Installation Manual: HMH7 Series - 17 SEER Horizontal Discharge Modulating Heat Pump

York International Corporation, 5005 York Drive, Norman, OK 73069

6046972-UIM-A-0221

Supersedes: Nothing

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Contents

General

Read all sections of this manual and keep the manual for future reference.

WARNING: Cancer and Reproductive Harm – www.P65Warnings.ca.gov.

The units are tested in accordance with the following:

ISO 9001 Certified Quality Management System

The outdoor units are designed to be connected to a matching indoor coil with sweat connect lines. This unit is to be matched with one ducted indoor unit and is not designed for application in a ductless configuration. Refer to the *Technical Guide* for permissible system configurations. Sweat connect units are factory charged with refrigerant for a nominal sized matching indoor coil plus 15 ft of field-supplied lines.

Safety

Read these safety precautions carefully to ensure correct installation.

Note the following:

- You must match the outdoor unit with an indoor unit with refrigerant R-410A.
- Use the specified filter drier on the liquid pipe when connecting the units.
- Carefully file the indoor and outdoor unit manuals away for future reference.

Understand and pay particular attention to the signal words **DANGER**, **WARNING**, or **CAUTION**.

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

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 **may result in minor or moderate injury**. It is also used to alert against unsafe practices and hazards involving only property damage.

WARNING

Incorrect installation may create a condition where the operation of the product could cause personal injury or property damage. Incorrect installation, adjustment, alteration, service, or maintenance can cause injury or property damage. Refer to this installation manual for assistance or for additional information, consult a qualified contractor, installer, or service agency.

CAUTION

This heat pump uses R-410A refrigerant. R-410A systems operate at higher pressures than R-22 systems. Do not use R-22 service equipment or components on R-410A equipment. Service equipment must be rated for R-410A.

CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to building, electrical, and mechanical codes.

Inspection

Inspect the unit immediately after receiving it for possible damage during transit, including copper distributor lines that may have shifted and are touching either copper lines or the cabinet. If damage is evident, the extent of the damage must be noted on the carrier's delivery receipt. A separate request for inspection by the carrier's agent must be made in writing. Contact the local distributor for more information.

Requirements for installing or servicing R-410A equipment

- Gauge sets, hoses, refrigerant containers, and recovery system must be designed to handle the POE type oils, and the higher pressures of R-410A.
- Manifold sets must be high side and low side with low side retard.
- All hoses must have a 700 psig service pressure rating.
- Leak detectors must be designed to detect HFC refrigerant.
- Recovery equipment (including refrigerant recovery containers) must be specifically designed to handle R-410A.

Limitations

Install the unit in accordance with all national, state, and local safety codes, and the following limitations:

- Observe the limitations for the indoor unit, coil, and appropriate accessories.
- Do not install the outdoor unit with any duct work in the air stream. The outdoor fan is the propeller type and is not designed to operate against any additional external static pressure.
- Observe the maximum and minimum conditions for operation to ensure a system that gives maximum performance with minimum service.

Table 1: Minimum and maximum operating limit conditions

Air temperature	Outdoor coil °F (°C)		Indoor coil °F (°C)	
	DB cool	DB heat	WB cool	DB heat
Minimum	35 (2)	-5 (-21)	57 (14)	50 (10)
Maximum	122 (50)	75 (24)	72 (22)	80 (27)

Note: See the NOTICE in the *Reduced capacity conditions* section.

Reduced capacity conditions

NOTICE

Inverter temperature protection

If excessive inverter temperatures are sensed, the compressor speed/capacity is reduced until an acceptable condition is reached. When the inverter temperature returns to an acceptable level, the system returns to normal operation.

NOTICE

Overcurrent and undercurrent protection

If a low or high current condition is sensed, the compressor speed/capacity is reduced until an acceptable current level is reached. When the system reaches an acceptable current level, the compressor and fan return to normal operating conditions.

NOTICE

Overvoltage and undervoltage protection

If a low or high supply voltage condition is sensed (below 187 VAC or above 265 VAC), the compressor speed/capacity is automatically reduced until an acceptable voltage level is reached. When an acceptable voltage level is sensed, the system automatically returns to a normal state of operation.

NOTICE

Low ambient protection

Cooling mode: The unit automatically adjusts to maintain cooling operation in outdoor ambient conditions down to 35°F (2°C). The unit reduces capacity and low ambient protection (cooling mode) or cycles off if asked to provide cooling when the outdoor temperature is at or below these conditions. Heating mode: The unit provides compressor heat down to an outdoor ambient temperature of -5°F (-29°C). As the outdoor ambient temperature reduces, available heat reduces for all air source heat pumps.

Piping considerations

When using more than 15 ft of interconnecting tubing, see Table 2 for charging. For long-line applications, interconnecting lines over 100 ft must be installed with liquid line solenoid. Refer to the *Piping Application Guide* for more information.

Figure 1: Refrigerant piping

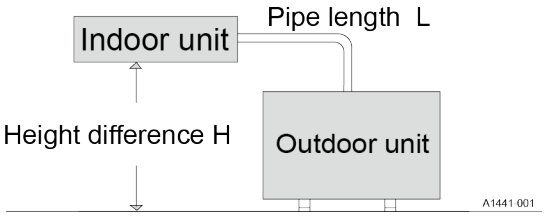


Table 2: Refrigerant piping

Model	Maximum pipe length (L)	Maximum height difference (H)	Additional refrigerant - exceeding 15 ft (4.6 m)
	ft (m)	ft (m)	oz/ft (g/m)
HMH72B24	164 (50)	98 (30)	0.38 (11)
HMH72B36	246 (75)	98 (30)	0.38 (11)
HMH72B48, HMH72B60	246 (75)	98 (30)	0.60 (17)

Liquid-line filter drier

This unit requires a bi-flow liquid line filter drier installed external to the unit. This is included in the wiring accessory kit HMH7AK001 required for installation.

R-410A filter-drier Source 1 Part Number	Apply with models
S1-404101	All

NOTICE

Using a larger than specified line size could result in oil return problems. Using too small a line results in loss of capacity and other problems caused by insufficient refrigerant flow. For the heat pump, maintain level horizontal refrigerant lines between the indoor unit and the outdoor unit to facilitate sufficient oil return.

Add-on replacement/retrofit

When using this unit as a replacement for an existing R-410A unit, these are matched systems. Replace the indoor coil and the outdoor unit. Perform the following steps to ensure correct system operation and performance.

1. Change out the indoor coil to an approved R-410A coil/air handling unit combination with the appropriate metering device.
2. Change out the lineset when replacing an R-22 unit with an R410A unit to reduce cross-contamination of oils and refrigerants. If change-out of the lineset is not practical, take the following precautions:
    a. Inspect the lineset for kinks, sharp bends, or other restrictions, and for corrosion.
    b. Determine if there are any low spots that might be serving as oil traps.
    c. Flush the lineset with a commercially available flush kit to remove as much of the existing oil and contaminants as possible.
3. If replacing the outdoor unit because of a compressor burnout, replace the refrigeration lines or, at a minimum, thoroughly flush the lines with a commercially available flush kit.

WARNING

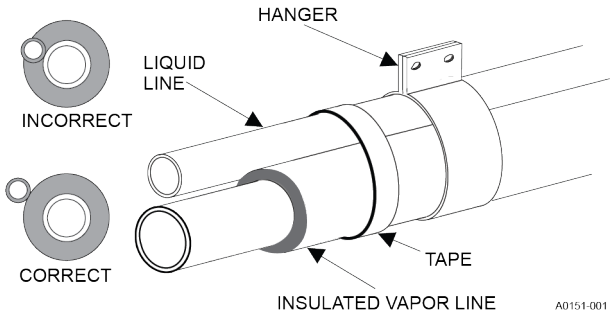
Never install a suction-line filter drier in the liquid line of an R-410A system. Failure to follow this warning can cause a fire, injury, or death.

Precautions for line installation

Adhere to the following during line installation:

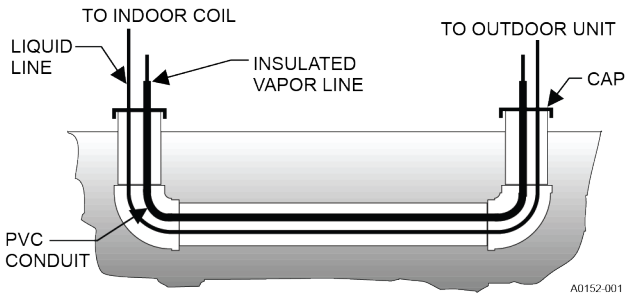
- Connect the outdoor unit to the indoor coil using field supplied refrigerant grade (ACR) copper tubing that is internally clean and dry. Units must only be installed with the tubing sizes for approved system combinations as specified in the *Tabular Data Sheet*. The charge given is applicable for total tubing lengths up to 15 ft (4.6 m).
- Install the refrigerant lines with as few bends as possible. Ensure not to damage the couplings or kink the tubing. Use clean hard drawn copper tubing where no appreciable amount of bending around obstruction is necessary. If soft copper must be used, ensure to avoid sharp bends that may cause a restriction.
- Install the lines so that they do not obstruct service access to the coil, indoor section, or filter.
- Isolate the refrigerant lines to minimize noise transmission from the equipment to the structure.
- Insulate the vapor line with a minimum of 1/2-in. foam rubber insulation (Armaflex or equivalent). Insulate liquid lines that may be exposed to direct sunlight, high temperatures, or excessive humidity.
- Tape and suspend the refrigerant lines correctly. Do not allow tube metal-to-metal contact. See Figure 2.

Figure 2: Installation of vapor line



- Use PVC piping as a conduit for all underground installations as shown in Figure 3. Keep buried lines as short as possible to minimize the build up of liquid refrigerant in the vapor line during long periods of shutdown.

Figure 3: Underground installation



- Pack fiberglass insulation and a sealing material such as permagum around refrigerant lines where they penetrate a wall to reduce vibration and retain some flexibility.

Additional refrigerant charge

The outdoor unit is precharged with enough R-410A refrigerant for the outdoor unit, the smallest indoor unit, and 15 ft of lineset. Additional refrigerant per foot of additional lineset is 0.38 oz for the 24k and 36k models, and 0.60 oz for the 48k and 60k models (see Table 2). Refer to the *Tabular Data Sheet* for more information on precharge amount and indoor combinations.

⚠ CAUTION

When installing the pipe through the wall, secure a cap at the end of the pipe. Do not place the pipe directly on the ground.

Unit installation

If installing the unit on a hot sun exposed roof or a paved ground area that is seasonally hot, raise the unit sufficiently above the roof or ground to avoid taking the accumulated layer of hot air into the outdoor unit, which can cause the unit to derate prematurely.

Transportation and handling

1. Route two lifting slings under the unit as shown in Figure 4. If there are no packaging materials, protect the unit with cloth or paper. See Figure 5.

Figure 4: Handling with packaging

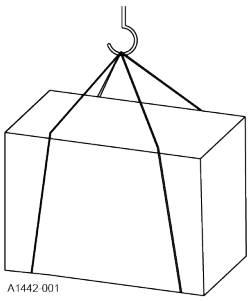
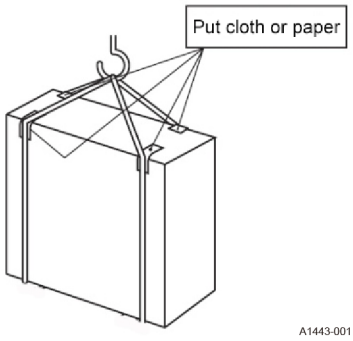


Figure 5: Handling without packaging



2. Ensure the unit is balanced and, if safe to do so, carefully lift the unit up.

Selecting a location for installation

Adhere to the following when selecting a location for installation:

- Install and anchor the unit on a solid base that is 2 in. above grade and does not shift or settle, which could cause strain on the refrigerant lines and possible leaks. Maintain the clearances shown in Figure 6 and install the unit horizontally in a level position. The base pad must not come in contact with the foundation or side of the structure because sound may transmit to the residence.
- Before starting the installation, select and check the suitability of the location for the indoor and outdoor units.
- Ensure that the outdoor unit is installed in an appropriate location that limits exposure to wind, rain, snow accumulation, and direct sunlight.
- Locate the outdoor unit away from bedroom windows or other rooms where sound might be objectionable.
- Provide ample clearance from shrubs to allow adequate air to pass across the outdoor coil without leaves or branches being pulled into the fan.
- Ensure that the outdoor unit has sufficient clearance for air entrance to the outdoor coil, air discharge, and service access.
- Keep the length of the refrigerant tubing between the outdoor unit and the indoor coil as short as possible to avoid capacity and efficiency losses. Observe all limitations and clearance requirements.
- Elevate the unit sufficiently to prevent any blockage of the air entrances by snow in areas where snow may accumulate. Check the local weather bureau for the expected snow accumulation in your area.
- Isolate the unit from rain gutters to avoid any possible wash out of the foundation.

⚠ WARNING

The outdoor unit must not be installed in an area where mud or ice could cause personal injury.

Roof installation

When installing units on a roof, the structure must be capable of supporting the total weight of the unit, including a pad, lintels, and rails, which must be used to minimize the transmission of sound or vibration into the conditioned space.

Wall mount installation

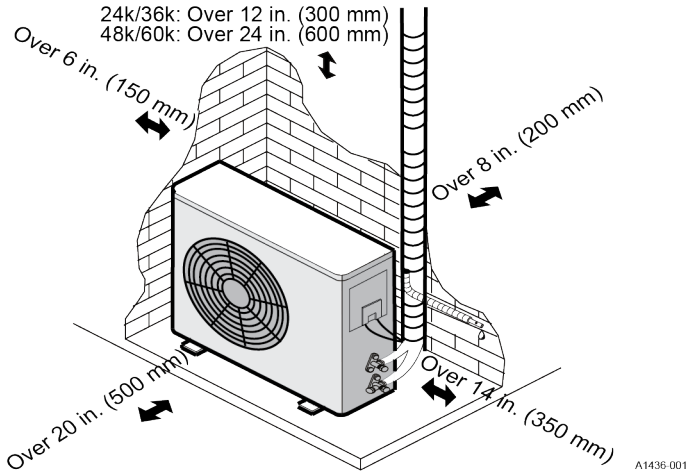
Ensure to mount the outdoor unit on a solid base that is sloped to shed water, secure from settlement, and isolated from the structural foundation or walls to prevent sound and vibration transmission into the living space.

On occasion, site conditions may require the use of direct wall mounted brackets to locate and support the outdoor unit. In these applications, ensure to address unit base pan support, structural integrity, safe access and serviceability, as well as the possible sound and vibration transmission into the structure. Wall mounting requires three mounting brackets and is best served by a properly engineered solution. Refer to the *Price Pages* for the specific part number for your application.

Avoid the following places for installation where damage to the outdoor section may occur:

- Where there is machine oil
- Coastal regions where the equipment is prone to atmospheric corrosion
- Near hot springs where the equipment is prone to sulfide gas corrosion
- In proximity to high-frequency or wireless equipment

Figure 6: Minimum clearances when selecting a location



Note: When operating the outdoor section in low ambient conditions, follow these instructions:

- Never install the outdoor unit in a place where its air inlet/outlet side may be exposed directly to wind.
- To prevent exposure to wind, install the outdoor unit with its air inlet side facing the wall.
- To prevent exposure to wind, install a baffle board on the air outlet side of the outdoor unit.

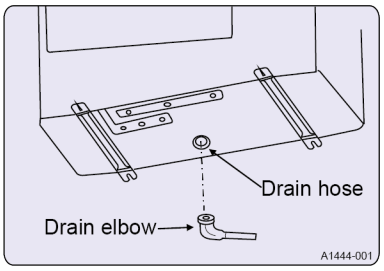
Installing the drain elbow and drain hose

About this task:

Condensate water may drain from the outdoor unit when the unit operates in heating mode. To avoid adverse conditions in the area around the unit, install the included drain elbow and a drain hose to drain out the condensate water. Install the drain elbow and drain the hose before the indoor and outdoor units are connected.

1. Connect the drain hose (field-supplied, 15 mm inside diameter) as shown in Figure 7.

Figure 7: Drainage



Note: Do not use a drainage elbow in colder climates. The drain may freeze and cause the fan to stop running.

NOTICE

Heat pumps defrost periodically resulting in water drainage. The unit must not be located where water drainage may freeze and create a hazardous condition, such as sidewalks and steps.

Installing the outdoor unit

1. Use washers when fastening the outdoor section at the foundation bolts.
2. When fastening the outdoor section with the foundation bolts, ensure that the anchoring locations are as shown in Figure 8.
3. Fasten the outdoor section as shown in Figure 9.
4. Make sure to fasten the outdoor unit tightly and in a horizontal position to prevent noise.
5. Do not drain condensate onto public places as this may lead to slippery surfaces.
6. Use a strong base, made of concrete or similar, that positions the outdoor section at least 2 in. from the ground. This keeps the outdoor section dry and reduces the chance of corrosion, which could reduce the life span of the outdoor section. See Figure 10.

Table 3: Anchoring locations

Model	A	B	C	D	E	F	d
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
HMH72B24	33 7/8 (860)	12 3/16 (310)	21 11/32 (542)	13 7/16 (341)	14 1/2 (368)	6 5/8 (168)	7/16–11/16 (11–17)
HMH72B36, HMH72B48, HMH72B60	37 3/8 (950)	13 3/8 (340)	22 7/8 (580)	14 15/16 (380)	16 1/4 (414)	7 1/4 (185)	5/8 (15)

Figure 8: Anchoring locations

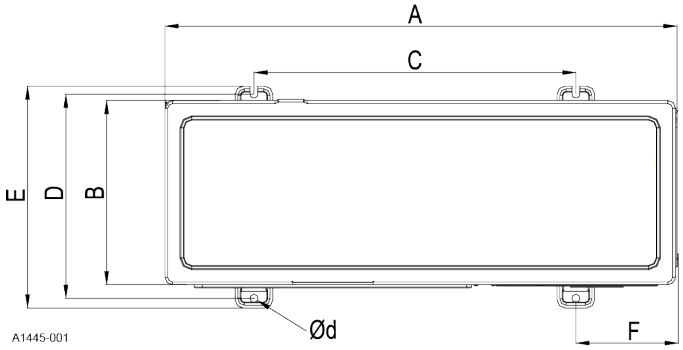
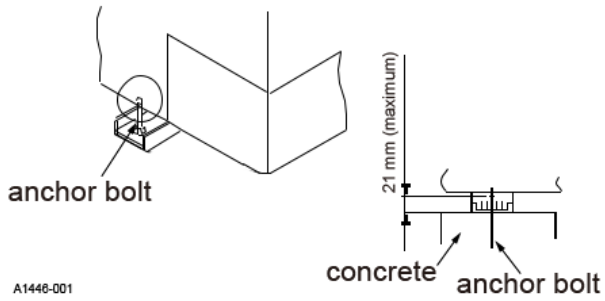
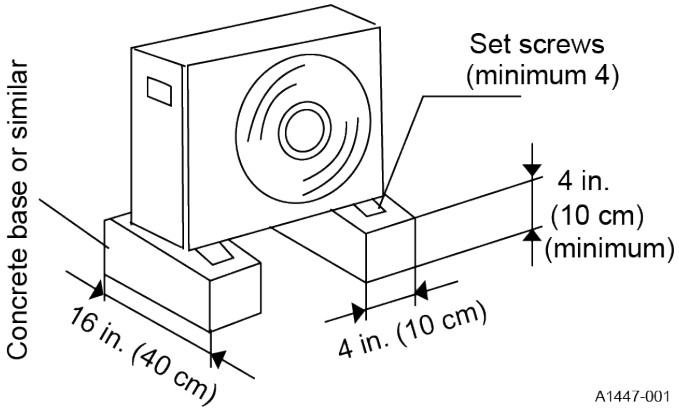


Figure 9: Securing the unit



Note: If the bolt is too long or impedes any future movement of the unit, cut it to a more appropriate length.

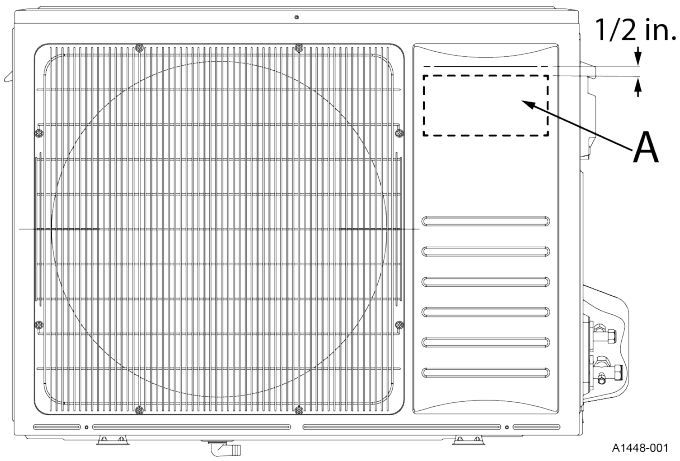
Figure 10: Concrete base



Affixing the brand label

1. Find the brand label in the plastic bag attached to the unit carton.
2. Remove the label backing and affix the brand label in the area marked A in Figure 11, centered 1/2 in. immediately below the tooling mark on the front panel.

Figure 11: Brand label location



Precautions for brazing of lines

All outdoor unit and indoor coil connections are copper-to-copper and must be brazed with a phosphorous-copper alloy material such as Silfos-5 or equivalent. **Do not** use soft solder. The outdoor units have reusable service valves on both the liquid and vapor connections. The total system refrigerant charge is retained within the outdoor unit during shipping and installation. The reusable service valves are provided to evacuate and charge per this instruction. Serious service problems can be avoided by taking adequate precautions to ensure an internally clean and dry system.

⚠ CAUTION

The indoor coil is under inert gas pressure. Relieve pressure from the coil by depressing the Schrader core at the end of the suction manifold stub out. Dry nitrogen must always be supplied through the tubing while it is being brazed because the temperature required is high enough to cause oxidation of the copper, unless an inert atmosphere is provided. The flow of dry nitrogen must continue until the joint cools. Always use a pressure regulator and safety valve to insure that only low pressure dry nitrogen is introduced into the tubing. Only a small flow is necessary to displace air and prevent oxidation.

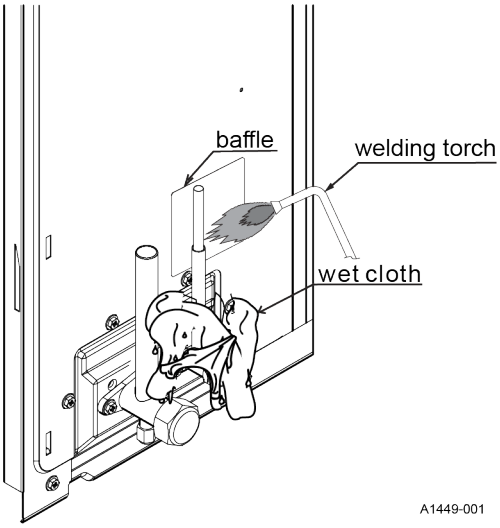
Precautions for brazing of the service valve

- Wrap a wet rag around the service valve to prevent heat damage, as shown in Figure 12.
- Protect all painted surfaces, insulation, and plastic base during brazing.
- After brazing, cool the joint with a wet rag.

⚠ WARNING

This is not a backseating valve. The service access port has a valve core. Opening or closing the valve does not close the service access port. If the valve stem is backed out past the chamfered retaining wall, the O-ring can be damaged, causing leakage or system pressure that could force the valve stem out of the valve body, possibly causing personal injury.

Figure 12: Brazing the service valve



Connecting the refrigerant lines

About this task:
The valve can be opened by removing the plunger cap and fully inserting a hex wrench into the stem, then backing out counter-clockwise until the valve stem just touches the chamfered retaining wall.

1. Remove the cap and Schrader core from both the liquid and vapor service valve service ports at the outdoor unit. Connect low pressure nitrogen to the liquid line service port.
2. Braze the liquid line to the liquid valve at the outdoor unit. Ensure to wrap the valve body with a wet rag. Allow the nitrogen to continue flowing.
3. Carefully remove the plugs from the liquid and vapor connections at the indoor coil.
4. Braze the liquid line to the indoor coil liquid connection. Nitrogen should be flowing through the indoor coil.
5. Slide the grommet away from the vapor connection at the indoor coil. Braze the vapor line to the indoor coil vapor connection. After the connection has cooled, slide the grommet back into original position.

6. Protect the vapor valve with a wet rag and braze the vapor line connection to the outdoor unit. The nitrogen flow should be exiting the system from the vapor service port connection. After this connection has cooled, remove the nitrogen source from the liquid fitting service port.
7. Replace the Schrader core in the liquid and vapor valves.
8. Leak test all refrigerant piping connections including the service port flare caps to ensure they are leak tight. Do not overtighten (between 40 in.·lb and 60 in.·lb maximum).

NOTICE

Pressurize the lineset and the indoor coil to 250 psig with dry nitrogen and leak test with a bubble type leak detector. Then release the nitrogen charge. Do not use the system refrigerant in the outdoor unit to purge or leak test.

9. Evacuate the vapor line, indoor coil, and liquid line to 500 microns or less.

NOTICE

If a leak is suspected, leak test with dry nitrogen to locate the leak. Repair the leak and test again. To verify that the system has no leaks, close the valve to the vacuum pump suction to isolate the pump and hold the system under vacuum. Watch the micron gauge for a few minutes. If the micron gauge indicates a steady and continuous rise, it is an indication of a leak. If the gauge shows a rise, then levels off after a few minutes and remains fairly constant, it is an indication that the system is leak free but still contains moisture and may require further evacuation if the reading is above 500 microns.

10. Release the refrigerant charge into the system. Open the liquid line service valve by removing the plunger cap and back out the valve stem counter-clockwise using a hex head wrench until fully open. Then, open the vapor line service valve in the same way. If the service valve is a ball type valve, use an adjustable end wrench to turn the valve 1/4 turn to open.
11. Replace the caps on the service ports. Do not remove the flare caps from the service ports except when necessary for servicing the system.
12. Replace the plunger caps finger tight, then tighten an additional 1/12 turn (1/2 hex flat). Ensure to replace the caps to prevent leaks.

CAUTION

Do not connect manifold gauges unless required to mitigate an identified issue. Approximately 3/4 oz of refrigerant is lost each time a standard manifold gauge is connected.

WARNING

Never attempt to repair any brazed connections while the system is under pressure. Personal injury could result.

Refrigerant charging

CAUTION

Refrigerant charging must only be carried out by a licensed qualified air conditioning contractor.

CAUTION

Compressor damage occurs if the system is incorrectly charged. On new system installations, charge the system as instructed in the *Tabular Data Sheet* for the matched coil and follow the guidelines in this instruction.

CAUTION

Do not leave the system open to the atmosphere. Unit damage could occur due to moisture being absorbed by the POE oil in the system. This type of oil is highly susceptible to moisture absorption.

CAUTION

It is unlawful to knowingly vent, release, or discharge refrigerant into the open air during repair, service, maintenance, or the final disposal of this unit.

Electrical connections

General information and grounding

Note: This unit uses discrete thermostat wiring. Do not interface with TTSCC, Hx™ , or Hx™3 thermostat communication connections. It is possible to interface with Hx™ or Hx™3 conventional terminals.

CAUTION

This equipment uses an inverter drive that stores hazardous energy up to 5 min after power is removed. Wait for more than 5 min before performing electrical work after power is removed.

NOTICE

Local codes may require use of an ELB (Earth Leakage Breaker) or RCD (Residual Current Device) breaker. When required, use a breaker capable of handling harmonics to prevent failure of the ELB or RCD breaker.

Field connections wiring

About this task:

All field wiring must be in accordance with national electrical codes (NEC) and local city codes.

1. Install the correct size weatherproof disconnect switch outdoors and within sight of the unit, per local codes.
2. Run the power wiring from the disconnect switch to the unit.
3. Route the wires from the disconnect through the power wiring exit provided and into the unit control box as shown in Figure 15, Figure 16, Figure 17, and Figure 18 for the various models.
4. Make the power supply connections to the supplied terminal block.
5. Mount the thermostat 5 ft above the floor, where it is exposed to normal room air circulation. Do not place it on an outside wall or where it is exposed to the radiant effect from exposed glass or appliances, drafts from outside doors, or supply air grilles.
6. Route the 24-V control wiring (NEC Class 2) from the outdoor unit to the indoor unit and thermostat. Keep the low-voltage wiring 4 in. or more away from the high-voltage wires that are leaving the control box.
7. Wrap tape along the wire and seal any wiring holes to prevent entry of condensate water and insects. Tightly secure the power source wiring using the cord clamp inside the unit.
8. See the unit-specific connection instructions below.

Table 4: Tightening torque of each screw

Screw	Minimum [lb·ft (N·m)]	Maximum [lb·ft (N·m)]
M4	0.7 (1.0)	1.0 (1.3)
M5	1.5 (2.0)	1.8 (2.5)
M6	3.0 (4.0)	3.7 (5.0)
M8	6.6 (9.0)	8.1 (11.0)
M10	13.3 (18.0)	21.7 (23.0)

Note: Apply adhesive to rubber bushings when not using conduit tubes to the outdoor unit.

General electrical checks

- Ensure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors, and wire terminals) have been properly selected according to the electrical data. Ensure that the components comply with the National Electrical Code (NEC).
- Ensure the voltage of the power supply is within 10% of nominal voltage and the ground is contained in the power supply wires. If not, electrical parts may be damaged.
- Ensure that the capacity of the power supply is of sufficient size. If not, an abnormal voltage drop when starting the unit may prevent the compressor from operating.
- Ensure that the ground wire is connected.
- Ensure that the electrical resistance is more than 2 MΩ, by measuring the resistance between the ground and the terminal of the electrical parts. If the electrical resistance is not more than 2 MΩ, do not operate the system until the electrical leakage is found and repaired.

Figure 13: Wiring diagram - HMH7 ACC STD ECM

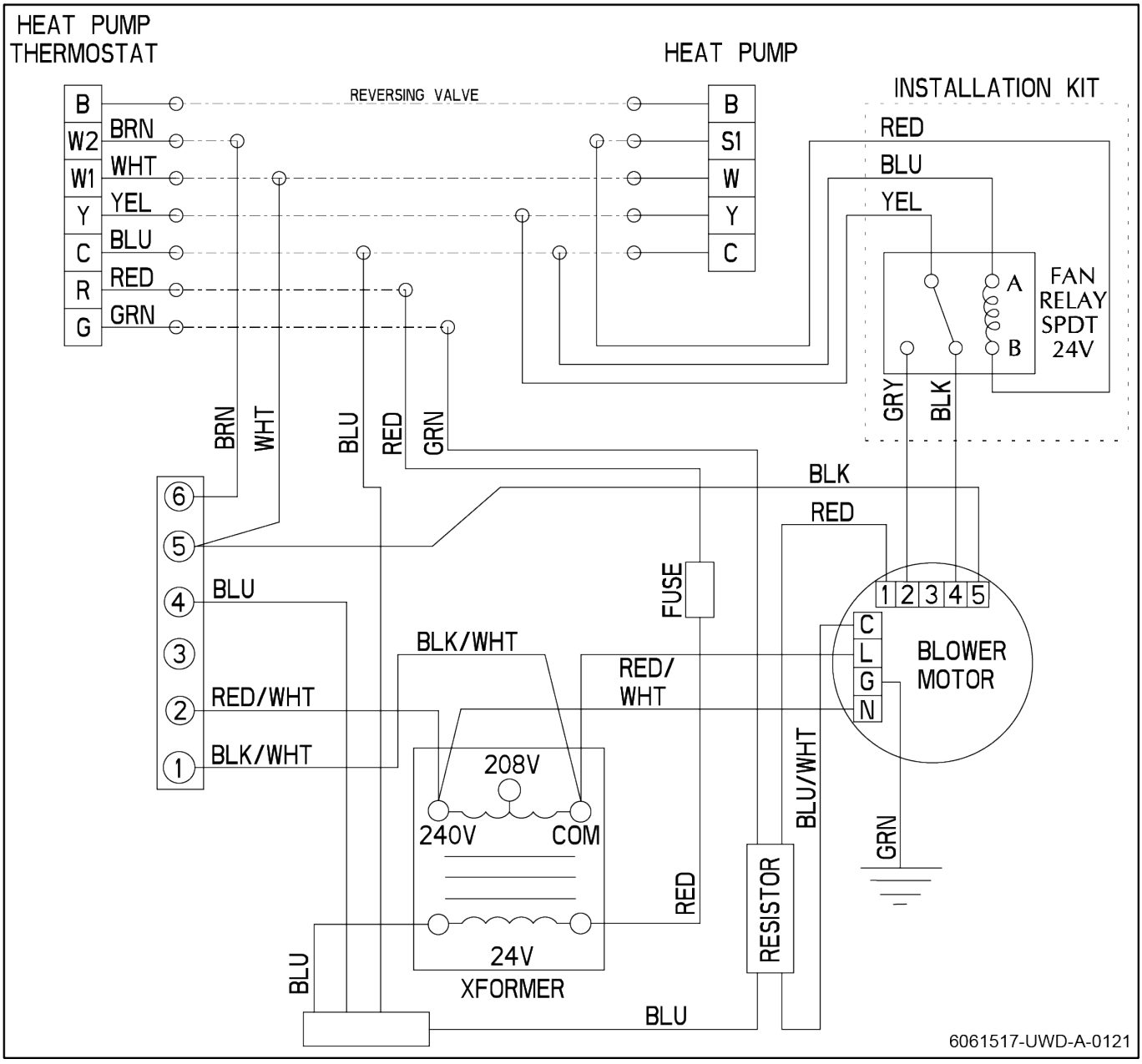
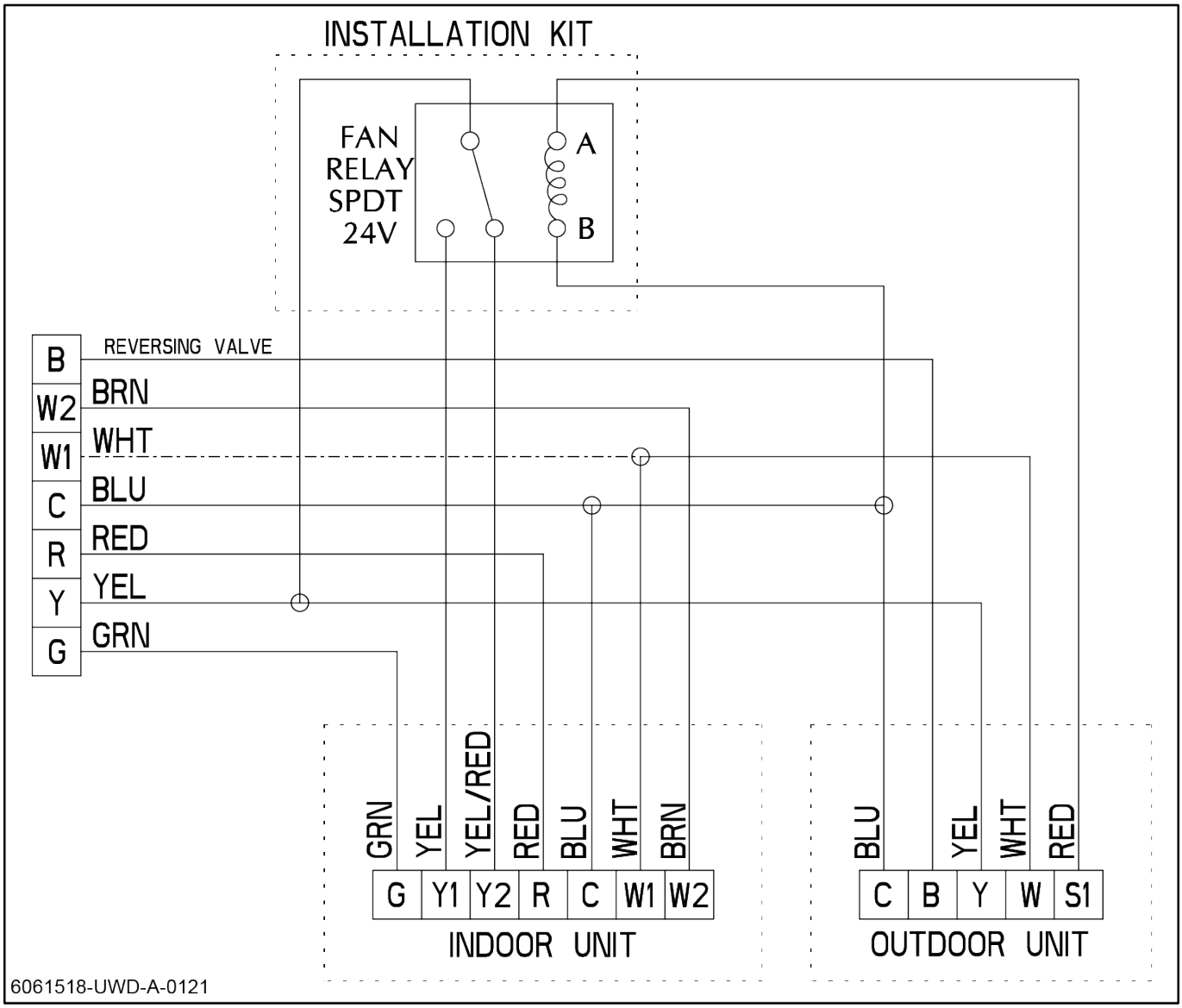


Figure 14: Wiring diagram - HMH7 ACC VS ECM



Note:

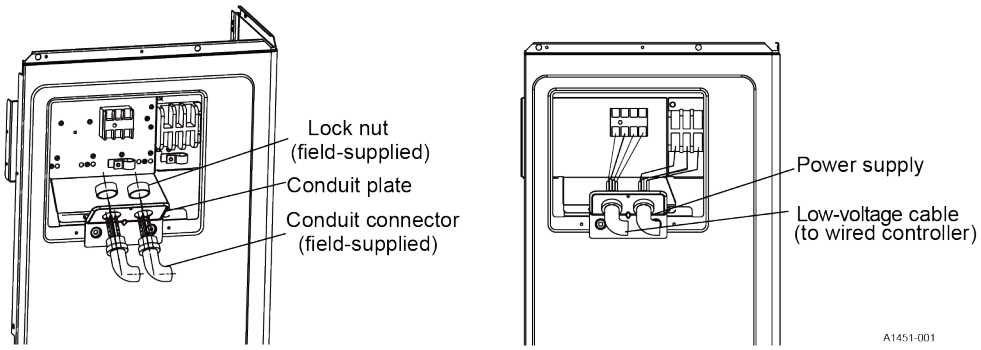
- Use the B terminal on the thermostat for the reversing valve connection (energized in heat mode).
- The room thermostat must control fossil fuel operation if matched with a gas furnace.
- Refer to wiring and installation kit HMH7AK001 for additional wiring detail on the indoor unit.

Connecting HMH72B24 and HMH72B36 wiring

About this task:
Connect wiring to the unit by completing the following steps.

1. Unscrew the mounting screws to remove the electric box cover.
2. Fasten the power supply cable and the low-voltage cable to the conduit holder using the lock nut.
3. Connect the power supply cable and the low-voltage cable to the terminal.
4. Fasten the power supply cable and the low-voltage cable with the cable clamp.
5. Make sure to seal any holes when wiring is complete. Place the cables side to side (do not overlap the cables).
6. Re-install the electric box cover when wiring is complete.

Figure 15: HMH72B24 and HMH72B36 wiring



Connecting HMH72B48 and HMH72B60 wiring

About this task:
Connect wiring to the unit by completing the following steps.

1. Remove the screws, maintenance plate, and the valve cover.
2. Pass the low-voltage cable and power supply through the two holes on the right side plate.
3. Fasten the conduit connection to the right side plate using the lock nut.
4. Connect the low-voltage cable and power supply to the terminal.
5. Secure the low-voltage cable and power supply with the clamp tightly.
6. Make sure to seal all holes when wiring is complete.
7. Replace the maintenance plate and the valve cover when wiring is complete.

Figure 16: HMH72B48 and HMH72B60 wiring (1)

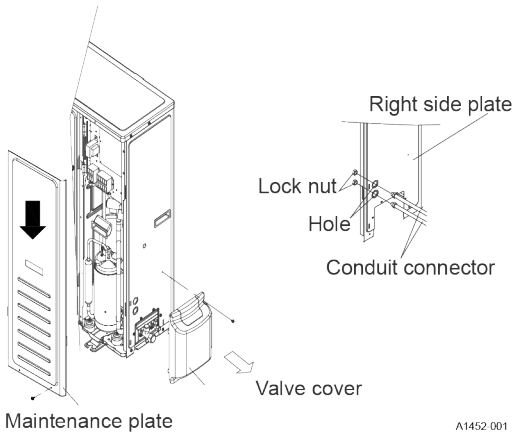


Figure 17: HMH72B48 and HMH72B60 wiring (2)

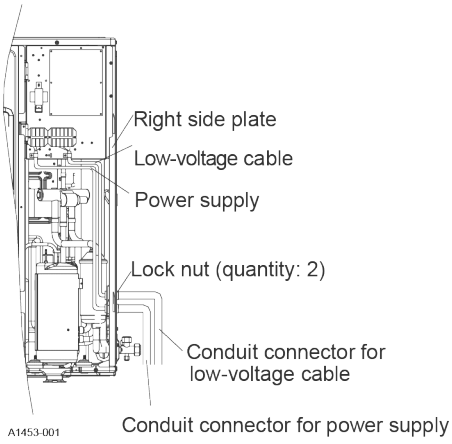
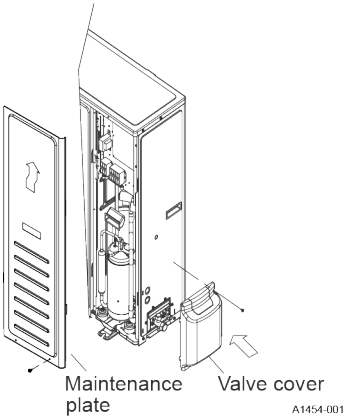


Figure 18: HMH72B48 and HMH72B60 wiring (3)



Electrical data

Table 5: Electrical data

Model (capacity)	Power supply	ELB/RCD rated current (A)*	ELB/RCD fault current (mA)*	Power source cable size	Low-voltage cable size	Circuit breaker (A)
HMH72B24	208/230 V~ /60 Hz	25	30	3 x 12 AWG	5 x 16 AWG	25
HMH72B36	208/230 V~ /60 Hz	35	30	3 x 10 AWG	5 x 16 AWG	35
HMH72B48, HMH72B60	208/230 V~ /60 Hz	50	30	3 x 8 AWG	5 x 16 AWG	50

*where required by code

Note: Maximum running current (A): refer to the nameplate.

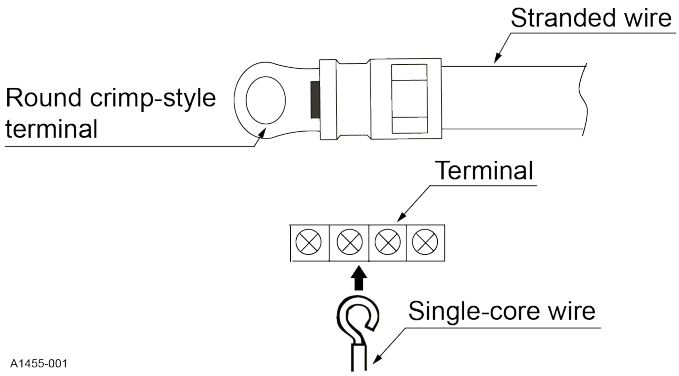
Note:

- Follow local codes and regulations when selecting field wires and ensure all wires are the minimum wire size.
- When the low-voltage cable is longer than 262 ft (80 m), select a larger wire size.
- Install a main switch and an ELB/RCD for each system separately. Select a high-response ELB/RCD that acts within 0.1 s.

NOTICE

When connecting to the terminal block using a stranded wire, make sure to use the round crimp-style solderless terminal.

Figure 19: Connecting the power supply



Performing a test run

About this task:

Perform a test run after the refrigerant piping, drain, and wiring are finished.

CAUTION

The outdoor section is provided with a compressor and base heater. Check to ensure the main power has been on for more than 6 h ahead of unit operation to avoid damage to the compressor.

CAUTION

Do not operate the system until all the checks have been performed.

1. Check to ensure that the service base valves of the outdoor unit are fully open.
2. Check to ensure that the electric wires are fully connected.
3. Use the thermostat to turn on the system and then proceed with the test run.
4. Turn off the power after the test run is finished.

WARNING

Do not touch any of the parts at the discharge gas side by hand. The compressor chamber and the pipes at the discharge side are heated to temperatures higher than 194°F (90°C).

Technical information

WARNING

Electrical Shock Hazard

Disconnect and lock out power before servicing. Wait 5 min to ensure that drive capacitors are discharged before servicing. Use compressor with grounded system only. Molded electrical plug must be used for connection to compressor.

WARNING

Burn Hazard

Failure to follow these warnings could result in serious personal injury or property damage. Ensure that materials and wiring do not touch high temperature areas of the compressor. Personal safety equipment must be used.

CAUTION

Drive Handling

Caution must be used when lifting and installing the drive. Failure to use caution may result in bodily injury. Personal safety equipment must be used. Failure to follow these warnings could result in personal injury or property damage.

CAUTION

Safety Statements

Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission and maintain this equipment. Electrical connections must be made by qualified electrical personnel. All valid standards and codes for installing, servicing, and maintaining electrical and refrigeration equipment must be observed.

Refrigerant cycle

Figure 20: Refrigerant flow diagram

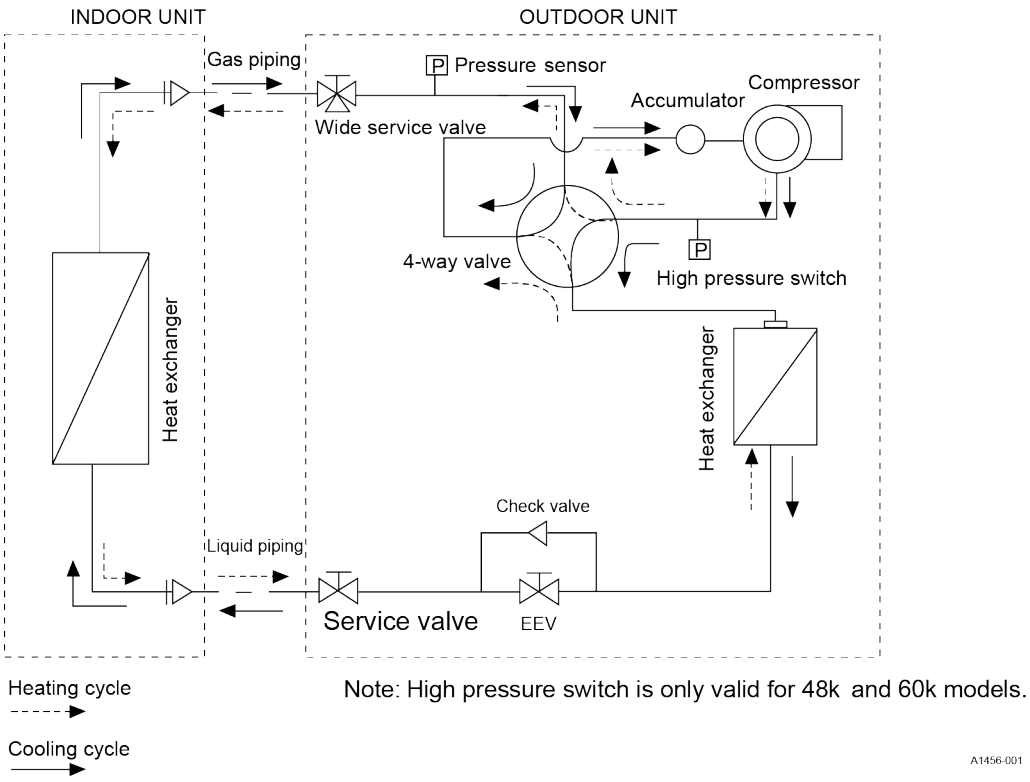
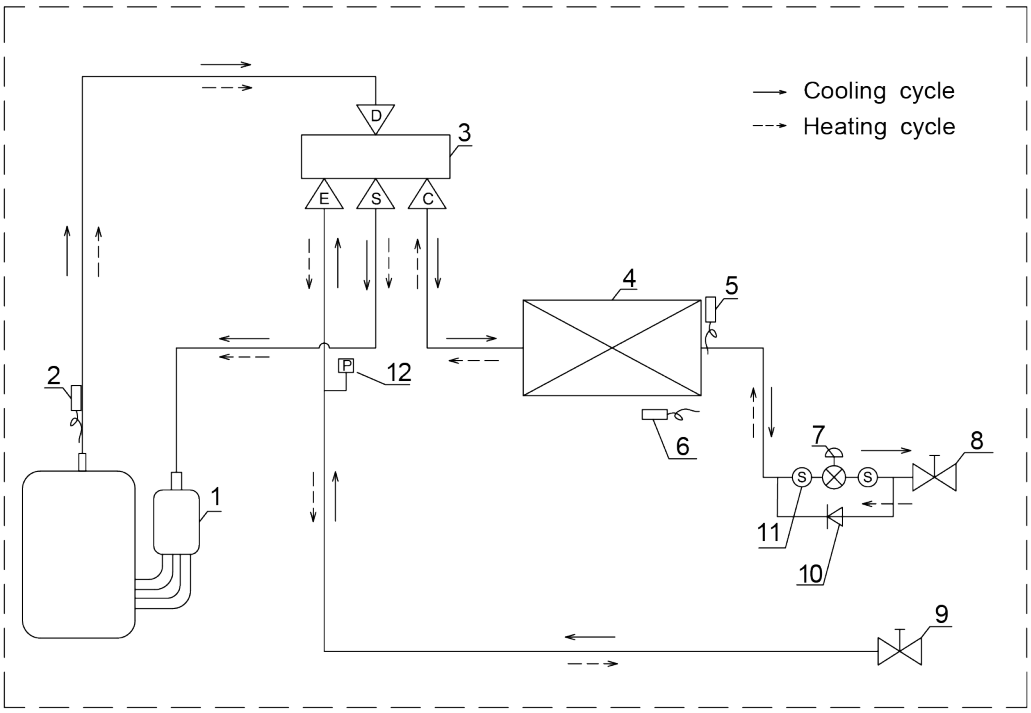


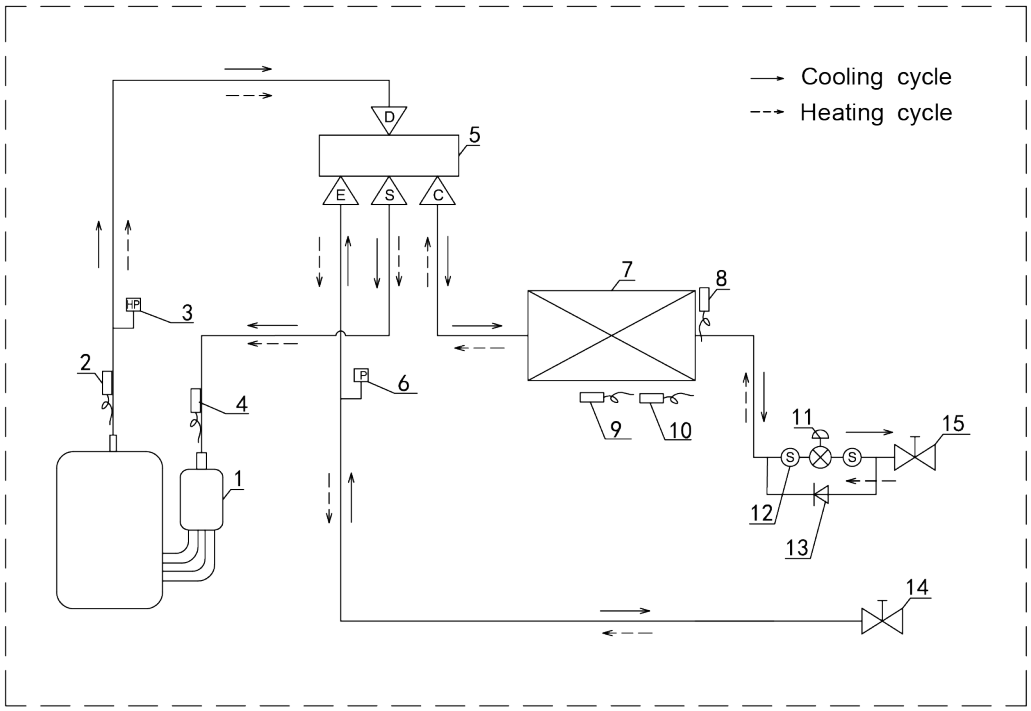
Figure 21: Outdoor unit - HMH72B24



List of components			
1	Compressor	7	Electronic expansion valve
2	Discharge temperature sensor	8	Stop valve (Liquid)
3	4-Way valve	9	Stop valve (Vapor)
4	Outdoor heat exchanger	10	One-way valve
5	Coil temperature sensor	11	Strainer
6	Ambient temperature sensor	12	Pressure sensor

A1457-001

Figure 22: Outdoor unit - HMH72B36



List of components			
1	Compressor	9	Coil temperature sensor
2	Discharge temperature sensor	10	Defrost temperature sensor
3	High pressure switch	11	Electronic expansion valve
4	Suction temperature sensor	12	Strainer
5	4-Way valve	13	One-way valve
6	Pressure sensor	14	Stop valve (Vapor)
7	Outdoor heat exchanger	15	Stop valve (Liquid)
8	Ambient temperature sensor		

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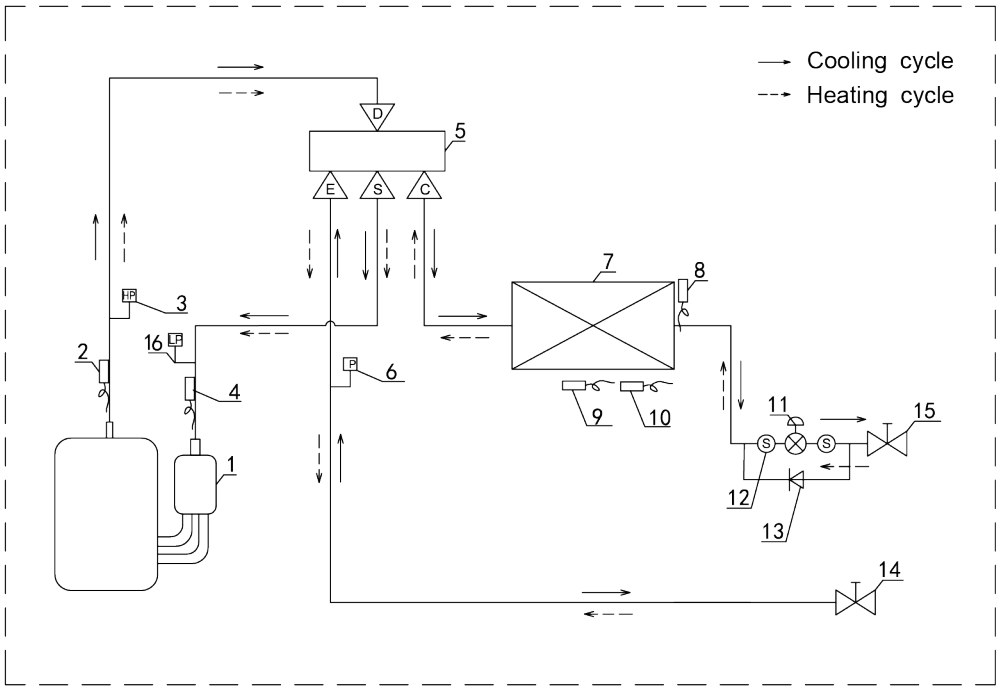
Figure 23: Outdoor unit - HMH72B48/HMH72B60



List of components			
1	Compressor	9	Coil temperature sensor
2	Discharge temperature sensor	10	Defrost temperature sensor
3	High pressure switch	11	Electronic expansion valve
4	Suction temperature sensor	12	Strainer
5	4-Way valve	13	One-way valve
6	Pressure sensor	14	Stop valve (Vapor)
7	Outdoor heat exchanger	15	Stop valve (Liquid)
8	Ambient temperature sensor	16	Low pressure switch

A1459-001

WARNING

High voltage

The outdoor power supply must be disconnected before maintenance. This equipment uses an inverter drive that stores hazardous energy up to 5 min after power is removed. Wait for more than 5 min before performing electrical work after power is removed.

Figure 24: HMH72B24 and HMH72B36 electrical wiring diagram

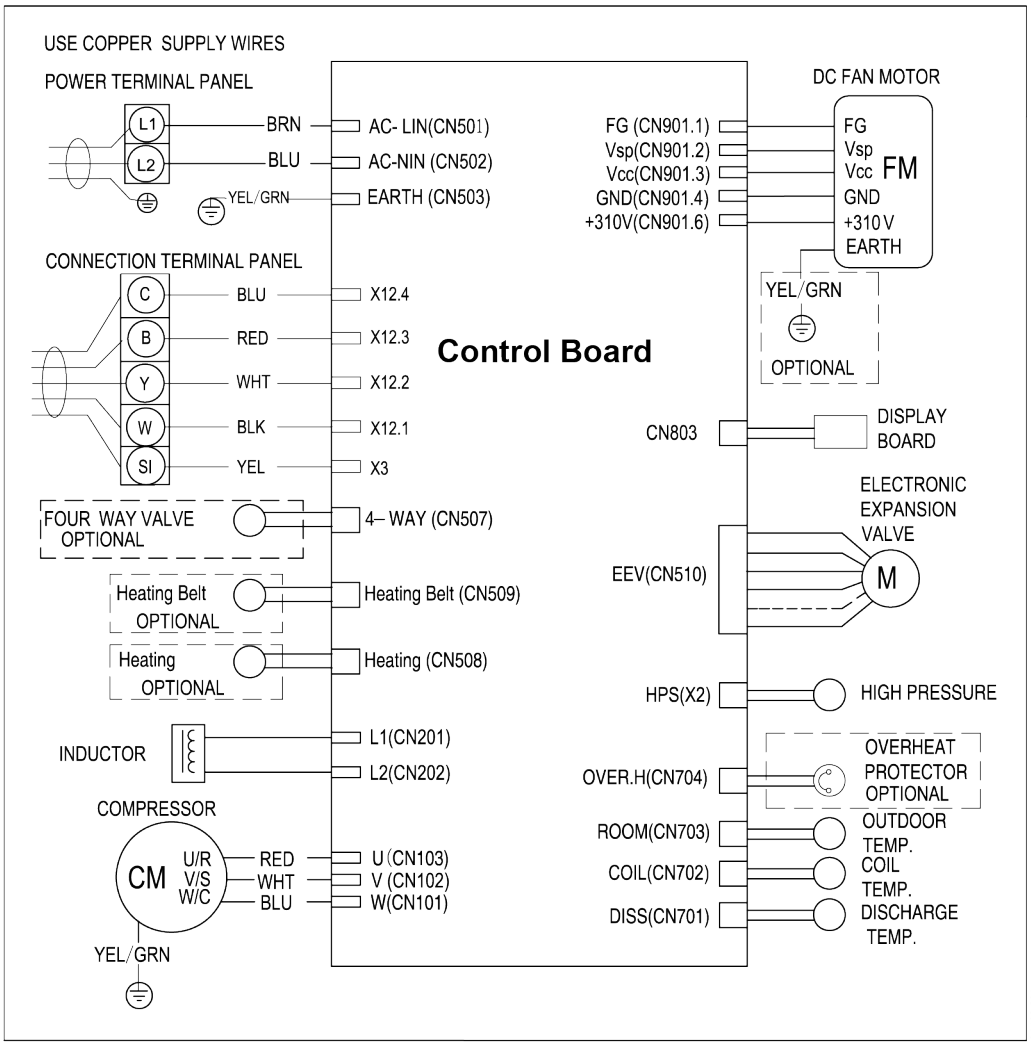
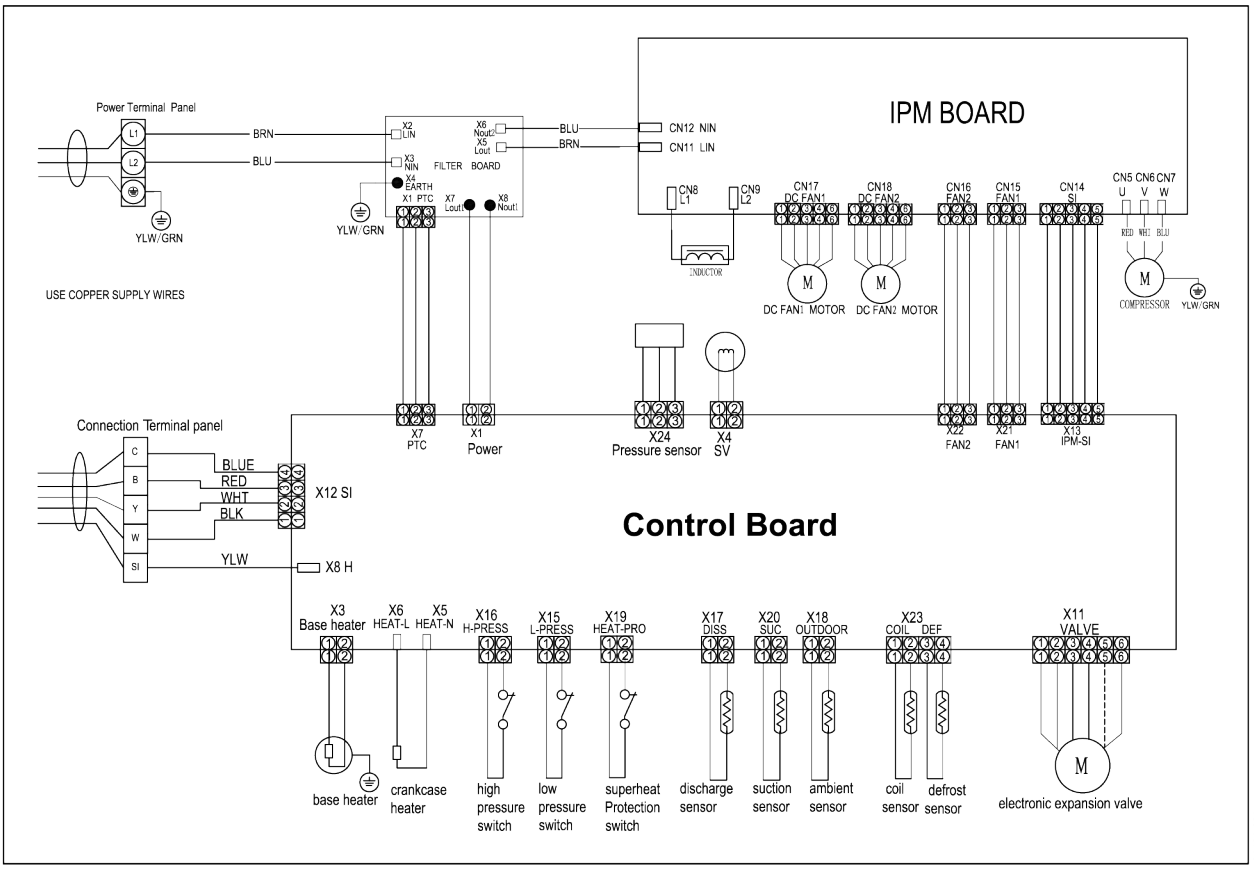


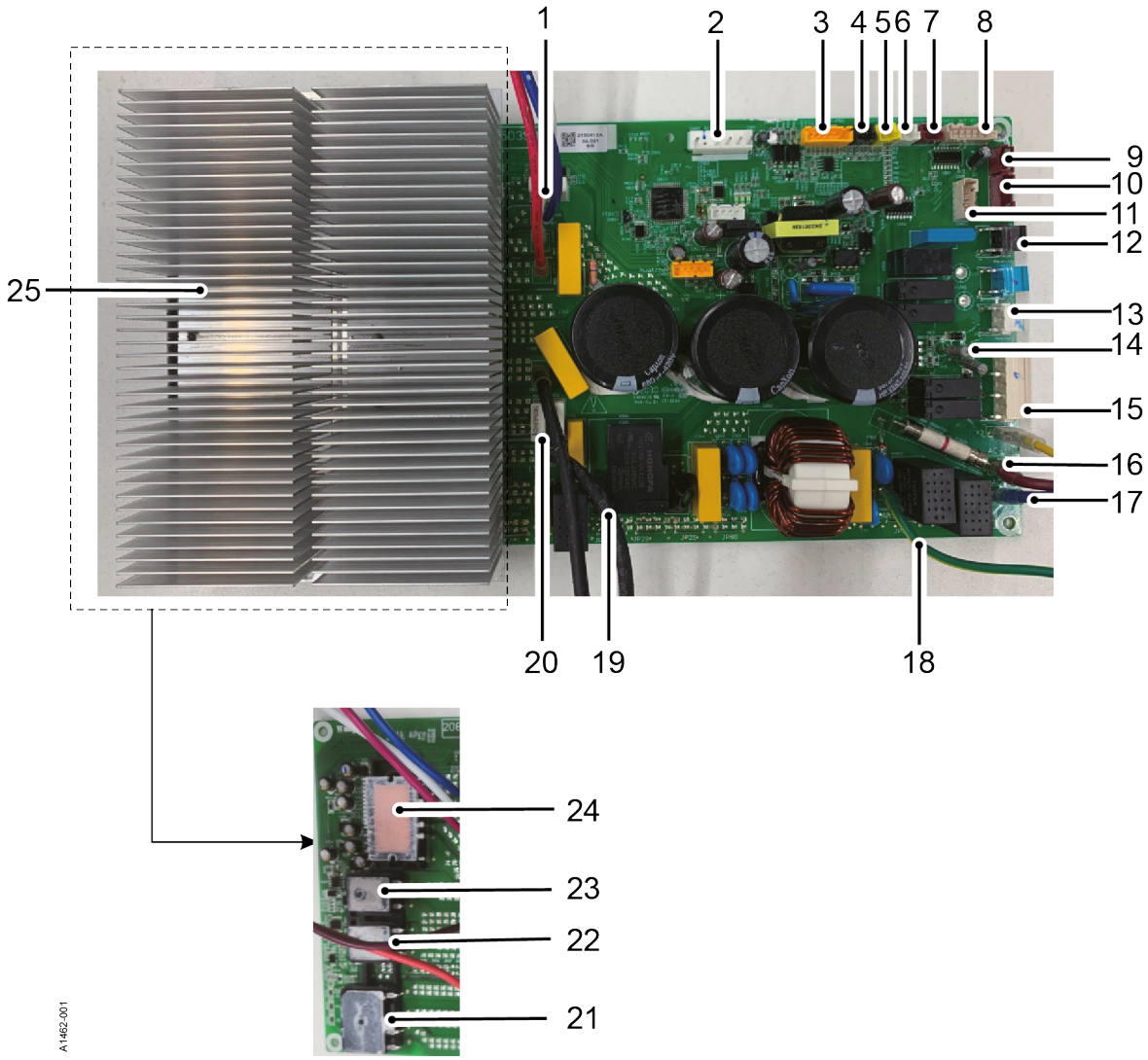
Figure 25: HMH72B48 and HMH72B60 electrical wiring diagram



For DIP switch settings, see Setting the DIP switch of the outdoor unit.

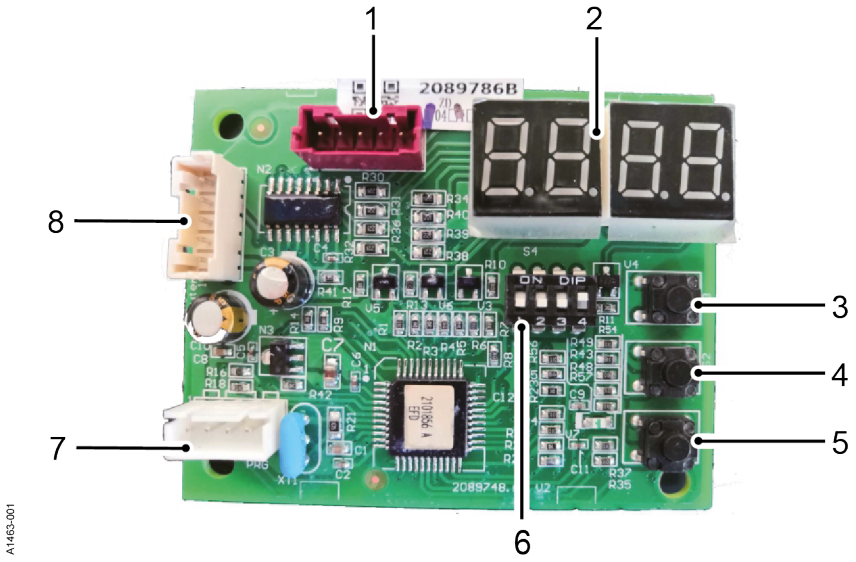
Control board

Figure 26: Main control board - HMH72B24/HMH72B36



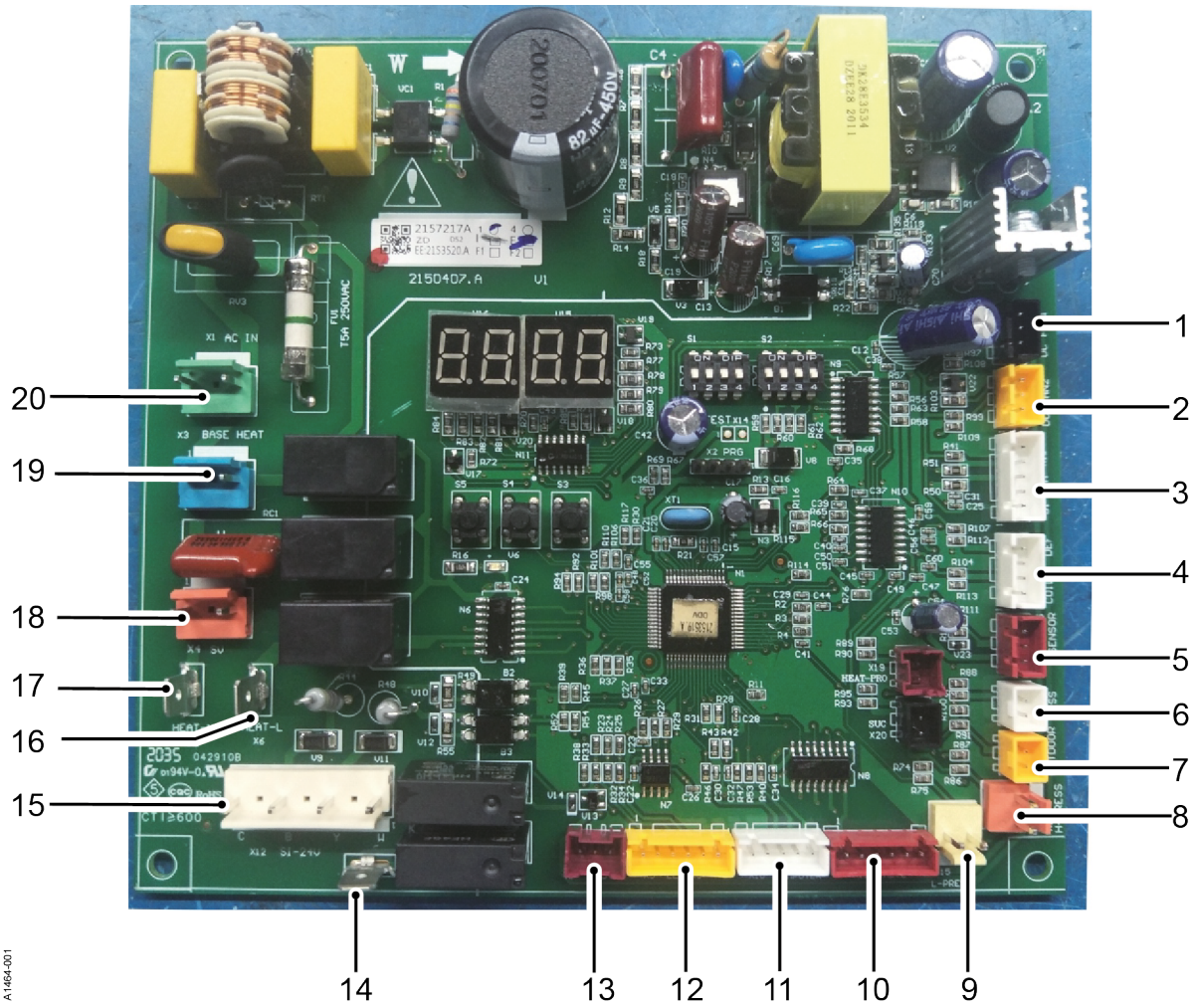
No.	Description	No.	Description
1	Compressor	14	Heater
2	DC fan	15	SI
3	EE	16	AC power LIN
4	Coil temperature sensor	17	AC power NIN
5	Ambient temperature sensor	18	GND
6	Discharge temperature sensor	19	Reactor L2
7	Overheat protector	20	Reactor L1
8	Electronic expansion valve	21	Rectifier bridge
9	High pressure	22	IGBT
10	SW	23	Diode
11	Computer/Checker	24	IPM
12	4-way valve	25	Radiator
13	Electric heating belt		

Figure 27: 7-segment display board - HMH72B24/HMH72B36



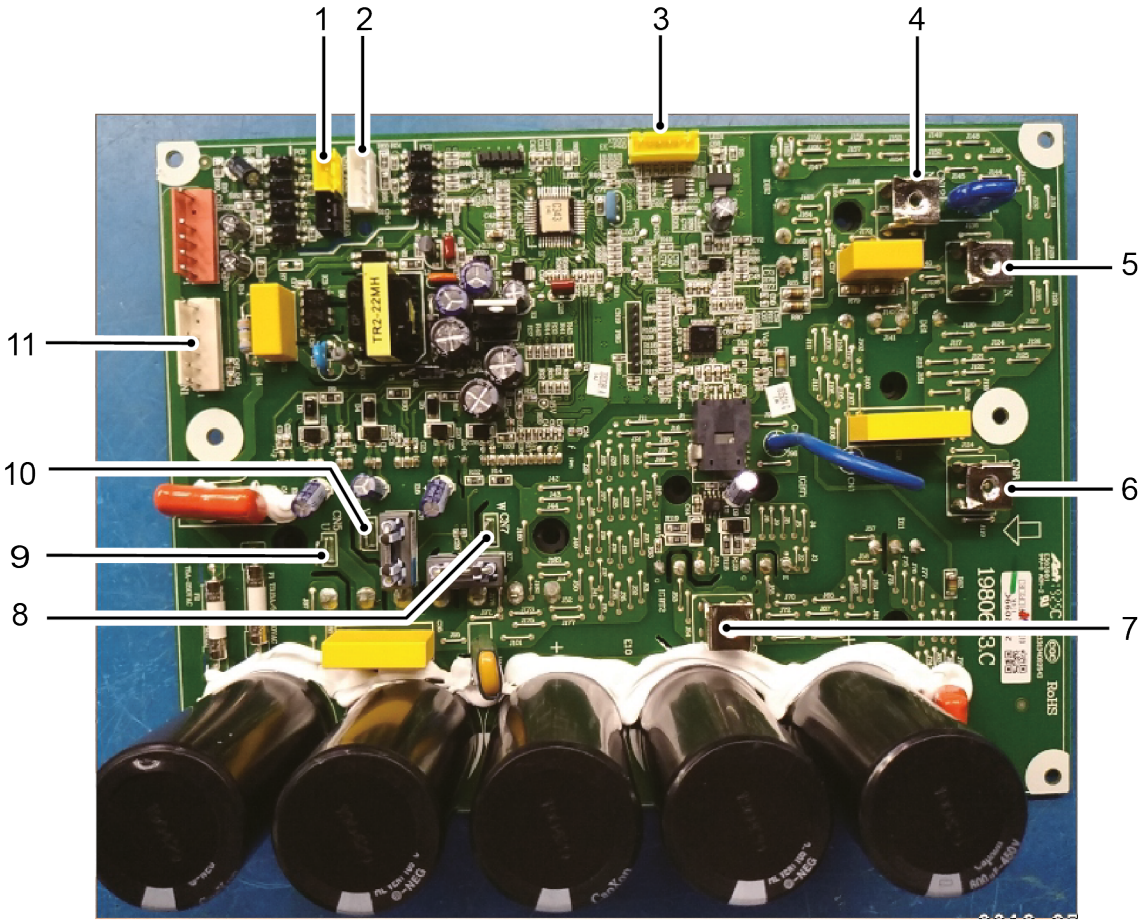
No.	Description	No.	Description
1	Switch to outdoor control board	5	S1- Select button
2	7-segment display	6	DIP switch
3	S3 - Decrease button	7	Program
4	S2 - Increase button	8	Computer/Checker to outdoor control board

Figure 28: Main control board - HMH72B48/HMH72B60



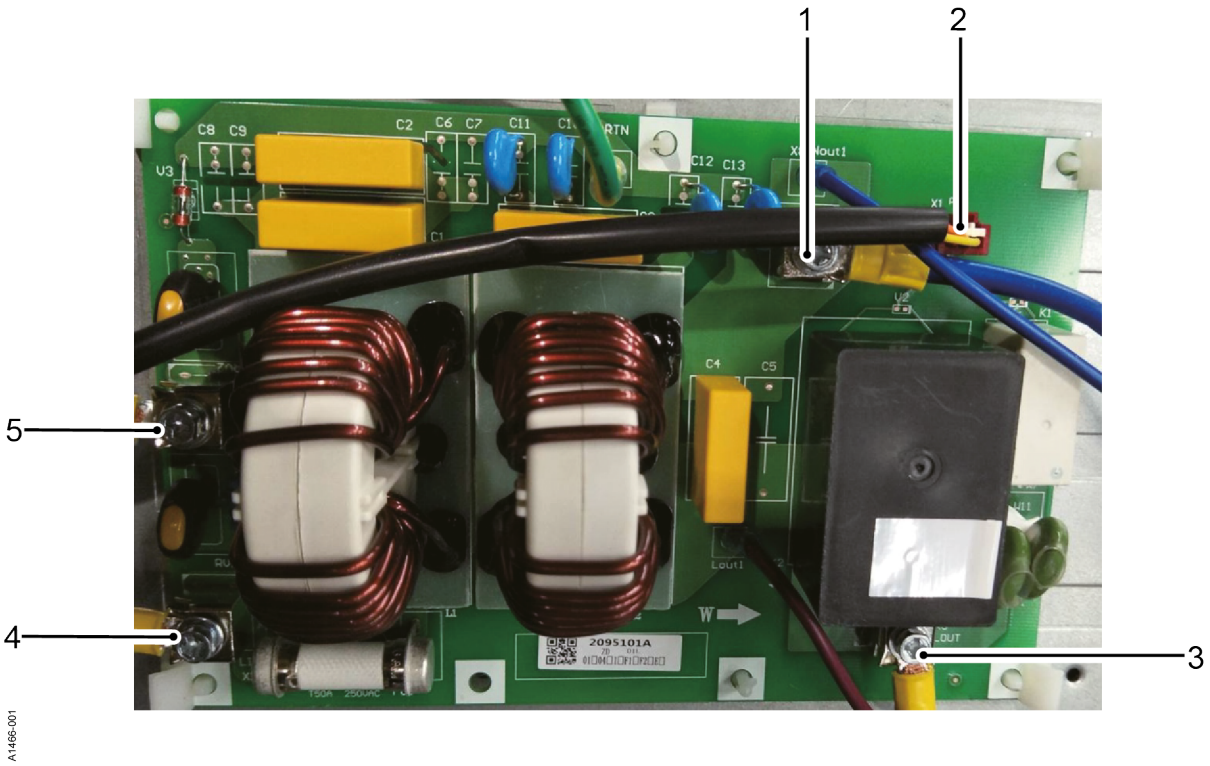
No.	Description	No.	Description
1	DC fan Driver1	11	Checker
2	DC fan Driver2	12	EEPROM
3	IPM-SI	13	PTC control signal
4	Defrost/Coil temperature sensor	14	H signal
5	Pressure sensor	15	Communication signal
6	Discharge temperature sensor	16	Electric heating belt
7	Ambient temperature sensor	17	Electric heating belt
8	High pressure switch	18	4-way valve
9	Low pressure switch	19	Base heater
10	Electronic expansion valve	20	AC power

Figure 29: Drive board



No.	Description	No.	Description
1	DC fan signal	7	Reactor L2
2	IPM-SI	8	Compressor W
3	EE	9	Compressor U
4	NIN	10	Compressor V
5	LIN	11	Driver
6	Reactor L1		

Figure 30: Filter board



No.	Description	No.	Description
1	N out	4	LIN
2	PTC control signal	5	NIN
3	L out		

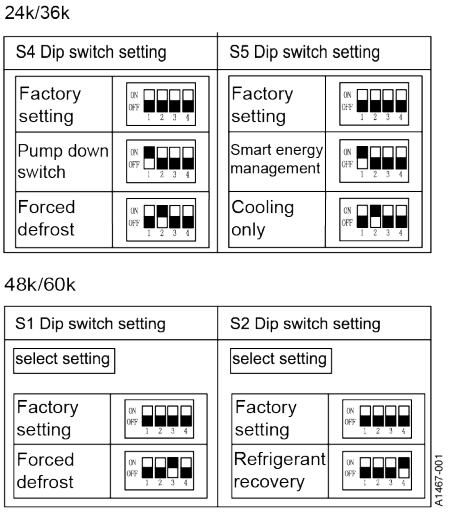
Field settings

Setting the DIP switch of the outdoor unit

1. Turn off all power sources before setting the switches to ensure settings are refreshed and valid.
2. Set switches according to the required setting as shown in Figure 31.

Note: Dip switch setting is optional.

Figure 31: DIP switch setting



Activating manual defrost mode

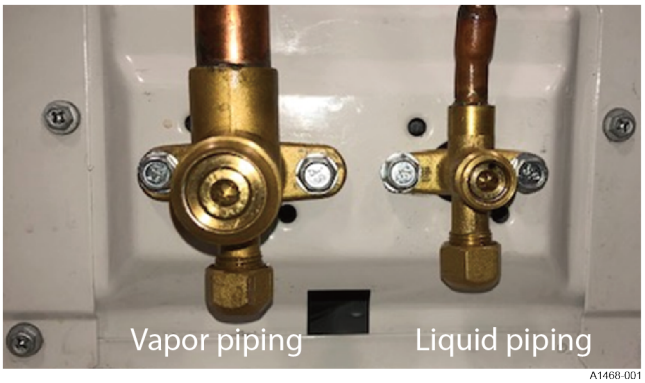
1. Change the switch from **OFF** to **ON** before applying power to the unit.
2. Set the room thermostat to heating mode, which then operates the unit in manual defrosting mode.

Activating pump down mode

The compressor runs with a target frequency and without any protection when the frequency rises. The EEV runs with an open setting. The outdoor unit fan runs with the set fan speed.

1. Remove line voltage power from the outdoor section.
2. Close the liquid line service valve using a hex head wrench by turning the valve stem fully clockwise until seated as shown in Figure 32.

Figure 32: Refrigerant collection



3. Open the maintenance panel.
4. Place the unit in pump-down mode by changing the dip switch setting on the main control board as shown in Figure 31.
5. Restore line voltage power to the outdoor section.
6. Note that the LED display on the main control board should display 40. This number then counts down to zero.
7. When the LED begins to blink zero, close the vapor line service valve using a hex head wrench by turning the valve stem fully clockwise until seated as shown in Figure 32.
8. Remove line voltage power from the outdoor section.

Note: Make sure to switch back the dip switch setting after the refrigerant recovery operation. If not, the unit enters the refrigerant recovery mode again after powering on.

NOTICE

The refrigerant in systems with linesets in excess of 40 ft cannot be recovered into the outdoor unit and requires recovery with external equipment.

Running a parameter query

Figure 33: 7-segment display query

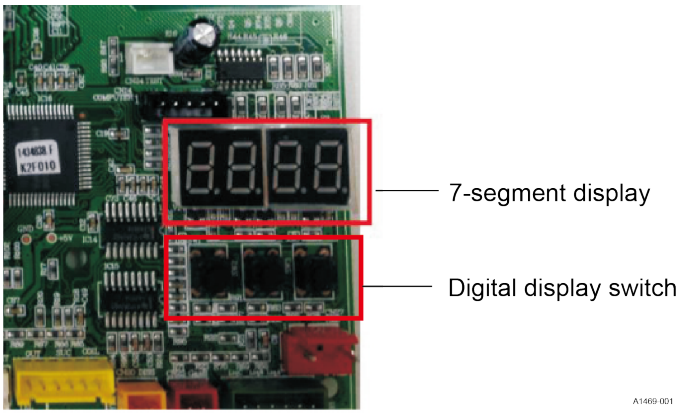
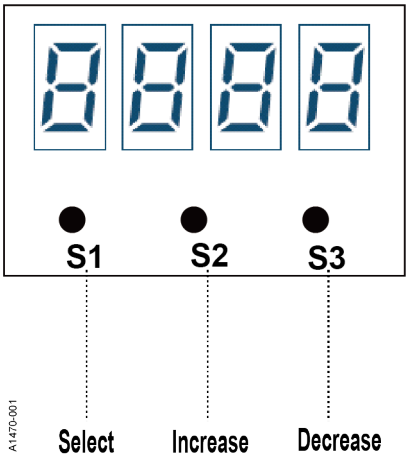


Figure 34: HMH72B24/HMH72B36 digital display board parameters



There are three buttons on the digital display board:

- **Select**: Press to display outdoor or indoor unit parameter. P.= The parameter of the outdoor unit.
- **Increase**: Press to increase the number by one.
- **Decrease**: Press to decrease the number by one.

Note: The parameter content is automatically displayed after the parameter code is selected for 3 s.

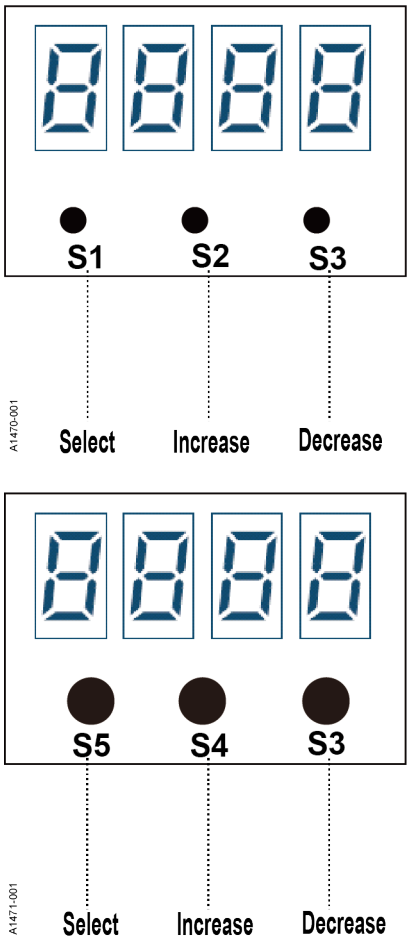
Table 6: Parameters - HMH72B24/HMH72B36

Parameter code	Description
P.0	Fault codes
P.1	Compressor actual frequency
P.2	Compressor driving frequency
P.4	Compressor target frequency
P.5	Compressor discharge temperature

Table 6: Parameters - HMH72B24/HMH72B36

Parameter code	Description
P.6	Outdoor suction temperature
P.7	Outdoor ambient temperature
P.8	Outdoor coil temperature
P.9	Outdoor defrosting temperature
P.10	IPM module temperature
P.11	Outdoor capacity requirement
P.13	Outdoor DC motor target speed
P.14	AC input current
P.15	AC input voltage
P.16	DC bus voltage
P.17	Compressor phase current
P.18	Frequency limit code

Figure 35: HMH72B48/HMH72B60 digital display board parameters



There are three buttons on the digital display board:

- **Select**: Press to display outdoor or indoor unit parameter. P./H.= The parameter of the outdoor unit.
- **Increase**: Press to increase the number by one. Hold down to increase rapidly.
- **Decrease**: Press to decrease the number by one. Hold down to decrease rapidly.

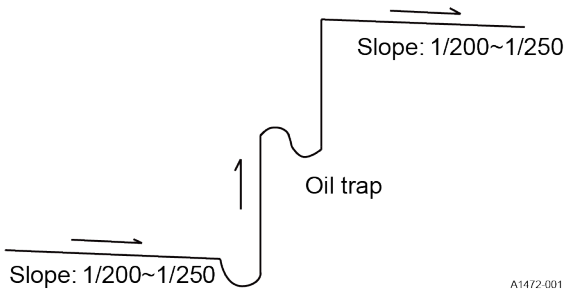
Table 7: Parameters - HMH72B48/HMH72B60

Parameter code	Description
0	Protection code or fault code
P.1	Compressor actual frequency
P.2	Compressor driving frequency
P.4	Outdoor EEV opening
P.5	Outdoor EEV target opening
P.6	Upper DC motor revolving speed
P.8	AC input voltage
P.9	AC input current
P.10	IPM module temperature
P.11	Outdoor capacity requirement
P.12	IPM module fault
P.20	Outdoor ambient temperature
P.21	Outdoor coil temperature
P.22	Outdoor defrost temperature
P.23	Suction temperature
P.24	Discharge temperature
H.1	DSH actual value
H.2	DSH target value
H.3	Target pressure in cooling mode
H.4	Target pressure in heating mode)
H.5	Actual pressure (= the displayed value/100)

Oil trap

When the indoor unit is lower than the outdoor unit and the height difference is larger than 16 ft, install an oil trap every 16 ft in the suction piping.

Figure 36: Oil trap



Note:

1. To avoid storing too much oil in the oil trap and to ensure better cooling and heating performance, the oil trap must be as short and as straight as possible.
2. The horizontal piping must slope toward the trap or outdoor section at a slope of 1/8 in/ft for proper oil return.

Control mode

Control function

1. **Cooling anti-freeze protection:** The outdoor pressure sensors monitor evaporator pressure and saturated temperature. This feature prevents the indoor unit evaporator temperature from becoming too low. If the indoor coil temperature is too low, the compressor automatically engages protection mode.
2. **Overload protection:** To prevent system overload caused by excessive pressure, the control implements real-time detection when the outdoor coil temperature is too high during cooling mode or the indoor coil temperature is too high during heating mode.
3. **Compressor discharge temperature protection:** To prevent damage due to a high compressor discharge temperature, the control monitors the discharge gas temperature and provides automatic protection if the temperature is too high.
4. **Oil-return control:** When the compressor runs at low frequencies for a long time, the control initiates an oil-return sequence to ensure oil is returned to the compressor.
5. **Operation mode:** Air conditioning mode is the operation mode set by users through the thermostat. Two modes are available: cooling and heating.
6. **Four-way valve control:** The four-way valve of the outdoor unit is de-energized in cooling and defrosting, and energized in heating. During heating, the four-way valve is de-energized for a period of time after the compressor stops.
7. **Start-up protection:** To prevent frequent compressor starts where the system pressure has not equalized, the control invokes a delay of 3 min between cycles to prevent short cycles.
8. **Pressure protection:** When the pressure increases to a preset value, the pressure switch automatically changes to protection mode. The compressor stops and reports the protection fault code.

Sensor parameter

These are the parameters for the outdoor compressor discharge sensor:
(R0=187.25K±6.3%, R100=3.77K±2.5K, B0/100=3979K±1%)

Table 8: Outdoor compressor discharge temperature sensor

T [℃]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
-30	908.2603	985.5274	1065.1210	-7.84	7.47
-15	384.2888	413.3808	442.9105	-7.04	6.67
0	175.4533	187.2500	199.0468	-6.30	5.93
15	85.4114	90.4842	95.5398	-5.61	5.29
30	44.1034	46.4046	48.6960	-4.96	4.71
45	23.9697	25.0632	26.1488	-4.36	4.15
60	13.6400	14.1799	14.7154	-3.81	3.64
75	8.0951	8.3705	8.6440	-3.29	3.16
90	4.9853	5.1292	5.2726	-2.81	2.72
105	3.1632	3.2491	3.3353	-2.64	2.58

These are the parameters for the suction, ambient, coil, and discharge sensors: (R0=15K±2%, B0/100=3450K±2%)

Table 9: Suction, ambient, coil, and discharge sensors

T [°C]	Rmin [KΩ]	Rnom [KΩ]	Rmax [KΩ]	Dev(MIN)%	Dev(MAX)%
-30	60.78	64.77	68.99	-6.16	6.12
-15	29.07	29.97	30.89	-3.00	2.98
0	14.70	15.00	15.29	-2.00	1.90
15	7.804	8.021	8.240	-2.71	2.66
30	4.355	4.550	4.753	-4.29	4.27
45	2.558	2.701	2.850	-5.29	5.23
60	1.551	1.654	1.762	-6.23	6.13
75	0.9676	1.041	1.120	-7.05	7.05
90	0.6188	0.6718	0.7291	-7.89	7.86
105	0.4056	0.4440	0.4859	-8.65	8.62

Troubleshooting

Variable capacity systems can be difficult to troubleshoot considering integrated fault isolation and protection algorithms. When the HP system is not operating within acceptable parameters or there is a need to verify system or component operation, it may be necessary to perform specific system checks. Follow the troubleshooting steps, component checks, and fault code/resolution tables in this section to isolate potential root causes.

Checking components

Check the refrigerant system.

Test system flow

Conditions:

- The compressor is running.
- The outdoor section is installed in a well-ventilated area.

Tool

Pressure gauge:

- See: Tube defrost
- Feel: The difference between the tube's temperature
- Test: Test pressure

Figure 37: Refrigerant system

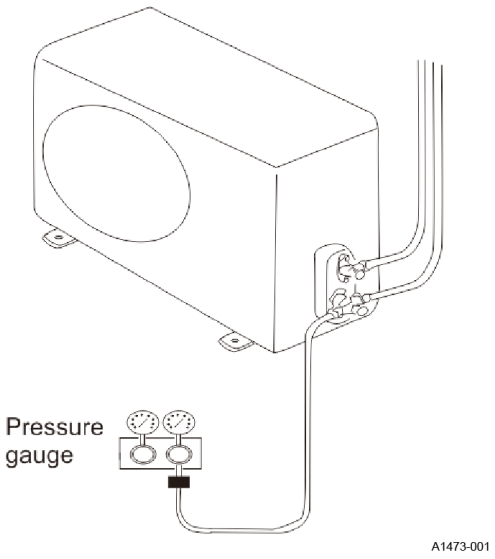


Figure 38: Cooling mode flow chart

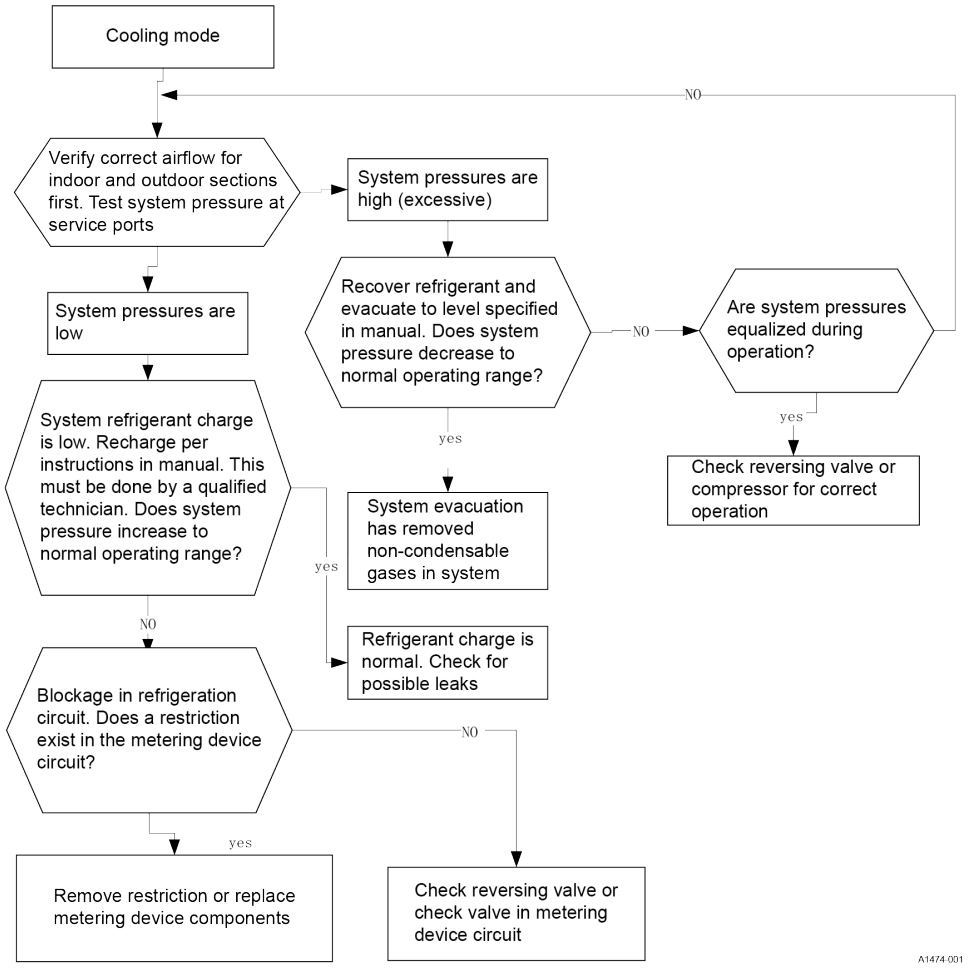
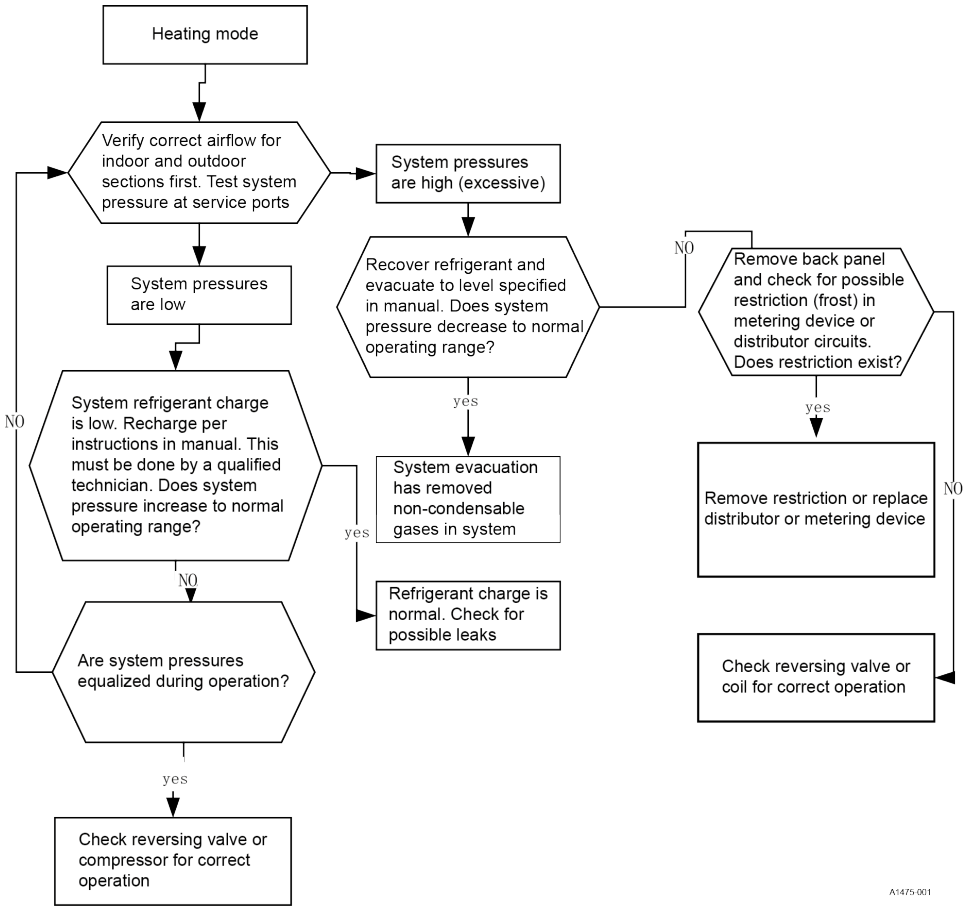


Figure 39: Heating mode flow chart



Fault codes

Table 10: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
1	Outdoor ambient temperature sensor fault	1. The outdoor ambient temperature sensor has a poor connection. 2. The outdoor ambient temperature sensor has failed. 3. The sampling circuit has failed.	1. Reconnect the outdoor ambient temperature sensor. 2. Replace the outdoor ambient temperature sensor components. 3. Replace the outdoor control board components.	
2	Outdoor coil temperature sensor fault	1. The outdoor coil temperature sensor has a poor connection. 2. The outdoor coil temperature sensor has failed. 3. Sensor circuit failure.	1. Reconnect the outdoor coil temperature sensor. 2. Replace the outdoor coil temperature sensor components. 3. Replace the outdoor control board components.	
3	Unit overcurrent turn-off fault	1. The control board current sampling circuit has failed. 2. Excessive current due to low supply voltage. 3. The compressor has failed. 4. Overload in cooling mode. 5. Overload in heating mode.	1. Replace the electrical control board components. 2. Normal protection. 3. Replace the compressor. 4. See Table 11. 5. See Table 12.	
4	EEprom data error	1. EE components fails. 2. EE components control circuit fails. 3. EE components are inserted incorrectly.	1. Replace the board. 2. Replace the outdoor control board components. 3. Reset the EE components.	

Table 10: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
5	Cooling freezing protection (the indoor coil temperature is too low) or heating overload (the indoor coil temperature is too high)	1. Indoor unit airflow restriction. 2. The room temperature is too low in cooling mode or the room temperature is too high in heating mode. 3. The filter is dirty. 4. The duct resistance is too high resulting in low airflow. 5. The selected indoor fan speed is too low. 6. The indoor unit is not installed in accordance with the installation instructions, and the air inlet is too close to the air outlet.	1. Check if the indoor fan, indoor fan motor, and indoor coil function normally. 2. Normal protection. 3. Clean the filter. 4. Correct the duct system. 5. Correct the indoor fan speed. 6. Reinstall the indoor unit referring to the installation instructions to resolve issues.	
7	Communication fault between the indoor unit and outdoor unit	1. The low-voltage cable is connected incorrectly between the indoor unit and the outdoor unit. 2. The low-voltage connection is loose. 3. The low-voltage cable is damaged. 4. The outdoor control board has failed. 5. The low-voltage circuit fuse is open. 6. The low-voltage cable is incorrect.	1. Reconnect the connection cable referring to the wiring diagram. 2. Reconnect the low-voltage cable. 3. Replace the low-voltage cable. 4. Replace the outdoor control board. 5. Check the low-voltage circuit, and adjust the DIP switch and the short-circuit fuse. 6. Choose suitable low-voltage cable. Refer to the installation instructions.	

Table 10: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
13	Compressor overheat protector device	1. The wiring of the overload protector has a poor connection. 2. Overload protector failure. 3. Low refrigerant charge. 4. Long lineset length applied without additional charge. 5. TXV/EEV valve failure. 6. Outdoor control board failure.	1. Reconnect the wiring of the overload protector. 2. Replace the overload protector. 3. Check the braze joints for leaks and recharge the refrigerant. 4. Add refrigerant. 5. Replace the expansion valve. 6. Replace the outdoor control board.	
14	The high-pressure switch operation or unit is turned off for high-pressure protection	1. The wiring of the high-pressure switch has a poor connection. 2. The high-pressure switch has failed. 3. The outdoor control board is abnormal. 4. Overload in cooling. 5. Overload in heating.	1. Reconnect the wiring of the high-pressure switch. 2. Replace the high-pressure switch. 3. Replace the outdoor control board. 4. See Table 11. 5. See Table 12.	Applies to models with high-pressure switch or pressure sensor.
15	The low-pressure switch protection or unit is turned off for low-pressure protection	1. The wiring of the low-pressure switch has a poor connection. 2. The low-pressure switch has failed. 3. The refrigerant charge is low. 4. The expansion valve fails in heating mode. 5. The outdoor control board is abnormal.	1. Reconnect the wiring of the low-pressure switch. 2. Replace the low-pressure switch. 3. Check for a refrigerant leak and adjust the refrigerant charge. 4. Replace the expansion valve. 5. Replace the outdoor control board.	Applies to models with low-pressure switch or pressure sensor.
16	Overload protection in cooling mode	System overload	See Table 11.	
17	Discharge temperature sensor fault	1. The wiring of the discharge temperature sensor has a poor connection. 2. The discharge temperature sensor has failed. 3. The sampling circuit is abnormal.	1. Reconnect the wiring of the discharge temperature sensor. 2. Replace the discharge temperature sensor. 3. Replace the outdoor control board.	

Table 10: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
18	AC voltage is abnormal	1. The AC voltage is >275 V or <160 V. 2. The AC voltage of the sampling circuit on the drive board is abnormal.	1. Normal protection, check the supply power. 2. Replace the drive board.	
19	Suction temperature sensor fault	1. The wiring of the suction temperature sensor has a poor connection. 2. The suction temperature sensor has failed. 3. Sensor circuit failure.	1. Reconnect the suction pressure sensor wiring. 2. Replace the suction pressure sensor. 3. Replace the outdoor control board.	
22	Defrosting sensor fault	1. The wiring of the defrost temperature sensor has a poor connection. 2. The defrost temperature sensor has failed. 3. Sensor circuit failure.	1. Reconnect the wiring of the defrost sensor. 2. Replace the defrost sensor. 3. Replace the outdoor control board.	
43	High-pressure sensor fault	1. The wiring of the high-pressure sensor has a poor connection. 2. The high-pressure sensor has failed. 3. The high-pressure pressure sensor circuit has failed.	1. Reconnect the high-pressure sensor wiring. 2. Replace the high-pressure sensor. 3. Replace the outdoor control board.	
45	IPM fault	Drive or amplifier fault	See Table 13 and Table 14 for drive fault codes.	
46	IPM and control board communication fault	1. The cable between the control board and the drive board has a poor connection. 2. The cable between the control board and the drive board has failed. 3. The drive board has failed. 4. The control board has failed.	1. Reconnect the cable between the control board and the drive board. 2. Replace the communication cable between the control board and the drive board. 3. Replace the drive board. 4. Replace the control board.	

Table 10: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
47	Excessive discharge temperature fault	1. Low refrigerant charge. 2. Low charge due to extended lineset. 3. Metering system failure. 4. Excessive outdoor ambient temperature.	1. Check for leaks. 2. Correct the refrigerant charge. 3. Replace the metering devices. 4. Normal protection.	
48	Outdoor DC fan motor fault (upper fan motor)	1. The DC fan motor connection is poor. 2. The wiring to the DC fan motor has failed. 3. The DC fan motor has failed. 4. The drive circuit of the upper DC fan motor has failed. 5. Outdoor airflow blockage.	1. Replace the DC fan motor wiring. 2. Replace the DC fan motor. 3. Replace the DC fan motor. 4. Replace the drive board of the fan motor. 5. Resolve the outdoor unit airflow restriction.	
49	Outdoor DC fan motor fault (lower fan motor)	1. The DC fan motor connection is poor. 2. The wiring to the DC fan motor has failed. 3. The DC fan motor has failed. 4. The drive circuit of the lower DC fan motor has failed. 5. Outdoor airflow blockage.	1. Replace the DC fan motor wiring. 2. Replace the DC fan motor. 3. Replace the DC fan motor. 4. Replace the drive board of the fan motor. 5. Resolve the outdoor unit airflow restriction.	

Table 10: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
91	Unit stops due to IPM board overheating fault	1. The outdoor ambient temperature is too high. 2. The speed of the outdoor fan motor is too low. 3. The outdoor unit is not installed in accordance with the installation instructions. 4. The supply power is too low.	1. Normal protection. 2. Check the fan motor and replace if necessary. 3. Reinstall the outdoor unit in accordance with the installation instructions. 4. Normal protection.	
96	Low charge	Inadequate system charge	Recover the refrigerant and charge the refrigerant. Refer to the *Tabular Data Sheet*.	
97	4-way valve failure	1. The connecting wiring of the 4-way valve coil is poor. 2. The 4-way valve coil has failed. 3. The 4-way valve has failed. 4. The drive board of the 4-way valve has failed.	1. Repair the wiring of the 4-way valve. 2. Replace the 4-way valve coil. 3. Replace the 4-way valve. 4. Replace the drive board of the 4-way valve.	

Note:

- If the indoor unit fails to start or the indoor unit stops after 30 s and the unit does not display the fault code, check the voltage and connection to the control board.
- Verify indoor unit control operation and setup.

Table 11: Overload in cooling mode

No.	Cause	Resolution
1	The refrigerant is excessive.	Recover the refrigerant, and recharge the refrigerant referring to the rating label.
2	The outdoor ambient temperature is too high.	Use within allowable temperature range.
3	Short-circuit occurs in the air outlet and air inlet of the outdoor unit.	Adjust the installation of the outdoor unit referring to the installation instructions.
4	The outdoor heat exchanger is dirty.	Clean the heat exchanger of the outdoor unit.
5	The speed of the outdoor fan motor is too low.	Check the outdoor fan motor operation and replace if necessary.
6	The outdoor fan is damaged or blocked.	Check the outdoor fan.
7	The air inlet and/or outlet has been blocked.	Remove the obstructions.
8	The expansion valve or the capillary has failed.	Replace the expansion valve or the capillary.

Table 12: Overload in heating mode

No.	Cause	Resolution
1	The refrigerant is excessive.	Recover the refrigerant, and recharge the refrigerant referring to the rating label.
2	The indoor ambient temperature is too high.	Use within allowable temperature range.
3	Short-circuit occurs in the air outlet and air inlet of the indoor unit.	Adjust the installation of the indoor unit referring to the installation instructions.
4	The indoor filter is dirty.	Clean the indoor filter.
5	The speed of the indoor fan motor is too low.	Check the indoor fan motor speed setting.
6	The indoor fan is not operating correctly.	Check the indoor fan.
7	The air inlet and/or outlet has been blocked.	Remove the obstructions.
8	The expansion valve or the capillary fails.	Replace the expansion valve or the capillary.

Table 13: Drive fault code - 24k/36k

Fault code	Fault description	Possible reasons for fault	Resolution
1	Inverter DC voltage overload fault	1. The power supply input is too high or too low. 2. Drive board fault.	1. Check the power supply. 2. Change the drive board.
2	Inverter DC low-voltage fault		
3	Inverter AC current overload fault		
4	Out-of-step detection	1. Compressor phase lost. 2. Bad drive board components. 3. Compressor insulation fault.	1. Check the compressor wire connection. 2. Change the drive board. 3. Change the compressor.
5	Loss phase detection fault (speed pulsation)		
6	Loss phase detection fault (current imbalance)		
7	Inverter IPM fault (edge)	1. System overload or current overload. 2. Drive board fault. 3. Compressor oil shortage, serious wear of crankshaft. 4. Compressor insulation fault.	1. Check the system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.
8	Inverter IPM fault (level)		
9	PFC_IPM IPM fault (edge)		
10	PFC_IPM IPM fault (level)		
11	PFC power detection of failure	1. The power supply is not stable. 2. Instantaneous power off. 3. Drive board failure.	1. Check the power supply. 2. N/A 3. Change the drive board.
12	PFC overload current detection of failure	1. System overload, current is too high. 2. Drive board fails. 3. PFC fails.	1. Check the system. 2. Change the drive board. 3. Change the PFC.

Table 13: Drive fault code - 24k/36k

Fault code	Fault description	Possible reasons for fault	Resolution
13	DC voltage detected abnormal	1. The input voltage is too high or too low. 2. Drive board fails.	1. Check the power supply. 2. Change the drive board.
14	PFC LOW voltage detected failure		
15	AD offset abnormal detected failure	Drive board fails.	Change the drive board.
16	Inverter PWM logic set fault		
17	Inverter PWM initialization failure		
18	PFC_PWM logic set fault		
19	PFC_PWM initialization fault		
20	Temperature abnormal		
21	Shunt resistance unbalance adjustment fault		
22	Communication failure	1. Communication wire connection is poor. 2. Drive board fails. 3. Control board fails.	1. Check the wiring. 2. Change the drive board. 3. Change the control board.
23	Incorrect motor parameters	Initialization is abnormal.	Reset the power supply.
26	DC voltage mutation error	1. The power input changes suddenly. 2. Drive board fails.	1. Check the power supply to provide stable power supply. 2. Change the drive board.
27	D axis current control error	1. System overload, phase current is too high. 2. Drive board fails.	1. Check the system to see if it works normally. 2. Check the stop valve to see if it is open. 3. Change the drive board.
28	Q axis current control error	1. System overloads, phase current is too high. 2. Drive board fails.	1. Check the system to see if it works normally. 2. Check the stop valve to see if it is open. 3. Change the drive board.

Table 13: Drive fault code - 24k/36k

Fault code	Fault description	Possible reasons for fault	Resolution
29	Saturation error of D axis current control integral	1. Momentary system overload. 2. The compressor parameter is not suitable. 3. Drive board fails.	1. Check the system to see if it works normally. 2. Check the stop valve to see if it is open. 3. Change the drive board.
30	Saturation error of Q axis current control integral	1. Momentary system overload. 2. The compressor parameter is not suitable. 3. Drive board fails.	1. Check the system to see if it works normally. 2. Check the stop valve to see if it is open. 3. Change the drive board.
35	EE data abnormal	Driver board EEPROM is abnormal.	1. Change the EEPROM. 2. Change the drive board.

Table 14: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
1	Q axis current detection, failure in drive control	1. The compressor wire connection is poor. 2. Bad drive board components. 3. The compressor start load is too large. 4. Compressor demagnetization. 5. Compressor oil shortage, serious wear of crankshaft 6. The compressor insulation has failed.	1. Check the wire of the compressor. 2. Change the drive board. 3. Allow pressures to equalize and then resume unit operation. 4. Change the compressor. 5. Change the compressor. 6. Change the compressor.
2	Phase current detection, failure in drive control	1. Compressor voltage default phase. 2. Bad drive board components. 3. The compressor insulation has failed.	1. Check the compressor wire connection. 2. Change the drive board. 3. Change the compressor.
3	Initialization, phase current imbalance	Bad drive board components.	Change the drive board.
4	Speed estimation, failure in drive control	1. Bad drive board components. 2. Compressor shaft clamping. 3. The compressor insulation has failed.	1. Change the drive board. 2. Change the compressor. 3. Change the compressor.

Table 14: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
5	IPM FO output fault	1. System overload or current overload. 2. Drive board fails. 3. Compressor oil shortage, serious wear of crankshaft. 4. The compressor insulation has failed.	1. Check the outdoor section system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.
6	Communication between drive board and control board fault	1. Communication wire connection is poor. 2. Drive board fault. 3. Control board fault.	1. Check the wiring. 2. Change the drive board. 3. Change the control board.
7	AC voltage, overload voltage	1. The supply voltage input is too high or too low. 2. Drive board fails.	1. Check the power supply. 2. Change the drive board.
8	DC voltage, overload voltage	1. The supply voltage input is too high. 2. Drive board fault.	1. Check the power supply. 2. Change the drive board.
9	AC voltage imbalance	Drive board fails.	Change the drive board.
10	PFC current detection circuit fault before compressor is **ON**	Bad drive board components.	Change the drive board.
11	AC voltage supply out of range	1. Power supply abnormal, power frequency out of range. 2. Drive board fails.	1. Check the system. 2. Change the drive board.
12	Products of single-phase PFC overcurrent, FO output low level	1. System overload, current is too large. 2. Drive board fault. 3. PFC fault.	1. Check the system. 2. Change the drive board. 3. Change PFC.
	Inverter overcurrent (3-phase power supply outdoor sections)	1. System overload, current is too large. 2. Drive board fault. 3. Compressor oil shortage, serious wear of crankshaft. 4. The compressor insulation has failed.	1. Check the system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.
13	Inverter overcurrent	1. System overload, current is too large. 2. Drive board fault. 3. Compressor oil shortage, serious wear of crankshaft. 4. The compressor insulation has failed.	1. Check the system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.

Table 14: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
14	PFC overcurrent (single-phase outdoor section)	1. System overload, current is too large. 2. Drive board fault. 3. PFC fault.	1. Check the system. 2. Change the drive board. 3. Change PFC.
	Phase imbalance, phase loss, or instantaneous power failure (only for 3-phase power supply outdoor sections)	1. 3-phase voltage imbalance. 2. 3-phase power supply phase lost. 3. The power supply wiring is incorrect. 4. Drive board fault.	1. Check the power supply. 2. Check the power supply. 3. Check the power supply wiring connection. 4. Change the drive board.
15	Instantaneous power off detection	1. The power supply is not stable. 2. Instantaneous power failure. 3. Drive board fault.	1. Check the power supply. 2. No fault. 3. Change the drive board.
16	Low DC voltage 200 V	1. The voltage input is too low. 2. Drive board fault.	1. Check the power supply. 2. Change the drive board.
18	Driver board read EE data error	1. EEPROM has no data or data error. 2. EEPROM circuit fault.	1. Change the EEPROM component. 2. Change the drive board.
19	PFC chip receives data fault	Abnormal communication loop.	Change the drive board.
20	PFC soft start abnormally	Abnormal PFC drive loop.	Change the drive board.
21	Compressor drive chip could not receive data from PFC chip	Communication loop fault.	Change the drive board.

Troubleshooting guide

Table 15: Troubleshooting for normal malfunction

Malfunction	Possible reasons for malfunction	Suggested action
Outdoor section does not start	1. Power supply failure. 2. Trip of breaker or open fuse. 3. Supplied voltage is too low. 4. Incorrect setting of the thermostat. 5. No power to the thermostat.	1. Check the power supply circuit. 2. Measure the insulation resistance to ground to see if there is any leakage. 3. Check if there is a defective contact or leakage current in the power supply circuit. 4. Check and set the thermostat. 5. Check the thermostat and thermostat wiring.
Compressor starts or stops frequently	The air inlet and/or outlet has been blocked or restricted.	Remove the blockage.
Poor cooling/heating	1. The outdoor heat exchanger is dirty. 2. Air leakage into the conditioned space or excessive load due to persons entering and exiting frequently. 3. Blockage of outdoor heat exchanger. 4. Incorrect temperature setting.	1. Clean the heat exchanger of the outdoor unit. 2. Keep certain air tightness indoors. 3. Remove the blockage. 4. Check and try to set the temperature again.
Sound from deforming parts	During system starting or stopping, a sound might be heard. This is due to thermal deformation of plastic parts.	Note that this is normal and the sound disappears quickly.
Water leakage	1. The drainage pipe is blocked or broken. 2. The insulation of the refrigerant piping is inadequate.	1. Change the drainage pipe. 2. Correct the refrigeration piping insulation.

LED-displayed fault codes - HMH72B24/HMH72B36

Fault codes are displayed by LED lamps on the outdoor main control board (**DC - inverter unitary**). Remove the system top cover to expose the indicator LED lamps.

There are three LED lamps on the main control board:

- LED1 indicates the fault code represented by a two-digit number.
- LED2 indicates the fault code represented by a single-digit number.
- LED3 indicates an outdoor drive control fault.

When LED3 is off, LED1 and LED 2 indicate the main control fault code.

When LED3 is on, LED1 and LED 2 indicate the drive control fault code.

When LED3 is flashing, and LED1 and LED 2 are both off, it indicates the compressor is preheating.

Failures display with 5-s intervals. This means the LED is off for 5 s to report the next fault code.

The system protection code display method is the same as the main control fault code.

LED lamps are off when there is no failure, protection, or preheating.

Figure 40: LED lamps

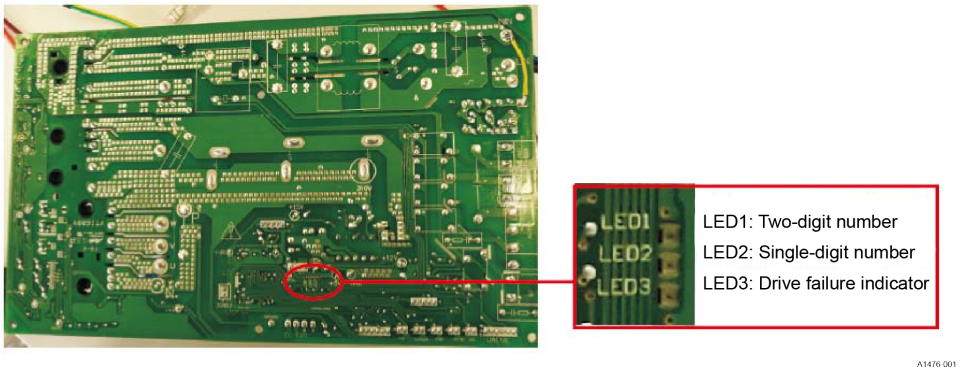


Figure 41: Example - outdoor main control fault 32

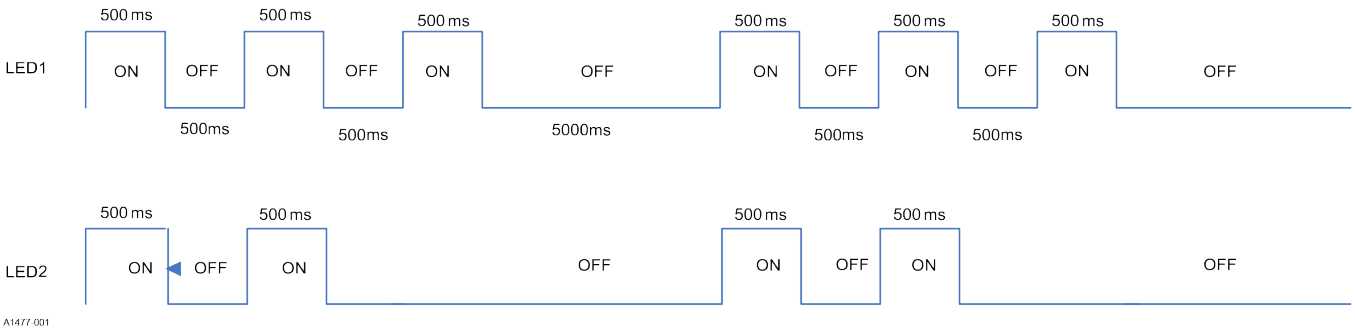


Figure 42: Example - outdoor drive fault 32

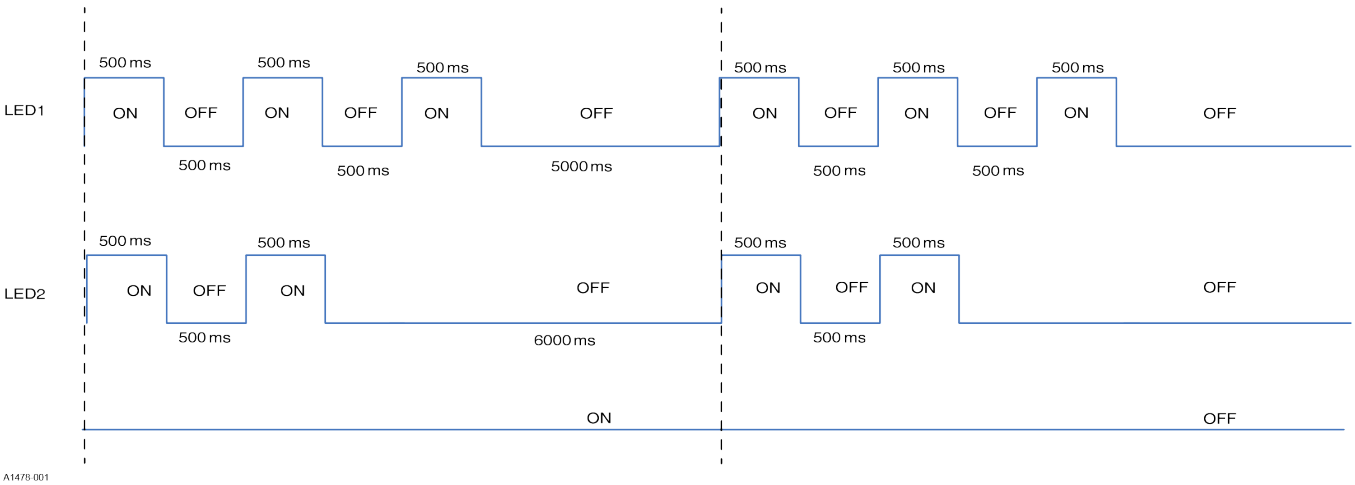
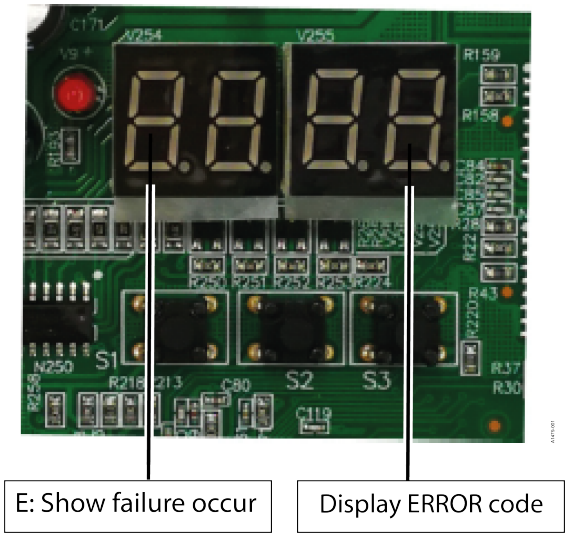
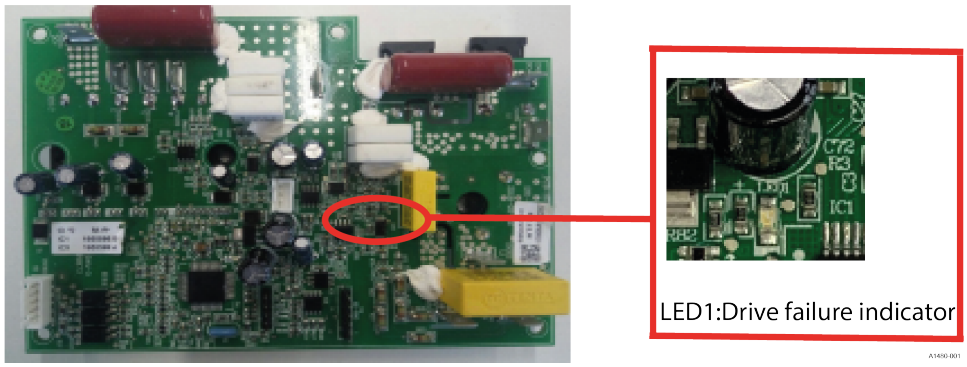


Figure 43: Main control fault display - HMH72B48/ HMH72B60



Note: The fault code is displayed by the 7-segment display on the main control board.

Figure 44: Drive fault code display



Note:

- The lamp of the drive board flashing shows that a failure has occurred.
- The number of times the drive failure lamp flashes shows the failure code.

Start-up sheet

Residential Split 2-Stage Capacity System Unit With Electric Heat Start-Up Sheet

Correct start-up is critical to customer comfort and equipment longevity

Start-Up Date		Company Name		Start-Up Technician	
Dealer Training Certification Number					

Owner Information

Name		Address		Daytime Phone	
City		State or Province		Zip or Postal Code	

Equipment Data

Outdoor Model #		Unit Serial #	
Indoor Coil/Air Handler Model #		Unit Serial #	
Furnace Model #		Unit Serial #	
Thermostat #		Unit Serial #	

General Information (Check all that apply)

○ New Construction	○ Roof level	○ Down flow	○ Horizontal
○ Retrofit	○ Grade level	○ Upflow	

Unit Location and Connections (Check all that apply)

☐ Unit is level and installed on: ☐ Slab ☐ Roof curb ☐ Duct connections are complete: ☐ Supply ☐ Return

☐ Condensate drain correctly connected per the installation instructions ☐ Condensate trap primed with water

Filters

☐ Filters installed Number of filters | Filter size

Electrical Connections & Inspection (Check all that apply)

○ 208 V AC ○ 230 V AC

☐ Inspect wires and electrical connections ☐ Transformer wired correctly for primary supply voltage ☐ Ground connected

☐ Low voltage present at control board "R and C" Measured voltage "R" and "C" outdoor unit control board

☐ Line voltage present at disconnect Measured voltage "L1 to L2"

Total amperes "L1" | "L2"

Air Flow Setup / Cooling

Motor Terminal

Blower Type and Set-Up							
○ ECM	High	○ 1	○ 2	○ 3	○ 4	○ 5
	Low	○ 1	○ 2	○ 3	○ 4	○ 5
	Fan	○ 1	○ 2	○ 3	○ 4	○ 5

Supply static (inches of water column)	Supply air dry bulb temperature	Supply air wet bulb temperature
Return static (inches of water column)	Return air dry bulb temperature	Return air wet bulb temperature
Total external static pressure	Temperature drop	Outside air dry bulb temperature

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Refrigerant Charge and Metering Device

○ R-410A	Suction line temperature	Discharge pressure
Data plate - lb / oz	Suction pressure	Liquid line temperature
Discharge line temperature	Superheat	Subcooling

Electric Heat

Electric heat kit - Model number		Serial number		Rated kW		
Single Phase or Three Phase	Measured Amperage	Heater 1		Heater 2		Heater 3	
		Heater 4		Heater 5		Heater 6	
Number of elements	Measured Voltage	Heater 1		Heater 2		Heater 3	
		Heater 4		Heater 5		Heater 6	
Heating return air dry bulb temperature		Heating supply air dry bulb temperature		Air temperature rise			

Clean Up Job Site

- ☐ Job site has been cleaned, indoor and outdoor debris removed from job site
- ☐ Tools have been removed from unit
- ☐ All panels have been installed

Unit Operation and Cycle Test

- ☐ Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems
- ☐ Operate the unit through cooling cycles from the thermostat, noting and correcting any problems

Owner Education

- ☐ Provide owner with the owner's manual
- ☐ Explain operation of system to equipment owner
- ☐ Explain thermostat use and programming (if applicable) to owner
- ☐ Explain the importance of regular filter replacement and equipment maintenance
- ☐ Explain the importance of registering the unit for warranty.

Comments and Additional Job Details