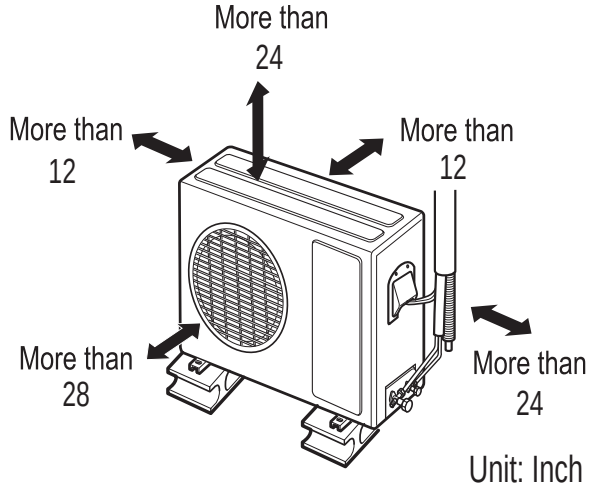
3.3 Clearance requirements

Proper airflow through the outdoor unit coil is critical for correct unit operation. When installing, consider service, inlet and outlet, and minimum allowable space requirements as illustrated in **Figure 3-4**.

3.3.1 Outdoor Unit Clearance

Specific clearance requirements are for the wall-mount systems. **Figure 3-4** shows the overall minimum clearances that must be observed for safe operation and adequate airflow around the outdoor unit.

Figure 3-4 Outdoor-unit clearances



When placing the outdoor unit under an overhang, awning, sunroof or other “roof-like” structure, observe the clearance requirements (as shown in **Figure 3-5**) for height in relation to the unit. This clearance ensures that heat radiation from the condenser is not restricted around the unit. See **Figures 3-6** and **3-7** for recommendations when other obstacles are present.

Adhere to all clearance requirements if installing the unit on a roof. Be sure to level the unit and ensure that the unit is adequately anchored. Consult local codes for roof-top mounting requirements.

NOTE

Do not place the unit where animals and/or plants will be in the path of the warm air, or where the warm air and/or noise will disturb neighbors.

Figure 3-5 Outdoor-unit sunroof/awning clearances

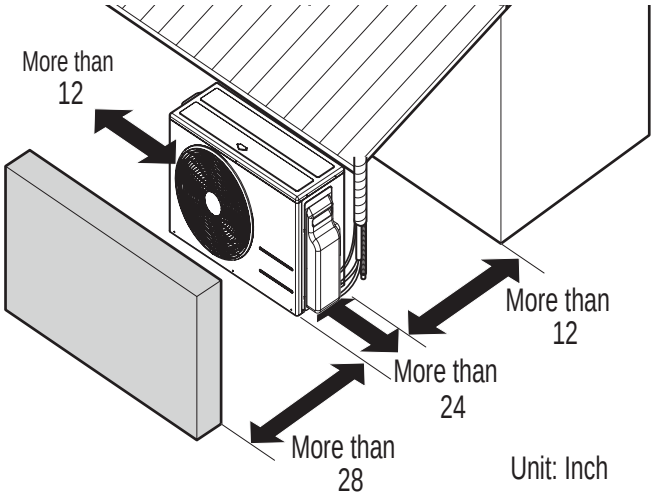
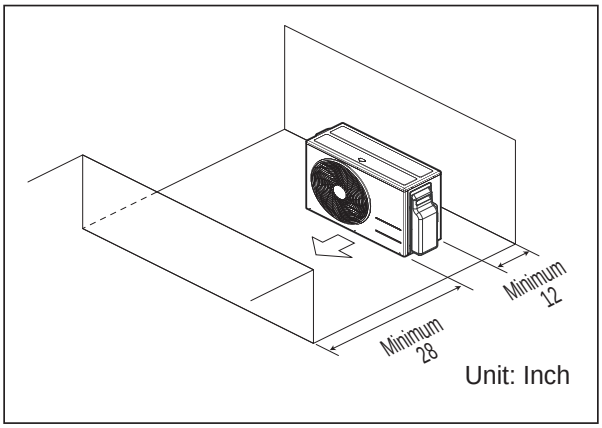


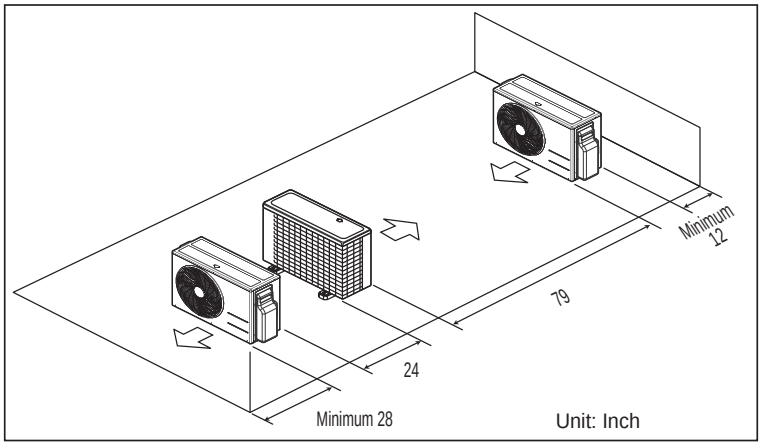
Figure 3-6 Clearances when there are obstacles on both air-inlet and air-outlet sides



NOTE

In **Figures 3-6** and **3-7**, *the obstacle on the outlet side is lower than the outdoor unit.*

Figure 3-7 Clearances when there are obstacles above and on both air-inlet and air-outlet sides

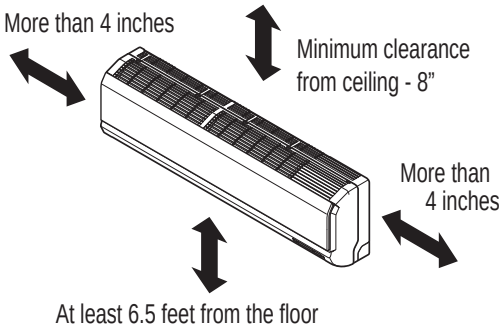


3.3.2 Indoor Unit Clearance

Follow recommended practices when choosing an indoor location for the wall-mounted indoor unit.

- Keep unit away from any indoor steam or excessive heat.
- No obstacles should be placed around the unit.
- Condensation drain (leakage piping) should be routed away from the unit.
- Do not install near a doorway.
- Clearance gap between any wall or enclosure and the left or right side of the unit must be greater than 4 inches, **Figure 3-8**.
- From the top of the unit to the ceiling, there must be greater 8 inches of clearance, see **Figure 3-8**.
- Unit should be at least 6.5 feet from the floor for adequate clearance.

Figure 3-8 Indoor unit clearance requirements



3.4 Installing the Indoor Unit

3.4.1 Mounting the Installation Plate to the Wall (SRC18)

WARNING

Risk of electrical shock. Can cause injury or death.

- When choosing a location for the wall-mount plate, be sure to take into consideration routing of wiring for power outlets within the wall. Avoid contact with hazardous voltage wiring.
- Use caution when drilling holes through the walls for the purposes of piping connections.

Refer to **3.4.3 - Drilling a Piping Hole in the Wall**, as you following the plate-installation procedure.

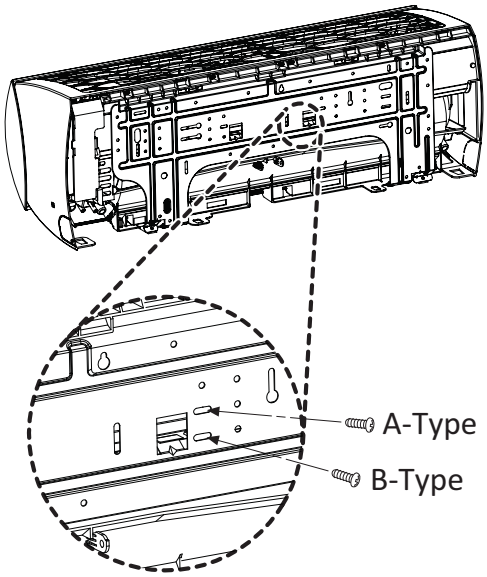
WARNING

Risk of improper mounting.Can cause building and equipment damage, serious injury or death. Consult a structural engineer to determine the suitability of the wall for mounting and the recommended fastening method. Unit must be anchored tightly to a wall having sufficient strength to support the unit during operation to prevent the unit from falling or creating excessive, unnecessary vibration during operation.

Follow this procedure and best practices when mounting the indoor unit’s plate to a wall.

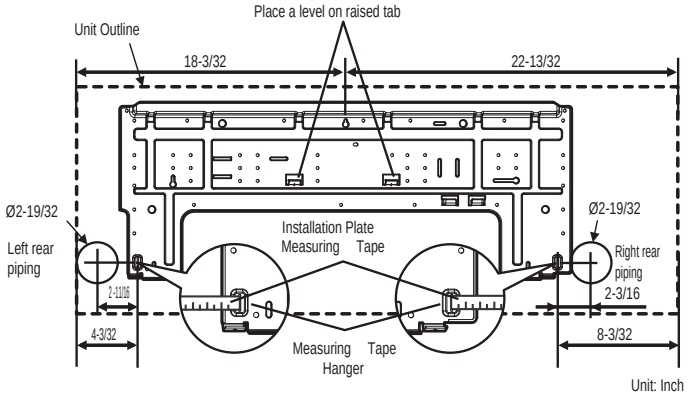
1. Before installation of the plate, confirm the position of the screw types (A or B) between the chassis and the installation plate, **Figure 3-9**.

Figure 3-9 Installation-plate screws for SRC18



2. Depending on indoor-unit model refer to **Figure 3-10** and mount the plate as follows:
   - Use the provided screws and mount the installation plate horizontally by aligning the centerline using a leveling tool.
   - Observe the left and right rear piping clearance when drilling into the wall.

Figure 3-10 Piping clearance for SRC18 plate



3.4.2 Mounting the Installation Plate to the Wall (SRC24, SRC36)

WARNING

Risk of electrical shock. Can cause injury or death.

- When choosing a location for the wall-mount plate, be sure to take into consideration routing of wiring for power outlets within the wall. Avoid contact with hazardous voltage wiring.
- Use caution when drilling holes through the walls for the purposes of piping connections.

Refer to **3.4.3 - Drilling a Piping Hole in the Wall**, as you following the plate-installation procedure.

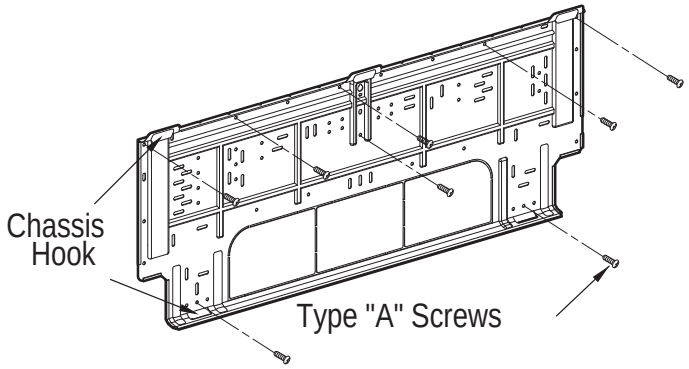
NOTE

Select the location carefully. Unit should be anchored to a strong wall to prevent unnecessary vibration.

Follow this procedure and best practices when mounting the indoor unit's plate to a wall.

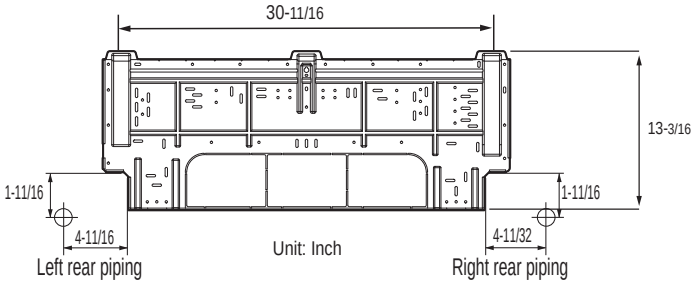
1. Use the provided screws, mount the installation plate horizontally by aligning the centerline using a leveling tool, **Figure 3-11**.

Figure 3-11 Installation-plate screws for SRC24 and SRC36



2. Observe the left and right rear piping clearance when drilling into the wall, **Figure 3-12**.

Figure 3-12 Piping clearance for SRC24 and SRC36 plate

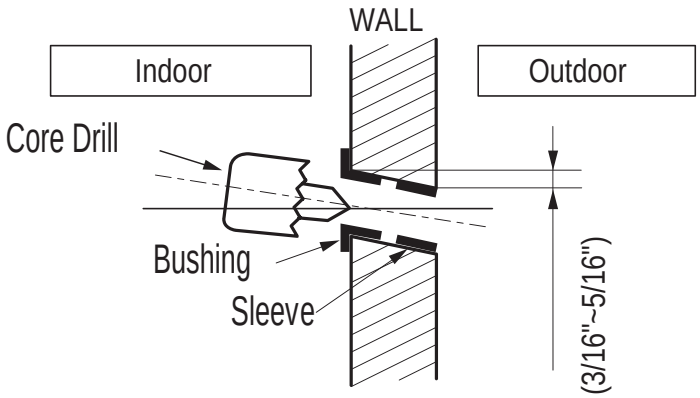


3.4.3 Drilling a Piping Hole in the Wall

Follow the left or right piping-clearance recommendations.

1. Using a 2-5/8 in. (0.65 mm) hole-core drill bits, drill a hole at either the right or left side of the wall mounting, **Figure 3-13**.
   - The slant of the hole should be 3/16 to 5/16 of an inch from level with an upward slant on the indoor-unit side and downward on the outdoor-unit side.
2. Finish-off the newly-drilled hole as shown in **Figure 3-13** with a bushing and sleeve covering.
   - The sleeve and bushing prevents damage to the tubing/bundling of the piping.

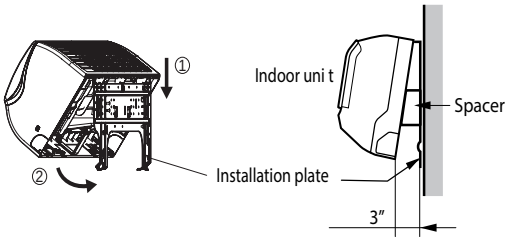
Figure 3-13 Drilling a piping hole



3.4.4 Mounting the Indoor Unit to the Plate

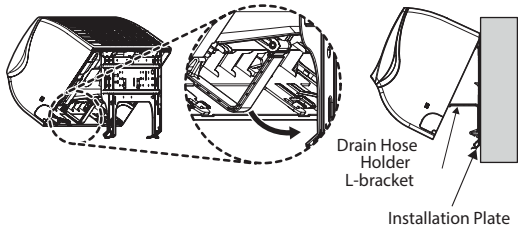
1. Hook the indoor unit onto the upper portion of the installation plate, **Figure 3-14**.
2. Engage the hooks at the top of the indoor unit with the upper edge of the installation plates.
   - Make sure that the hooks are properly seated on the installation plate by moving the unit left and right.

Figure 3-14 Hook the top of the unit to the plate



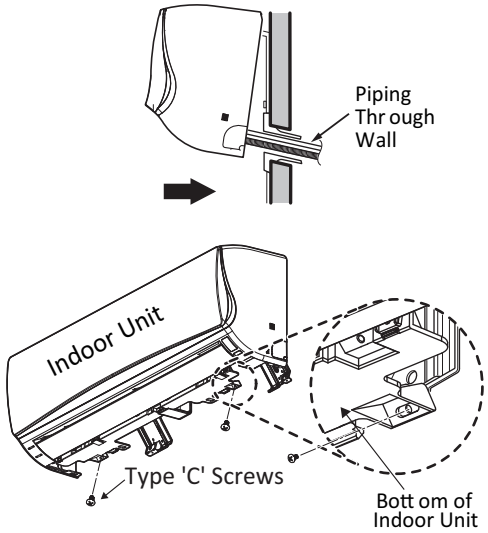
3. Move the bottom of the unit toward the installation plate to anchor to wall, **Figure 3-15**.
   - It helps to press the lower-left and -right sides of the unit against the installation plate until the hooks engage in their slots.
   - You will hear a clicking sound as the bottom attaches to the installation plate.

Figure 3-15 Move the bottom of the unit to the plate and attach to plate



4. Finish by inserting 2 type “C” screws into the bottom of the installation plate, **Figure 3-16**.
   - As you insert the screws, pay attention to the position of the piping through any wall, as shown in the figure.

Figure 3-16 Insert and tighten screws



3.4.5 Prepare for Piping/Electrical Connection

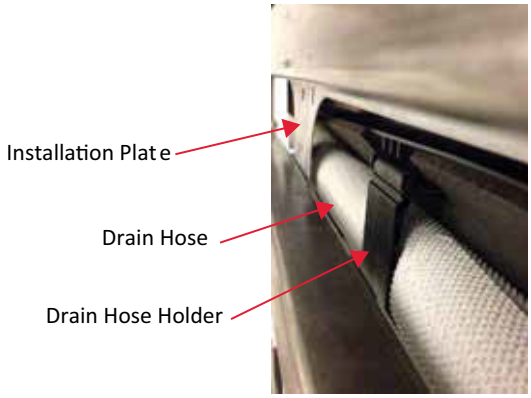
1. To prepare the indoor unit for piping, disengage the bottom on the indoor unit from the installation plate by reversing **Step 3** of **3.4.4 - Mounting the Indoor Unit to the Plate**.
   - This separates the bottom of the indoor unit from the wall mount so you can route the drain hose correctly. **Figure 3-17** shows the rear view of the indoor unit.
2. Swing the drain-hose holder (L-bracket) out and anchor as show in **Figure 3-15**.

3. Refer to **5.0 - Piping**, to continue with the piping connections to the indoor unit.

   – or –

   Refer to **6.0 - Electrical Connections**, to continue with the conduit/electrical wiring to the indoor unit.

Figure 3-17 Rear view of indoor unit



3.5 Pump Down Procedure

CAUTION

Risk of inhalation of refrigerant gas. Can cause illness and injury.

Never air purge with refrigerant as it can cause refrigerant leakage.

NOTE

Use a vacuum pump that can evacuate down to 500 microns.

1. *If moisture remains in the piping after the system is evacuated for 2 hours, break the vacuum (down to 7.5 psi with nitrogen gas).*
2. *Evacuate the system again with the vacuum pump for at least 1 hour to 500 microns.*
3. *If the system does not reach 500 microns within 2 hours, repeat the vacuum break and evacuation procedure until the gauge does not rise.*

This procedure is performed when a unit must be relocated or the refrigerant circuit is serviced. “Pumping down” is a term that means collecting all refrigerant into the outdoor unit without the loss of any refrigerant. Use the following procedure to safely collect refrigerant back into the outdoor unit. Always adhere to and be familiar with local codes regarding the handling of refrigerant.

The system must be placed in Cooling mode to proceed with the pump-down procedure. Refer to **8.3 - Enabling Cooling-only Mode**, for the steps.

CAUTION

Risk of exposure or contact with refrigerant. Can cause injury and illness.

Refrigerant is toxic and too cold for safe human contact. Do not inhale or handle refrigerant directly.

NOTE

Perform pump-down procedure only in cooling mode.

1. Connect a low-pressure gauge with manifold hose to the charge port on the gas-line service valve.
2. Open the gas-line service valve half-way.

3. Purge the air in the manifold hose using the refrigerant.
4. Close the liquid line service valve completely.
5. Turn on the cooling-unit's power switch and start cooling-mode operation, **8.3 - Enabling Cooling-only Mode**.
6. Observe the pressure gauge reading.

   - When the gauge reads 1 to 0.5 kg/cm^2 (14.2 to 7.1 psig), fully-close the gas-line valve and immediately turn of the cooling unit.

   Pump-down is complete, and all refrigerant should be collected into the outdoor unit.

4.0 Installation Checklist

Major Component Rough-in

___ 1. Unit was connected properly per local code and the product installation procedures.

___ 2. All literature and bagged accessories have been removed from the fan discharge.

___ 3. Indoor unit was installed, properly supported, and located indoors in a non-corrosive environment.

___ 4. Unit's gravity condensate drain line was connected and routed where it properly drains away or, if installed in a mechanical room, was connected and properly routed to a drain terminal.

Piping and Insulation

___ 1. Copper

___ 2. Over 5/8 inches—Rigid ACR only

___ 3. 5/8 inches and under—can use soft ACR.

___ 4. 15% silver brazing material only.

___ 5. All refrigerant pipes and valves were insulated separately. Insulation butts up against the walls of the indoor units. No gaps or cracks. Insulation was not compressed at clamps and hangers.

Brazing Practices

___ 1. Medical grade (there are 4 available) dry nitrogen for purging during brazing was used (constant 3 psi while brazing).

Installation

Refer to the details in the Installation section for more information on any procedure.

Refrigerant Piping

___ 1. All pipe materials were properly stored, capped, and clean. All burrs were removed after cutting and pipe ends were reamed before brazing.

___ 2. During refrigerant pipe installation, for each segment of pipe, a record was made of the pipe length (including expansion loops, offsets, double-back sections), and sizes, as well as the quantity and type of elbows used.

___ 3. All long runs of straight pipe were provided with expansion loops.

___ 4. A torque wrench and backup wrench were used to tighten all flare connections.

___ 5. The back side of all flares were lubricated with a small drop of PVE refrigeration oil before tightening flare fittings.

___ 6. Ensure all field-made flares are 45°. Used factory-suppled flare nuts only.

___ 7. Pipe segments were properly supported and all wall penetrations were sleeved.

___ 8. Pipe insulation was not compressed at any point.

___ 9. No oil traps, solenoid valves, sight glasses, filter driers, or any other unauthorized refrigerant specialties were present.

___ 10. Best practice including a minimum of 20-inch straight pipe was installed between each elbow.

Power Wire and Communication Cables

___ 1. Power wiring was connected to a single-phase 208 – 230-V source.

___ 2. Ground wire was installed and properly terminated at the unit.

___ 3. The power supplied was clean with voltage fluctuations with specifications. (±10% of nameplate).

___ 4. Power wiring to the outdoor unit was installed per all local electrical code requirements.

___ 5. Power wiring to the indoor unit was installed per all local electrical code requirements.

___ 6. Factory-supplied cable was used between the indoor unit and the thermostat. No cables were spliced and no wire caps are present.

___ 7. Communication type RS-485-BUS type.

___ 8. All communication cables were a minimum of 18-AWG, 4 conductor, shielded, and stranded, with insulation material per local code. Cable segment shield were tied together.

___ 9. Used appropriate crimping tool to attach ring or spade terminals at all power wiring and control cable terminations.

___ 10. All power and control wires were properly separated using the recommended distance provided in the installation manual.

5.0 Piping

5.1 Piping Preparation

WARNING

- Do not allow the refrigerant to leak during brazing. If the refrigerant is combusted, it generates a toxic gas that can cause physical injury or death.
- Do not braze in an enclosed location, and always test for gas leaks before/after brazing.
- After brazing, check for refrigerant gas leaks.

NOTE

1. *Do not use kinked pipe cause by excessive bending in one specific area on its length.*
2. *Braze the pips to the service-valve pipe stem of the outdoor unit.*

5.1.1 Creating a Flare Fitting

WARNING

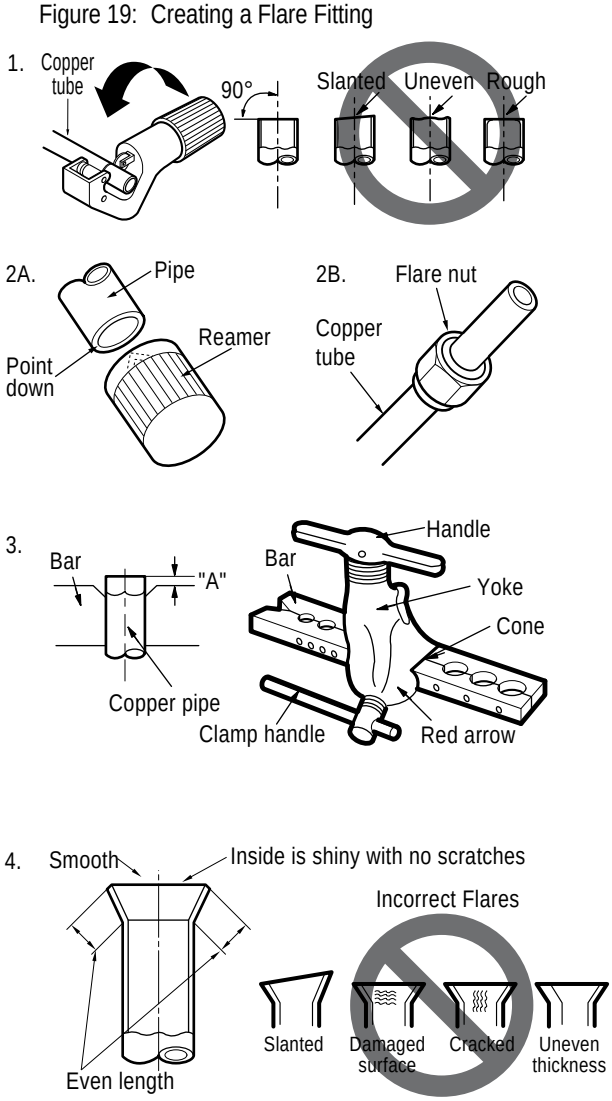
Risk of refrigerant leaks. Can cause equipment malfunction, injury, sickness and death from suffocation due to oxygen depletion in closed, non-ventilated areas.

When selecting flare fittings, always use a 45° fitting rated for use with high-pressure refrigerant R410A. Verify that all fittings comply with local, state, or federal standards.

NOTE

One of the main causes of refrigerant leaks is defective flared connections. Create flared connections using the procedure shown in ***Figure 5-1*** *and steps that follow.*

Figure 5-1 Creating a flared fitting



1. Cut the pipe to length.
   - Measure the distance between the indoor unit and the outdoor unit.
   - Cut the pipes a littler longer than the measured distance.
   - Cut the cable 4.9 ft longer than the pipe length.
2. A. Remove the burrs.
   - Completely remove all burrs from pipe ends.
   - When removing burrs, point the end of the copper pipe down to avoid introducing foreign materials into the pipe.

   B. Slide the flare nut onto the copper tube.
3. Flaring the pipe end.
   - Use the proper size flaring tool to finish flared connections as shown in **Figure 5-1**.
   - Always create a 45° flare when working with R410A. Refer to the Warning preceding this procedure.

4. Carefully inspect the flared pipe end.
   - Compare the geometry with **Figure 5-1** and the dimensions detailed in **Figure 5-2** and **Table 5-1**.

Figure 5-2 Flared-connection dimensions

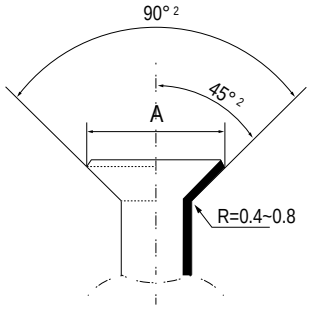


Table 5-1 Flared-connection dimensions

Pipe		"A"		Thickness	
Vapor (in. O.D.)	Liquid (in. O.D.)	Vapor (in.)	Liquid (in.)	Vapor (in.)	Liquid (in.)
1/2	1/4	1/8	1/16	1/8	1/8
5/8	3/8	1/8	1/16	1/16	1/8

5.1.2 Tightening Flare Nuts

NOTE

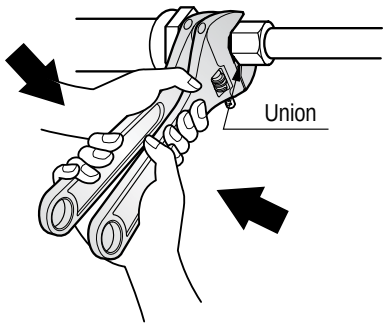
Do not use polyolyester (POE) or any other type of mineral oil as a thread lubricant. These lubricants are not compatible with PVE oil used in this system and create oil sludge leading to equipment damage and system malfunction.

1. When connecting the flare nuts, coat the flare (inside and outside) with polyvinyl ether (PVE) refrigeration oil only.
2. Initially, hand tighten the flare nuts using 3 or 4 turns.
3. Finishing tightening the flare nuts using both a torque wrench and a backup wrench as shown in **Figure 5-3**.

Table 5-2 Tightening torque for flare nuts

Pipe size (in. O.D.)	Tightening torque (ft-lbs)	Width of flare (A [in.])
1/4∅	13.9 – 18	1/8
3/8∅	24.5 – 30.3	1/8
1/2∅	39.7 – 47.7	1/8
5/8∅	45.5 – 59.2	1/16

Figure 5-3 Tightening the flare nuts



5.1.3 Loosening Flare Nuts

Always use 2 wrenches to loosen the flare nuts.

5.2 Piping Materials and Handling

Pipes used for the refrigerant piping system must include the specified thickness, and the interior must be clean.

While handling and storing, do not bend or damage the pipes, and take care not to contaminate the interior with dust, moisture, etc. See **Table 5-3** for care of piping.

Figure 5-4 Keep piping capped while storing

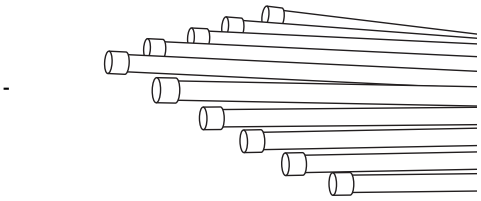
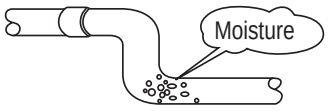
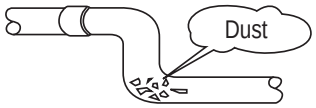
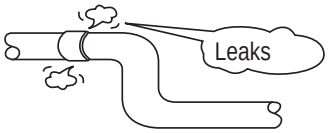


Table 5-3 Three principles of refrigerant piping

	Dry	Clean	Airtight
Principles	No moisture should be inside the piping.	No dust should be inside the piping.	No leaks should occur.
			
Problems Caused	• Significant hydrolysis of refrigerant oil. • Refrigerant oil degradation. • Poor insulation of the compressor. • System does not operate properly. • EEVs, capillary tubes are clogged.	• Refrigerant oil degradation. • Poor insulation of the compressor. • System does not operate properly. • EEVs and capillary tubes become clogged.	• Refrigerant gas leaks/shortages. • Refrigerant oil degradation. • Poor insulation of the compressor. • System does not operate properly.
Solutions	• Remove moisture from the piping. • Piping ends should remain capped until connections are complete. • Do not install piping on a rainy day. • Connect piping properly at the unit's side. • Remove caps only after the piping is cut, the burrs are removed, and after passing the piping through the walls. • Evacuate system to a minimum of 500 microns and ensure the vacuum holds at that level for 24 hours.	• Remove dust from the piping. • Piping ends should remain capped until connections are complete. • Connect piping properly at the side of the unit. • Remove caps only after the piping is cut and burrs are removed. • Retain the cap on the piping when passing it through walls, etc.	• Test system for air-tightness. • Perform brazing proc3edures that comply with all applicable standards. • Perform flaring procedures that comply with all applicable standards. • Perform flanging procedures that comply with all applicable standards. • Ensure that refrigerant lines are pressure-test to 550 psig.

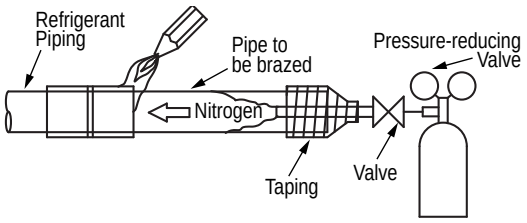
5.2.1 Brazing Practices

NOTE

It is imperative to keep the piping system free of contaminants and debris such as copper burrs, slag, or carbon dust during installation. Contaminants can result in mechanical failure of the system.

All joints are brazed in the field. Refrigeration-system components contain very small capillary tubes, small orifices, electronic expansion valves, oil separators, and heat exchangers that can easily become blocked. Proper system operation depends on the installer using best practices and utmost care while assembling the piping system.

Figure 5-5 Refrigerant-pipe brazing



- While brazing, use a dry-nitrogen purge operating at a minimum pressure of 3 psig and maintain a steady flow.
- Before assembly, use dry nitrogen to blow clean all pipe sections.
- Use a tubing cutter, do not use a saw to cut pipe. De-burr and clean all cuts before assembly.
- Store pipe stock in a dry place. Keep pipe capped and clean.
- Use adapters to assemble different sizes of pipe.
- Do not use flux, soft solder, or anti-oxidant agents.
- Use a 15% silver phosphorous copper-brazing alloy to avoid overheating and produce good flow.
- Protect isolation valves, electronic expansion valves, and other heat-sensitive control components from excessive heat with a wet rag or a heat-barrier spray product.

5.2.2 Refrigerant-piping System Insulation

NOTE

All refrigerant piping, field-provided isolation ball valves, service valves, and elbows shall be completely insulated using closed-cell pipe insulation. The liquid and vapor lines must be insulated separately.

To prevent heat loss/heat gain through the refrigerant5 piping, all refrigerant piping, including liquid lines and vapor lines shall be insulated separately. Insulation shall be a minimum 1/2-in. thick, and thickness may need to be increased based-on ambient conditions and local codes.

All insulation joints shall be glued with no air gaps. Insulation material shall fit snugly against the refrigeration pip3e with no air space between it and the pipe. Insulation passing through pipe hangers, inside conduit, and/or sleeves must not be compressed. Protects insulation inside handers and supports with a second layer. All pipe insulation exposed to the sun and outdoor elements shall be properly protected with PVC, aluminum vapor barrier, or alternatively placed in a weather-resistant enclosure such as a pipe rack with a top cover and meet local codes.

The design engineer should perform calculations to determine if the factory-supplied insulation jackets are sufficient to meet local codes and avoid sweating. Add additional insulation if necessary. Mark all pipes at the pint where the insulation jacket ends. Remove the jacket. Install field-provided insulation on the run-out and main-trunk pipes first. Peel the adhesive glue protector slip from the insulation jacket and install the clam-shell jacket over the fitting.

For specific insulation procedures, see **5.4 - Piping Insulation**.

5.2.3 Selecting Field-supplied Copper Tubing

Copper is the only approved refrigerant-pipe material for use with the Liebert SRC, and Emerson recommends seamless phosphorous deoxidized ACR type copper pipe, hard-drawn rigid type “K” or “L,” or annealed-tempered, copper pipe.

- Drawn temper (rigid) ACR copper tubing is available in sizes 3/8 through 2-1/8 inches (ASTM B 280, clean, dry, and capped).
- Annealed temper (soft) ACR copper tubing is available in sizes 1/4 through 2-1/8 inches (ASTM B 280, clean, dry, and capped).

NOTE

*Tube wall thickness should meet local code requirements and be approved for an operating pressure of 551 psi. If local code does not specify wall thickness, Emerson suggests using tube thickness per **Table 5-4**. When bending tubing, try to keep the number of bends to a minimum, and use the largest radii possible to reduce the equivalent length of installed pipe. Also, bending radii greater than 10 pipe diameters can minimize pressure drop. Be sure that no traps or sags are present when rolling-out soft copper-tubing coils.*

Table 5-4 ACR copper-tubing material

Type	Seamless phosphorous deoxidized
Class	UNS C12200 DHP
Straight Lengths	H58 temper
Coils	O60 temper

Table 5-5 Piping-tube thickness

OD (in.)	1/4	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8	1-5/8
Material	Rigid type “K” or “L” and a soft ACR acceptable			Rigid type “K” or “L” only					
Min. Bend Radius (in.)	.563	.9375	1.5	2.25	3.0	3.0	3.5	4.0	4.5
Min. Wall Thickness (in.)	.03	.03	.035	.040	.042	.045	.050	.050	.050

Table 5-6 ACR copper-tubing dimensions and physical characteristics[1-4]

Nominal Pipe Outside Diameter (in.)	Actual Outside Diameter (in.)	Drawn Temper			Annealed Temper		
		Nominal Wall Thickness (in.)	Weight (lb/ft)	Cubic ft per Linear ft	Nominal Wall Thickness (in.)	Weight (lb/ft)	Cubic ft per Linear ft
1/4	0.250	—	—	—	0.030	0.081	.00020
3/8	0.375	0.030	0.126	.00054	0.032	0.134	.00053
1/2	0.500	0.035	0.198	.00101	0.032	0.182	.00103
5/8	0.625	0.040	0.285	.00162	0.035	0.251	.00168
3/4	0.750	0.042	0.362	.00242	0.042	0.362	.00242
7/8	0.875	0.045	0.455	.00336	0.045	0.455	.00336
1-1/8	1.125	0.050	0.655	.00573	0.050	0.655	.00573

1. All dimensions provided are in accordance with ASTM B280 – Standard.
2. Design pressure = 551 psig.
3. ACR tubing is available as hard-drawn or annealed (soft) and are suitable for use with R410A refrigerant.
4. The Copper Tube Handbook, 2010, Copper Development Association Inc., 260 Madison Avenue, New York, NY 10016.

NOTE

- *Commercially-available piping often contains dust and other materials. Always blow it clean with a dry, inert gas.*
- *Prevent dust, water or other contaminants from entering the piping during installation. Contaminants can cause mechanical failure.*

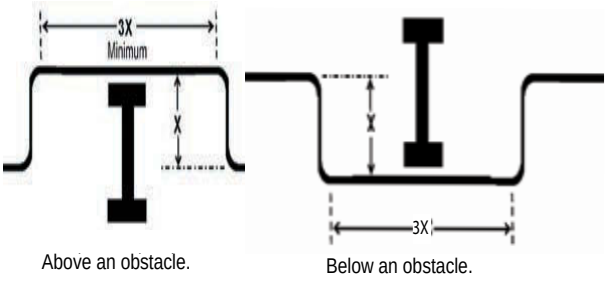
5.2.4 No Pipe Size Substitutions

Use only the pipe size recommended by this manual. Using a different size is prohibited and may result in a system malfunction or failure to work at all.

5.2.5 Obstacles

When an obstacle, such as an I-beam or concrete T, is in the path of the planned refrigerant-pipe run, it is best practice to route the pipe over the obstacle. If adequate space is not available to route the insulated pipe over the obstacle, then route the pipe under the obstacle. In either case, it is imperative that the length of the horizontal section of pipe above or below the obstacle be a minimum of 3-times the longest vertical rise (or fall) at either end of the segment, **Figure 5-6**.

Figure 5-6 Installing piping above and below an obstacle



5.2.6 Copper Expansion and Contraction

Under normal operating conditions, the vapor pipe temperature of a Liebert SRC can vary as much as 280°F. With this large variance in pipe temperature, the designer must consider pipe expansion and contraction to avoid pipe and fitting fatigue failures.

Refrigerant pipe along with the insulation jacket form a cohesive unit that expands and contracts together. During system operation, thermal heat transfer occurs between the pipe and the surrounding insulation.

If the pipe is mounted in free-air space, no natural restriction to movement is present, if the mounting clips are properly spaced and installed. When the refrigerant pipe is mounted underground in a utility duct, stacked among other pipes, natural restriction to linear movement is present. In extreme cased, the restrictive force of surface friction between insulation jackets could become so great that natural expansion ceases and the pipe is “fixed” in place. In this situation, opposing force caused by change in refrigerant fluid/vapor temperature can lead to stress failure of pipes/fittings.

The refrigerant-pipe support system must be engineered to allow free expansion to occur. When a segment of pipe is mounted between two fixed points, provisions must be provided to allow pipe expansion to naturally occur. The most common method is the inclusion of expansion loops or U-bends. Each segment of pipe has a natural fixed point where no movement occurs. This fixed point is located at the center point of the segment assuming that the entire pipe is insulated in a similar fashion. The natural fixed point of the pipe segment is typically where the expansion loop or U-bend should be.

Linear pipe expansion can be calculated using the following formula:

$LE = C \times L \times (T_r - T_a) \times 12$

LE = Anticipated linear tubing expansion (in.)

C = Constant (for copper = 9.2×10^{-6} in./in.°F)

L = Length of pipe (ft)

T_r = Refrigerant-pipe temperature (°F)

T_a = Ambient air temperature (°F)

12 = Inches-to-feet conversion (12 in./ft)

1. From **Table 5-7**, find the row corresponding with the actual length of the straight pipe segment.
2. Estimate the minimum and maximum temperature of the pipe.
   In the column showing the minimum pipe temperature, look up the anticipated expansion distance. Do the same for the maximum pipe temperature.

3. Calculate the difference in the two expansion distance values.
   The result is the anticipated change in pipe length.

Table 5-7 Linear thermal expansion of copper tubing, in inches

Pipe Length[1]	Fluid Temperature, °F																			
	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°	130°
10	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.11	0.12	0.13	0.14	0.15	0.15
20	0.08	0.08	0.10	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.23	0.26	0.28	0.29	0.30
30	0.12	0.12	0.15	0.18	0.20	0.21	0.23	0.24	0.26	0.27	0.29	0.30	0.32	0.33	0.32	0.35	0.39	0.42	0.44	0.45
40	0.16	0.16	0.20	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.43	0.46	0.52	0.56	0.58	0.60
50	0.20	0.20	0.25	0.30	0.33	0.35	0.38	0.40	0.43	0.45	0.48	0.50	0.53	0.55	0.54	0.58	0.65	0.70	0.73	0.75
60	0.24	0.24	0.30	0.36	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.65	0.69	0.78	0.84	0.87	0.90

1. Pipe length baseline temperature = 0°F. “Expansion of Carbon, Copper and Stainless Steel Pipe,”

Example:

A system is installed and the design shows that there is a 100-foot straight segment of tubing between an indoor unit and the outdoor unit. When heating, this pipe transports hot gas vapor to the indoor units at 120°F. When cooling, the same tube is a suction line that returns refrigerant vapor to the outdoor unit at 40°F. Look-up the copper-tubing expansion at each temperature and calculate the difference.

Vapor Line

Transporting hot vapor: 100-ft pipe at 120°F = 1.40 in.

Transporting suction vapor: 100-ft pipe at 40°F = 0.40 in.

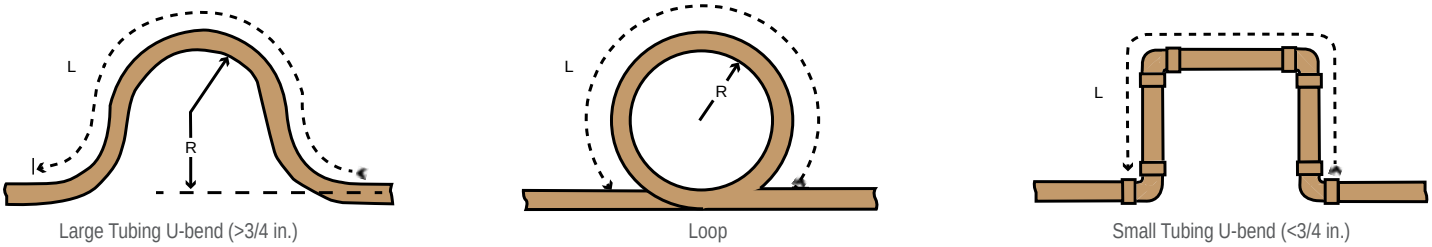
Anticipated change in length: 1.40 in. – 0.40 in. = 1.00 in.

Liquid Line

The liquid temperature remains relatively the same temperature, only direction of flow reverses. Therefore, no significant change in length of the liquid line is anticipated.

When creating an expansion joint, the joint height should be a minimum of two times the joint width. Although different types of expansion arrangements are available, the data for correctly sizing an expansion loop is provided in **Table 5-8**. Use soft copper with long-radius bends on longer runs or long-radius elbows for shorter pipe segments. Using the anticipated linear expansion (LE) distance calculated, look-up the expansion loop or U-bend minimum design dimensions. If you choose to use other types of expansion joints, design per ASTM B-88 Standards.

Figure 5-7 Coiled expansion loops and offsets



Large Tubing U-bend (>3/4 in.) Loop Small Tubing U-bend (<3/4 in.)

Table 5-8 Radii of coiled expansion loops and developed lengths of expansion offsets

Anticipated Linear Expansion (LE) (in.)		Nominal Tube Size (OD) in.			
		1/4	3/8	1/2	3/4
1/2	R[1]	6	7	8	9
	L[2]	38	44	50	59
1	R[1]	9	10	11	13
	L[2]	54	63	70	83
1-1/2	R[1]	11	12	14	16
	L[2]	66	77	86	101
2	R[1]	12	14	16	19
	L[2]	77	89	99	117
2-1/2	R[1]	14	16	18	21
	L[2]	86	99	111	131
3	R[1]	15	17	19	23
	L[2]	94	109	122	143
3-1/2	R[1]	16	19	21	25
	L[2]	102	117	131	155
4	R[1]	17	20	22	26
	L[2]	109	126	140	166

5.2.7 Pipe Bends

When bending soft copper, use long-radius bends. Refer to **Table 5-8** for minimum radius specifications.

5.2.8 In-line Refrigeration Components

NOTE

Components such as oil traps, solenoid valves, filter-dryers, sight glasses, tee fittings, and other after-market accessories are not permitted on the refrigerant-piping system between the outdoor unit and the indoor unit.

Liebert SRC systems are provided with redundant systems that assure oil is properly returned to the compressor. Sight glasses and solenoid valves may cause vapor to form in the liquid stream.

NOTE

Over time, dryers may deteriorate and introduce debris into the system. The designer and installer should verify that the refrigerant-piping system is free of traps, sagging pipes, sight glasses, filter dryers, etc.

5.2.9 Field-provided Isolation Ball Valves

Emerson allows the installation of field-supplied ball valves with Schrader ports at each indoor unit. Full-port isolation ball valves with Schrader ports (positioned between valve and indoor unit) rated for use with R410A refrigerant should be used on both the liquid and vapor lines.

If valves are not installed and a single indoor unit must be removed or repaired, the entire system must be shut down and evacuated. Position valves with a minimum distance of 3 to 6 inches of pipe on either side of the valve, and placed between 6 and 12 inches from the run-out pipe to the upstream main pipe. If ball valves are installed closer that this to the indoor unit, a section of pipe becomes a dead zone where oil may accumulate when the valves are closed.

5.2.10 Using Elbows

Filed-supplied elbows are allowed as long as they are designed for use with R410A refrigerant. The designer, however, should be cautious with the quantity and size of fittings used, and must account for the additional pressure losses in equivalent-pipe-length calculation.

The equivalent pipe length of each elbow must be added to each pipe segment, **Table 5-9**.

Table 5-9 Equivalent piping length for piping components

Component	Size (in.)				
Elbow (ft)	1/4	3/8	1/2	5/8	3/4
	0.5	0.6	0.7	0.8	1.2

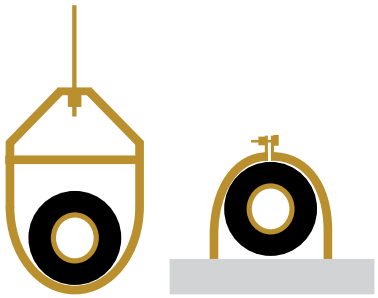
5.2.11 Pipe Supports

NOTE

A properly-installed pipe system should be adequately supported to avoid pipe sagging. Sagging pipes become oil traps that lead to equipment malfunction.

Pipe supports should never touch the pipe wall. Insulate the pipe first because pipe supports must be install outside (around) the primary pipe-insulation jacket, **Figure 5-8**. Use Clevis hangers with shield between the hangers and insulation. Field-provided pipe supports should be designed to meet local codes. If allowed by code, use fiber straps or split-ring hangers suspended from the ceiling on all-thread rods (fiber straps or split-ring hangers may be used as long as they do not compress the pipe insulation). Place a second layer of insulation of the pipe-insulation jacket to prevent chafing and compression of the primary insulation withing the confines of the support-pipe clamp.

Figure 5-8 Pipe-hanger details



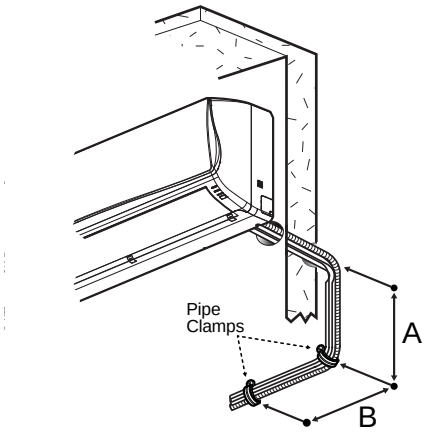
A properly-installed pipe system has sufficient supports to prevent pipes from sagging during the life of the system. As necessary, place supports closer for segments where potential sagging could occur. Maximum spacing of the pipe supports must meet local codes.

If local codes do not specify pipe-support spacing, support the pipes as follows:

- Maximum of 5 feet on center for straight segments of pipe up to 3/4-in. outside diameter.
- Maximum of 6 feet on center for pipe up to 1-in. outside diameter.
- Maximum of 8 feet on center for pipe up to 2-in. outside diameter.

Wherever the pipe changes direction, place pipe clamps within 12 inches on one side and within 12 to 19 inches of bend on the other side, as shown in **Figure 5-9**.

Figure 5-9 Typical pipe-support location for a change in pipe direction

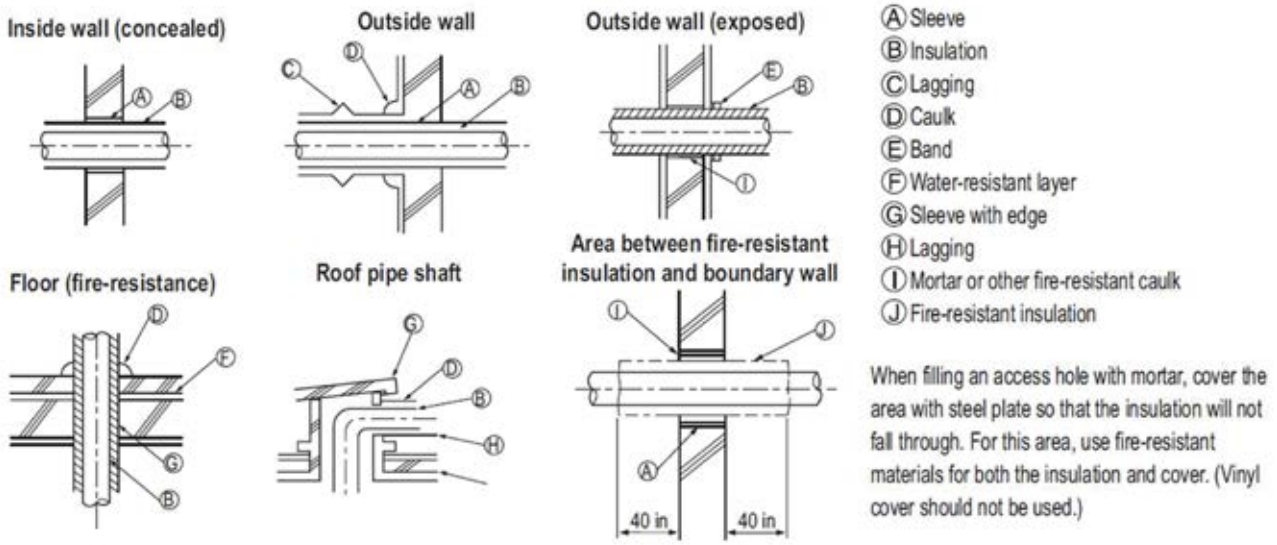


A + B ≈ 12”–19”

5.2.12 Pipe Sleeves at Penetrations

Emerson requires that all pipe penetrations through walls, floors, and pipes buried underground be properly-insulated and routed through an appropriate wall sleeve of sufficient size to prevent compression of refrigerant-pipe insulation and free movement of the pipe withing the sleeve, **Figure 5-10**.

Figure 5-10 Pipe sleeve options



NOTE

The diameter of the penetrations must be determined by the pipe diameter plus the thickness of the insulation.

5.2.13 Underground Refrigerant Piping

Refrigerant pipe installed underground should be routed inside a vapor-tight protective sleeve to prevent deterioration of the insulation and water infiltration. Refrigerant pipe installed inside underground casing must be continuous without any joints. Underground refrigerant pipe must be located at a level **below the frost line**.

Figure 5-11 shows the arrangement of refrigerant pipe and cable(s) in a conduit. **Table 5-10** shows conduit sizes for utility conduit.

Figure 5-11 Typical arrangement of pipe and cables in a utility conduit

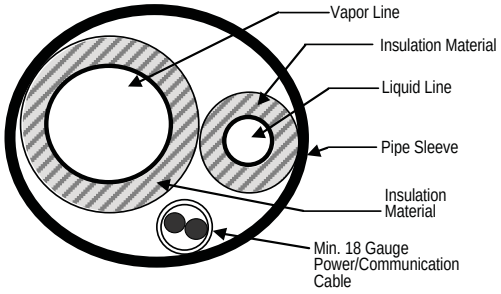


Table 5-10 Utility-conduit sizes

Liquid Pipe[1]	Vapor Pipe[1]	
	3/8 (1-1/8[2,3])	5/8 (2-1/8[2,4])
3/8 (1-1/8)[3]	4	4

1. OD pipe diameter in inches. Values in parentheses indicate OD of pipe with insulation jacket.
2. Diameter of pipe with insulation. Thickness of pipe insulation is typical. Actual required thickness may vary based on surrounding ambient conditions and should be calculated and specified by the design engineer.
3. Insulation thickness (value in parenthesis) = 3/8 inch.
4. Insulation thickness (value in parenthesis) = 1 inch.

Table 5-11 Heat-pump unit refrigerant-pipe connections (All brazed type)

Model	Liquid Conn., in.	Vapor Conn., in.
SCR18, 24, 36	3/8	5/8

5.3 Piping Connections

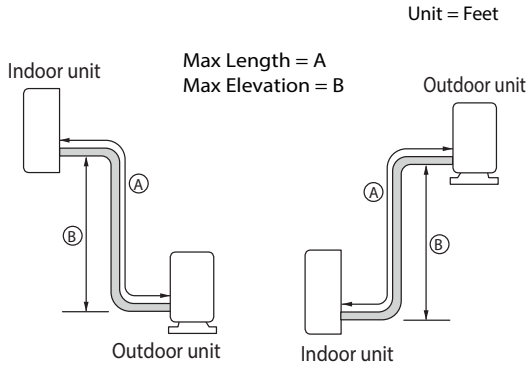
5.3.1 Connection Limitations

Liebert SRC systems consist of one outdoor unit and one indoor unit. One of the most critical elements of a system is the refrigerant piping. **Table 5-12** lists pipe-length limits that must be followed in the design of an SRC system. Refer to **Figure 5-12** for maximum length and elevation of piping.

Table 5-12 Refrigerant-piping system limitations

Pipe Length (ELF = Equivalent length of pipe in feet)	Longest total equivalent piping length	SRC18	SRC24	SRC36
		98.4	164.0	164.0
	Shortest total equivalent piping length	9.8	9.8	9.8
	Distance between fittings and indoor units or outdoor units	≥20 in.	≥20 in.	≥20 in.
Elevation (All elevation limitations are measured in actual feet.)	If outdoor unit is above indoor unit.	49.2	98.4	98.4
	If outdoor unit is below indoor unit.	49.2	98.4	98.4
Additional refrigerant needed (oz/ft)		0.22	0.38	0.38

Figure 5-12 System layout

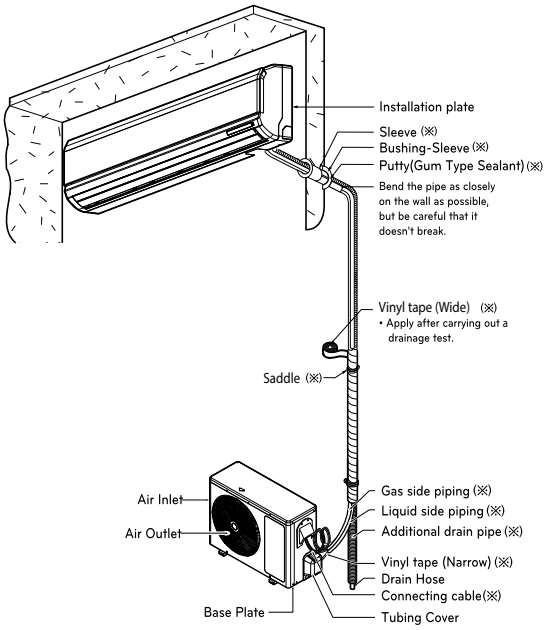


5.3.2 Piping Connections Layout

Liebert SRCs are a 1-to-1 system. There is a direct piping connection between the outdoor unit and the indoor unit. **Figure 5-13** illustrates the basic pipe connections between the outdoor and indoor unit. Refer back to this illustration as you proceed with pipe connection. **Figure 5-13** shows the indoor unit installed at a higher position than the outdoor unit. However, if you install the outdoor unit in a higher position than the indoor units, the basic pipe connections still apply.

Refer to **Table 5-12** for specific length limitations on indoor- and outdoor-unit positioning.

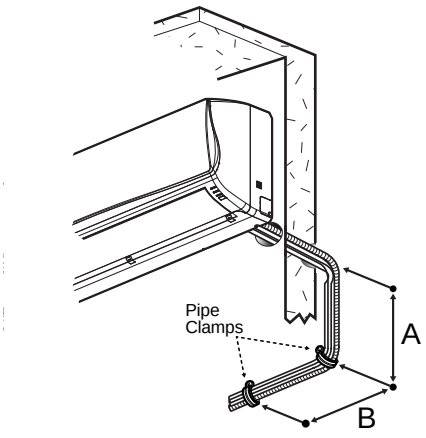
Figure 5-13 Piping installation and connection overview



NOTE

- *As you proceed with the piping connections, be sure to adhere to the pipe-support spacing as shown in **Figure 5-14**. Refer back to **5.2.11 - Pipe Supports**, for more information about using elbows, clamps and pipe-support materials.*
- *Always follow state and local codes for piping and accurate support-spacing along the outdoor pipe line.*

Figure 5-14 Pipe-support spacing for outdoors

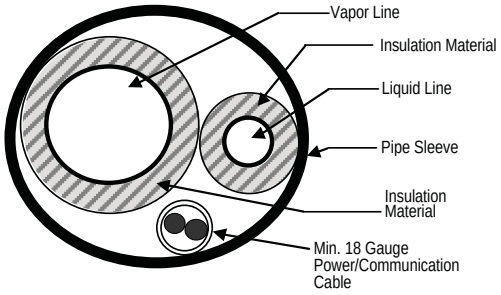


A + B ≈ 12”–19”

5.3.2.1 Pipe bundling

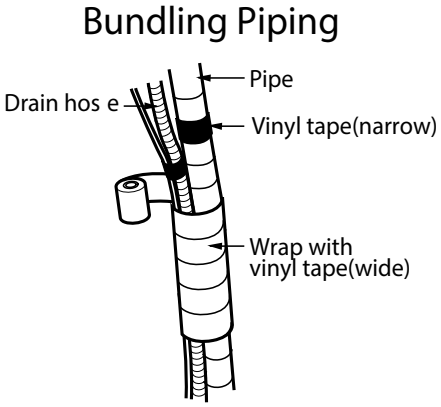
Refer to **Figure 5-15** for proper cable and pipe bundling. Note the placement of the piping along with the necessary insulation material.

Figure 5-15 Proper pipe and cable bundling—cut-away



1. Be sure to wrap each pipe with proper insulation material.
2. Secure the piping by wrapping vinyl tape vinyl tape around the pipe.
   - Use narrow-size tape for wrapping the actual pipe, **Figure 5-16**.
3. You can include the drain hose in the bundled piping and wrap all of them together using wider vinyl tape, **Figure 5-16**.
   - The end of the drain-hose outlet must be routed above the ground.

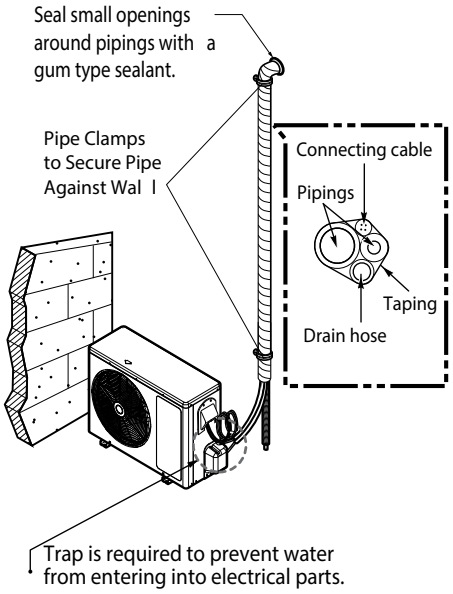
Figure 5-16 Bundling and taping piping and cables



5.3.2.2 Bundling and Trap when Indoor Unit is above Outdoor Unit

1. Refer to **Figure 5-17**, and tape the piping, drain hose, and connection cable from down to up.
2. Secure the taped piping along the exterior wall using pipe clamps.
3. Create a trap above the electrical connections cover to prevent water from penetrating electrical components and wiring.

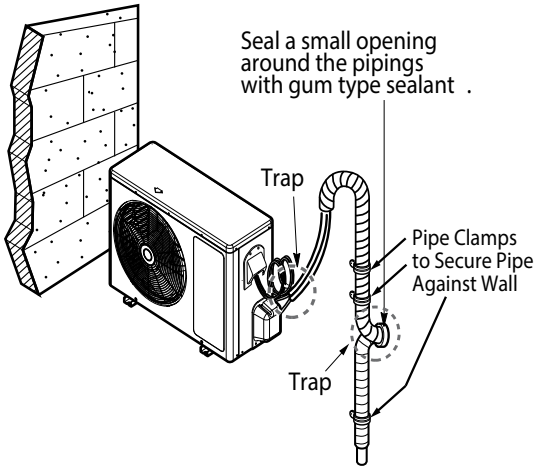
Figure 5-17 Piping/Trap when indoor unit is above outdoor unit



5.3.2.3 Bundling and Trap when Indoor Unit is below Outdoor Unit

1. Refer to **Figure 5-18**, and tape and tape the piping, drain hose, and connection cable from down to up.
2. Secure the taped piping along the exterior wall using pipe clamps.
3. Create a trap above the electrical connections cover to prevent water from penetrating electrical components and wiring.

Figure 5-18 Piping/Trap when indoor unit is below outdoor unit



5.3.3 Routing the Drain Hose for Indoor Unit

Drain hose is routed from the indoor unit, through the structure (wall) to the outdoors. The hose should slope at an angle where it is higher at the indoor unit and lower at the outdoor area, letting gravity push condensation down and out. **Figure 5-19** shows the proper drainage slope. **Figure 5-20** shows incorrect methods of routing the drain hose, which cause leakage at the indoor unit.

Figure 5-19 Correct slope angle for drain hose

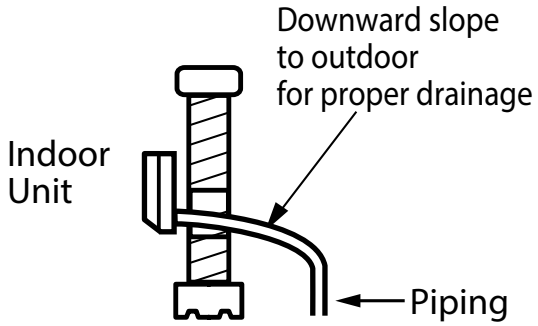
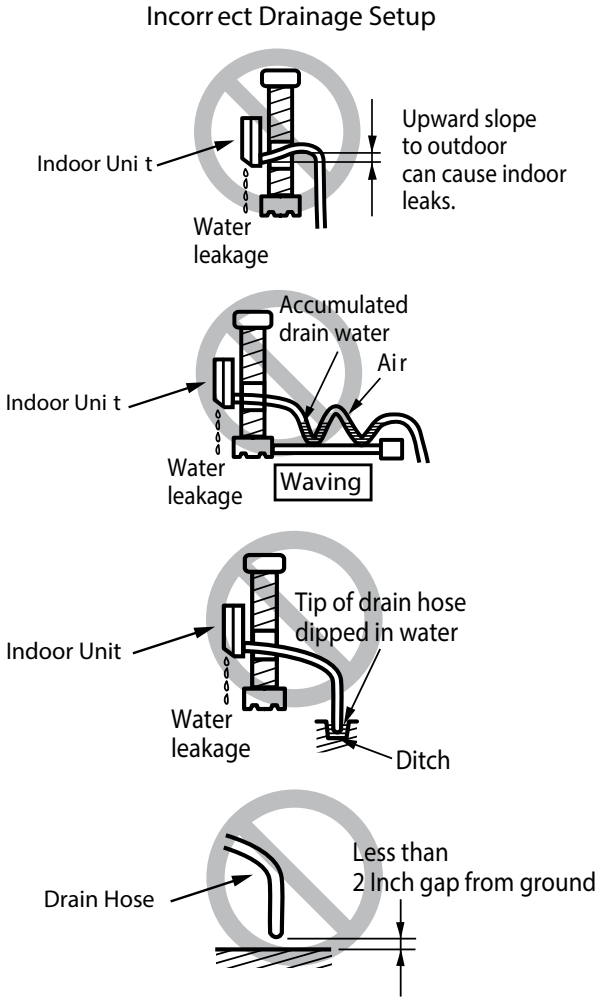


Figure 5-20 Incorrect methods of routing drain hose



5.3.4 Installing a Drain Hose on the Outdoor Unit

Depending on the installation site, it may be necessary to install a drain plug (factory-supplied).

1. Depending on your unit model, refer to **Figure 5-21** or **5-22** and to **Table 5-13** for the drain-connection components.
2. Connect a field-suppled hose to the drain connections (A). If the hose is too long, position it carefully to prevent kinks.

Table 5-13 Outdoor unit drain-connection components

Label	Quantity, each		Component
	SRC18	SRC24, SRC36	
A	1	1	Drain connection
B	3	1	Drain cap
C	1	1	Drain washer

NOTE

Do not use a drain hose with the outdoor unit in cold climates, otherwise the drain water may freeze and impair heating performance.

Figure 5-21 Outdoor unit drain-connection components for SRC18

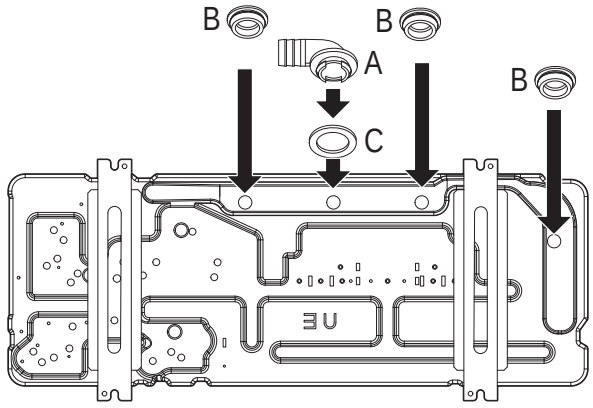
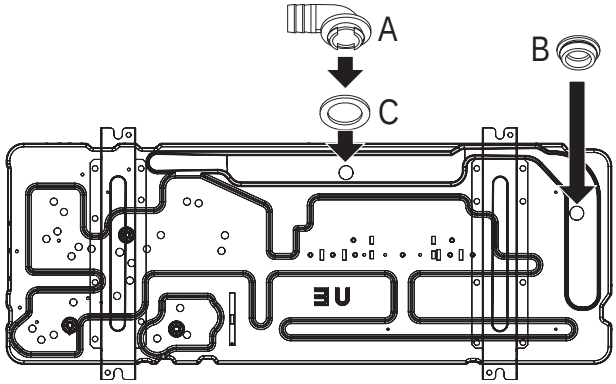


Figure 5-22 Outdoor unit drain-connection components for SRC24 and SRC36

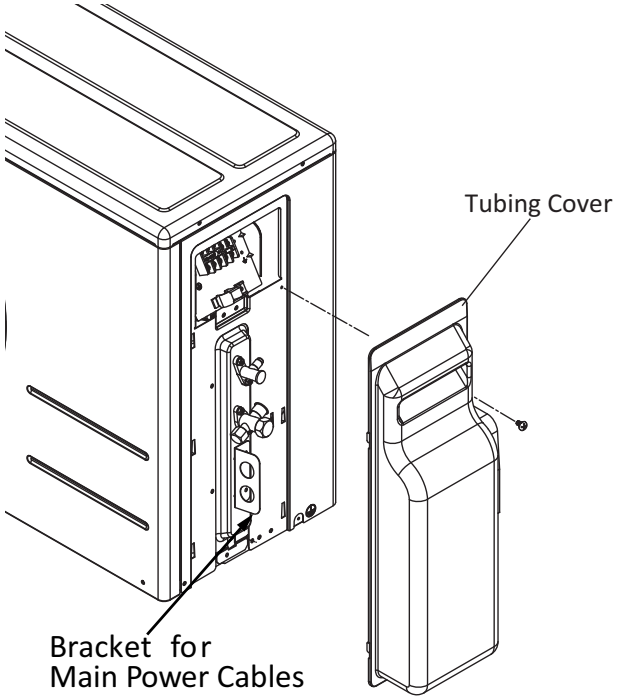


5.3.5 Connecting Piping on the SCR18 Outdoor Unit

1. Remove the tubing cover by loosening the fastening screws, **Figure 5-23**.

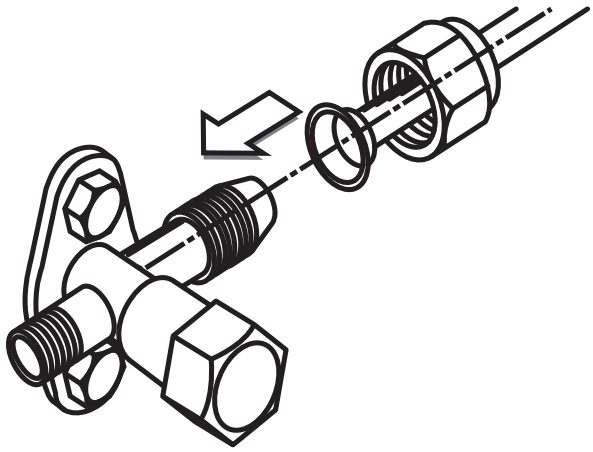
NOTE
Do not thread liquid or gas piping through bracket used to hold main power cables.

Figure 5-23 Removing connection cover from SRC18 outdoor unit



2. Align the center of the refrigerant pipe and corresponding connection as shown in **Figure 5-24**.

Figure 5-24 Align center of piping connection



3. Refer to **Figure 5-25** for correct liquid and gas pipe attachment to the outdoor unit.
4. Place a couple of drops of refrigerant oil on the opening rim of the flare before assembling, making sure that you do not introduce any contaminants, and tighten the flare nut by hand.

5. Following the torque guidelines in **Figure 5-14**, finish tightening the flare nut with a torque wrench until the wrench clicks referring to **Table 5-25** for correct connection points.

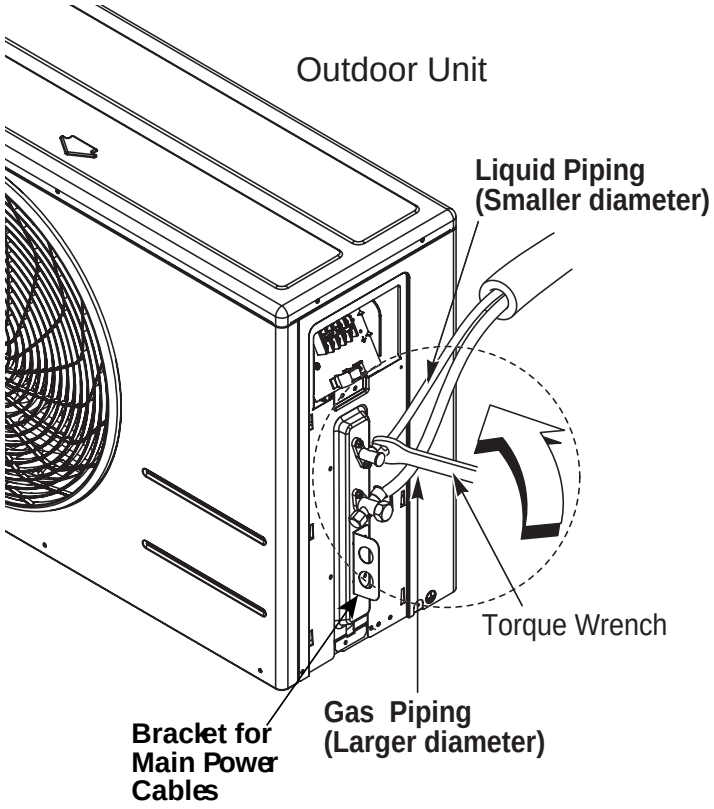
NOTE

When tightening the flare nut with a torque wrench, make sure the direction for tightening follows the arrow on the wrench.

Table 5-14 Tightening torque for flare nuts

Pipe size (in. O.D.)	Tightening torque (ft-lbs)
1/4	13.9 – 18
3/8	24.5 – 30.3
1/2	39.7 – 47.7
5/8	45.5 – 59.2
3/4	71.6 – 87.5

Figure 5-25 Correct piping attachment for SRC18 outdoor unit

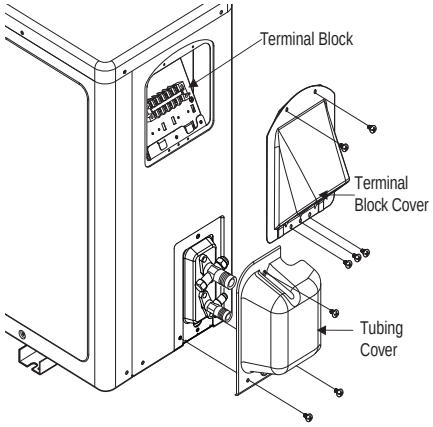


5.3.6 Connecting Piping on the SCR24 and SCR36 Outdoor Unit

1. Remove the tubing cover by loosening the fastening screws, **Figure 5-26**.

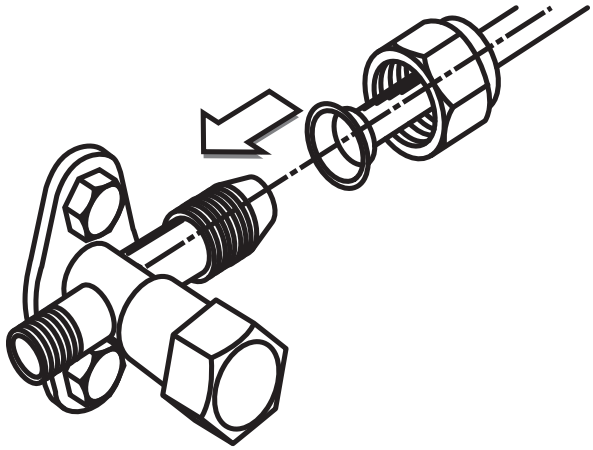
NOTE
When tightening the flare nut with a torque wrench, make sure the direction for tightening follows the arrow on the wrench.

Figure 5-26 Removing connection cover from SRC24 and SRC36 outdoor unit



2. Align the center of the refrigerant pipe and corresponding connection as shown in **Figure 5-27**.

Figure 5-27 Align center of piping connection



3. Refer to **Figure 5-28** for correct liquid and gas pipe attachment to the outdoor unit.
4. Place a couple of drops of refrigerant oil on the opening rim of the flare before assembling, making sure that you do not introduce any contaminants, and tighten the flare nut by hand.

5. Following the torque guidelines in **Table 5-15**, finish tightening the flare nut with a torque wrench until the wrench clicks referring to **Figure 5-28** for correct connection points.

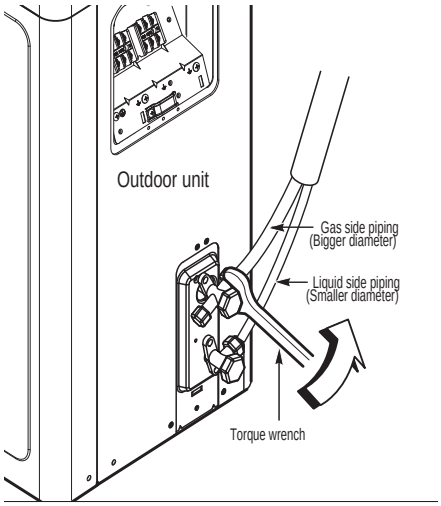
NOTE

When tightening the flare nut with a torque wrench, make sure the direction for tightening follows the arrow on the wrench.

Table 5-15 Tightening torque for flare nuts

Pipe size (in. O.D.)	Tightening torque (ft-lbs)
1/4	13.9 – 18
3/8	24.5 – 30.3
1/2	39.7 – 47.7
5/8	45.5 – 59.2
3/4	71.6 – 87.5

Figure 5-28 Correct piping attachment for SRC24 and SRC36 outdoor unit

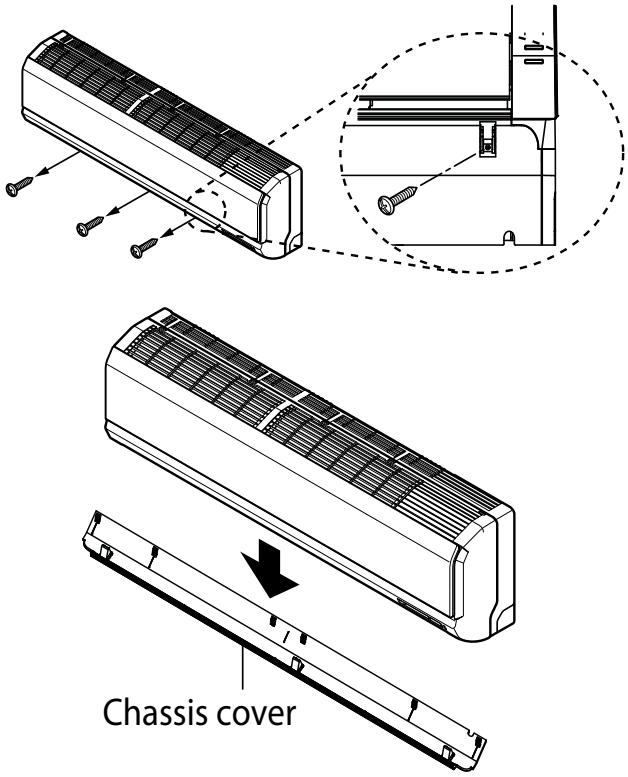


5.3.7 Connecting Piping on the Indoor Unit

While following this procedure, refer to **5.3.2.1 - Pipe bundling** for specific bundling instructions, and to **5.3.3 - Routing the Drain Hose for Indoor Unit** for proper drainage slope during piping.

1. Pull the screw cap at the bottom of the indoor unit.
2. Unscrew the 3 screws at the bottom of the chassis cover, **Figure 5-29**, and remove the chassis cover, taking care not to scratch the main horizontal vane.

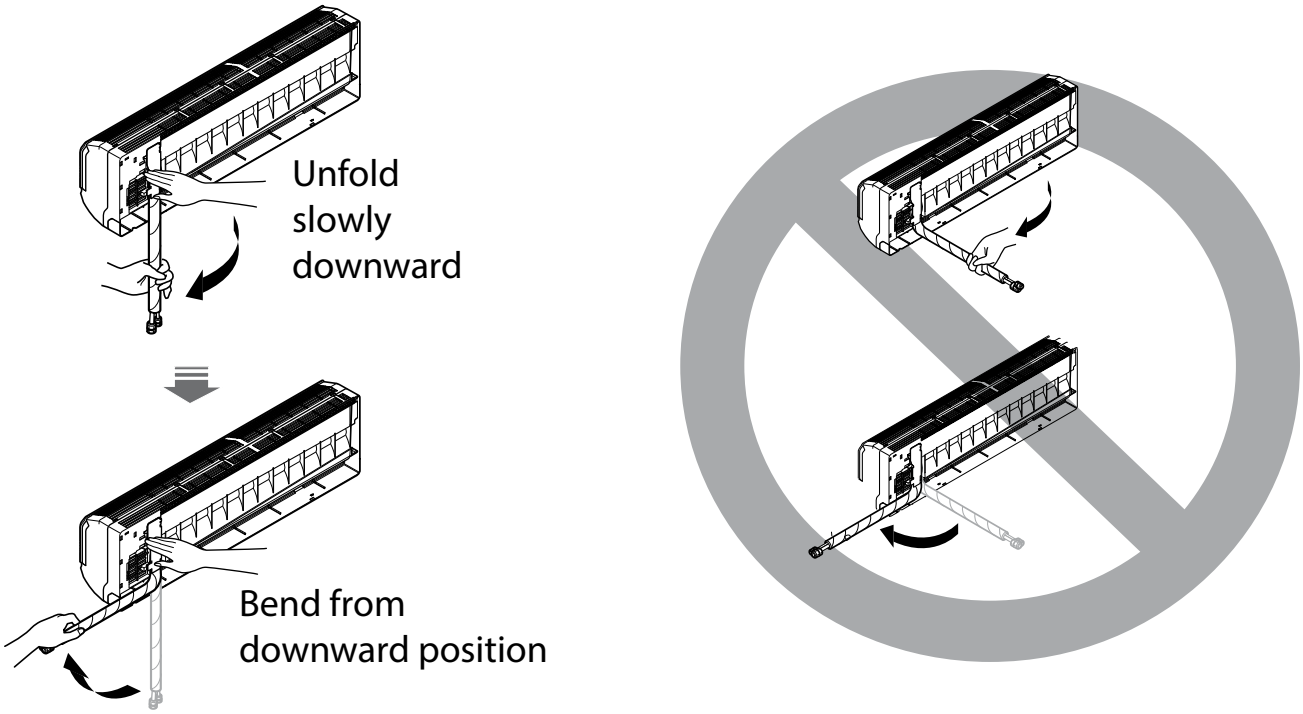
Figure 5-29 Removing the chassis cover from indoor unit



3. From the rear of the indoor unit, pull the tubing holder away from the unit as shown in **Figure 5-30**.
4. Remove the pipe port cover.
5. Position the tubing by unfolding the tubing and bending the tubing slowly downward first, as shown in **Figure 5-30**.

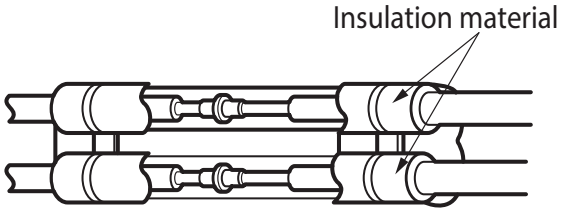
NOTE
Bending the tubing directly left or right, without bending downward first, may cause damage.

Figure 5-30 Bending drain tubing at rear of indoor unit



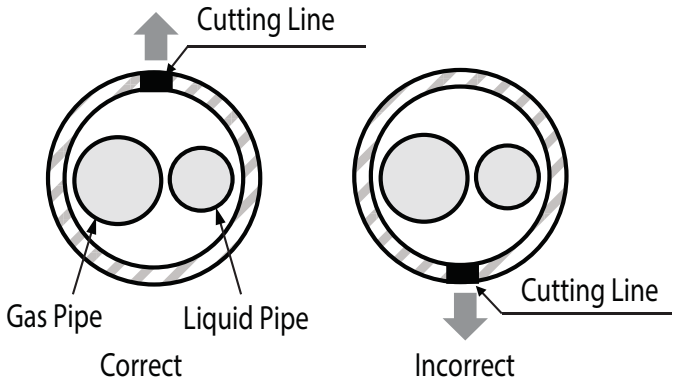
6. As shown in **Figure 5-31**, the fully encase the connection pipe and the indoor-unit pipe in insulation material by binding them together using vinyl tape. Make sure there are not gaps when binding.

Figure 5-31 Piping connection with insulation material



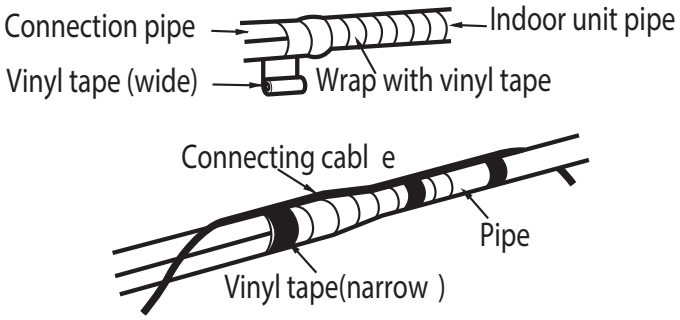
7. Make sure the tube cutting line is placed upward, **Figure 5-32**.

Figure 5-32 Correct cutting line placement



8. Use narrow type vinyl tape, and make sure that the section placed in the rear pipe housing is wrapped sufficiently.
9. Continue to wrap the indoor-unit pipe connection to the outdoor-unit as shown in **Figure 5-33**.

Figure 5-33 Wrapping connection pipe to indoor-unit pipe



10. Using a wider vinyl tape, bundle the piping and the drain hose together, **Figure 5-34**.
    - The tape should cover the piping and fit into the rear pipe housing on the back of the indoor unit as shown in **Figure 5-35**.

Figure 5-34 Bundling pipe and drain hose at rear of indoor unit

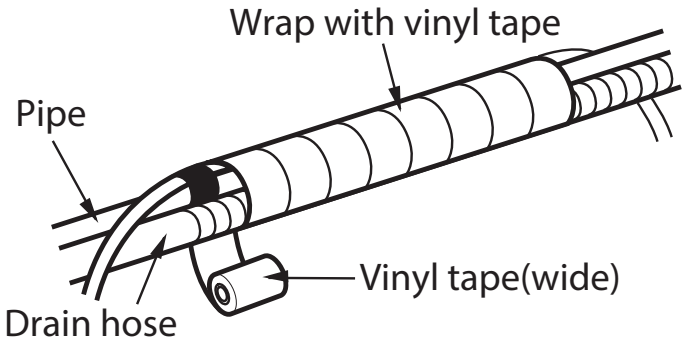
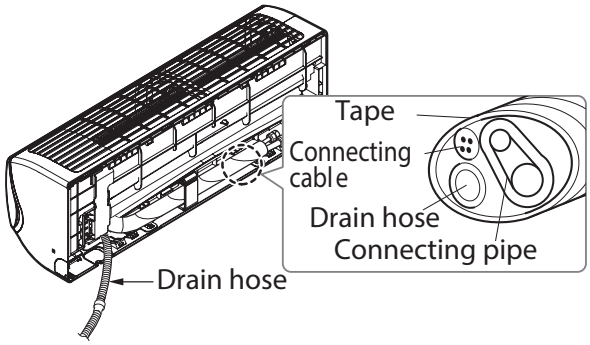


Figure 5-35 Piping bundle placement in housing at rear of indoor unit



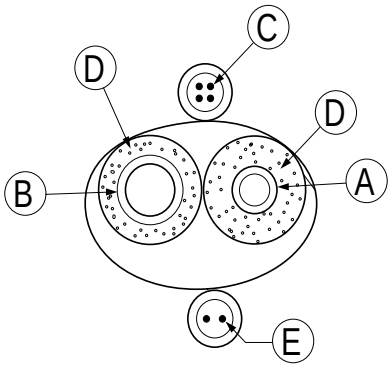
5.4 Piping Insulation

To prevent heat loss/heat gain through the refrigerant piping, all refrigerant piping, including liquid lines and vapor lines, must be insulated separately. Insulation must be a minimum 1/2-in. thick, and the thickness may need to be increased based on ambient conditions and local codes. All refrigerant piping, including field-supplied isolation ball valves, service valves, and elbows must be completely insulated using closed-cell pipe insulation. All insulation joints must be glued with no air gaps. Insulation material must fit snugly against the refrigerations pipe with now space between it and the pipe. Insulation passing through pipe hangers, inside conduit, and/or sleeves must not be compressed. Protect insulation inside hangers and supports with a second layer. All pipe insulation exposed to direct sunlight and deterioration-producing elements must be properly protected with a PVC-aluminum vapor-barrier jacket, or placed in a weather-resistant enclosure such as a pipe rack with a top cover. The design engineer should perform calculations to determine if the factory-supplied insulation jackets have sufficient thickness to meet local codes and to void sweating at job-site conditions. Maximum refrigerant-pipe temperature is 227°F. Minimum refrigerant-pipe temperature is –4°F. Add additional insulation if necessary.

NOTE

- *Do not insulate gas and liquid pipes together as this can result in pipe leakage and malfunction due to extreme temperature fluctuations.*
- *Be sure to fully insulate the piping connections.*

Figure 5-36 Typical pipe-insulation, power wire, and communications-cable arrangement



A Liquid Pipe
B Gas Pipe
C Power Wiring
D Insulation
E Communication Cables

Figure 5-37 Typical butt-joint insulation at indoor unit

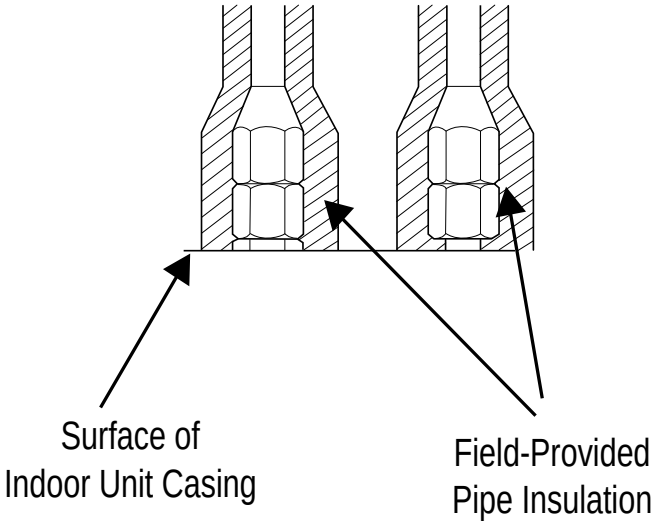
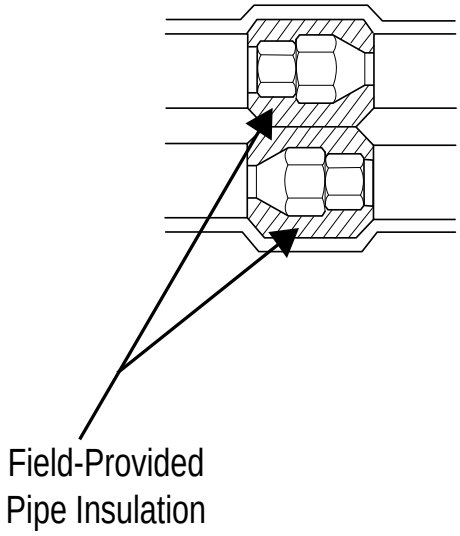


Figure 5-38 Typical refrigerant flare-fitting insulation



5.4.1 Minimum Requirements for Wall Thickness of Ethylene Propylene Diene Methylene (EPDM) Pipe Insulation

NOTE
Follow local codes when selecting EPDM insulation wall thickness.

Table 5-16 Insulation guidelines for typical and special circumstances

Classification		Air-conditioned location		Non-air-conditioned location	
		1. Typical location	2. Special location	3. Typical location	4. Special location
Liquid pipe	1/4 in.	1/2 in.	1/2 in.	1/2 in.	1/2 in.
	3/8 in.				
	≥1/2 in.	1/2 in.	1/2 in.	1/2 in.	1/2 in.
Vapor	3/8 in.	1/2 in.	3/4 in.	3/4 in.	1 in.
	1/2 in.				
	5/8 in.				
	3/4 in.				
	7/8 in.				
	1 in.				
	1-1/8 in.	3/4 in.			
	1-1/4		1 in.	1 in.	
	1-3/8 in.				
	1-1/2 in.				
	1-3/4 in.				

1. Typical location (air-conditioned): When the piping passes through and indoor area where the indoor unit operates.
   - Apartment, classroom, office, mall, hospital, etc.
2. Special location (air-conditioned):
   a. When the location is air-conditioned, but there is severe temperature/humidity difference due to high ceilings.
      - Church, auditorium, theater, lobby, etc.
   b. When the location is air-conditioned, but internal temperature/humidity are high.
      - Bathroom, swimming pool, locker room, etc.
3. Typical location (non air-conditioned): When the piping passes through an indoor area where the indoor unit does not operate.
   - Hallway, dormitory, school, etc.
4. Special location (non air-conditioned): If the following conditions are present:
   a. When the piping passes through an indoor area where the indoor unit does not operate.
   b. When the humidity is high and there is no air flow in the location where the piping is installed.
      - The thickness of the above insulation material is based on heat conductivity of 0.61 Btu/in/h/ft^2/°F.

5.5 Air Purging

Air purging is performed after all piping is connected between the indoor and the outdoor unit. This step is necessary to be sure that air refrigerant can flow through the system without the danger of leakage or pressure issues. Air and moisture that is left in the ping can lead to undesirable results and can cause damage to the working unit. it is important to go through a complete air-purging cycle to be sure that the lines are cleared out. Note that you may have to repeat this process if any air or moisture is found to remain in the piping. After air purging and evacuating the lines, be sure do a leak test for all piping and tubing.

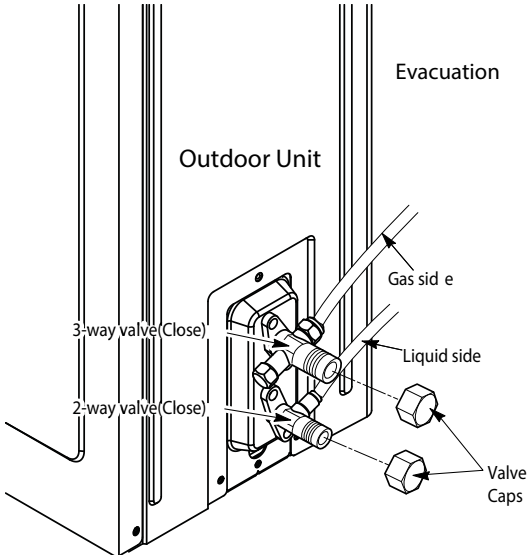
NOTE

Insufficient or incorrectly-performed air purging may lead to the following:

- *Pressure in the system can rise.*
- *Operating current can rise.*
- *Cooling or heating efficiency falls.*
- *Moisture in the refrigerant circuit may freeze and block capillary tubing.*
- *Water can lead to corrosion of parts in the system.*

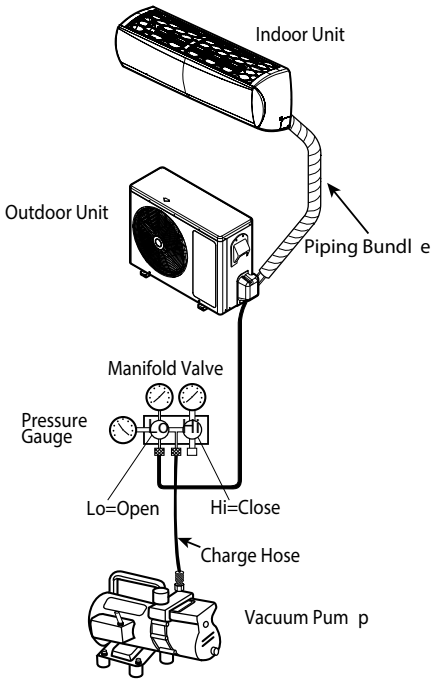
1. Verify that each set of pipes (liquid and gas) are properly connected between the indoor and outdoor unit.
2. Verify that all wiring for a test run is complete.
3. Remove the service-valve caps from the gas and liquid valves at the outdoor unit, **Figure 5-39**.
   - Keep both liquid and gas service valves closed at this step.

Figure 5-39 Removing service-valve caps from outdoor unit for purging



4. Set-up the purging-hose connections, **Figure 5-40**.

Figure 5-40 Evacuation set up



5. Do a leak test per **5.5.1 - Piping Leak Test**.
   - A successful leak test must be completed before beginning evacuation.
6. Refer to **5.5.2 - Evacuation** to complete the purge process.

5.5.1 Piping Leak Test

Perform the leak test by pressurizing nitrogen gas to 550 psi on both the liquid and gas pipes. Test with the piping service valves closed. if the pressure does not drop for 24 hours, the system passes the test. It the pressure drops, there is a nitrogen leak in the system. Find the leak, repair it, and test again.

WARNING

Risk of using combustible gases. Can cause explosion and fire resulting in building and equipment damage, serious injury or death.

Do not use combustible gases, including oxygen for leak detection. Use only inert gas (nitrogen) when checking plumbing leaks, cleaning or repairing pipes, etc.

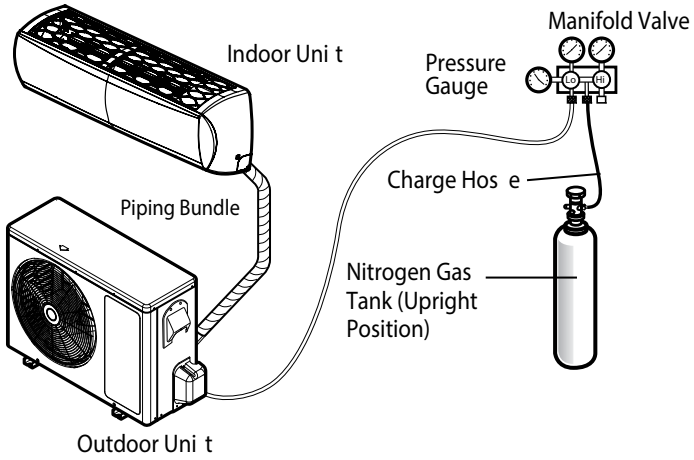
5.5.1.1 Connecting the pressure gauge

NOTE

- *To avoid nitrogen entering the refrigerant system in a liquid state, the top of the cylinder must be higher than its bottom when you pressurize the system.*
- *Be sure the cylinder is used in a vertical standing position.*

1. Connect the manifold valve (which includes the pressure gages) and the dry-nitrogen gas cylinder to the services valves using a charge hose, **Figure 5-41**.
2. Pressurize the system to maximum 550 psig with dry-nitrogen gas and close the cylinder valve when the gauge reaches 550 psig.

Figure 5-41 Leak-test set-up diagram



5.5.1.2 Soap-and-Water Leak Testing

1. Remove the caps from the 2-way and 3-way valves, **Figure 5-39**.
2. Open the 2-way valve by turning the valve stem counter-clockwise approximately 90 degrees, wait for 2 to 3 seconds, and close it.
3. While running nitrogen pressure, apply a soapy-water or liquid, neutral detergent on the indoor or outdoor unit connections using a soft brush, and observe the connections for any leaks.
   - Bubbles at connection points or joints indicate a leak.
4. Make a note of any leaks along the liquid and gas piping.
5. Disengage the nitrogen pressure by loosening the charge hose at the cylinder, **Figure 5-41**.
6. When pressure returns to normal, disconnect the charge hose from the cylinder.
7. Make repairs to all connections and piping where leaks were observed.
8. When repairs are complete, repeat the leak test using nitrogen pressure and check for further leaks.
9. Once the piping system is leak-free, proceed to **5.5.2 - Evacuation**.

5.5.1.3 Ambient Temperature for Leak Test

If the ambient temperature changed between the time when the pressure was applied and when the pressure-drop was checked, adjust the results by factoring-in approximately 1.45 psi for each 2°F of temperature difference.

Correction formula = (Ambient temperature when pressure was applied – Ambient temperature when pressure drop was checked) x 0.01.

For example:

When pressure (550 psig) was applied, the ambient temperature was 80.6°F. When the pressure drop was checked 24 hours later (540 psi), the ambient temperature was 68°F.

Therefore, 80.6 – 68 x 0.01 = 0.126. In this case, the pressure drop of 0.126 was due to temperature difference, and there is no leak in the refrigerant-piping system.

5.5.2 Evacuation

After successfully completing leak testing, use the same hook-up described in **Figure 5-40**, page **67**, to perform the evacuation procedure.

NOTE

- *Be sure to use a manifold valve for air purging. If it is not available, use a stop valve.*
- *Be sure that the knob of the 3-way valve is always kept closed.*

1. Confirm that the “Lo” knob of the manifold valve is open, **Figure 5-40**, page **67**.
2. Confirm that the “Hi” know of the manifold valve is closed.
3. Run the vacuum pump until the system is evacuated down to 300 microns, and continue to run the pump an additional 15 minutes.

NOTE

*The duration of running the vacuum pump will vary according to pipe length and pump capacity. Refer to **Table 5-17** for accurate time duration.*

Table 5-17 Evacuation timing*

Tubing less than 33 ft.	Tubing more than 33 ft.
10 minutes or more	15 minutes or more
* Required time for evacuation when 30-gal/h vacuum pump is used.	

4. When appropriate time has elapsed, turn-off the pump and leave the connections secured on the service valves for 5 minutes.
5. If the system fails to hold 500 microns or less, check all connections for a tight fit and repeat the evacuation steps.
6. When the correct vacuum is reached, close the “Lo” know of the manifold valve and stop the vacuum pump.

5.5.3 Removing Purge and Test Equipment

When evacuation is completed, turn-off all valves a t the outdoor unit and safely disengage the manifold valve and vacuum pump using the following steps.

1. Using a wrench, turn the valve of the liquid stem counter-clockwise to fully open the valve, **Figure 5-40**, page **67**.
2. Turn the valve of the gas temp counter-clockwise to fully open the valve.
3. Loosen the charge hose connected to the gas-side service port slightly to release the pressure, and remove the hose.
4. Replace the flare nut and its cap on the gas service port, and fasten the flare nut securely using an adjustable wrench.
   - This step is very important to prevent leakage from the system.
5. Replace the valve caps at both gas- and liquid-side service valves and fasten them tightly.

6.0 Electrical Connections

WARNING

Arc flash and electric shock hazard. Can cause serious injury or death. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is off and wear personal protective equipment per NFPA 70E before working within the electric control enclosure.

WARNING

Risk of electric shock and overheated wiring. Can cause injury or death. All field-supplied power wiring, overcurrent protection (circuit breakers/fuses) and earth grounding must be installed by a trained and qualified HVAC technician in accordance with local, state, and National Electrical Code regulations related to electrical equipment and wiring.

- Read and follow explicitly all instructions and safety alert messages in this manual.
- Do not connect ground wire to refrigerant, gas or water piping, to lightning rods, to telephone ground wiring, or to the building plumbing system.
- Replace and securely fasten all control box and panel covers immediately after working on the unit to protect the operator from the hazards above.

NOTICE

Risk of electrical phase reversal. Can cause equipment damage, unit malfunction and loss of cooling operation.

If there is a possibility of reversed phase, phase loss, momentary blackout, or the power goes on and off while the system is operating, install a field-supplied phase-loss protection circuit.

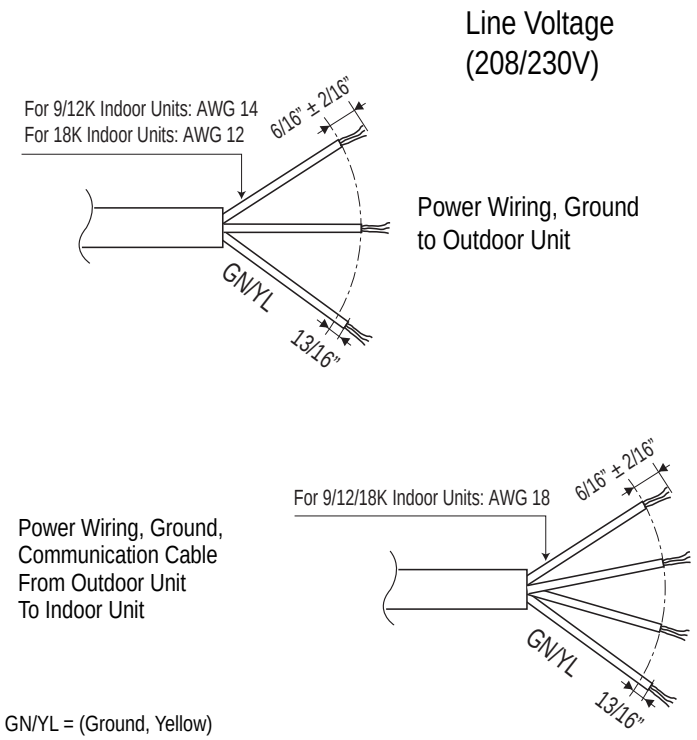
NOTE

Consider ambient conditions (temperature, direct sunlight, inclement weather, etc.) when selecting, installing, and connecting the power wiring.

6.1 Power-supply/Power-wiring Specifications

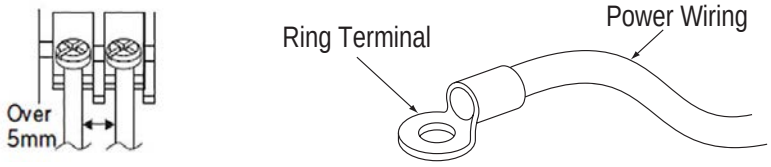
- Liebert SRC systems operate at 1∅, 208 – 230 V, 60 Hz.
- Power-supply wire type and size should be selected based on National Electrical Code and local codes. Maximum allowable voltage fluctuation ±10% or nameplate rated value. Refer to **Figure 6-1** for wiring guidelines.
- Properly ground the indoor and outdoor unit per National Electrical Code and local codes.
- Use only copper wiring that is stranded and shielded with the wires separately insulated.
- Ground wire should be longer than the common power/communication wires.
- Refer to the appropriate circuit and terminal-block diagrams for your model unit.
- Always match color codes of each wire and follow wiring diagram.

Figure 6-1 Indoor and Outdoor wiring and communications cable diagram



Best practice dictates using ring or spade terminals to terminate power wiring at the power terminal block, **Figure 6-2**.

Figure 6-2 Typical ring terminal



If ring terminals or space clips are not available then:

WARNING

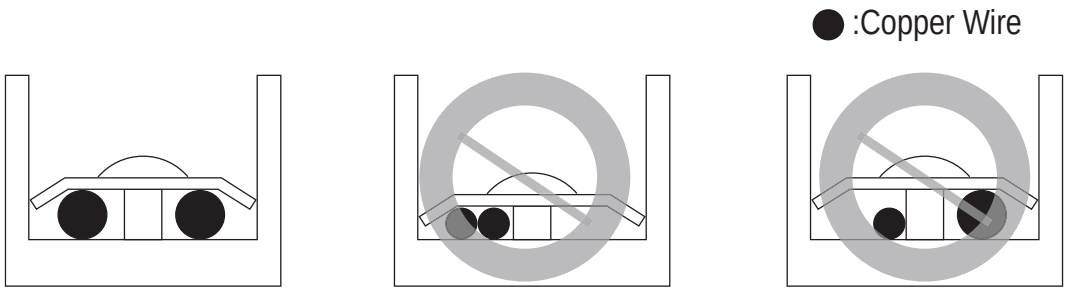
Risk of improper electrical connection termination. Can cause building and equipment damage, excessive heat at the terminations, smoke, fire, electric shock, serious injury and death.

Do not terminate different gauge wires to the power terminal block. Slack in the wiring may generate heat and fire.Do not ground the shield of the communications cable to the indoor unit frame or other grounded entities of the building.

NOTE

- *When terminating wires of the same thickness, follow the instructions in* ***Figure 6-3****.*
- *Attach the wire securely without placing external force on the terminal block.*
- *Use an appropriately-sized screwdriver to tighten the terminals.*
- *Do not over-tighten the connections. Over-tightening may damage the terminals.*
- *Never apply line-voltage power to the communications-cable terminal block. If contact is made, the PCBs may be damaged.*
- *Always include some allowance in the wiring length when terminating. Provide some slack to facilitate removal of electrical panels when servicing.*

Figure 6-3 Proper and Improper power-wiring connections



6.2 Communication-cable Specifications

- Use a 4 conductor, shielded, stranded cable between the outdoor unit and the indoor unit.
- Minimum 18-gauge shielded CVVS or CPEVS cable.
- Insulation materials as required by local code.
- Rated for continuous exposure of temperatures up to 140°F.
- Maximum allowable cable length: 984 ft.
- Firmly attach the cable. Provide slack but secure in a way to prevent external forces from being imparted on the terminal block.
- Terminate the cable shield to a grounded surface at the outdoor unit only.

NOTE

- *Always verify that the communication cable is connected to a communications terminal on the unit. Never apply line-voltage power to the communication-cable connection. If contact is made, PCBs may be damaged.*
- *The shield of the communication cable connecting the outdoor unit to the indoor unit should be grounded only to the outdoor-unit frame.*
- *Tie the shield of each cable segment together using a wire nut at each indoor unit. Maintain polarity through the communication network.*
- *Never use a common multiple-core communication cable. Each communications bus must be provided a separate cable (that is, between the outdoor unit and indoor unit).*

6.3 Communication Cables between the Unit and Controller

- Field-supplied, 18 gauge, stranded 4-conductor communication cable (shielded).
- All insulation material as recommended by local code.
- Starting at the outdoor unit, terminate the cable on terminals Internet A and Internet B. Route the cable as needed between each device.

6.4 Connecting Indoor Unit Electrical Wiring

The general guidelines for connecting electrical and communication cables to the indoor unit are the same for each system. However, the actual connections on the terminal block will differ. Refer to the figures for the model that you are wiring for correct contact on each terminal block. Depending on your indoor unit, the location of the terminal block may vary slightly from the images shown in this section.

WARNING

Arc flash, electric shock and short circuit hazard. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is off and wear personal protective equipment per NFPA 70E before working within the electric control enclosure or making any electrical connections or disconnections. Verify that all field wiring is connected correctly before closing the disconnect switches and starting the unit.

Failure to comply can cause building and equipment damage, smoke, fire, serious injury or death.

NOTE

- *Follow all safety information outlined at the beginning and throughout this manual.*
- *Some units may require you to remove the control cover from the terminal-block area. Most control covers are attached with a Phillips-head screw.*
- *Connect the electrical cable to the indoor unit by connecting the wires to the terminals on the control board individually according to the outdoor-unit connection. Be sure that the color of the wires at the outdoor unit and the terminal numbers are the same as those for the indoor unit.*

1. At the bottom panel of the indoor units, un-snap the latches that cover the Phillips screw heads, **Figure 6-4**.

Figure 6-4 Latch over the screws on bottom panel of indoor unit

2. Using a Phillips-head screwdriver, remove the screws from the bottom panel of the indoor unit, **Figure 6-5** and set the bottom panel aside, **Figure 6-6**.
   - The electrical/communication wiring is usually routed through the back/bottom of the indoor unit through a knockout panel, **Figure 6-7**.

Figure 6-5 Remove screws from bottom panel

Figure 6-6 Remove bottom panel

Figure 6-7 Communication-wires knockout panel

3. Using a screwdriver, connect the wires as shown in **Figure 6-8**.
   - Attach each wire securely to the terminal block.
   - Pay attention to the location/connection of the green/yellow ground cable.

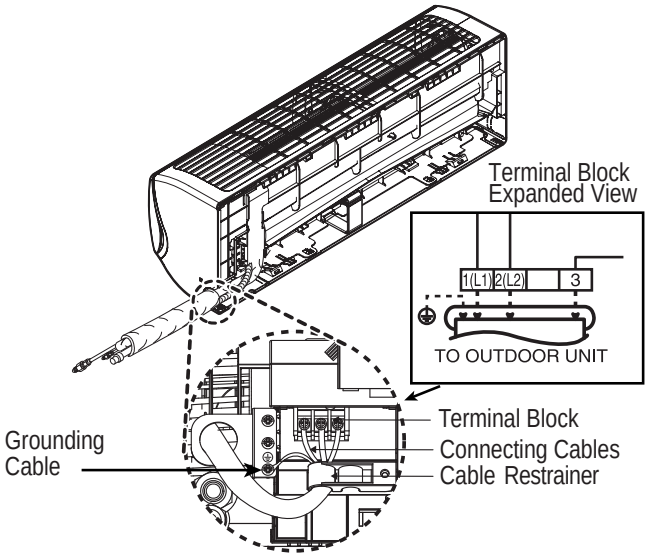
Figure 6-8 Indoor-unit terminal block with grounding cable (example only)

6.4.1 Terminal-block Connection for SRC18

NOTE

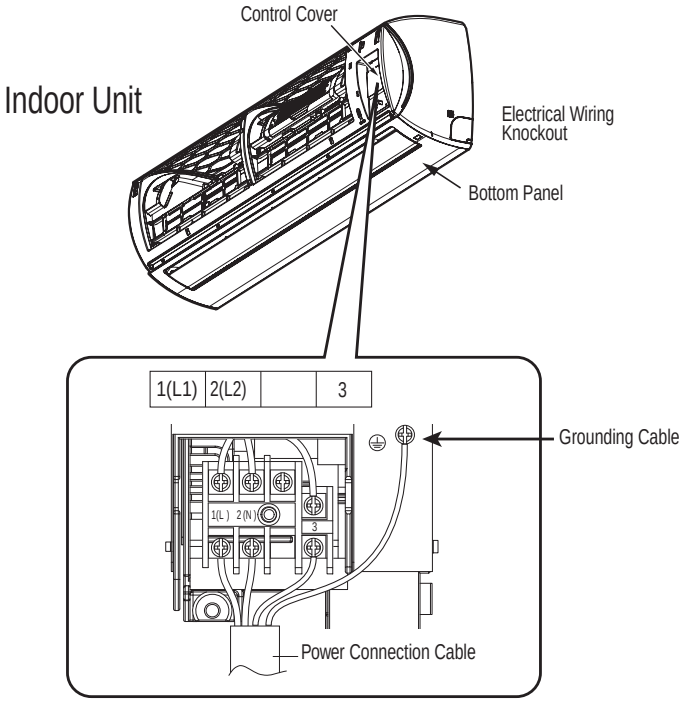
- *Pay special attention to the location of the grounding cable and the cable restrainer around the other electrical/communication cables when connecting.*
- *The terminal block is located behind the drain hose and bundled piping on these units.*

Figure 6-9 SRC18 indoor-unit terminal-block connections



6.4.2 Terminal-block Connection for SRC24, SRC36

Figure 6-10 SRC24 and SRC36 indoor unit terminal-block connections



6.5 Connecting Outdoor Unit Electrical Wiring

The general guidelines for the electrical and communication cables to the outdoor unit are the same for each system. However, the actual connections on the terminal block will differ. Refer to each figure for the model you are installing for the correct wiring of each terminal block.

WARNING

Arc flash and electric shock hazard. Can cause serious injury or death. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is off and wear personal protective equipment per NFPA 70E before working within the electric control enclosure or making any electrical connections or disconnections.

- Follow all safety information in this manual.
- Verify that a circuit breaker or some other emergency-power cutoff device is in place before any power wiring is done to the system.
- Never touch any power lines or live cables before power is cut-off to the system.
- Familiarize yourself with the location of the circuit breaker.

1. Using a Phillips-head screwdriver, remove the conduit-panel cover from the outside of the unit.
2. Inspect all wiring inside the casing to make sure that they are secure and have not come loose during transportation and installation.
   - Loose wires can cause the wiring to burn-out quickly.
   - Inspect wires for damage or cracks (manufacturing defects).
3. Confirm that the Electrical power-supply capacity is sufficient to run the unit. Refer to the specifications in **2.1 - Electrical Data**.
4. Confirm that you are using the correct wire gauge size to proceed.

5. Using a screwdriver, refer to **Figure 6-11** or **Figure 6-12**, and connect the wires as follows:
   - Securely attach each wire to the terminal block.
   - Bundle cabling using a cable restrainer.
   - Pay attention to the location/connection of the green/yellow grounding cable. In some models, the connection is located on the side of the actual terminal block.
   - Maintain a minimum of 0.2-in. of wire length from the terminal block to cable bundle.

Figure 6-11 SRC18 outdoor-unit terminal-block connections

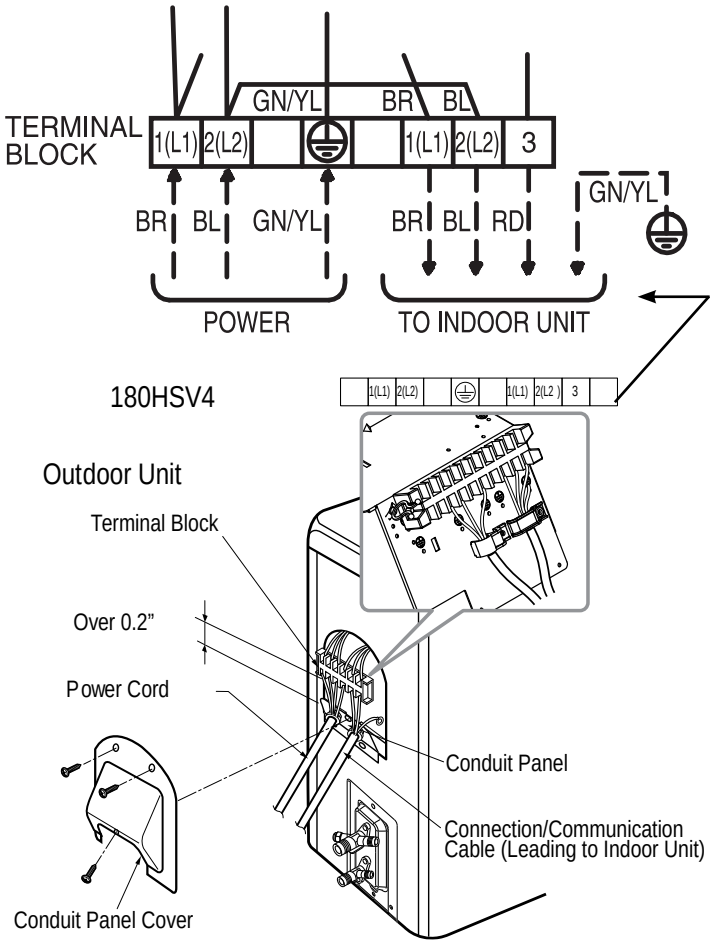
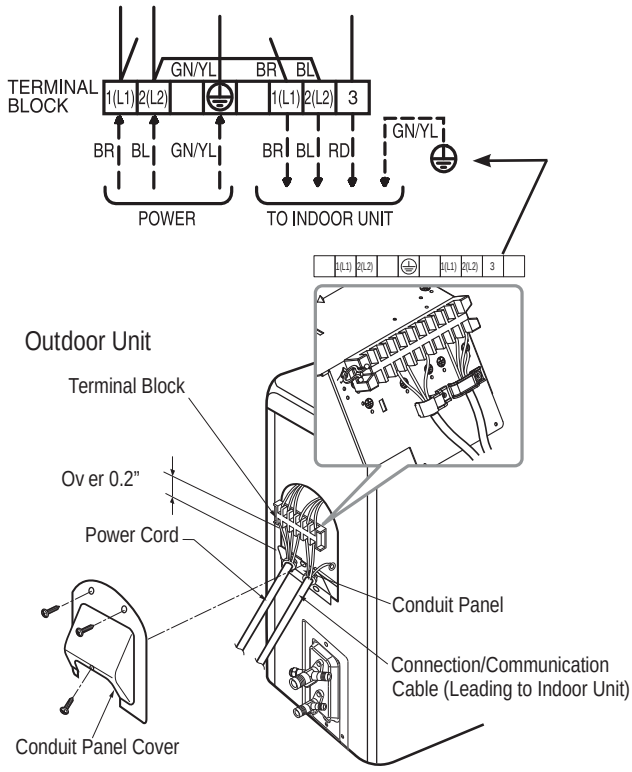


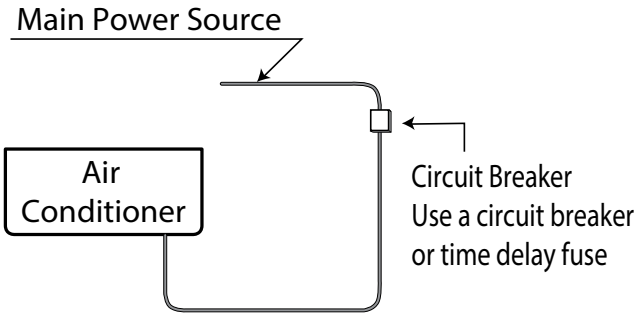
Figure 6-12 SRC24 and SRC36 outdoor-unit terminal-block connections



6. Use a recognized circuit breaker between the power source and the unit. A disconnecting device to adequately disconnect all supply lines must be fitted.

Figure 6-13 shows an example of how a circuit breaker should be wired through the Liebert SRC system.

Figure 6-13 Circuit breaker wiring



6.6 Thermostat Installation and Wiring

NOTICE

Risk of improper thermostat installation. Can cause unit malfunction.

- Installation work must be performed in accordance with the national wiring standards and local code by authorized personnel only.
- If local electric and building code requires plenum(CMP) cable, use an enclosed, non-combustible conduit (metal raceway) or FT-6 rated or above cable.
- When using back cable-entry, AWG#22, 3 core shielded wire is recommended.
- When using top or right-side cable entry, AWG#24, 3 core shielded wire is recommended.
- Do not bury the thermostat in the wall. This can damage the temperature sensor.
- Do not install a cable 164 ft (50 m) or longer. This can cause communication errors.

NOTE

If the distance between the thermostat and the indoor unit is longer than 32 ft (10 m), use an extension cable.

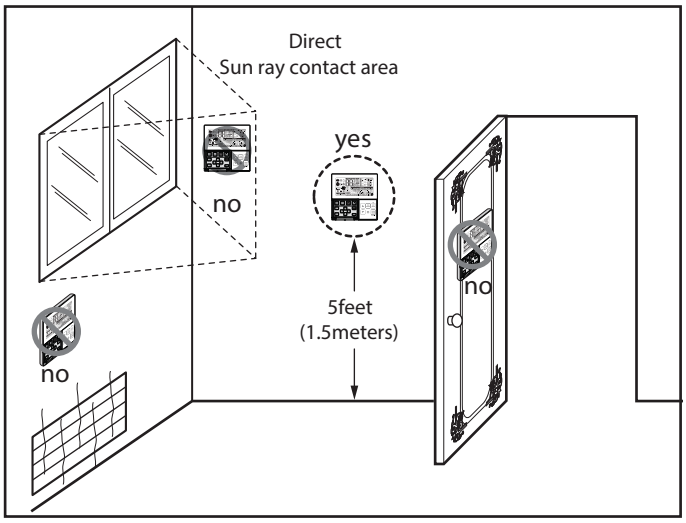
Because the room-temperature sensor is in the thermostat, it should be installed in a place away from direct sunlight, high humidity, and direct supply of cold air to maintain proper temperature of the space. Install the thermostat about 5 ft. (1.5 m) above the floor in an area with good air circulation at an average temperature, **Figure 6-14**.

Do not install the thermostat where it can be affected by the following:

- Drafts or dead spots behind doors and in corners.
- Hot or cold air from ducts.
- Radiant heat from sun or appliances.
- Concealed pipes or chimneys.
- Uncontrolled areas such as on an outside wall.

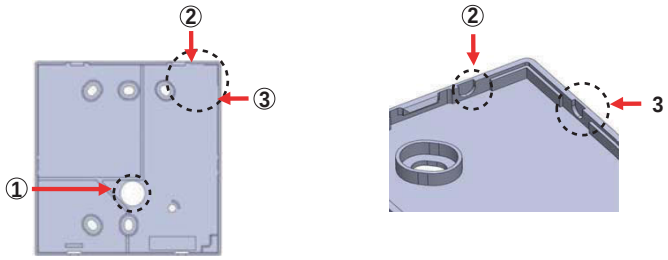
The thermostat is equipped with an LCD display and should be installed at the recommended height for proper view of the display.

Figure 6-14 Proper and Improper thermostat locations



1. Once the proper location for the thermostat is determined, determine the cable-entry location from one of three options:
   - Back
   - Top
   - Right
2. If you use top or right-side entry, remove the cable-guide groove from the back plate with long-nose pliers, **Figure 6-15**.

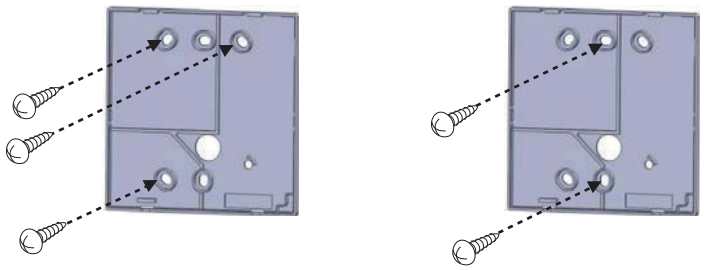
Figure 6-15 Cable-entry hole/guide grooves



No.	Description
1	Back entry (through wall)
2	Top entry
3	Right-side entry

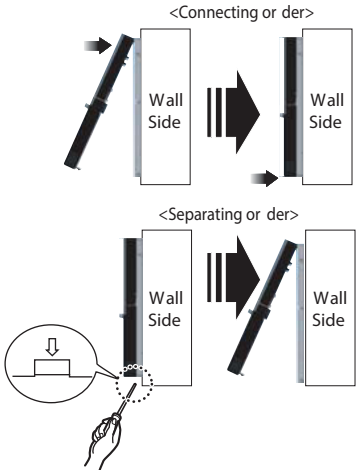
3. Place the back plate in the installation location and secure it with screw, **Figure 6-16**.
   - Do not bend the back plate when tightening screws.
   - If there is an electric box, fit the back plate to the box when installing.
   - Do not leave a gap between the wall and back plate or the thermostat could move or shake.

Figure 6-16 Thermostat back plate installation



4. Making sure that the cable does not interfere, place the upper part of the thermostat on the back plate as shown in **Figure 6-17**, and press the lower part onto the back plate to connect it.
   - Leave no gaps between the thermostat and the back plate.
   - To remove the thermostat from the back plate, insert a screwdriver into one of the separating holes on the bottom of the thermostat and twist. Repeat in the second hole, to release the thermostat from the back plate.

Figure 6-17 Mounting thermostat onto back plate



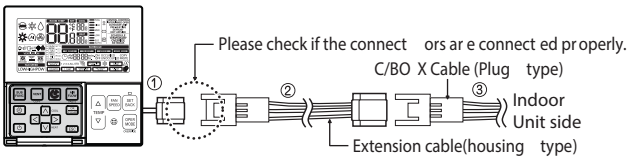
5. Refer to **Figure 6-18** to connect the indoor unit to the thermostat using the extension cable.

NOTICE

Risk of improper thermostat installation. Can cause unit malfunction.

If local electric and building code requires plenum(CMP) cable, use an enclosed, non-combustible conduit (metal raceway) or FT-6 rated or above cable.

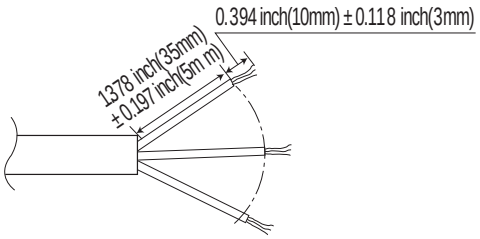
Figure 6-18 Extension cable from indoor unit to thermostat



No.	Description
1	AWG#24
2	AWG#22
3	AWG#22

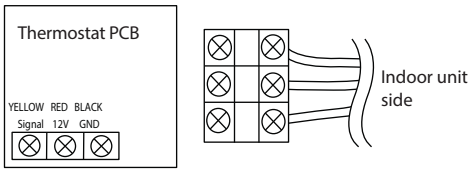
6. To connect the extension cable directly to the thermostat
   - Loosen the screw holding the cable in the thermostat terminal block.
   - Use a cutting nipper to remove the housing from the extension cable and peel it as shown in **Figure 6-19**.

Figure 6-19 Thermostat cable prep



7. Connect the wires to the thermostat terminal block and the indoor-unit terminal block as shown in **Figure 6-20**.
   - Tighten securely and make sure wires are not touching each other.

Figure 6-20 Thermostat and Indoor unit terminal-block connections



Thermostat terminal block	Indoor-unit terminal block	Function
YELLOW	YL	Signal
RED	RD	12 V
BLACK	BK	GND

7.0 Installation Set-up and System Start-up

NOTICE

Risk of improper thermostat installation. Can cause unit malfunction.

The Installer setting mode sets up the detailed function of the thermostat.

If the installation is not set correctly, it can cause problems for the product, user injury, or property damage. Installation set-up must be performed by a certified technician. Non-certified personnel attempting to install or make changes shall be responsible for any adverse effects or operation.

7.1 Accessing Installer Set-up Mode

1. On the thermostat, press  for at least 3 seconds.
   The function code displays.

NOTE
A press less than 3 seconds enters "user" settings mode.

2. Refer to the following procedures and **Table 7-1** to make the correct settings for your installation.

NOTE
Some menu options and functions may not be displayed or the menu name may be different depending on your system and model.

Table 7-1 General unit functions—Installer set-up codes

Function Code	Description	Value
01	Test Run	01 = Set
02	Address Setting	00 ~ FF = Address
03	E.S.P Value	Step: 01 = Very Low 02 = Low 03 = Med 04 = High 05 = Very High
		Value: 0 ~ 255
04	Thermistor	01 = Remo 02 = Indoor 03 = 2TH
05	Ceiling Height	01 = Low 02 = Med 03 = High 04 = Very High
06	Static Pressure	01 = V-H 02 = F-H 03 = V-L 04 = F-L
Some menu options and functions may not be displayed or the menu name may be different depending on your system and model.		

Table 7-1 General unit functions—Installer set-up codes (continued)

Function Code	Description	Value
07	Master setting	00 = Slave 01 = Master (only “Plus 1 series models) 00 = Group 01 = Single
08	Override setting	00 = Slave 01 = Master
09	Dry contact	00 = Auto-off 01 = Auto-on
12	Celsius/Fahrenheit	00 = Celsius 01 = Fahrenheit
18	Emergency heater	Select mode: 00 = not used 01 = use Low-ambient heating operation: 0 = not used 1 = compressor off 0°F (–18°C)/ on 5°F (–15°C) 2 = compressor off 5°F (–15°C)/ on 10°F (–12°C) 3 = compressor off 10°F (–12°C)/ on 15°F (–9°C) Fan speed: 0 = fan off 1 = fan on
20	Plasma	00 = not installed 01 = installed
21	Electric heater	
22	Humidifier	
23	Elevation grill	
24	Ventilation kit	
25	Auxiliary heater	
31	Settings temperature range	00 = 60~86°F / 16~30°C 01 = 40~99°F / 4~37.5°C
Some menu options and functions may not be displayed or the menu name may be different depending on your system and model.		

7.2 Running Test Mode

NOTE
Before running test mode, make sure of the following:

- *Leak testing is complete and there are no leaks.*
- *Air purge/evacuation is complete and successful.*
- *All tubing, piping, and wiring are properly connected.*

1. On the thermostat, press ⚙ for at least 3 seconds.
   The function code blinks in the lower-middle of the display.

NOTE
A press less than 3 seconds enters “user” settings mode.

2. Press OK/CLEAR.
   The test run starts.
   - During the test run, pressing any of the following buttons will exit the test: Oper Mode, Temp up/down, Fan Speed, Wind Direction, or Start/Stop.

7.3 Setting the Address of Central Control

Refer to **Table 7-1** for the specific function-setting values.

1. On the thermostat, press ⚙ for at least 3 seconds.
   The function code blinks in the lower-middle of the display.

NOTE
A press less than 3 seconds enters "user" settings mode.

2. Press ⚙ repeatedly to select the function code.
3. Press >, to select the Group No., then use ∧ ∨ to select the setting.
4. Press >, to select the Indoor No., then use ∧ ∨ to select the setting.
5. Press OK/CLEAR.
   The setting is saved.
6. Press ESC to exit installer setting mode.

NOTE
If there is no button input for 25 seconds, set-up mode is automatically exited.

If you exit without pressing OK/CLEAR, your settings are not saved.

7.4 Setting E.S.P.

This function determines the wind-strength for each wind level.

Refer to **Table 7-1** for the specific function-setting values.

NOTE
If E.S.P is set incorrectly, the unit may malfunction.

ESP may not work on products that do not have "weak" or power fan-speed settings.

1. On the thermostat, press ⚙ for at least 3 seconds.
   The function code blinks in the lower-middle of the display.

NOTE
A press less than 3 seconds enters "user" settings mode.

2. Press ⚙ repeatedly to select the function code.
3. Press > to select the Step (wind level).
4. Press > to select the Value (wind strength), then use ∧ ∨ to select the setting.

5. Press < then ∧ ∨ to select the next Step.
6. Press > to select the Value, then use ∧ ∨ to select the setting.
7. Repeat **Steps 5** to **6** until the strength is set for each wind level.
8. Press OK CLEAR.
   The setting is saved.
   - Press ESC to exit installer setting mode.

NOTE
If there is no button input for 25 seconds, set-up mode is automatically exited.

If you exit without pressing OK CLEAR, your settings are not saved.

7.5 Setting the Thermistor

Refer to **Table 7-1** for the specific function-setting values.

1. On the thermostat, press ⚙ for at least 3 seconds.
   The function code blinks in the lower-middle of the display.

NOTE
A press less than 3 seconds enters "user" settings mode.

2. Press ⚙ repeatedly to select the function code.
3. Press >, to select Value, then use ∧ ∨ to select the setting. Refer to **Table 7-2** for descriptions of the thermistor settings.

Table 7-2 Thermistor setting options

Value			Function
01	Thermostat		Operates based on temperature sensor in thermostat.
02	Indoor Unit		Operates based on temperature sensor in indoor unit.
03	2TH	Cooling	Operates based on higher temperature comparing the reading from thermostat temp. sensor and indoor-unit temp sensor.
		Heating	Operates based on lower temperature comparing the reading from thermostat temp. sensor and indoor-unit temp sensor.

The 2TH functions differently depending on product model.
If the indoor temperature is below 10°F, the value for the temperature sensor of the thermostat is displayed regardless of the thermistor setting.

4. Press OK CLEAR.
   The setting is saved.
5. Press ESC to exit installer setting mode.

NOTE
If there is no button input for 25 seconds, set-up mode is automatically exited.

If you exit without pressing OK CLEAR, your settings are not saved.

7.6 Setting the Ceiling Height

Refer to **Table 7-1** for the specific function-setting values.

1. On the thermostat, press ⚙ for at least 3 seconds.
   The function code blinks in the lower-middle of the display.

NOTE
A press less than 3 seconds enters "user" settings mode.

2. Press ⚙ repeatedly to select the function code.

3. Press >, to select the Value, then use ∧ ∨ to select the setting. Refer to **Table 7-3** for descriptions of the ceiling-height settings.

Table 7-3 Ceiling-height setting options

Value		Function
01	Low	Decrease indoor air-flow rate 1 step from standard level.
02	Medium	Set indoor air-flow rate as standard level.
03	High	Increase indoor air-flow rate 1 step from standard level.
04	Very high	Increase indoor air-flow rate 2 steps from standard level.

4. Press OK CLEAR.
   The setting is saved.

5. Press ESC to exit installer setting mode.

NOTE
If there is no button input for 25 seconds, set-up mode is automatically exited.

If you exit without pressing OK CLEAR, your settings are not saved.

7.7 Setting Fahrenheit/Celsius

Refer to **Table 7-1** for the specific function-setting values.

1. On the thermostat, press ⚙ for at least 3 seconds.
   The function code blinks in the lower-middle of the display.

NOTE
A press less than 3 seconds enters "user" settings mode.

2. Press ∨ to select the function code.

3. Press >, to select Value, then use ∧ ∨ to select the setting.

4. Press OK CLEAR.
   The setting is saved.

5. Press ESC to exit installer setting mode.

NOTE
If there is no button input for 25 seconds, set-up mode is automatically exited.

If you exit without pressing OK CLEAR, your settings are not saved.

7.8 Setting Optional Functions

Used when options are added or removed.

Refer to **Table 7-1** for the specific function-setting values.

1. On the thermostat, press ⚙ for at least 3 seconds.
   The function code blinks in the lower-middle of the display.

NOTE
A press less than 3 seconds enters "user" settings mode.

2. Press ⚙ repeatedly to select the function code.
3. Press >, to select the condition, then use ^ v to select the setting.
4. Press OK CLEAR.
   The setting is saved.
5. Press ESC to exit installer setting mode.

NOTE
If there is no button input for 25 seconds, set-up mode is automatically exited.

If you exit without pressing OK CLEAR, your settings are not saved.

7.9 Setting Temperature Range

Refer to **Table 7-1** for the specific function-setting values.

1. On the thermostat, press ⚙ for at least 3 seconds.
   The function code blinks in the lower-middle of the display.

NOTE
A press less than 3 seconds enters "user" settings mode.

2. Press ⚙ repeatedly to select the function code.
3. Press >, to select the Value, then use ^ v to select the setting.
4. Press OK CLEAR.
   The setting is saved.
5. Press ESC to exit installer setting mode.

NOTE
If there is no button input for 25 seconds, set-up mode is automatically exited.

If you exit without pressing OK CLEAR, your settings are not saved.

8.0 Operation

8.1 Operating the Unit

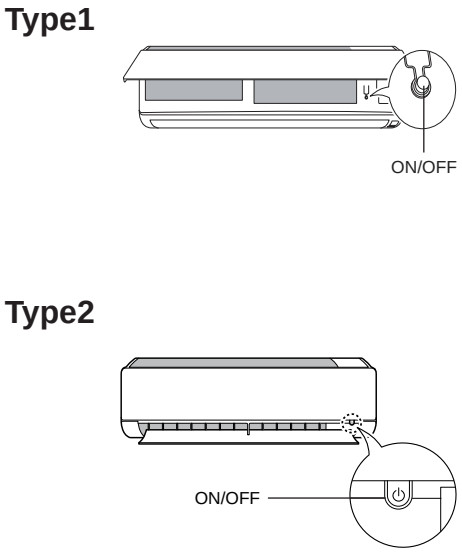
Use the ON/OFF button on the indoor unit to operate the system.

1. Depending on the type of unit, Type 1 or Type 2 (**Figure 8-1**), open the front cover.
2. Press the ON/OFF button.

NOTE

- *If the horizontal vane opens rapidly, the stepping motor may be broken.*
- *The fan speed is set too high. Depending on the model, fan speed may be changed.*
- *You cannot change temperature using this ON/OFF button.*
- *For cooling-only models, the temperature is set to 71.6°F (22°C).*
- *For cooling-and-heating models, the temperature is set from 71.6°F (22°C) to 75.2°F (24°C).*

Figure 8-1 On/Off button location



8.2 Automatic Unit Restart

When the unit is turned-on after a power failure, this function restores the previous settings.

NOTE
Auto-restart may be changed depending on the type of model.

Disabling Auto Restart

1. Open the front cover of the indoor unit.
2. Press and hold the ON/OFF button for 6 seconds.
   The unit beeps twice and the lamp blinks 4 times.
   - To re-enable Auto Restart, press and hold the ON/OFF button for 6 seconds.
     The unit beeps twice and the lamp blinks 4 times.

NOTE
Pressing and holding the ON/OFF button 3 to 5 seconds, instead of 6 seconds, initiates test operation. In test operation, the unit blows strong, cool air fro 18 minutes then returns to factory-default settings.

8.3 Enabling Cooling-only Mode

Cooling-only mode is used when performing the Pump Down procedure. Cooling-only mode is set in "Installer" mode.

NOTE
- *Automatic operation is suspended when cooling-only mode is initiated in Installer mode.*
- *When cooling-only mode is disabled, the unit returns to normal operation.*
- *Installer mode cannot be initiated if the unit is running. The system must be powered-off completely.*
- *All Installer-mode function codes must be entered while the system is powered-off (complete system shutdown).*
- *WLAN module's communication time will lag by about 1 minute after the unit is powered back on and normal operation resumes.*
- *Entire lock or Mode lock cannot be set if you set heating or automatic operation through the central controller.*

1. Completely shut-down system power.
2. At the thermostat, access Installer mode by pressing  for at least 3 seconds.
   The function code displays.

NOTE
A press less than 3 seconds enters "user" settings mode.

3. Press  repeatedly to select the function code *45*, then power-on the unit.
   The unit beeps to acknowledge that the code is received.
4. Turn-off power for at least 30 seconds.
5. Turn-on power to the system.
   Cooling-only mode is enabled.

8.4 Disabling Cooling-only Mode

Cooling-only mode is used when performing the Pump Down procedure. Once pump-down is complete, disable cooling-only and return to normal operation using the following procedure.

1. Completely shut-down system power.
2. At the thermostat, access Installer mode by pressing ⚙ for at least 3 seconds.
   The function code displays.

NOTE
A press less than 3 seconds enters "user" settings mode.

3. Press ⚙ repeatedly to select the function code *46*, then power-on the unit.
   The unit beeps to acknowledge that the code is received.
4. Turn-off power for at least 30 seconds.
5. Turn-on power to the system.
   Cooling-only mode is disabled.

8.5 Standard Operation

8.5.1 Selecting Cooling Mode

1. On the thermostat, press ⏻ to power-on the indoor unit.
2. Press OPER MODE until ❄ displays in the operation-mode section.
3. Adjust the temperature setting by pressing ∧ TEMP ∨.

NOTE
The temperature range varies depending on Installer set-up.

- *Factory default is 64~86°F (18~30°C).*

8.5.2 Selecting Power Cooling

Power cooling lets you cool or warm the indoor air quickly and is available with cooling, heating, and dehumidification modes.

1. On the thermostat, press ⏻ to power-on the indoor unit.
2. Press OPER MODE until ❄ displays in the operation-mode section.
3. Press FAN SPEED until *Po* displays under the Cooling-temperature setpoint in the temperature section.

8.5.3 Selecting Heating Mode

1. On the thermostat, press ⏻ to power-on the indoor unit.
2. Press OPER MODE until ☀ displays in the operation-mode section.
3. Adjust the temperature setting by pressing ∧ TEMP ∨.

NOTE

The temperature range varies depending on Installer set-up.

- *Factory default is 64~86°F (18~30°C).*

8.5.4 Selecting Dehumidification Mode

Dehumidification removes moisture from a highly-humid environment, especially during the rainy season, to prevent mold from setting-in. Dehumidification mode adjusts room temperature and fan speed automatically to maintain the optimal humidity level.

1. On the thermostat, press ⏻ to power-on the indoor unit.
2. Press OPER MODE until 💧 displays in the operation-mode section.

8.5.5 Selecting Fan Mode

Fan mode circulates indoor air without changing the room temperature.

1. On the thermostat, press ⏻ to power-on the indoor unit.
2. Press OPER MODE until displays in the operation-mode section.

8.5.6 Selecting Auto Mode

Auto mode changes modes automatically to maintain the temperature setpoint within ±3.6°F (±2°C).

When operating in auto mode, the Auto icon and cool, heat, etc. icon display simultaneously in the Operating Mode section to indicate the current mode.

1. On the thermostat, press ⏻ to power-on the indoor unit.
2. Press OPER MODE until AUTO displays in the operation-mode section.

3. Set the cooling setpoint by pressing ^ COOL ,
   then adjust the temperature displayed

   under Cool-temperature setpoint in the Temperature section of the display by pressing ^ TEMP v .

4. Set the cooling setpoint by pressing v HEAT ,
   then adjust the temperature displayed

   under Heat-temperature setpoint in the Temperature section of the display by pressing ^ TEMP v .

8.5.7 Selecting Timed Override

Timed override temporarily overrides the current schedule (occupied/unoccupied).

- Reverts to last occupied schedule in unoccupied override.
- Reverts to last unoccupied schedule in occupied override.

See **8.6.5**, **Setting Override Time**, **page 98**, to set the duration of the override.

Press OPER MODE for 3 seconds.
Timed override is enabled.

- To cancel timed override, press OPER MODE for 3 seconds.
  Operation reverts to last weekly schedule.

8.5.8 Selecting Set Back

Set Back reverts to the last unoccupied schedule until set-back operation is canceled. If there is no unoccupied schedule, it returns to the default set-back setting. See **8.6.6**, **Setting Set-back Temperature**, **page 98**, to set the set-back setting.

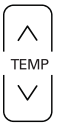
Press SET BACK .
Set back is enabled.

- To cancel set back, press SET BACK .

NOTE

- *You cannot changes settings in set-back mode. HL and the lock is displayed.*
- *Set back is canceled if a command from another controller is received.*

8.5.9 Setting the Temperature

You can adjust the temperature simply by pressing 

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NOTE

In Auto mode, both setpoints adjust automatically when you set the temperature in this way.

To adjust the cooling or heating setpoint individually, press the appropriate button before adjusting the temperature.

8.5.10 Adjusting Air Flow

1. Press FAN SPEED to cycle through the fan-speed options (displayed in Fan Speed section).
2. Press AIR FLOW to cycle through the wind-direction options (displayed in Air-flow/Louvers section).

8.5.11 Selecting Energy-saving Cooling

Energy-saving cooling operation improves comfort and power-saving capacity by automatically adjusting temperature during cooling mode.

NOTE

Energy-save mode can only be set up in Cooling mode and does not operate with Auto Mode.

1. Press SUB FUNC until  is displayed in the sub-function section of the display.
2. Press OK CLEAR.
   The setting is saved.
3. Press ESC to exit the sub-function set-up.

8.5.12 Selecting Automatic Drying

Automatic drying dries the inside of the indoor unit when it is turned-off by operating the fan to remove moisture and prevent mold.

1. Press SUB FUNC until  is displayed in the sub-function section of the display.
2. Press OK CLEAR.
   The setting is saved.
3. Press ESC to exit the sub-function set-up.

8.5.13 Selecting Fan Auto

Operates the fan when the outdoor unit is running.

1. Press SUB FUNC until AUTO is displayed in the sub-function section of the display.
2. Press OK CLEAR.
   The setting is saved.
3. Press ESC to exit the sub-function set-up.

8.6 Function Settings

8.6.1 Setting Louver Angle Control

Adjusts the angle of airflow.

NOTE
While louver/vane angle is adjusted, commands from the central controller are delayed for 1 minute.

1. Press repeatedly until flashes in the Function Settings section of the display.
2. Press < > to select the vane number, or *All* to set all vanes at once 1 2 3 4 ALL STD (STD sets all louvers to factory-default).
3. Press ^ v to select the angle, then press OK CLEAR.
4. Repeat **Steps 2** and **3** for each louver if needed.
5. When done, Press OK CLEAR.
   The settings are saved.
6. Press ESC to exit the function set-up.

8.6.2 Locking the Display

Locks the display to prevent un-authorized use.

1. Press repeatedly until flashes in the Function Settings section of the display.
2. Press < > to select , then press OK CLEAR.
   The display is locked.
3. Press ESC to exit the function set-up.

8.6.3 Setting the Minimum Difference between the Cooling and Heating Setpoints

1. Press ⚙ repeatedly until AUTO flashes in the Function Settings section of the display.
2. Press ∧ ∨ to select the temperature, then press OK/CLEAR.
   The minimum difference is set.
3. Press ESC to exit the function set-up.

8.6.4 Setting Current Time

1. Press ⚙ repeatedly until SET flashes in the Function Settings section of the display.
2. Press ∧ ∨ to select the current day, then press > to move to AM/PM setting.
3. Press ∧ ∨ to select AM/PM, then press > to move to hour setting.
4. Press ∧ ∨ to select the hour, then press > to move to minute setting.
5. Press ∧ ∨ to select minute, then press OK/CLEAR.
   Current time is set.
6. Press ESC to exit the function set-up.

8.6.5 Setting Override Time

1. Press ⚙ repeatedly until OVERRIDE/SET TIME flashes in the Function Settings section of the display.
2. Press ∧ ∨ to select the duration of the override interval from 30 to 240 minutes.
3. Press OK/CLEAR.
   Override interval is set.
4. Press ESC to exit the function set-up.

8.6.6 Setting Set-back Temperature

1. Press ⚙ repeatedly until SETBACK/TEMP flashes in the Function Settings section of the display, and the Cool setpoint temperature flashes in the Temperature section.
2. Press ∧ TEMP ∨ to select the set-back cooling setpoint, then press ∨, to move to the Heat setpoint temperature.
3. Press ∧ TEMP ∨ to select the set-back heating setpoint, then press OK/CLEAR.
   The set-back setpoint temperatures are set.
4. Press ESC to exit the function set-up.

8.6.7 Clearing the “Clean Filter” Alarm

1. Press [⚙] repeatedly until [🧹] flashes in the Function Settings section of the display.
2. Press [OK CLEAR].
   The display is cleared.
3. Press [ESC] to exit the function set-up.

8.7 Schedule Set-up

8.7.1 Simple Schedule

A simple schedule automatically runs for a specified time then stops.

1. On the thermostat, press [🕒] until [SIMPLE] displays in the Schedule section.
2. Press [∧] [∨] to select the sleep time from 1 to 3 hours.
3. Press [OK CLEAR].
   The schedule is set.
4. Press [ESC] to exit the function set-up.

8.7.2 Sleep Schedule

A sleep schedule shuts-off the unit for a specified time.

1. On the thermostat, press [🕒] until [SLEEP] displays in the Schedule section.
2. Press [∧] [∨] to select the duration of the schedule from 1 to 7 hours.
3. Press [OK CLEAR].
   The schedule is set.
4. Press [ESC] to exit the function set-up.

8.7.3 Weekly Schedule

A weekly schedule sets up daily-operation schedules for the week.

1. On the thermostat, press [🕒] until [WEEK] displays in the Schedule section.
2. Press [∧] [∨] to select the day, then press [>] to move to the timer section.
3. Press [∧] [∨] to select the timer number, then press [>] to move to AM/PM section.
4. Press [∧] [∨] to select AM or PM, then press [>] to move to the hour section.
5. Press [∧] [∨] to select the hour, then press [>] to move to the minute section.
6. Press [∧] [∨] to select the minute, then press [>] to move to the ON/OFF section.
7. Press [∧] [∨] to select On or Off, then press [>] to move to the OCCUPIED/UNOCCUPIED section.

8. Press ∧ ∨ to select Occupied or Unoccupied, then press > to move to the Operation Mode section.
   The operating-mode icon blinks.

9. Press OPER MODE to select the operating mode, then press ∧ COOL .

10. Set the cooling setpoint for the schedule, then press ∨ HEAT .

11. Set the heating setpoint for the schedule, then press > to move to the Fan Speed section.

12. Press FAN SPEED to select the fan speed, press OK CLEAR.
    The schedule is set.

13. Press ESC to exit the function set-up.

8.7.4 Copy/Paste a Schedule

You can copy a weekly schedule to another day.

1. On the thermostat, press ◷ until WEEK displays in the Schedule section.

2. Press ∧ ∨ to select the day to copy, then press VENT COPY for 3 seconds.
   The COPY icon flashes in the Schedule section.

3. Press ∧ ∨ to select day to which you want to paste the schedule, then press AIR FLOW PASTE for 3 seconds.
   The PASTE icon flashes in the Schedule section, and the schedule is pasted.

4. Press ESC to exit the function set-up.

8.7.5 Schedule a Holiday

Schedules stop on the day reserved.

1. On the thermostat, press ◷ until HOLIDAY displays in the Schedule section.

2. Press ∧ ∨ to select the day, then press OK CLEAR.
   The holiday is set.

3. Press ESC to exit the function set-up.

8.7.6 Delete all Schedules

On the thermostat, press and hold ◷ and OK CLEAR simultaneously for 3 seconds.

9.0 Maintenance

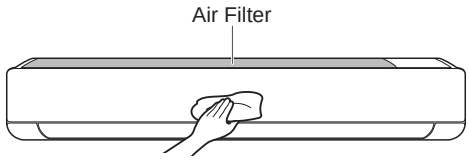
WARNING

Arc flash and electric shock hazard. Can cause serious injury or death. Open all local and remote electric power disconnect switches, verify with a voltmeter that power is off and wear personal protective equipment per NFPA 70E before working within the electric control enclosure.

If the unit will not be used for an extended period of time, dry the unit to maintain it in the best condition. Clean the unit regularly to maintain optimal performance and to prevent possible breakdown.

- Dry the unit in Fan mode for 3 to 4 hours and disconnect the power. There may be internal damage if moisture is left in unit's components.
- Before using the unit again, dry the unit in Fan mode for 3 to 4 hours to remove odor generated by moisture.

Figure 9-1 Cleaning the outside of the indoor unit



NOTICE

Risk of improper cleaning. Can cause cabinet finish damage.

- Never use water that is higher than 104° (40°C) when you clean the filters. It may cause deformation or discoloration.
- Never use volatile substances when you clean the filters. These may damage the surface of the unit.
- Do not wash the 3M filter (optional) with water because it can be damaged by water.
- Do not wash the Triple filter (optional) with water because it can be damaged by water.

Table 9-1 Cleaning Schedule

Component	Description	Interval
Air filter	Clean with a vacuum or hand wash.	2 weeks
Triple filter	Clean with a vacuum or brush.	Every 3 months
3M filter	Clean with a vacuum or brush.	Every 6 months
Ionizer (optional)	Use a dry cotton bud to remove any dust.	Every 6 months
Indoor unit	Clean the surface using a soft, dry cloth.	Regularly
	Have a professional clean the condensate drain pan.	Once a year
	Have a professional clean the condensate drain pipe.	Every 4 months
Outdoor unit	Have a professional clean the heat-exchanger coils and the panel vents. (Consult a technician.)	Once a year
	Have a professional clean the fan.	Once a year
	Have a professional clean the condensate drain pan	Once a year
	Have a professional verify that the fan assembly is firmly tightened.	Once a year
	Clean the electric components with air.	Once a year

9.1 Cleaning the Air Filter

Clean the air filter once every 2 weeks or more if necessary.

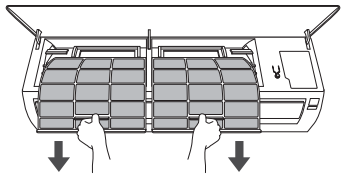
NOTE

- *Bending the air filter can break it.*
- *If the air filter is not assembled correctly, dust and other substances can enter the indoor unit.*

9.1.1 Cleaning the Air Filter on Type 1 Units

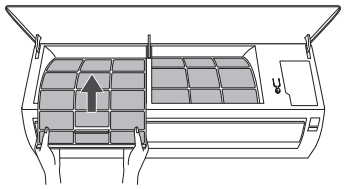
1. Turn-off power and unplug the power cord.
2. Open the front cover by lifting both sides of the cover slightly.
3. Hold the knobs on the air filters, pull them down slightly and remove them from the unit, **Figure 9-2**.

Figure 9-2 Removing the air filter from Type 1 unit



4. Clean the filters with a vacuum cleaner or lukewarm water with a neutral detergent.
5. Dry the filters in the shade.
6. Insert the hooks of the air filters into the front cover, **Figure 9-3**, and make sure the filters are inside the cover for correct assembly.

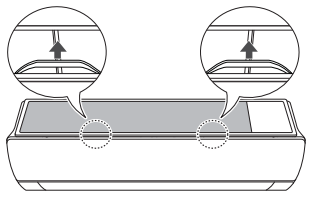
Figure 9-3 Inserting cleaned air filter in Type 1 unit



9.1.2 Cleaning the Air Filter on Type 2 Units

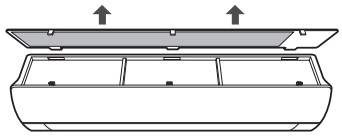
1. Turn-off power and unplug the power cord.
2. Hold the knobs on the air filters, lift up slightly, **Figure 9-4**.

Figure 9-4 Knobs on air filter of Type 2 unit



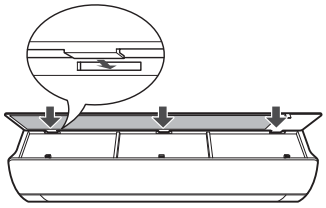
3. Remove them from the unit, **Figure 9-5**.

Figure 9-5 Removing the air filter from Type 2 unit



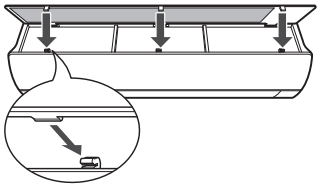
4. Clean the filters with a vacuum cleaner or lukewarm water with a neutral detergent.
5. Dry the filters in the shade.
6. Insert the hooks of the air filters into the front cover, **Figure 9-6**.

Figure 9-6 Inserting cleaned air filter on the hooks of the Type 2 unit



7. Press down onto hooks, **Figure 9-7**, and make sure the filters are installed correctly.

Figure 9-7 Push down on the hooks of the Type 2 unit

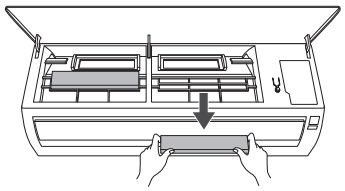


9.2 Cleaning the Optional 3M or Triple Filter

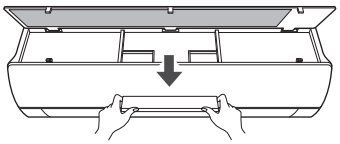
1. Turn off power and unplug the power cord.
2. Remove the air filters from the unit.
3. Remove the 3M and/or Triple filters from the unit, **Figure 9-8**.

Figure 9-8 Removing 3M/Triple filters from indoor unit

Type1



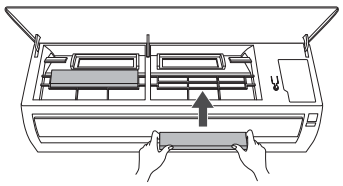
Type2



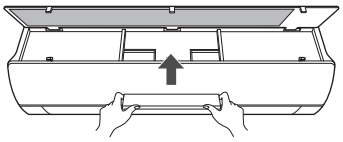
4. Clean the filters with a vacuum cleaner.
5. Insert the 3M and/or Triple filters in the unit, **Figure 9-9**.

Figure 9-9 Replacing 3M/Triple filters in the indoor unit

Type1



Type2



6. Replace the air filters.
7. Check the sides of the front cover to make sure the air filters are installed correctly.

10.0 Troubleshooting

10.1 Self-diagnosis at the Indoor Unit

The Liebert SRC has a built-in self-diagnosis function. If an error occurs, the lamp of the indoor unit blinks in 2-second intervals. If this occurs, contact your dealer or service center.

10.2 Before Calling for Service

Please check the following before contacting service. If the problem persists after corrective action, contact your local service center.

Problem	Possible Causes	Corrective Action
The unit does not work normally.	Burning smell and strange sounds are coming from the unit.	• Turn-off the unit, unplug the power cable or disconnect the power supply, and contact service.
	Water leaks from the indoor unit even when humidity level is low.	
	The power cable is damaged or it is generating excessive heat.	
	A switch, circuit breaker (safety, ground), or a fuse is not operating properly.	
	The unit generates and error code from self diagnosis.	
	Incorrect cabling.	• Check the communication cable connections.
	Incorrect scheduling setup.	• Check the programmed Schedule settings.
The unit does not work.	The unit is unplugged.	• Check to see if the power cord is plugged into the outlet or if the power isolators are switched on.
	A fuse exploded or the power supply is blocked.	• Replace the fuse or check to see if the circuit breaker is tripped.
	Voltage is too high or too low.	• Turn of the unit when a power failure occurs. • When the power is restored, wait 3 minutes before turning-on the unit.
	The unit was turned-off automatically at a scheduled time.	• Turn the unit on.

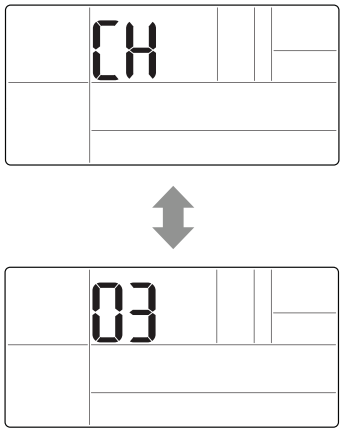
10.3 Self-diagnosis at the Thermostat

If the unit has a problem, it will self-diagnose with Troubleshooting mode and display “CH” and an error code in the Temperature section of the display, **Figure 10-1**.

NOTE

Verify the thermostat function settings after recovery from an error. The settings could have changed because of communication with the controller in group mode.

Figure 10-1 Error codes displayed at the thermostat



10.4 Troubleshooting Error Codes at the Indoor and Outdoor Units

Table 10-1 list the most-common error codes that you will see on these units. Some models may display codes not listed here. Please contact service if a power-down/reboot does not correct the issue. Do not attempt to fix the unit yourself.

The error codes indicate different types of failures, assist in self-diagnosis, and helps track frequency of occurrence. **Figures 10-2** and **10-3** show where error codes display based on model number.

If two or more errors occur simultaneously, the lower number displays first. When an error is resolved, the number no longer displays.

Decoding Error Display for SRC18

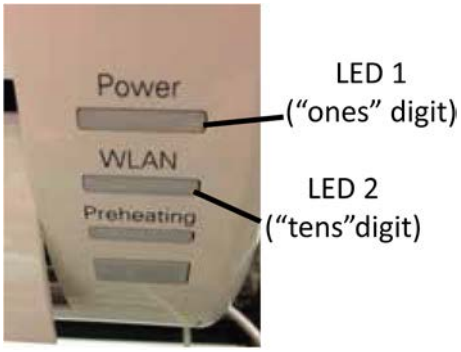
Refer to **Figure 10-2**.

LED 1 blinks (green) to indicate the second, “ones” digit of the error code.

LED 2 blinks (red) to indicate the first, “tens” digit of the error code.

For example, if the error code is 21, LED 1 blinks 1 time, and LED 2 blinks 2 times.

Figure 10-2 Error-code display for SRC18



Decoding Error Display for SRC24 and SRC36

Refer to **Figure 10-3**.

The digital display blinks “CH” then the error number.

Figure 10-3 Error-code display for SRC24 and SRC36

Table 10-1 Error Codes

Unit	Error No.	Description	Indoor Unit LED	SRC18 LED blinks		SRC24 and SRC36 displays
				LED 1 (2nd digit)	LED 2 (1st digit)	
Indoor	1	Indoor unit room-temperature sensor error	✓	1x	—	CH01
	2	Indoor unit inlet pipe sensor error	✓	2x	—	CH02
	3	Wired remote-control error	✓	3x	—	CH03
	4	Float switch (optional) error	✓	4x	—	CH04
	5	Communication error between indoor and outdoor unit	✓	5x	—	CH05
	6	Indoor unit outlet-pipe sensor error	✓	6x	—	CH06
	9	Indoor unit EEPROM error	✓	9x	—	CH09
	10	Indoor unit BLDC motor fan lock	✓	—	1x	CH10
	12	Indoor unit middle pipe sensor error	✓	2x	1x	CH12
Outdoor	21	DC Peak (IPM fault)	✓	1x	2x	CH21
	22	CT 2 (Max CT)	✓	2x	2x	CH22
	23	DC Link Low/High Volt	✓	3x	2x	CH23
	26	DC Comp Position Error	✓	6x	2x	CH26
	27	PSC Fault	✓	7x	2x	CH27
	29	Comp Phase Over-current	✓	9x	2x	CH29
	32	Invert Compressor D-pipe Overheat	✓	2x	3x	CH32
	38	Refrigerant Leak detection	✓	8x	3x	CH38
	37	Exceed the Compression Ration Limit	✓	7x	3x	CH37
	41	D-pipe Sensor Error	✓	1x	4x	CH41
	44	Outdoor Air Sensor Error	✓	4x	4x	CH44
	45	Cond. Out Pipe High	✓	8x	4x	CH45
	51	Excess Capacity (Mismatching between In/Outdoor unit)	✓	1x	5x	CH51
	53	Communication Error (IN-OUT)	✓	3x	5x	CH53
	60	Outdoor EEPROM Check sum error	✓	—	6x	CH60
	61	Cond. Pipe High	✓	1x	6x	CH61
	62	Heat Sink Sensor Temp. High	✓	2x	6x	CH62
	65	Heat sink Th Error (open/short)	✓	5x	6x	CH65
	67	BLDC Motor Fan Lock	✓	7x	6x	CH67
	72	Detect 4 Way Valve Transfer Failure	✓	2x	7x	CH72
	93	Communication Error (IN-OUT)	✓	3x	9x	CH93

10.5 Troubleshooting Table

Table 10-2 lists problems, possible causes, and a corrective action.

Table 10-2 Troubleshooting problems, causes and correction

Problem	Possible Causes	Corrective Action
Unit does not emit cool air	Air is not circulating properly.	• Make sure that there are not curtains, blinds, or furniture blocking the front of the unit.
	The air filter is dirty.	• Clean the air filter once every 2 weeks. See **9.1**, **Cleaning the Air Filter**, **page 102**.
	The room temperature is too high.	• In summer, cooling the indoor air fully may take some time. In this case, select Power Cool to cool the indoor air quickly.
	Cold air is escaping from the room.	• Make sure that no cold air is escaping through ventilation points in the room.
	The desired temperature is higher than the set temperature.	• Set the desired temperature to a level lower than the current temperature.
	There is a heating source nearby.	• Avoid using heat generators like electric ovens or gas burners while the unit is operating.
	Fan Mode is selected.	• During fan mode, air blows from the unit without cooling or heating the indoor air. • Switch the operation mode to cooling.
	Outside temperature is too high.	• The cooling effect may not be sufficient.
The fan speed cannot be adjusted.	The Jet Mode or Auto Operation Mode is selected.	• In some operation modes, you cannot adjust the fan speed. Select an operation mode in which you can adjust the fan speed.
The temperature cannot be adjusted.	The Fan Mode or Jet Mode is selected.	• In some operation modes, you cannot adjust the temperature. Select an operation mode in which you can adjust the temperature.
The unit stops during operation.	The unit is suddenly turned off.	• The Timer Function may have timed-out, which turns the unit off. Check the timer/schedule settings.
	A power failure has occurred during operation.	• Wat for the power to come back. If you have the Auto Restart function enabled, your unit will resume in its last operation mode several minutes after power is restored.
The indoor unit is still operating even when the power has been turned off.	The Auto Clean function is being operated.	• All the Auto Clean function to continue because it removes any remaining moisture inside the indoor unit. If you do not want it to continue, turn the unit off.
The air outlet on the indoor unit is discharging mist.	The cooled air from the unit makes mist.	• When the room temperature decreases, the phenomenon will disappear.
Water leaks from the outdoor unit.	In heating operation, condensed water drops from the heat exchanger.	• This requires installing a drain hose under the base pan. Contact the installer.
There is a noise or vibration.	A clicking sound cab be hard when the unit starts or stops due to movement of the reversing valve. Creaking sound: The plastic parts of the indoor unit creak due to sudden temperature changes. Flowing or Blowing sound: This is the flow of the refrigerant through the unit.	• These are normal occurrences. The noise will stop.
The indoor unit gives off an odor.	Odors (such as cigarette smoke) may be absorbed into the indoor unit and discharged with air flow.	• If the smell does not disappear, wash the air filter. If this does not work, contact service to clean the heat exchanger.
Depending on mode, some functions may not be supported.		

Table 10-2 Troubleshooting problems, causes and correction (continued)

Problem	Possible Causes	Corrective Action
The unit does not emit warm air.	When Heating Mode starts, the vane is almost closed and no air comes out, even thought the outdoor unit is operating.	• This is normal. Please wait until the unit has generated enough warm air to blow through the indoor unit.
	The outdoor unit is in Defrosting Mode.	• In Heating Mode, ice/frost builds up on the coils when the outside temperature falls. This function removes the layer of frost on the coil and should finish in approximately 15 minutes.
	Outside temperature is too low.	• The heating effect may not be sufficient.
Depending on mode, some functions may not be supported.		

10.6 Refrigerant Leaks

ASHRAE Standards 15-2010 and 34-2010 offer guidelines that address refrigerant safety and the maximum allowable concentration of refrigerant in an occupied space. Refrigerant will dissipate into the atmosphere, but a certain volume of air is required for this to occur safely. For R410A refrigerant, the maximum allowable concentration is 0.026 lbs/ft^3 per 1,000 ft^3 of air in an occupied space. Buildings with 24-hour occupancy allow half of that concentration.[1]

ASHRAE Standards 15 and 34 assume that if a system develops a leak, its entire refrigerant charge will dump into the area where the leak occurs. To meet ASHRAE Standards 15 and 34, calculate the refrigerant concentration that may occur in the smallest room volume on the system, and compare the results to the maximum allowable concentration number.[1] Also consult state and local codes with regard to refrigerant safety.

CAUTION

Risk of exposure to excessive refrigerant concentration and oxygen depletion. Can cause illness or injury. If the unit is installed in a small improperly or non-ventilated space, take measures to prevent the refrigerant concentration from exceeding safety limits in the event of a refrigerant leak.

Verify the maximum refrigerant concentration level in the space where the indoor unit will be mounted meets the concentration limit for the application.

NOTE

Take appropriate actions at the end of HVAC equipment life to recover, recycle, reclaim or destroy R410A refrigerant according to applicable US EPA rules.

To calculate the potential refrigerant concentration level (RCL):

1. Measure the occupied space dimensions (in feet).
2. Calculate the cubic foot volume of air in the smallest occupied space. (To obtain a detailed overview of the RCL, perform the same calculations to the second smallest zone, the third smallest zone until the RCL is obtained for all zones. Also, pay special attention to areas such as basements, etc., where refrigerant cannot dissipate easily.)
3. Divide the refrigerant change of the Liebert SRC serving the area in pounds by the results of **Step 1**.

4. If the calculation indicates that the potential refrigerant concentration level is higher than the allowed RCL, increase the cubic volume of the smallest occupied space or modify the piping system design.
5. The allowable RCL limit for most applications must be equal to or less than 0.026 lbs/ft^3. In special occupied spaces, however, such as hospitals and nursing homes where occupants may have limited mobility, the allowable RCL limit is cut in half. See ASHRAE Standard 34-2007 and local codes for detailed information.[1]

Figure 10-4 Refrigerant Concentration Limit (RCL) Calculations Equation

Amount of Factory-Charged Refrigerant per Outdoor Unit + Amount of Additional Refrigerant Trim Charge = Total System Refrigerant Charge

$$\text{RCL (lbs./ft}^3\text{)} = \frac{\text{Total System Refrigerant Charge (lbs.)}}{\text{Volume of Smallest Occupied Space (ft}^3\text{)}}$$

[1]American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE). Atlanta, GA. ASHRAE, Inc. Information about ASHRAE Standard 15-2010 / 34-2010 and addenda current as of the date of this publication.

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