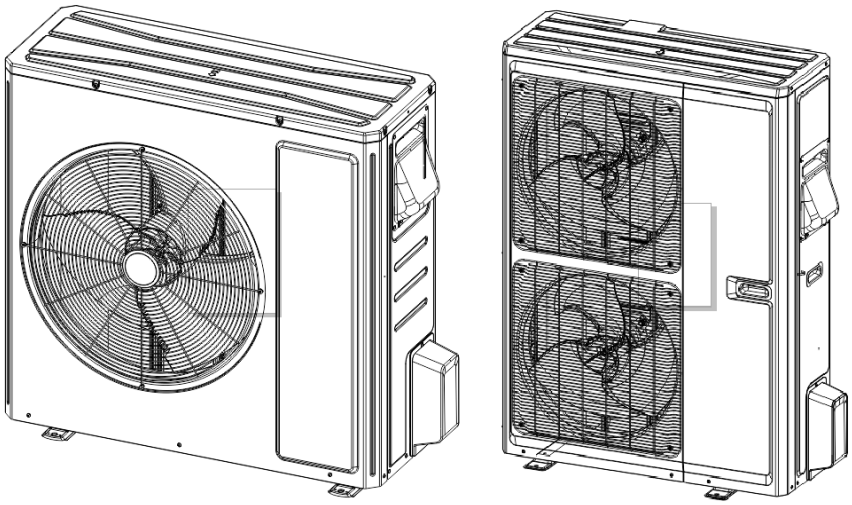
Installation, Operation, and Maintenance

Inverter Side Discharge HP

5HCL5036B1000A
5HCL5060B1000A



Note: *Graphics in this document are for representation only. Actual model may differ in appearance.*

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

September 2025

ODR-SVX012A-EN

Introduction

Read this manual thoroughly before operating or servicing this unit.

This document is customer property and is to remain with this unit. Return to the service information pack upon completion of work.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/ sleeves, butyl gloves, safety glasses, hard hat/ bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

⚠ WARNING

Cancer and Reproductive Harm!

This product can expose you to chemicals, including lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

⚠ WARNING

Safety Hazard!

Failure to follow instructions below could result in death or serious injury or property damage.

This unit is not to be used by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

Do not allow children to play or climb on the unit or to clean or maintain the unit without supervision.

⚠ WARNING

Safety Hazard!

Failure to follow instructions below could result in death or serious injury and/or property damage.

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

⚠ WARNING

Risk of Fire — Flammable Refrigerant!

Failure to follow instructions below could result in death or serious injury, and equipment damage.

- **To be repaired only by trained service personnel.**
- **Do not puncture refrigerant tubing.**
- **Dispose of properly in accordance with federal or local regulations.**

⚠ WARNING

Ventilation Required!

Failure to follow instructions below could result in death or serious injury or property damage.

Confirm the area is adequately ventilated before breaking into the system or conducting any hot work.

⚠ WARNING

Hazardous Voltage!

Failure to follow instructions below could result in death or serious injury.

Voltage may be present even with power disconnected due to high winds causing fan rotation.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

⚠ WARNING

Safety Hazard!

Failure to follow instructions below could result in death or serious injury and equipment or property damage.

- **Do not use any items other than those approved by the manufacturer for defrosting or cleaning process.**
- **Store the appliance in a room without continuously operating ignition sources(for example: open flames, an operating gas appliance, or an operating electric heater).**
- **Do not pierce or burn.**
- **Be cautious that refrigerants may be odorless.**

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

⚠ WARNING

Grounding Required!

Failure to follow instructions below could result in death or serious injury, or property damage.

- **Reconnect all grounding devices.**
- **All parts of this product that are capable of conducting electrical current are grounded.**
- **If grounding wires, screws, straps, clips, nuts, or washers used to complete a path to ground are removed for service, they must be returned to their original position and properly fastened.**

⚠ CAUTION

Unit Contains R–454B Refrigerant!

Failure to use proper service tools may result in equipment damage or personal injury.

Use only R-454B refrigerant and approved compressor oil.

⚠ CAUTION

Caution!

Failure to follow instructions below could result in minor to moderate injury or equipment damage.

- **For brazing, confirm all joints are brazed, not soldered.**
- **For mechanical connections, confirm a negative leak test.**
- **Inspect lines and use proper service tools.**

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Table of Contents

Overview

This system is a cold-climate heat pump that can pair with only the 5TDM air handler or 5DXC coil. The manufacturer recommends installing only approved matched indoor and outdoor systems. All of the manufacture's split systems are AHRI rated only with TXV/EEV indoor systems. Some of the benefits of installing approved matched indoor and outdoor split systems are maximum efficiency, optimum performance and the best overall system reliability.

Operating Range

Table 1. Operating Range

	Cooling	Heating
Outdoor temperature	5°F (-15°C) ~ 129.2°F (54°C)	-22°F (-30°C) ~ 75.2° F (24°C)

Accessories

Table 2. 5HCL5036B1000A accessories

Name	Quantity	Usage
Drain plug	3	To plug the unused drain hole
Drainage connector	1	To connect the hard PVC drain pitpe

Table 3. 5HCL5060B1000A accessories

Name	Quantity	Usage
Drain plug	4	To plug the unused drain hole
Drainage connector	1	To connect the hard PVC drain pitpe

Sound Performance Overview

Table 4. Sound performance data by system capacity

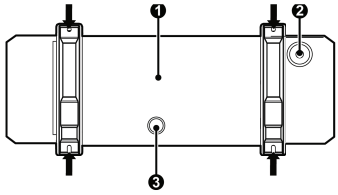
		24-K	36-K	48-K	60-K
Sound Pressure Level (H)	dB(A)	60	61	62	62
Sound Power Level (H)	dB(A)	70	71	72	72

Unit Location Considerations

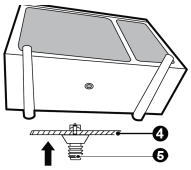
Consider the following when selecting a location for the outdoor unit:

- Avoid installing where noise and air flow produced by the outdoor unit will cause a disruption.
- Select a location that is safe and away from animals and plants. If not, add safety fences to protect the unit.
- Confirm the location has good ventilation with no obstacles nearby that may obstruct the air inlet and outlet.
- The installation location should be able to withstand the weight and vibration of outdoor unit and allow the installation to be carried out safely.
- Avoid installing where there is a leakage of inflammable gas, oil smoke, or corrosive gas.
- Avoid strong wind, as wind conditions can impact the outdoor fan and lead to insufficient air flow volume and poor performance.
- Unit should be away from objects like satellite dish, antennas, and generators.
- Install where condensate can be easily drained.
- If the outdoor unit is installed on a solid ground such as concrete, use screw bolts and nuts to secure the unit and make sure the unit stands erect and level.
- If it vibrates and causes noise, add a rubber cushion between the outdoor unit and the installation base. To avoid outdoor unit noise, the outdoor unit should be away from bedrooms and windows.
- When the outdoor unit is in heating or defrosting, it needs to drain water. When installing the drain pipe, plug the accompanied drainage connector to the drainage hole on the chassis of the outdoor unit. Then connect a drain hose to the drainage connector. If a drainage connector is used, the outdoor unit should be at least 4 inches from the installation ground.

Figure 1. Drain pipe



❶ Bottom
❷ Drain cap
❸ Drain pipe mounting hole



❹ Chassis
❺ Drain connection

- Do not install the air conditioner in a corrosive environment, as it may shorten the life or negatively impact the performance of the unit.

Dimensional Data

Figure 2. Unit dimensions

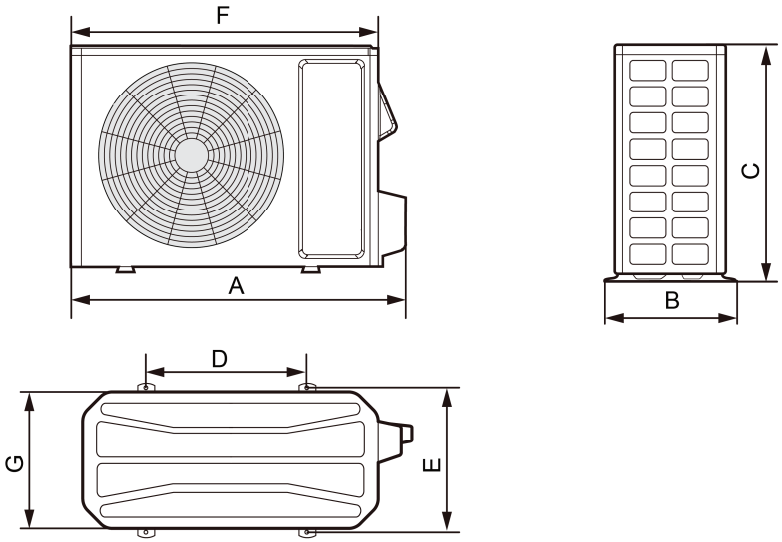


Table 5. Dimensions

	A	B	C	D	E	F	G
5HCL5036B1000A	42-1/16 in. (1068 mm)	16-13/16 in. (427 mm)	37-13/16 in. (960 mm)	29-3/4 in. (755 mm)	15-9/16 in. (396 mm)	39 in. (990 mm)	14-9/16 in. (370 mm)

Figure 3. Dimensions

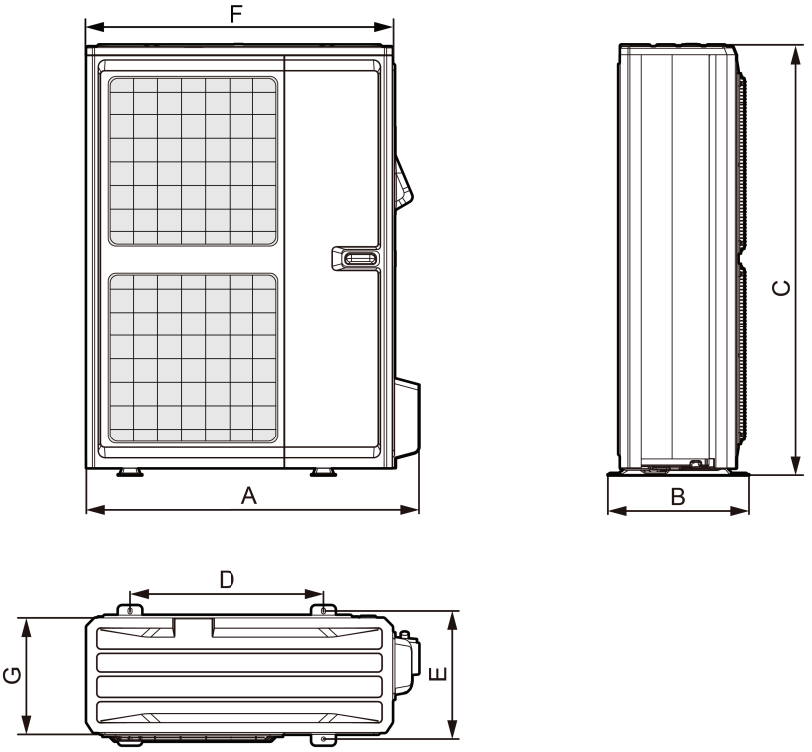


Table 6. Dimensions

	A	B	C	D	E	F	G
5HCL5060B1000A	38-1/2 in. (978 mm)	16-1/4 in. (412 mm)	49-5/8 in. (1260 mm)	22-7/16 in. (570)	14-7/8 in. (378 mm)	35-7/16 in. (900 mm)	13-3/8 in. (340 mm)

Notes:

- *The indoor unit models that can be matched with the outdoor unit can be found on the AHRI website.*
- *This unit is equipped with electrically powered safety measures. For the safety measures to be effective, the unit must be electrically powered at all times after installation, other than when servicing.*

Unit Clearances

For the best system reliability:

- Do not locate close to bedrooms as operational sounds may be objectionable.
- Avoid locations near windows and similar areas where condensation and freezing defrost vapor can annoy a customer.

Important:

- *When installing multiple units, confirm the discharge air from one unit is not drawn into another unit. When installing single or multiple units in an alcove, roof well, or partially enclosed area, confirm there is adequate ventilation to prevent recirculation of discharge air.*
- *If installation is in areas with known prevailing winds in excess of 25 mph, a wind baffle kit [1] is suggested.*
- *Units shall not be stacked vertically.*

1. *Not provided by the manufacturer.*

Figure 4. Single outdoor unit clearances

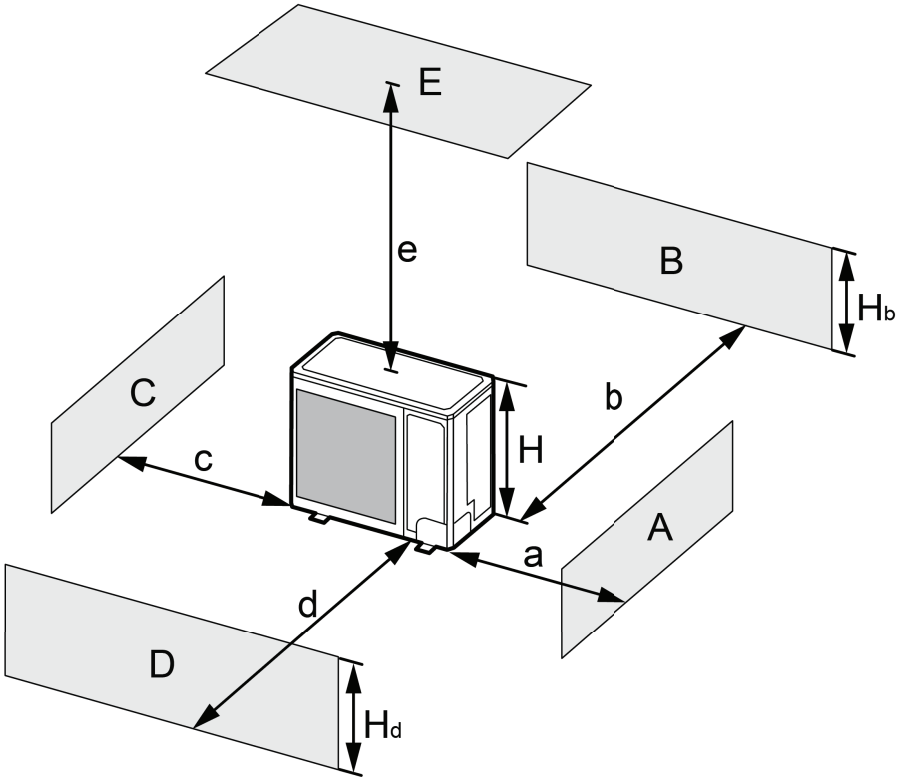


Table 7. Single outdoor unit clearances

A-E	H_b H_d H		(in)				
			a	b	c	d	e
B	—		—	≥3.93	—	—	—
A, B, C	—		≥11.81	≥3.93	≥3.93	—	—
B, E	—		—	≥3.93	—	—	≥39.37
A, B, C, E	—		≥11.81	≥5.91	≥5.91	—	≥39.37
D	—		—	—	—	≥39.37	—
D, E	—		—	—	—	≥39.37	≥39.37
B, D	$H_b < H_d$	$H_d > H$	—	≥3.93	—	≥39.37	—
	$H_b > H_d$	$H_d < H$	—	≥3.93	—	≥39.37	—
B, D, E	$H_b < H_d$	$H_b \leq 1/2$ H	—	≥9.84	—	≥78.74	≥39.37
		1/2 H < $H_b \leq$ H	—	≥9.84	—	≥78.74	≥39.37
		$H_b >$ H	Prohibited				
	$H_b > H_d$	$H_d \leq 1/2$ H	—	≥3.93	—	≥78.74	≥39.37
		1/2 H < $H_d \leq$ H	—	≥7.87	—	≥78.74	≥39.37
		$H_d >$ H	Prohibited				

Note: If less than 39 inches is desired from D to d in Figure 4, p. 9, C to c must be greater than 4 inches to assist with air circulation.

Figure 5. Multiple outdoor unit clearances

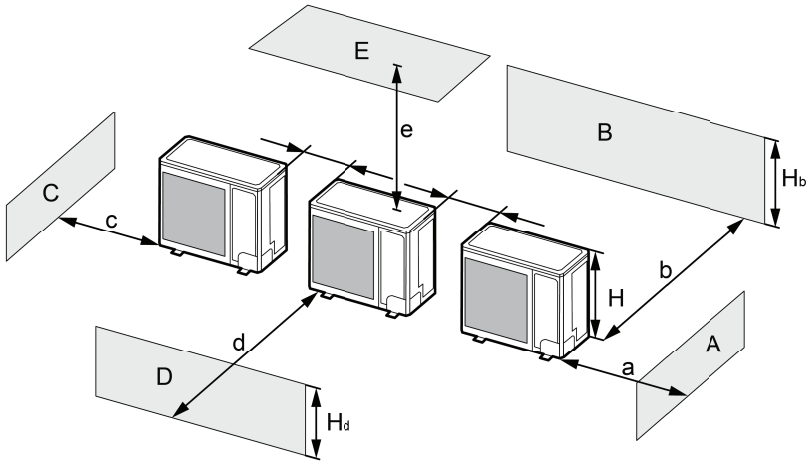


Table 8. Multiple outdoor unit clearances

A-E	H_b H_d H		(in)				
			a	b	c	d	e
A, B, C	—		≥11.81	≥11.81	≥39.37	—	—
A, B, C, D	—		≥11.81	≥11.81	≥39.37	—	≥39.37
D	—		—	—	—	≥78.74	—
D, E	—		—	—	—	≥78.74	≥39.37
B, D	$H_b < H_d$	$H_d > H$	—	≥11.81	—	≥78.74	—
	$H_b > H_d$	$H_d < 1/2\ H$	—	≥9.84	—	≥78.74	—
		$1/2\ H < H_d \leq H$	—	≥11.81	—	≥98.43	—
B, D, E	$H_b < H_d$	$H_b \leq 1/2\ H$	—	≥11.81	—	≥78.74	≥39.37
		$1/2\ H < H_b \leq H$	—	≥11.81	—	≥98.43	≥39.37
		$H_b > H$	Prohibited				
	$H_b > H_d$	$H_d \leq 1/2\ H$	—	≥9.84	—	≥98.43	≥39.37
		$1/2\ H < H_d \leq H$	—	≥11.81	—	≥98.43	≥39.37
		$H_d > H$	Prohibited				

Figure 6. Outdoor units installed in rows clearances

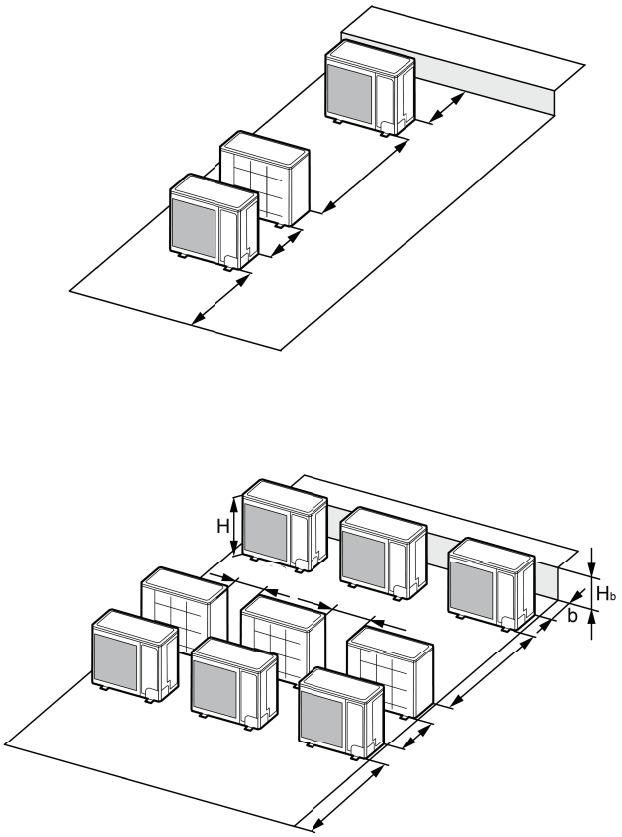


Table 9. Outdoor units installed in rows clearances

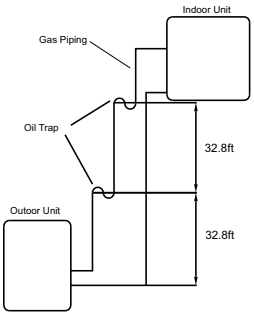
H_b H	(in)
$H_b \leq 1/2$ H	b ≥ 9.84
1/2 H < $H_b \leq$ H	b ≥ 11.81
H_b > H	Prohibited

Oil Traps

Indoor unit installed higher than the outdoor unit

If oil flows back into the outdoor unit's compressor, it might cause liquid compression or deterioration. Oil traps in the rising gas piping can prevent this. An oil trap should be installed every 32.8 ft of vertical suction line riser.

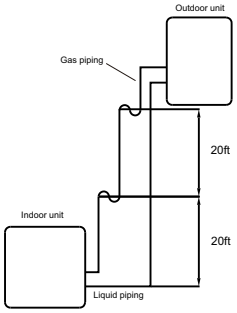
Figure 7. Indoor unit installed higher than outdoor unit



Outdoor unit installed higher than the indoor unit

It is recommended that vertical suction risers not be up-sized. Proper oil returns to the compressor should be maintained. An oil trap should be installed every 20 ft of vertical suction line riser.

Figure 8. Outdoor unit installed higher than indoor unit



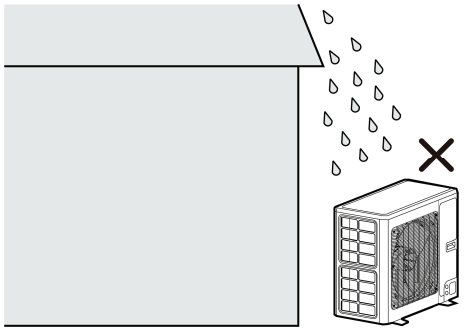
Cold Climate Considerations

Confirm there is a throttling valve (which throttles the unit when it operates in cooling mode and opens fully when it operates in heating mode) in the indoor unit (air handler or A coil).

For areas with frequent snowfall, clean up the snow in time to avoid covering the unit. The unit installed in areas expecting snow are suggested to be raised with support frames. If possible, avoid locations that are likely to accumulate snow. If not possible, a snow guard may be installed on the unit to prevent accumulation of snow on the top of the unit.

Do not install the air conditioner where water, ice, or snow from overhang or roof may damage or flood the unit.

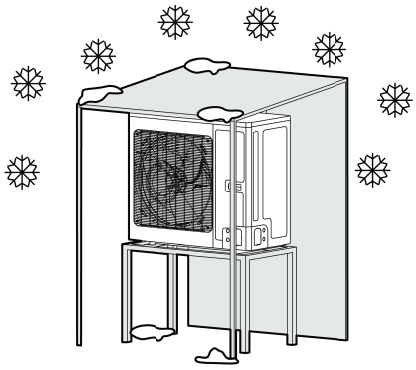
Figure 9. Avoid water, ice, snow



Installation requirements for snowy areas:

- Install the air conditioner on a stand which more than 20 in.(500mm) higher than the expected snow fall to prevent it from being covered by snow.
- Attach a snow hood and snow guard if needed. See the following figures for reference. Snow hood and snow guard not provided.
- Do not install the air conditioner where a snowdrift is generated.
- Remove the air inlet grille to prevent snow from accumulating on it.
- Plugs and drainage connector are not recommended.

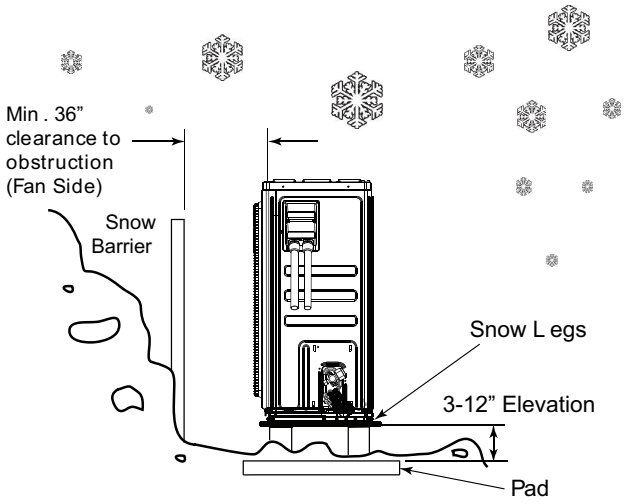
Figure 10. Avoid snow accumulation



These precautions are recommended for units installed in areas where snow accumulation and prolonged below-freezing temperatures occur:

- Units should be elevated 3–12 inches above the pad or rooftop, depending on local weather. This additional height will allow drainage of snow and ice melted during defrost cycle prior to refreezing. Confirm that drain holes in unit base pan are not obstructed, preventing drainage of defrost water.
- If possible, avoid locations that are likely to accumulate snow drifts. If not possible, a snow drift barrier should be installed around the unit to prevent a build-up of snow on the sides of the unit.

Figure 11. Snow barrier



Pad Installation

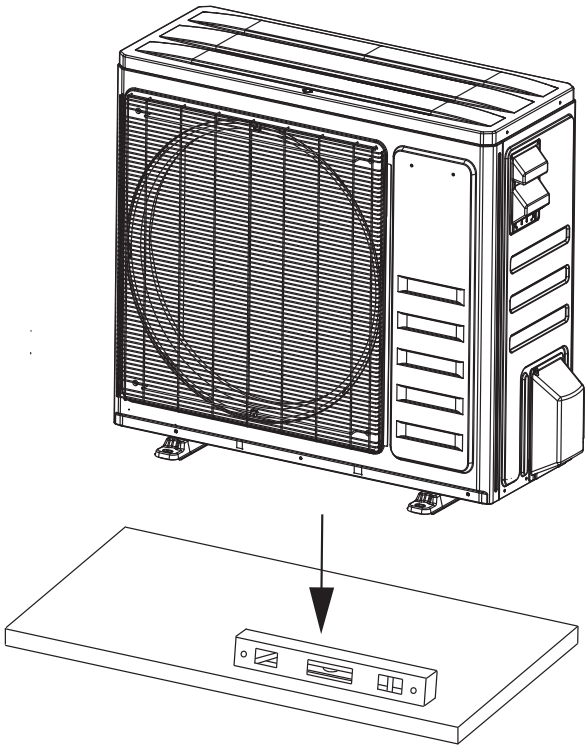
When installing the unit on a support pad, such as a concrete slab, consider the following:

- The pad should be at least 1 inch larger than the unit on all sides.
- The pad must be separate from any structure.
- The pad must be level.

- The pad should be high enough above grade to allow for drainage.
- The pad location must comply with National, State, and Local codes.

Important: *Unit can be secured to the pad if there is concern of the unit tipping.*

Figure 12. Pad installation



Installation

Refrigerant Line Considerations

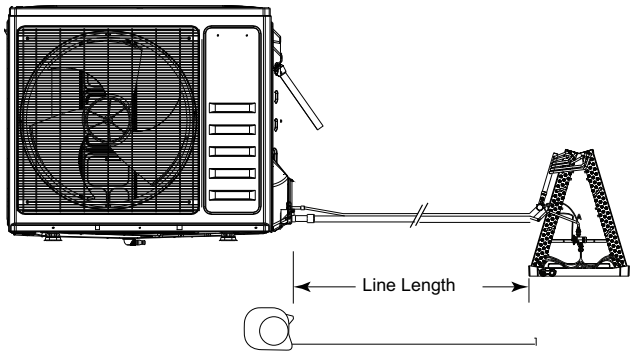
Refrigerant Line Length

Determine required line length and lift.

Total Line Length = _____ft.

Total Vertical Change (lift) = _____ft.

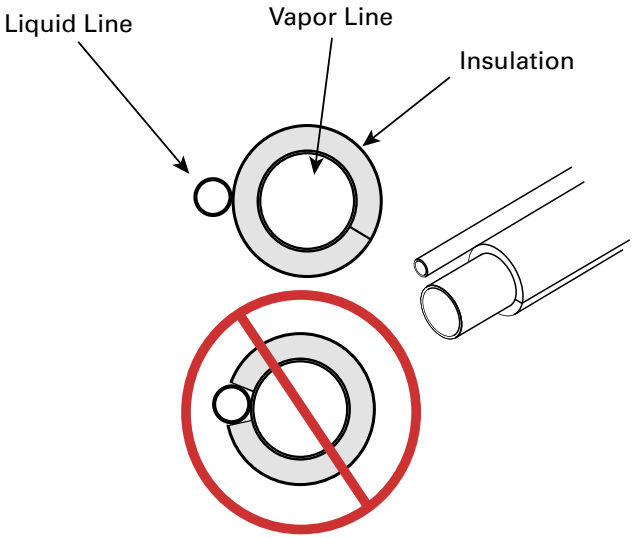
Figure 13. Required refrigerant line length



Note: *Factory charge is sufficient for 24.6 ft. of line length. See System Charge Adjustment section for adding additional refrigerant per line set length.*

Refrigerant Line Insulation

Figure 14. Liquid line, vapor line, and insulation



Important: *The vapor line must always be insulated. DO NOT allow the Liquid Line and Vapor Line to come in direct (metal to metal) contact.*

Note: *The vapor line must always be insulated. Insulating the liquid line through attic spaces may benefit system performance by minimizing heat gain in the liquid line.*

Reuse Existing Refrigerant Lines

⚠ CAUTION

Brazed Joints!

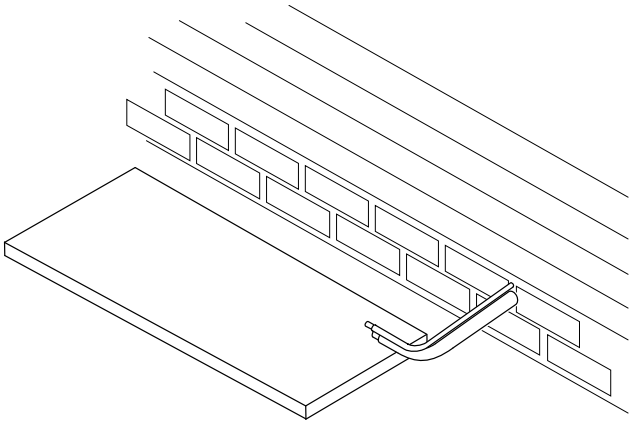
Failure to follow instructions below could result in minor to moderate injury or equipment damage.

When using existing refrigerant lines, verify all joints are brazed and not soldered.

For retrofit applications, where the existing indoor evaporator coil and/or refrigerant lines will be used, the following precautions should be taken.

- Ensure that the indoor evaporator coil and refrigerant lines are the correct size.
- Ensure that the refrigerant lines are free of leaks, acid, and oil.

Figure 15. Verify brazed joints



Refrigerant Line Routing Precautions

Important: *Comply with National, State, and Local Codes when isolating line sets from joists, rafters, walls, or other structural elements.*

Important: *Take precautions to prevent noise within the building structure due to vibration transmission from the refrigerant lines.*

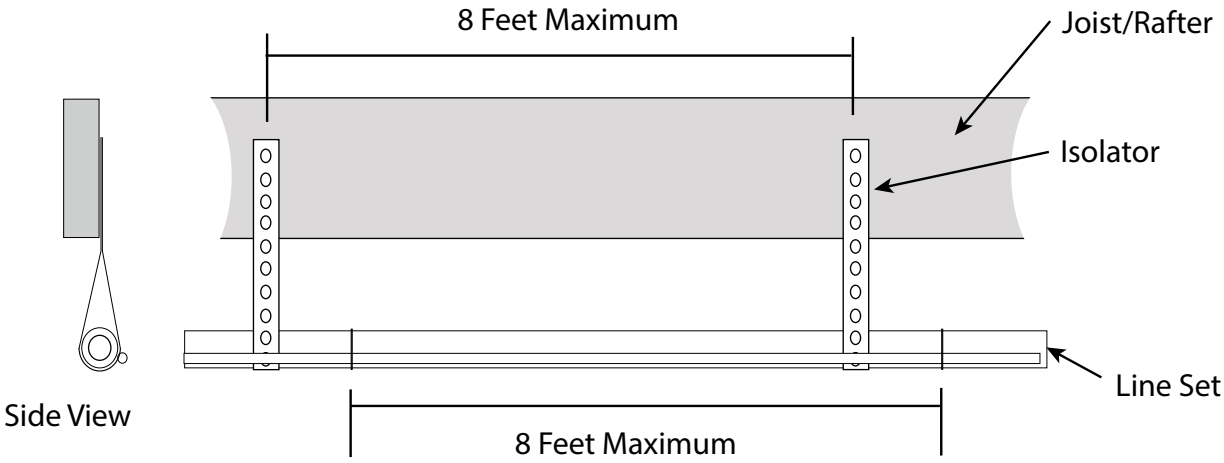
For Example:

- When the refrigerant lines must be fastened to floor joists or other framing in a structure, use isolation type hangers.
- Isolation hangers should also be used when refrigerant lines are run in stud spaces or enclosed ceilings.
- Where the refrigerant lines run through a wall or sill, they should be insulated and isolated.
- Isolate the lines from all duct work.
- Minimize the number of 90° turns.

Isolation from Joist/Rafter

Secure Vapor Line from joists using isolators every 8 ft. Secure Liquid Line directly to insulated Vapor Line using tape, wire, or other appropriate method every 8 ft.

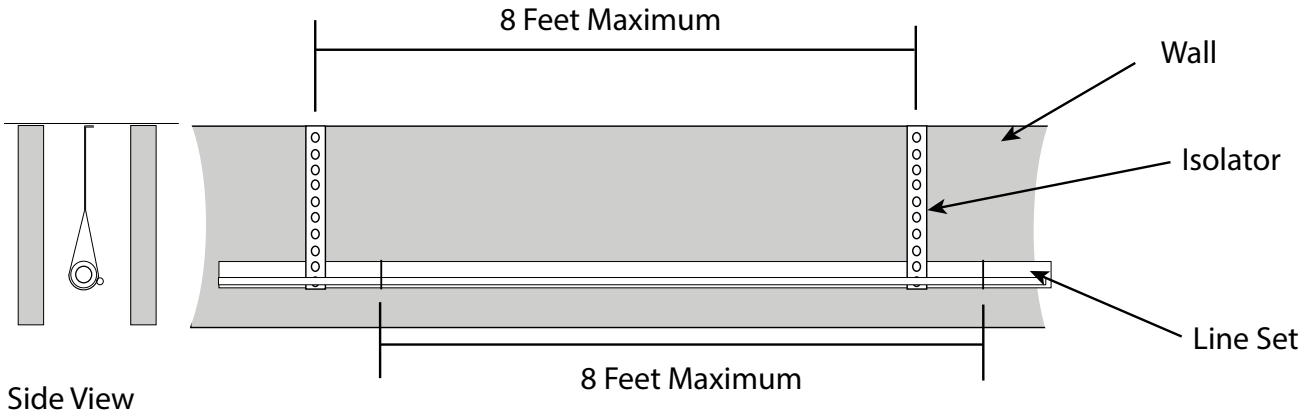
Figure 16. Isolation from joist/rafter



Isolation in Wall Spaces

Secure Vapor Line from joists using isolators every 8 ft. Secure Liquid Line directly to insulated Vapor Line using tape, wire, or other appropriate method every 8 ft.

Figure 17. Isolation in wall spaces



Isolation Through Wall

Figure 18. Isolation through wall

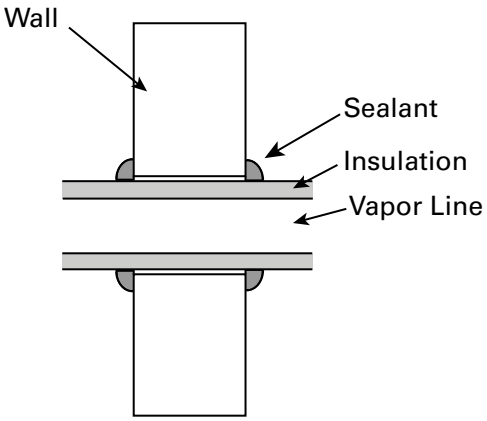
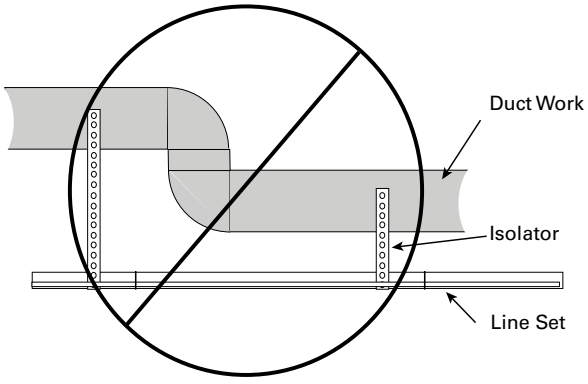


Figure 19. Isolation through wall

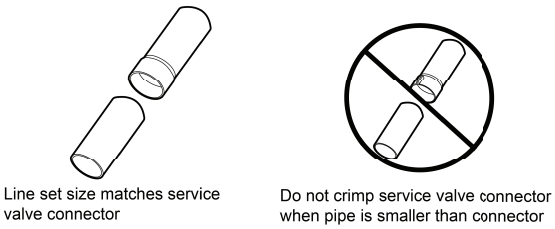


DO NOT hang line sets from duct work

Refrigerant Line Connections

Connect the connection pipes first to the unit. When bending a connection pipe, be careful not to damage the pipe. Do not over-tighten the screw nut, otherwise leakage will occur.

Figure 20. Installation precautions



Line set size matches service valve connector

Do not crimp service valve connector when pipe is smaller than connector

The connection pipe should have water-proof insulating material. Its wall thickness should be 0.02-0.04 inch and the pipe wall should be able to withstand 870 PSI (6 MPa). The longer the connection pipe is, the worse cooling and heating performance it has.

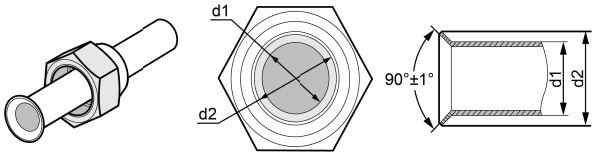
Table 10. Refrigerant line connections

Model/Item	Size of fitting pipe (inch)		Maximum pipe length	Largest drop between indoor and outdoor units
	Liquid pipe	Gas Pipe		
5HCL5036B1000A 5HCL5060B1000A	Φ 3/8 in.	Φ 3/4 in.	98.4 ft. (30 mm)	49.2 ft. (15 mm)

Pipe Flaring

1. Cut the connection pipe with a pipe cutter.
2. The mouth of connection pipe should face downward. Remove burrs with the cut surface so that the chips do not enter the pipe.
3. Remove the cut-off valve of outdoor unit and take out the flare nut from the bag of indoor unit accessories.
4. Fit the flare nut on the pipe and use a flaring tool to flare the mouth of connection pipe.
5. Check if the flaring part has cracked. (See the figure below.)
6. If you replace the outdoor unit, you need to braze in an additional bi-flow liquid line drier.

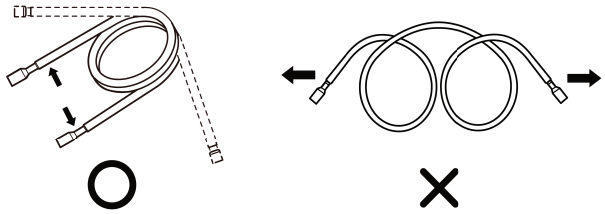
Figure 21. Pipe flaring



Pipe Bending

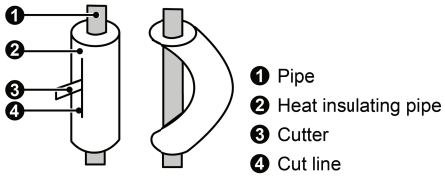
1. The pipes are shaped by your hands. Be careful not to collapse them.

Figure 22. Pipe bending



2. Do not bend the pipes in an angle more than 90°.
3. If the pipe is repeatedly bent or extended, it will become hard and difficult to be bent or extended. So do not bend or extend the pipe for more than three times.
4. When bending the pipe, do not bend it excessively, otherwise it will get broken. As shown beside, use a sharp cutter to cut the heat insulating pipe and bend it after the pipe is exposed. After bending, place the heat insulating pipe back on the pipeline and fix it with adhesive tape.

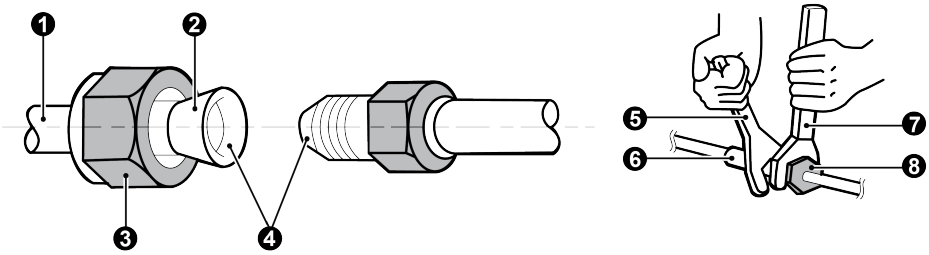
Figure 23. Cut the pipe



Unit Pipe Connection

1. Connect the pipe to the unit. Use both spanner and torque wrench. See.
2. When connecting the tapered screw nut, first apply chilled machine oil on its inner and outer surface and then rotate it three to four times.
3. Confirm the tightening torque by referring to the following table (If the screw nut is over-twisted, it may be damaged and cause leakage).
4. Check if gas leakage occurs to the connection pipe and then apply thermal insulation, as shown below.
5. Wind sponge around the joint of gas pipe and heat insulation sheath of gas collecting pipe.
6. Connect gas pipe after liquid pipe is connected.
7. Insulate the gas pipe. Insulation for liquid pipe is optional.

Figure 24. Screw connection



❶ Copper piping
❷ Oil applied
(To reduce friction with the flare nut)
❸ Flare nut
❹ Oil applied(Improves seal air-tightness)
❺ Spanner
❻ Piping union
❼ Torque wrench
❽ Flare nut

Table 11. Unit pipe connections

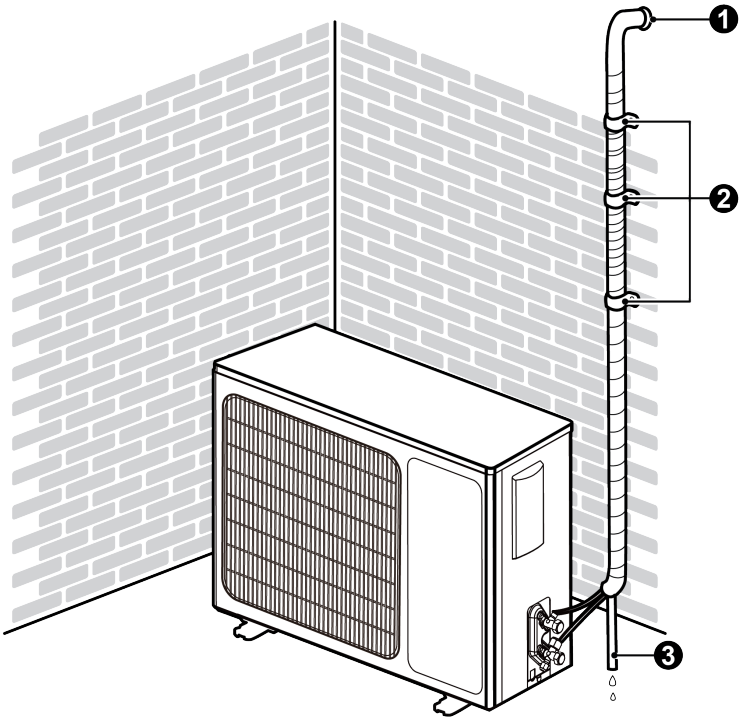
Pipe diameter	Tightening Torque (lb-ft)
Φ 3/8 in.	25–30
Φ 3/4 in.	51–55

Drain Pipe Installation

Outdoor Side Drainage Pipe

- If the outdoor unit is below the indoor unit, arrange the pipeline according to the following diagram.

Figure 25. Outdoor drainage pipe — outdoor unit below the indoor unit

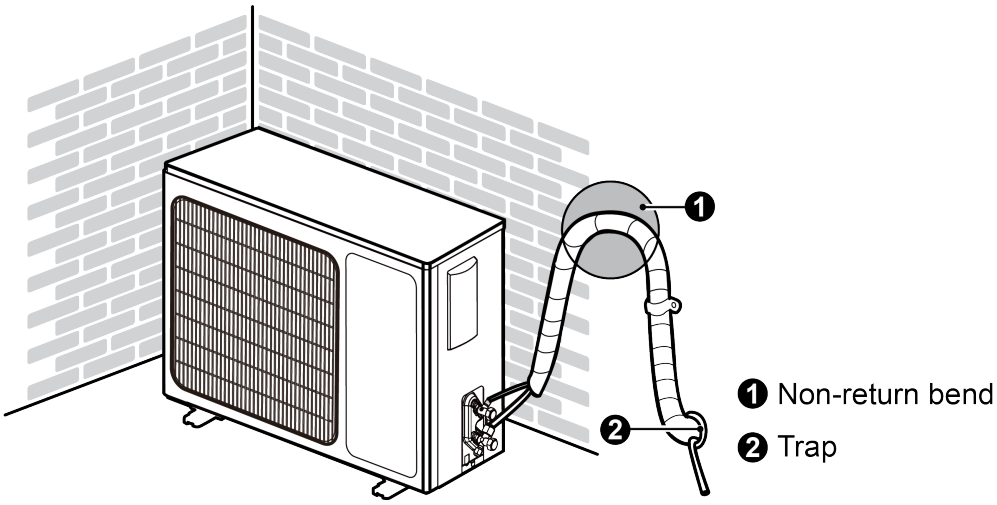


1 Sealed
2 Saddle
3 Drain pipe

  – Drain hose should be placed on the ground and its end should not be immersed into water. The whole pipeline should be supported and fixed onto the wall.
  – Wind the insulating tape from bottom to top.
  – The whole pipeline should be wound with insulating tape and fixed onto the wall with saddles.

- If the outdoor unit is above the indoor unit, arrange the pipeline according to the following diagram.
  – Wind the insulating tape from bottom to top.
  – The whole pipeline should be wound together to avoid water returning to the room.
  – Use saddles to fix the whole pipeline onto the wall.

Figure 26. Outdoor drainage pipe — outdoor unit above the indoor unit



Refrigerant Line Leak Check

After completion of field piping for split systems, the field pipework shall be pressure tested with nitrogen and then vacuum tested prior to refrigerant charging.

Important: *The outdoor unit should not be tested higher than 450 psig for servicing or component replacement. The indoor unit and linesets should be tested to the max pressure specified on the outdoor or indoor unit nameplate. The service valves should be closed when pressure testing the evaporator coil and linesets to separate the outdoor unit from the indoor unit.*

Final Pressure Check:

Isolate the outdoor unit from the evaporator coil and linesets using the service valves. Pressurize the evaporator coil and linesets to the max pressure specified on the outdoor or indoor unit nameplate for a minimum of 60 minutes. Do not add additional refrigerant or test gas after reaching the evaporator coil specified pressure. The system should show no loss of pressure once pressurized. Once the pressure test is complete follow the steps for evacuation.

***Optional Preliminary Pressure Check:**

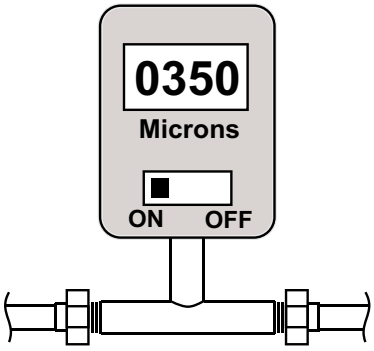
Pressurize the refrigerant lines and evaporator coil to 150 PSIG using dry nitrogen. Check for leaks by using a soapy solution or bubbles at each brazed location. Remove pressure and repair any leaks before continuing.

Evacuation and Servicing

Important: *Do not open the service valves until the refrigerant lines and indoor coil leak check and evacuation are complete.*

1. Evacuate until the micron gauge reads no higher than 350 microns, then close off the valve to the vacuum pump.

Figure 27. Observe micron gauge reading



2. Observe the micron gauge. Evacuation is complete if the micron gauge does not rise above 1500 microns in ten (10) minute.
3. When evacuation is complete, blank off the vacuum pump and micron gauge, and close the valves on the manifold gauge set.

Figure 28. Wait 10 minutes

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

Servicing

When servicing:

- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.
- Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapor being present while the work is being performed.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand.
- Have a dry powder or CO_2 fire extinguisher adjacent to the servicing area.
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.
- A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

  Important: *The following leak detection methods are deemed acceptable for all refrigerant systems:*

  – *Electronic leak detectors calibrated for R–454B*

  – *Bubble method*

  Important: *Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks.*
- If a leak is suspected, all naked flames shall be removed/extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.
- If repairs must be made after system is charged, properly and safely remove or isolate refrigerant and purge the section of the system needing repair with inert gas or oxygen free nitrogen prior to opening the circuit.
- The refrigerant charge shall be recovered into the correctly marked recovery cylinders. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available."

Table 12. Nitrogen purge

Nitrogen Purge Times				
Flow Rate	**Lineset Length**			
CuFT/Hr	< 50 feet	< 100 feet	< 150 feet	< 200 feet
15	2 Minutes	4 Minutes	6 Minutes	8 Minutes
30	1 Minute	2 Minutes	3 Minutes	4 Minutes
60	1 Minute	1 Minute	2 Minutes	2 Minutes

- Confirm that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. Only use cylinders designated for the recovered refrigerant and labelled for that refrigerant. Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order.
- A calibrated weighing scale shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Ensure any associated electrical components are sealed.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder. Do not mix refrigerants.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.

Service Valves

Important: *Leak check and evacuation must be completed before opening the service valves.*

Note: *Do not vent into the atmosphere.*

1. Remove valve stem cap.
2. Using an adjustable wrench, turn valve stem 1/4 turn counterclockwise to the fully open position.
3. Replace the valve cap to prevent leaks. Tighten finger tight plus an additional 1/4 turn.

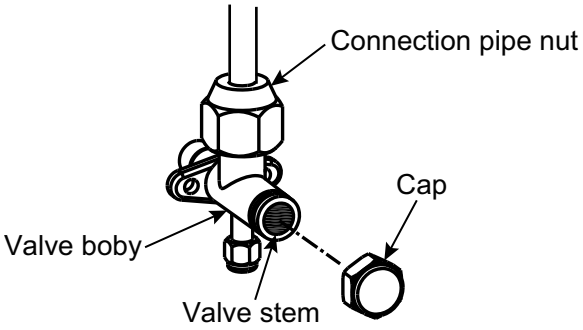
⚠ WARNING

System Charge!

Failure to follow instructions below could result in abrupt release of system charge and could result in serious injury or property damage.

When opening the suction and liquid line service valve, turn the valve stem counterclockwise only until the stem contacts the rolled edge. Do not apply torque.

Figure 29. Service valves



Electrical Installation

Electrical Requirements

⚠ WARNING

Electrical Hazard!

Failure to follow instructions below could result in death or serious injury, and property damage.

- **The electric circuit must be equipped with a circuit breaker and an air switch with sufficient capacity.**
- **Use a specialized power circuit for the air conditioner. Do not draw power from another power circuit.**
- **Locate the air conditioner at least 1.5 m away from flammable surfaces.**
- **Confirm external power cords, communication wires, and the outdoor unit do not come into direct contact with hot objects (such as chimney pipes or warm gas pipes). They must also avoid intersecting metal beams, the edge of the ceiling, or touching any metal burrs or sharp metal edges.**
- **Do not pull, stretch, or bend the wires.**
- **Firmly connect the wiring to the terminal board.**
- **Replace damaged power cords by specialized wires.**
- **Connect the ground wire.**

⚠ WARNING

Electrical Shock Hazard!

Failure to follow instructions below could result in death or serious injury.

Always turn off all power to the unit before installing or servicing the unit. There may be more than one disconnect switch. Lock out and tag switch with a suitable warning label.

⚠ WARNING

Safety Hazard!

Failure to follow instructions below could result in death or serious injury.

All phases of the installation must conform to NATIONAL, STATE, AND LOCAL CODES. For additional information, please contact your local distributor.

The electrical installation must be conducted by professionals in compliance with local laws and regulations and the instructions in this manual.

Notes:

- *Connect wires correspondingly by referring to the circuit diagram labeled on the unit or electric box. Screws must be tightened up. Slipped screws must be replaced by specialized flat-head screws.*
- *This outdoor unit has a heating four-way valve.*

Table 13. Electrical parameters

Model	Power supply	Fuse capacity (A)	Maximum over-current protection (A)	Minimum circuit capacity (A)
5HCL5036B1000A	208/230V- 1Ph-60Hz	25	25	21
	208/230V- 1Ph-60Hz	30	30	27.7
5HCL5060B1000A	208/230V- 1Ph-60Hz	45	45	39.9
	208/230V- 1Ph-60Hz	45	45	39.9

Note: *All wires must go through insulating tape or have electrical tape.*

Connection of Power Cords and Communication Wires

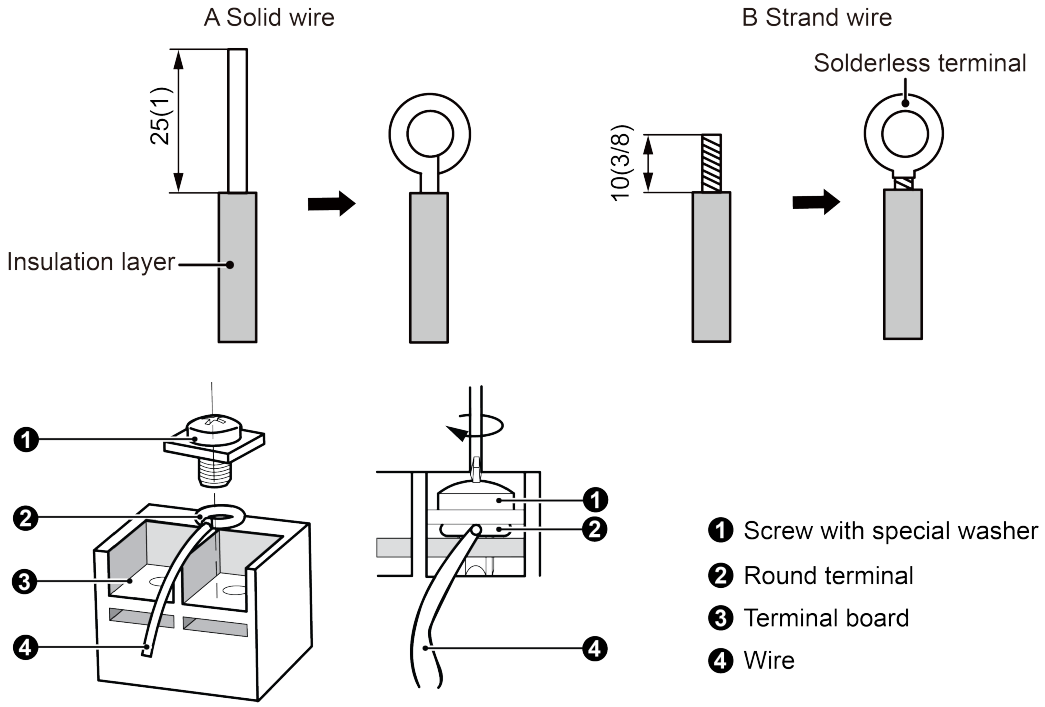
For solid wires (as shown below):

1. Use wire cutters to cut off the wire end and then peel up to 0.5 to 1 inch of the insulation layer.
2. Use a screwdriver to unscrew the terminal screw on the terminal board.
3. Use nippers to bend the solid wire into a ring that fits the terminal screw.
4. Form a proper ring and then put it on the terminal board. Use a screwdriver to tighten up the terminal screw.

For strand wires (as shown below):

1. Use wire cutters to cut off the wire end and then peel up to 0.4 inch of the insulation layer.
2. Use a screwdriver to unscrew the terminal screw on the terminal board.
3. Use a round terminal fastener or clamp to fix the round terminal firmly on the peeled wire end.
4. Locate the round terminal conduit. Use a screwdriver to replace it and tighten up the terminal screw.

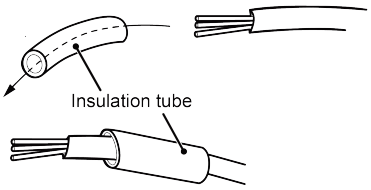
Figure 30. Connect power cords and communication wires



Connect communication wires and power cords:

- Lead the communication wires and power cords through the insulation tube .

Figure 31. Insulation tube



⚠ WARNING

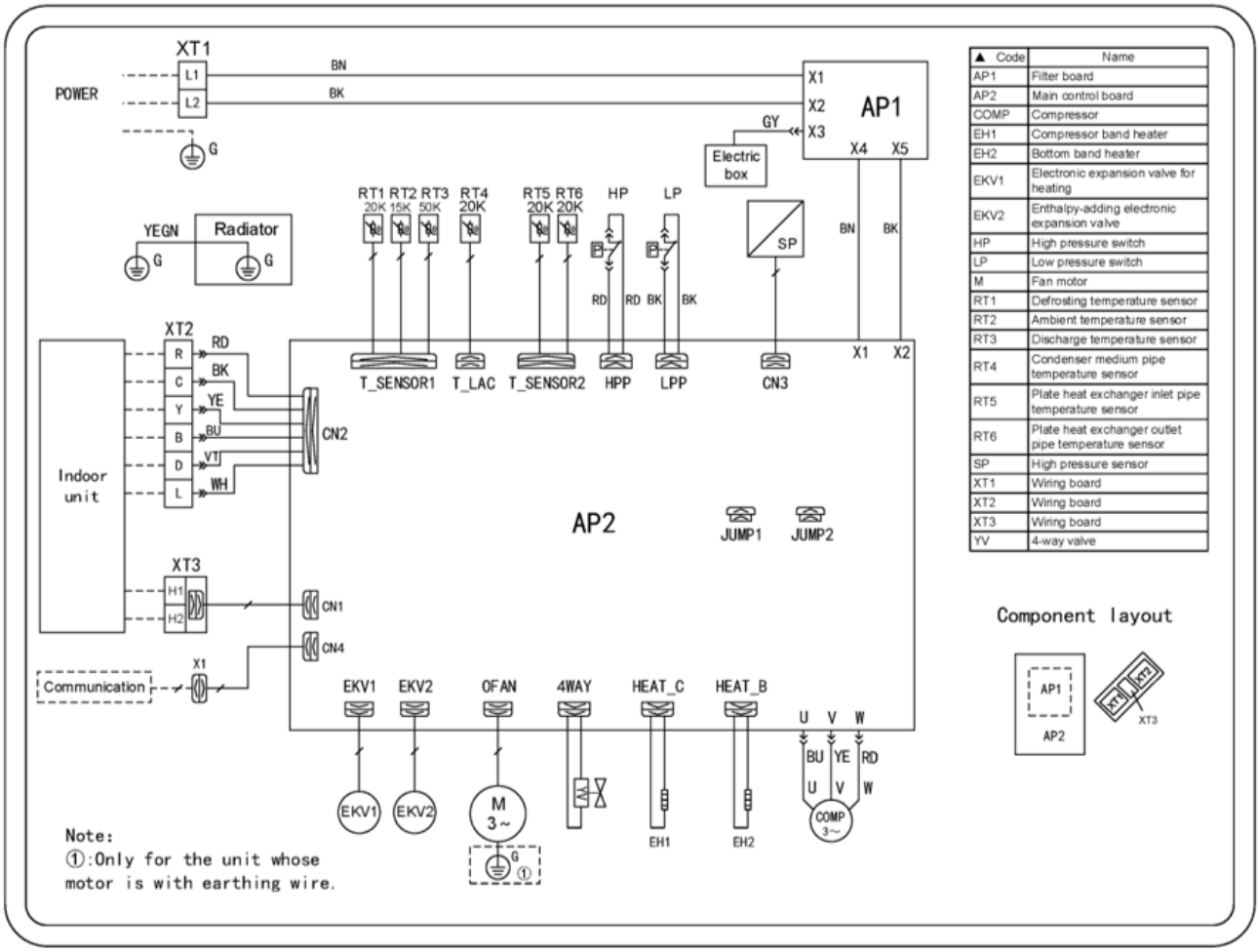
Electrical Hazard!

Failure to follow instructions below could result in death or serious injury, and property damage.

- **Do not bundle up communication wires or lay them side by side to prevent errors.**
- **Secure high and low voltage wires separately.**
- **Use screws to tighten the communication wires and power cords of the units on the terminal board.**
- **Ground the units by connecting the ground wire.**
- **The units should comply with applicable local and national rules and regulations on power consumption.**
- **When connecting the power cords, confirm the phase sequence of the power supply matches with the corresponding terminals; otherwise the compressor will reverse and operate abnormally.**

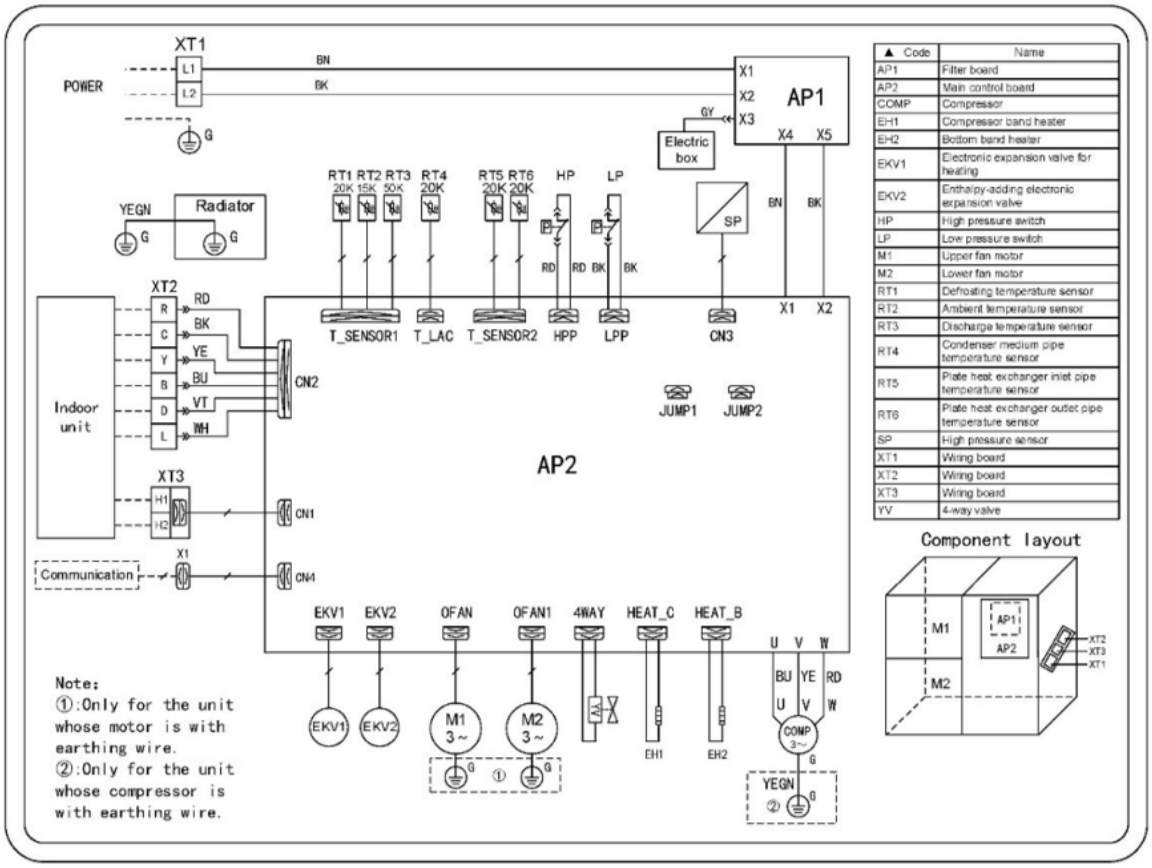
Wiring Diagrams

Figure 32. 5HCL5036B1000A



▲ Code	Name
AP1	Filter board
AP2	Main control board
COMP	Compressor
EH1	Compressor band heater
EH2	Bottom band heater
EKV1	Electronic expansion valve for heating
EKV2	Enthalpy-adding electronic expansion valve
HP	High pressure switch
LP	Low pressure switch
M	Fan motor
RT1	Defrosting temperature sensor
RT2	Ambient temperature sensor
RT3	Discharge temperature sensor
RT4	Condenser medium pipe temperature sensor
RT5	Plate heat exchanger inlet pipe temperature sensor
RT6	Plate heat exchanger outlet pipe temperature sensor
SP	High pressure sensor
XT1	Wiring board
XT2	Wiring board
XT3	Wiring board
YV	4-way valve

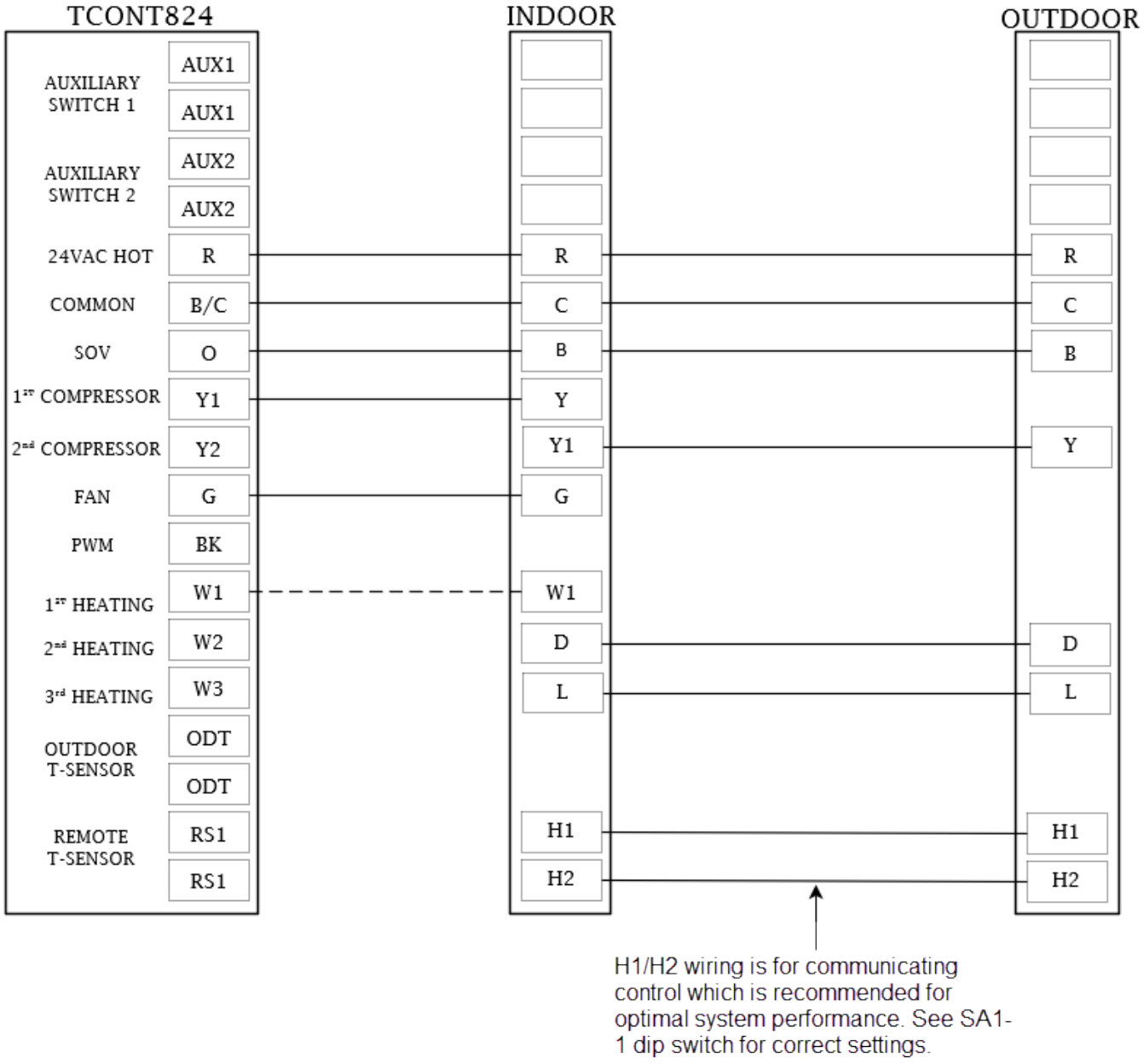
Figure 33. 5HCL5060B1000A



▲ Code	Name
AP1	Filter board
AP2	Main control board
COMP	Compressor
EH1	Compressor band heater
EH2	Bottom band heater
EKV1	Electronic expansion valve for heating
EKV2	Enthalpy-adding electronic expansion valve
HP	High pressure switch
LP	Low pressure switch
M1	Upper fan motor
M2	Lower fan motor
RT1	Defrosting temperature sensor
RT2	Ambient temperature sensor
RT3	Discharge temperature sensor
RT4	Condenser medium pipe temperature sensor
RT5	Plate heat exchanger inlet pipe temperature sensor
RT6	Plate heat exchanger outlet pipe temperature sensor
SP	High pressure sensor
XT1	Wiring board
XT2	Wiring board
XT3	Wiring board
YV	4-way valve

Electrical - Low Voltage

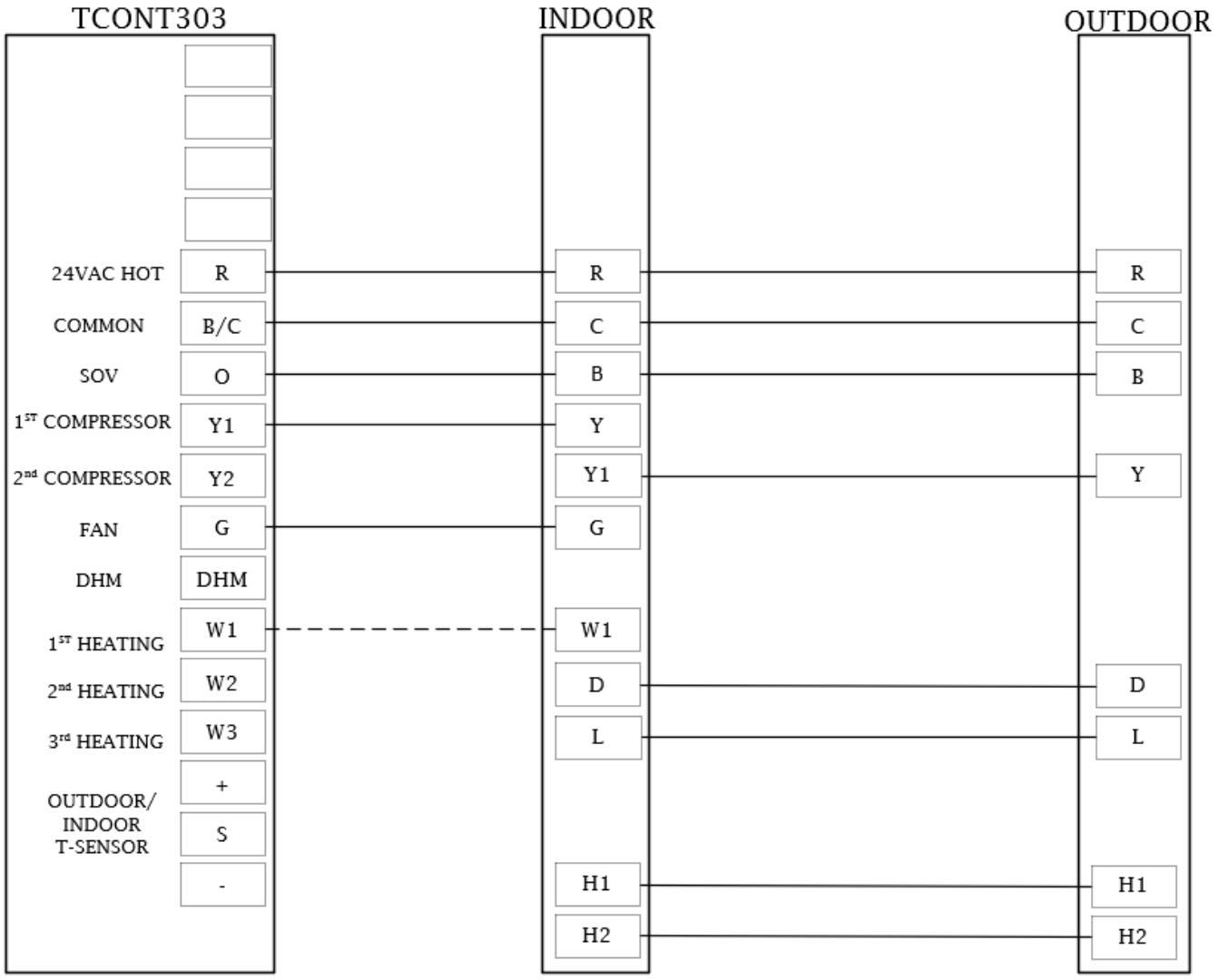
Figure 34. Field wiring



Notes:

- *H1/H2 wiring requires 18 AWG stranded shielded wiring.*
- *If H1/H2 is wired, SA1-1 dip switch MUST remain in the OFF position.*
- *If H1/H2 is NOT wired, SA1-1 dip switch must be moved to the ON position.*

Figure 35. Field wiring



Electrical - High Voltage

High Voltage Power Supply

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

The high voltage power supply must agree with the equipment nameplate.

Power wiring must comply with national, state, and local codes.

Follow instructions on unit wiring diagram located on the inside of the control box cover.

High Voltage Disconnect Switch

⚠ WARNING

Electrical Shock Hazard!

Failure to follow instructions below could result in death or serious injury or property damage.

Confirm proper grounding before connecting electrical supply.

Install a separate disconnect switch at the outdoor unit.

For high voltage connections, flexible electrical conduit is recommended whenever vibration transmission may create a noise problem within the structure.

Operating Settings

Unit Capacity Adjustment

Set the capacity of the outdoor unit using SA3 on the main control board. This setting is dependent on the indoor unit capacity.

Figure 36. Unit capacity adjustment

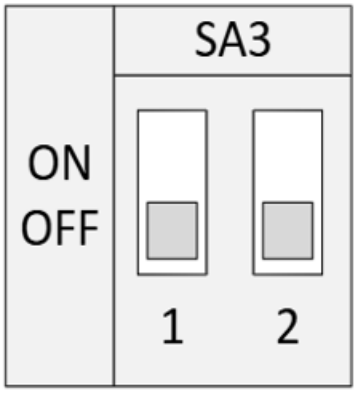


Table 14. Capacity adjustment

Capacity Adjustment		SA3-1	SA3-2
5HCL5036B1000A	24K	OFF	OFF
	36K	OFF	ON
5HCL5060B1000A	48K	ON	OFF
	60K	ON	ON

Operation Mode

Set the operation mode of the system using the first switch of SA1. H1/H2 wiring is for communicating control mode which is recommended for optimal system performance. If H1/H2 is wired, SA1-1 dip switch MUST remain in the OFF position. If H1/H2 is NOT wired, SA1-1 dip switch must be moved to the ON position.

Figure 37. Operation mode

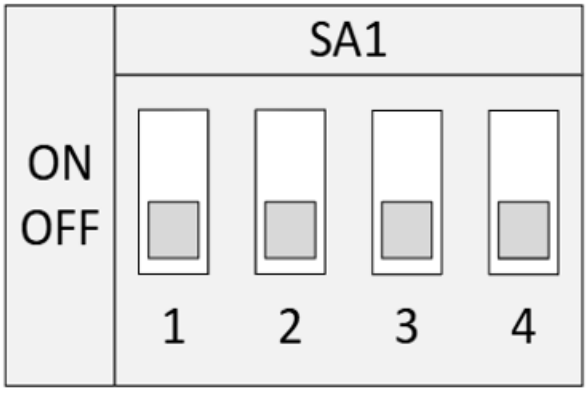


Table 15. Operation mode

Operation Mode	SA1-1
RS485 Mode (Default)	OFF
24V Mode	ON

Indoor Unit Type

Set the indoor unit type using the second switch of SA1. The options are either the 5TDM air handler or 5DXC cased coil.

Table 16. Indoor unit type

Indoor Unit Type	SA1-2
Air Handler (Default)	OFF
Cased Coil	ON

Optional Performance Enhancements

The third dip switch and the fourth dip switch in SA1 are selecting the operating mode. Standard mode is the conventional mode. By setting the strong mode dip switches of the condensing unit, the air conditioner can quickly increase the capacity output and ensure reliable operation in a short time, so as to meet the user's demand for the indoor temperature to quickly reach the set temperature. Energy saving mode is achieved by setting the condensing unit operating mode to operate the air conditioner within a small load range.

Table 17. Operating mode

Operating Mode	SA1-3	SA1-4
Standard Mode (Default)	OFF	OFF
Strong Mode	OFF	ON
Energy Saving Mode	ON	OFF
Self-Adaptation Mode	ON	ON

Defrost Mode

The first dip switch in SA2 is to select the defrost mode. The factory default setting is standard defrost. Under extremely low environment temperature, if the standard defrost cannot have the condenser defrosted completely, please set the second dip switch to be strong defrost. Under strong defrost, the defrosting time will be longer, which enable the condenser to be defrosted completely.

Figure 38. Defrost mode

Table 18. Defrost mode

Defrost Mode	SA2-1	SA2-2
Standard Defrost (Default)	OFF	OFF
Dry Cooling	OFF	ON

Table 18. Defrost mode (continued)

Defrost Mode	SA2-1	SA2-2
Humid Cooling	ON	OFF
Snowy	ON	ON

Noise Reduction Mode

The third dip switch and the fourth dip switch in SA2 are to select the noise reduction mode. Factory default setting is standard mode. Overall sound levels can be lowered by up to 5 dB.

Table 19. Noise reduction mode

Noise Reduction Mode	SA2-3	SA2-4
Standard (Default)	OFF	OFF
Noise Reduction Mode 1	OFF	ON
Noise Reduction Mode 2	ON	OFF
Noise Reduction Mode 3	ON	ON

System Charge Adjustment

Table 20. System charge adjustment

Model/Item	Standard pipe length	Unnecessary charge pipe length	Additional refrigerant amount for extra pipe	Factory charge amount at 25 ft of lineset
5HCL5036B1000A	25 ft (7.5 m)	31 ft (9.5 m)	0.322 oz/ft (30 g/m)	7.06 lbs
5HCL5060B1000A			0.22 oz/ft (20 g/m)	10.14 lbs

Note: *Compliance with relevant national gas regulations: indoor refrigerant joints made on site shall be tested for tightness. The test method shall be leak detection with equipment with a sensitivity of 5g/year or higher at a minimum of 0.25 times the maximum allowable pressure. There shall be no leakage detection.*

System Check and Start Up

Post-Installation Checks

Items to check	Possible outcomes of improper installation
Is the main body installed securely?	The unit may fall, vibrate, or produce noise.
Did you perform a water leakage test?	Cooling capacity may become unsatisfactory.
Is the unit well insulated from heat?	Condensate, water drops may occur.
Does water drain correctly?	Condensate, water drops may occur.
Is the voltage consistent with that stated on the nameplate?	The unit may fail or its components may get burned.
Are the wires and pipes installed correctly?	The unit may fail or its components may get burned.
Has the unit been safely grounded?	Risk of electric leakage.
Do the specifications of wires comply with the requirement?	The unit may fail or its components may get burned.
Is there any obstacle blocking the air inlet and outlet of the units?	Cooling capacity may become unsatisfactory.
Have you recorded the length of refrigerant pipe and the refrigerant charging amount?	The refrigerant charging amount cannot be controlled.

Confirm Electrical Connections

Before connecting the power:

- Power must not be connected if the installation work is not completed.
- Control circuit is correct and all the wires are firmly connected.
- Cut-off valves of the gas pipe and liquid pipe are open.
- The inside of the unit and the duct of indoor unit should be clean. Take irrelevant objects out if there is any.
- After checking, re-install the front side plate.

After connecting the power:

- If all the above works are finished, power on the unit. Otherwise, it is forbidden to power on the unit.
- If the outside temperature is more than 86 F (30 C), heating mode cannot be enabled.
- Before test operation, make sure unit is power on and compressor has been preheated for more than 8 hours. Touch the unit to check whether it's normally preheated. Start test operation after unit is normally preheated, otherwise compressor might be damaged. Debugging must be performed by professional technicians or under the guide of professional technicians.
- Confirm the units can run normally.
- Liquid slugging can occur if compressor is cold, allow for 8 hours of crank case heat

Notes:

- *It is recommended to use a thermostat with a five minute compressor delay.*
- *If the thermostat does not display any information, confirm the connection wires between the units and the thermostat are connected.*

Troubleshooting and Start Up

General Failures and Errors

Note: *Check the following items and implement corrective measures. If the air conditioner continues to function poorly, please stop the air conditioner immediately and contact an authorized local service center.*

Table 21. Troubleshooting

Problem	Cause	Corrective measure
The air conditioner does not run	If you turn off the unit and then immediately turn it on, in order to protect the compressor and avoid system overload, compressor will delay running for 3 min	Wait at least 3 minutes before turning the system on.
	Wire connection is incorrect	Connect wires according to the wiring diagram.
	Fuse or circuit breaker is broken	Replace the fuse or switch on the circuit breaker.
	Power failure	Restart the device.
	Power plug is loose	Re-insert the power plug.
Insufficient cooling or heating	Air inlet and outlet of the units have been blocked	Clear all obstructions and confirm the unit is well ventilated.
	Improper temperature setting	Adjust the temperature.
	Fan speed is too low	Reset a proper fan speed.
	Air flow direction is incorrect	Change the direction of air louvers.
	Doors or windows are open	Close doors and windows
	Exposed sunshine	Cover windows to reduce exposure.
	Too many heat sources in the room.	Remove unnecessary heat sources.
	Filter is blocked or dirty.	Have a technician clean the filter.

Table 22. System issues

Problem	Time of Occurrence	Cause
Condensation coming from air handler	During operation	During periods of high humidity, condensation will quickly dissipate.
	System switches to heating mode after defrosting.	The defrosting process will generate some water, which will turn to water vapor.
The air conditioner generates some noise	During operation.	It is normal for the unit to create a noise, especially for a few minutes after start up. Call a service technician if noise it is excessive
The air conditioner produces dust	The unit starts operation after being unused for a long time	Dust inside the units come out together with the air.

Error Codes

⚠ WARNING

Electrical Hazard!

Failure to follow instructions below could result in death or serious injury, and property damage.

If the unit is not functioning as expected, stop the unit immediately and disconnect power. Do not attempt to repair the unit. Contact a local dealer for professional help.

Table 23. Error codes

No.	Error code	Error
1	E1	Compressor high pressure protection
2	E3	Compressor low pressure protection
3	E4	Compressor discharge high-temperature protection
4	H4	Overload protection
5	C6	Discharge temperature sensor error
6	F3	Outdoor ambient temperature sensor error
7	e1	High pressure sensor error
8	e3	Low pressure sensor error
9	EE	EEPROM error
10	C4	ODU jumper cap error
11	C3	Condenser temperature sensor error
12	C7	ODU tube temperature sensor error
13	H3	Compressor overload protection
14	E2	Indoor Anti-freezing Protection
15	b2	Overcooler gaseous inlet tube temperature sensing error
16	b3	Overcooler gaseous outlet tube temperature sensing error
17	E6	Internal and external machine communication fault
18	H2	IPM low temperature protection
19	FE	Refrigerant sensor fault
20	EH	Protection of auxiliary electric heating by mistake
21	C1	Return air temperature sensor fault
22	C2	Indoor tube temperature sensing bag fault
23	FJ	Indoor air outlet temperature sensing bag fault
24	CA	Evaporator inlet tube temperature sensing bag fault
25	Cb	Evaporator output tube temperature sensing bag fault
26	CJ	Internal jumper cap fault
27	Ab	Drive reset protection (fan drive)
28	EA	Internal refrigerant leakage protection
29	A6	Fan communication failure (fan drive)
30	A8	Module temperature too high (fan driven)
31	A9	Drive sensor fault (fan drive)
32	Ad	Phase loss protection (fan drive)
33	AH	Bus voltage too high (fan drive)
34	AL	Bus voltage too low (fan drive)
35	C8	Driver jumper cap fault
36	U2	Compressor phase-sequence protection
37	LE	Compressor lock rotor

Table 23. Error codes (continued)

No.	Error code	Error
38	P6	Communication fault between main control and driver
39	P8	Heat sink or IPM module or PFC module over temperature
40	UL	Over-current protection of frequency conversion external fan
41	PL	Bus low-voltage protection
42	PH	Bus high-voltage protection
43	PA	ODU AC current protection
44	H5	IPM module current protection
45	L3	DC fan error
46	HC	PFC overcurrent protection
47	Lc	Compressor startup failure
48	P0	Driver reset protection
49	P5	Compressor phase over-current protection
50	U1	Current detection circuit fault or current sensor fault
51	H7	Compressor out-of-step protection
52	P7	Module temperature sensor circuit failure
53	PU	Capacitor charging failure
54	A1	Outdoor fan IPM module protection
55	Ac	Outdoor fan startup failure
56	AE	Outdoor fan current detection circuit error
57	AJ	Outdoor fan out-of-step protection
58	E0	Indoor fan error

User Maintenance

⚠ WARNING

Electrical Shock, Fire, or Explosion Hazard!

Failure to follow the safety warnings exactly could result in dangerous operation, serious injury, death, or property damage.

Improper servicing could result in dangerous operation, serious injury, death, or property damage.

- **Before servicing, disconnect all electrical power to the furnace.**
- **When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.**
- **Verify proper operation after servicing.**

⚠ WARNING

Electrical Hazard!

Failure to follow instructions below could result in death or serious injury, and property damage.

Verify piping connected to the unit does not contain potential ignition sources. For units using A2L refrigerant connected to one or more rooms via a duct system, the supply and return air should be directly ducted to the space. Do not use open areas such as ceilings as return air ducts.

Follow these guidelines when servicing the unit:

- Do not allow any flammable objects near the unit.
- Use soap and water to clean the unit.
- For component replacement, seek a professional to repair with OEM parts.
- Do not spray with water or directly on control boards.
- Keep all vents free of obstructions.
- Avoid excessive vibration of refrigeration lines.

- Protect the unit from environmental effects, such as water accumulation, freezing, pollutants, and garbage accumulation.
- Avoid expansion and contraction of the pipeline as it can shorten the lifespan.
- Minimize hydraulic shock damage to the system.
- The solenoid valve should be properly installed in the pipeline to avoid hydraulic shock. Unless sufficient pressure relief is provided, it must not block the liquid refrigerant.
- Steel pipes and components shall be protected by rust-resistant coatings to prevent corrosion before contacting any insulating materials.

Outdoor Unit Heat Exchanger

Clean the outdoor unit heat exchanger at least once every two months. Dust and use a nylon brush to clean the surface of the heat exchanger. If there is a compressed air source, use the compressed air to blow the dust on the surface of the heat exchanger. Do not use tap water for cleaning.

Drainage Pipe

Periodically confirm that the drainage pipe is not blocked.

Seasonal Maintenance

At the beginning of the cooling season:

- Check if the air inlet/outlet of the units are blocked.
- Check if the ground connection is reliable.
- Check if the air filter screen is properly installed.
- If starting up again after long-term shut down, preset the power switch of air conditioner to “ON” status before 8h of operation to preheat the crankcase of outdoor compressor.

At the end of the cooling season:

- Cut off the main power of air conditioner.
- Clean and dust the outdoor unit.
- If the outdoor unit is rusty, coat with paint to prevent rust from spreading.

Refrigerant Circuit (Reference Only)

Figure 39. 5HCL5036B1000A

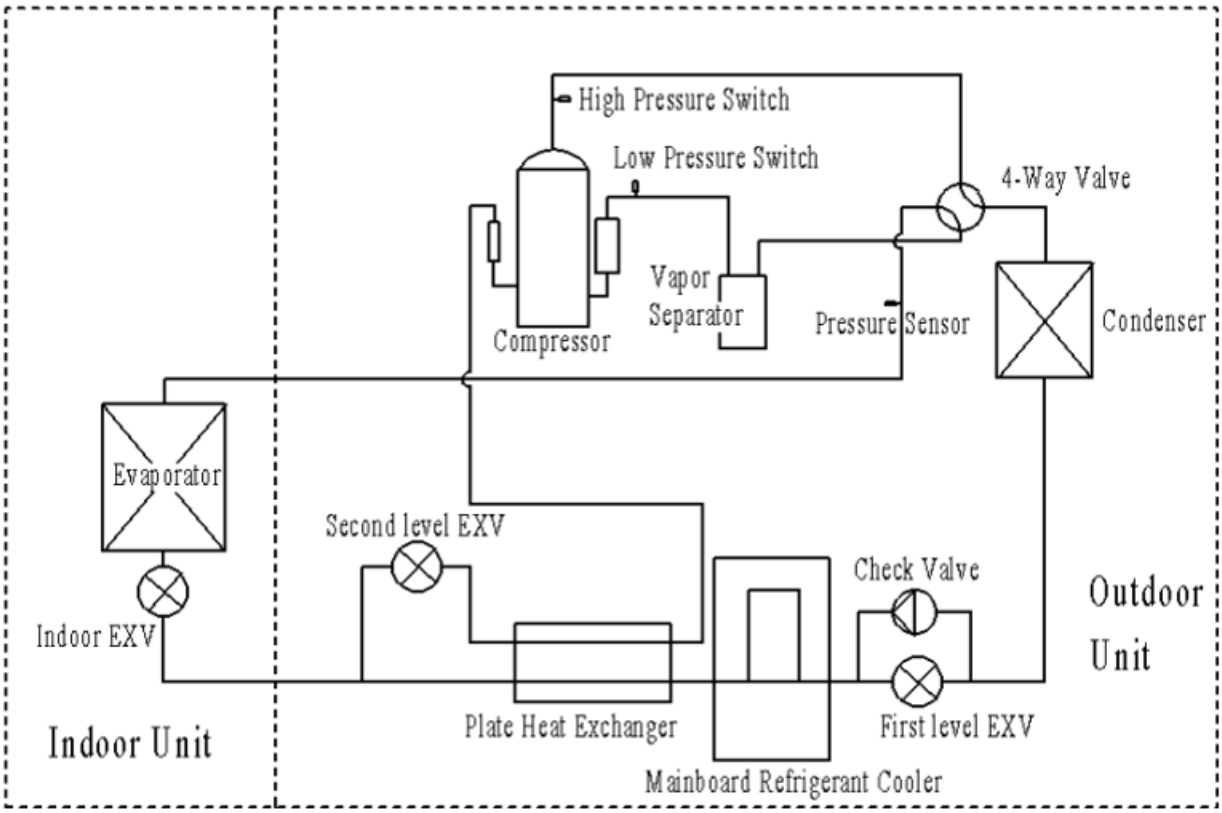
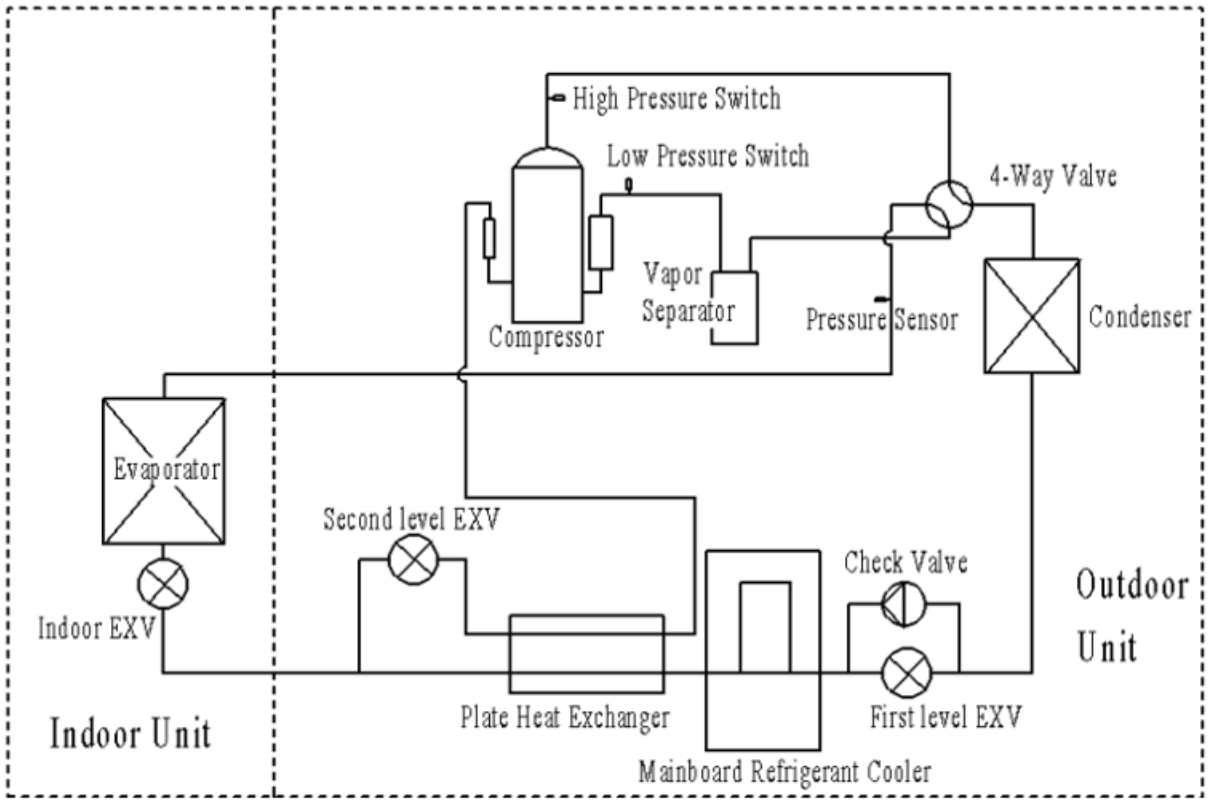


Figure 40. 5HCL5060B1000A



Servicing

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to minimize ignition risk. For repair to the refrigerating system, complete the following before beginning work:

- **Work procedure** — Use a controlled environment to minimize the risk of flammable gas or vapor being present during servicing.
- **General work area** — Inform all maintenance staff and others working in the local area of the nature of work being carried out. Avoid work in confined spaces.
- **Check for refrigerant** — Use an appropriate refrigerant detector prior to and during work to ensure the technician is aware of potentially toxic or flammable atmospheres. Confirm that the leak detection equipment used is suitable for all applicable refrigerants (non-sparking, adequately sealed, or intrinsically safe).
- **Fire extinguisher** — If any hot work is to be conducted on the refrigerating equipment or any associated parts, confirm appropriate fire extinguishing equipment is. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.
- **No ignition sources** — Do not use any source of ignition that may lead to fire or explosion. Keep all possible ignition sources, including cigarettes, far away from the site of installation, repair, removal and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the confirm there are no flammable hazards or ignition risks in the area around the equipment. “No Smoking” signs shall be displayed.
- **Ventilation** — Confirm that the area is adequately ventilated before beginning work or conducting any hot work. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

Refrigerant Equipment

Confirm the following when using flammable refrigerants:

- The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.
- The ventilation machinery and outlets are operating adequately and are not obstructed.
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.

- Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

Electrical Devices

Perform initial and ongoing safety checks of electrical components. If an issue exists that could compromise safety, do not connect any electrical supply o the circuit until it is resolved. If the error cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution can be used. Report all issues o the owner of the equipment.

Initial safety checks include:

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

Electrical Safety

Do not alter casing on electrical components in such a way that the level of protection is impacted. This includes damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, and incorrect fitting of glands.

Confirm that apparatus is mounted securely.

Confirm that seals or sealing materials have not degraded and are ineffective. Replacement parts shall be in accordance with the manufacturer’s specifications.

Important:

- *The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment.*
- *Intrinsically safe components do not have to be isolated prior to working on them.*

Pipe Installation

Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected.

The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.

Repairs to Sealed Components

Sealed electrical components must be replaced.

Repair to Intrinsically Safe Components

Do not apply any permanent inductive or capacitance loads to the circuit without confirming that it will not exceed the permissible voltage and current permitted for the equipment in use.

Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. Confirm the testing devices is at the correct rating.

Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

Cabling

Check that cabling is not showing signs of wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects. Take into account the effects of ageing or continual vibration from sources such as compressors or fans.

Detection of Flammable Refrigerants

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

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

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Confirm that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

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

Examples of leak detection fluids are:

- Bubble method

- Fluorescent method agents

If a leak is suspected, all open flames shall be removed/ extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system or isolated (by means of shut off valves) in a part of the system remote from the leak.

Removal and Evacuation

When opening the refrigerant circuit to make repair, or for any other purpose, conventional procedures shall be used. Recover the refrigerant charge into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times:

1. Safely remove refrigerant following local and national regulations.
2. Evacuate.
3. Purge the circuit with inert gas (optional for A2L).
4. Evacuate (optional for A2L).
5. Continuously flush or purge with inert gas when using flame to open circuit.
6. Open the circuit.

Do no use compressed air or oxygen for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging is achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

Charging Procedures

In addition to conventional charging procedures, the follow these requirements:

- Confirm that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept upright.
- Confirm that the refrigeration system is grounded prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Use extreme care to not overfill the refrigeration system.
- Prior to recharging the system, pressure test it with OFN. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site

Decommissioning

A technician familiar with the equipment should perform this procedure. Before decommissioning, take an oil and refrigerant sample in case analysis is required prior to reuse of reclaimed refrigerant. It is essential that the unit is powered before beginning decommissioning.

1. Become familiar with the equipment and its operation.
2. Isolate the system electrically.
3. Before attempting the procedure confirm that:

- Mechanical handling equipment is available, if required, for handling refrigerant cylinders.
- All personal protective equipment is available and being used correctly.
- The recovery process is supervised at all times by a competent person.
- Recovery equipment and cylinders conform to the appropriate standards.

4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Confirm that cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with manufacturer's instructions.
8. Do not overfill cylinders. (No more than 80% volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, confirm that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

Labeling

Label equipment that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed.

Recovery

When removing refrigerant from a system, either for servicing or decommissioning, all refrigerants must be removed safely.

When transferring refrigerant into cylinders, confirm that only appropriate refrigerant recovery cylinders are used. Confirm that the correct number of cylinders for holding the

total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (special cylinders for the recovery of refrigerant).

Cylinders need to have a pressure relief valve and associated shut-off valves in good working order.

A set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order and has been properly maintained. Consult the manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Notice arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, confirm that they have been evacuated to an acceptable level and that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers.

Any quality or other issues encountered in the purchased air conditioner, please contact the local after-sales service department.

About Trane and American Standard Heating and Air Conditioning

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