

Installation Manual: HMCG2 Series - 16 SEER2 Horizontal Discharge Modulating Air Conditioner

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6255353-UIM-B-0822

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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:



Intertek



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 25 ft of field-supplied lines.

① **Note:** A contractor supplied filter/drier must be field-installed at the indoor coil.

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 air conditioner 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	WB cool
Minimum	50 (10)	57 (14)
Maximum	122 (50)	72 (22)

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 50°F (10°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.

Piping considerations

When using more than 25 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

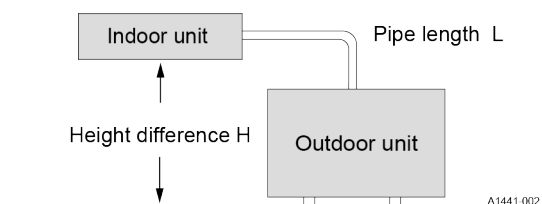


Table 2: Refrigerant piping

Model	Maximum pipe length (L)	Maximum height difference (H)	Additional refrigerant - exceeding 25 ft (7.62 m)
	ft (m)	ft (m)	oz/ft (g/m)
HMCG22B24	131 (40)	98 (30)	0.38 (11)
HMCG22B36			
HMCG22B48	164 (50)		
HMCG22B60			

Liquid-line filter drier

This unit requires a liquid line filter drier installed externally to the unit.

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.

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

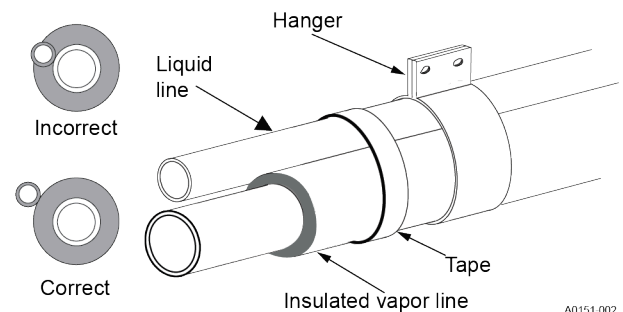
Never install a suction-line filter drier in the liquid line of an R-410A system. Failure to follow this warning can cause a fire, injury, or death.

Precautions for line installation

Adhere to the following during line installation:

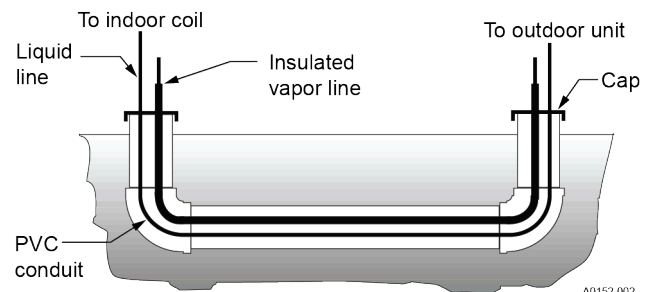
- Connect the outdoor unit to the indoor coil using field supplied refrigerant grade (ACR) copper tubing that is internally clean and dry. Units must only be installed with the tubing sizes for approved system combinations as specified in the *Tabular Data Sheet*. The charge given is applicable for total tubing lengths up to 25 ft (7.62 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 3/8 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 25 ft of lineset. Additional refrigerant per foot of additional lineset is 0.38 oz for all 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.

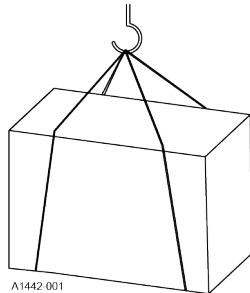
Unit installation

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

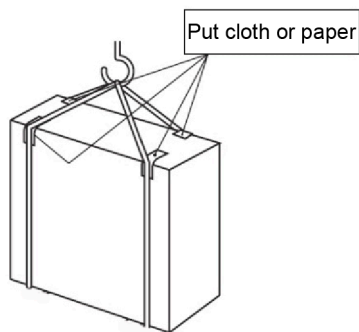
1. Route two lifting slings under the unit as shown in Figure 4. If there are no packaging materials, protect the unit with cloth or paper. See Figure 5.

Figure 4: Handling with packaging



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Figure 5: Handling without packaging



A1443-002

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

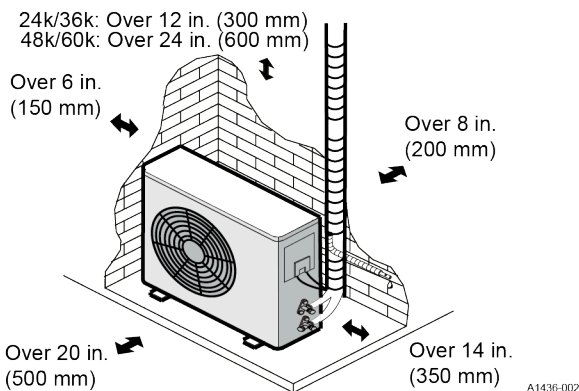
Ensure to mount the outdoor unit on a solid base that is sloped to shed water, secure from settlement, and isolated from the structural foundation or walls to prevent sound and vibration transmission into the living space.

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 two mounting brackets and is best served by a properly engineered solution.

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

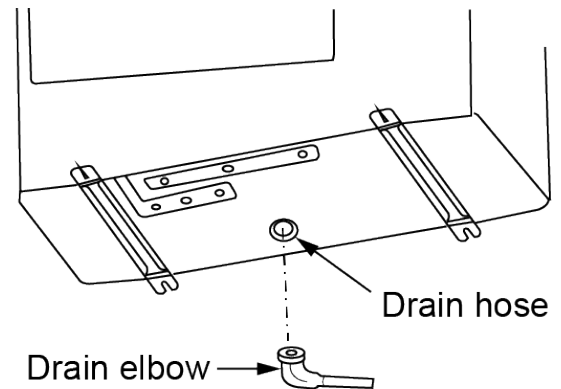
About this task:

Condensate water may drain from the outdoor unit. 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



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NOTICE

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)
HMCG22B241S	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)
HMCG22B361S	35 3/8 (900)	13 3/8 (340)	23 15/16 (608)	14 1/2 (368)	15 11/16 (398)	5 3/4 (146)	4 3/8—3/4 (10—20)
HMCG22B481S	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)
HMCG22B601S	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

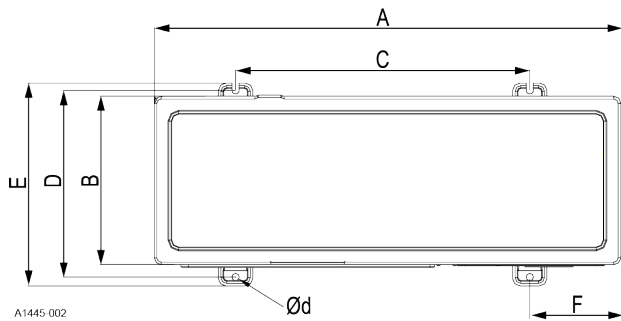
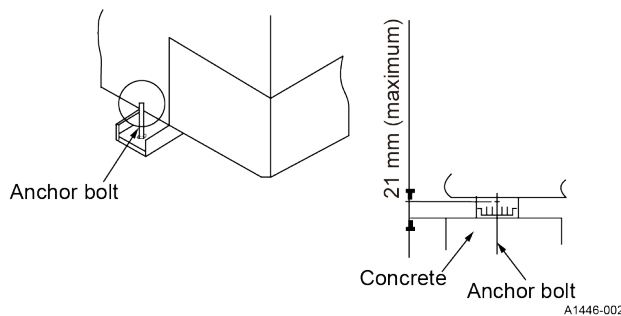
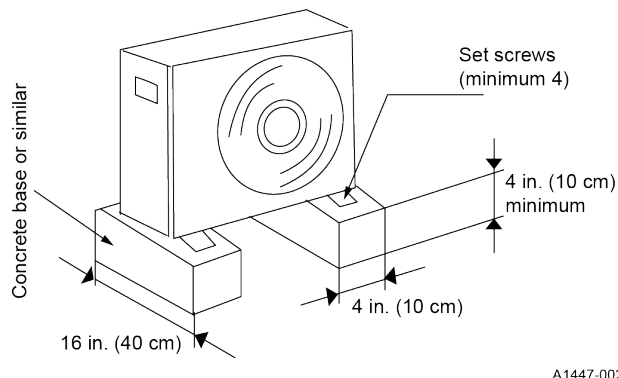


Figure 9: Securing the unit



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

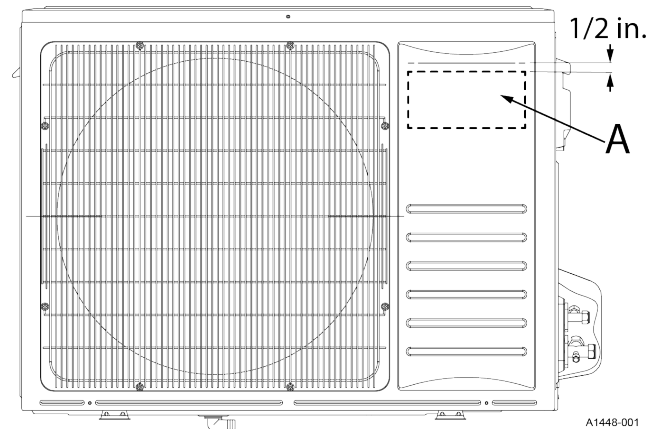
Figure 10: Concrete base



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.

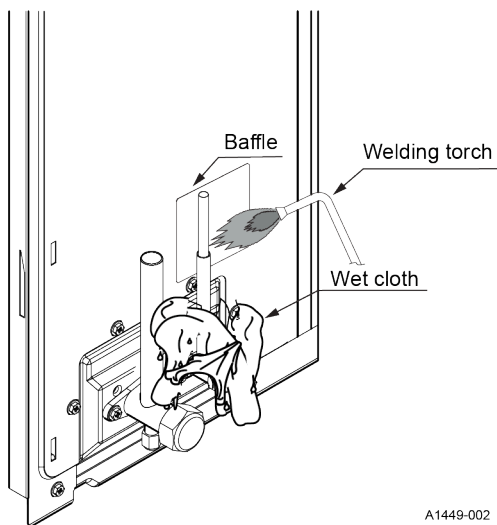
Precautions for brazing of the service valve

- 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 conventional 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

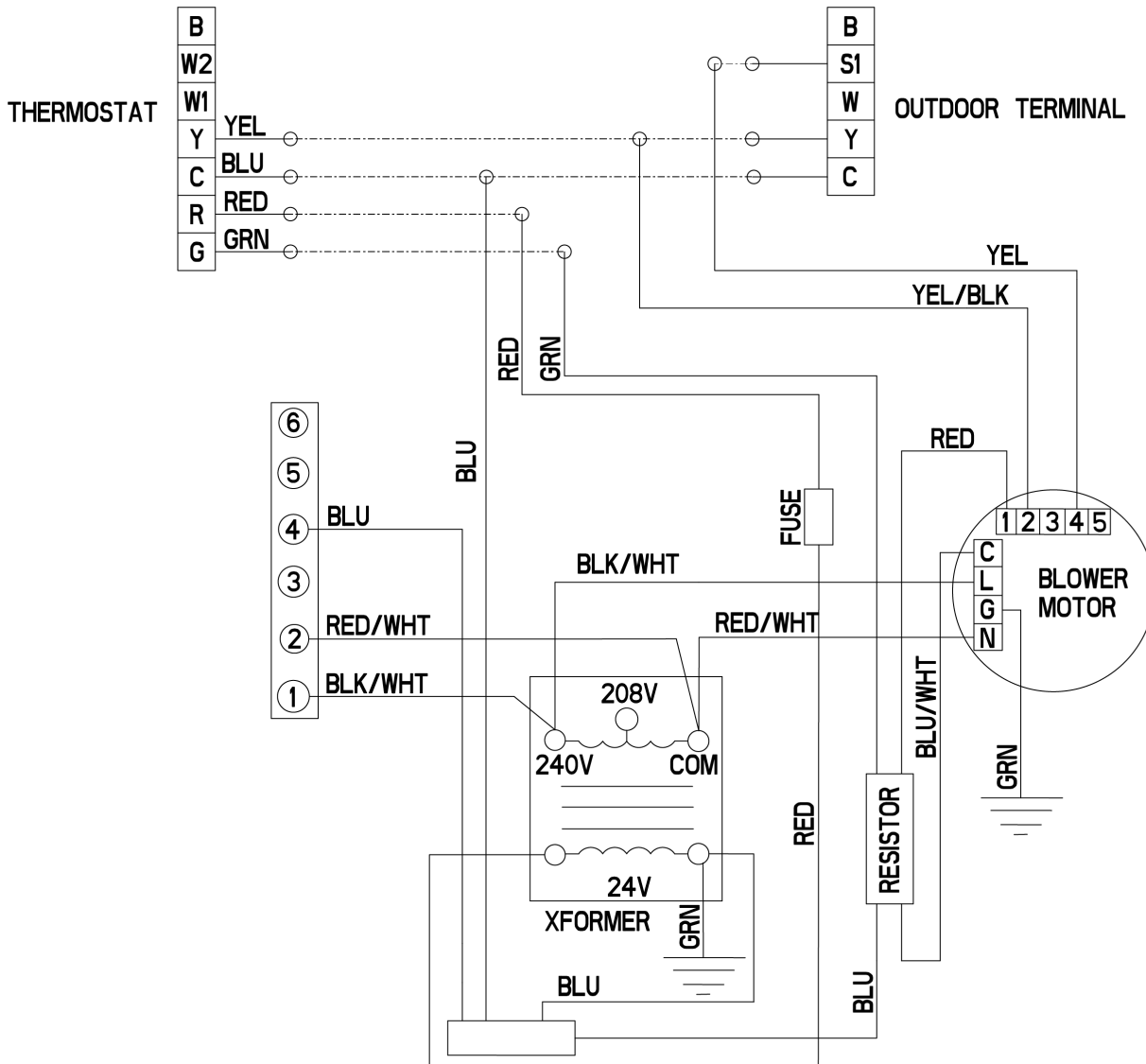
Screw	Minimum [lb-ft (N·m)]	Maximum [lb-ft (N·m)]
M4	0.7 (1.0)	1.0 (1.3)
M5	1.5 (2.0)	1.8 (2.5)
M6	3.0 (4.0)	3.7 (5.0)
M8	6.6 (9.0)	8.1 (11.0)
M10	13.3 (18.0)	21.7 (23.0)

-  **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 M Ω , by measuring the resistance between the ground and the terminal of the electrical parts. If the electrical resistance is not more than 2 M Ω , do not operate the system until the electrical leakage is found and repaired.

Figure 13: Wiring diagram - HMC2 ACC STD ECM

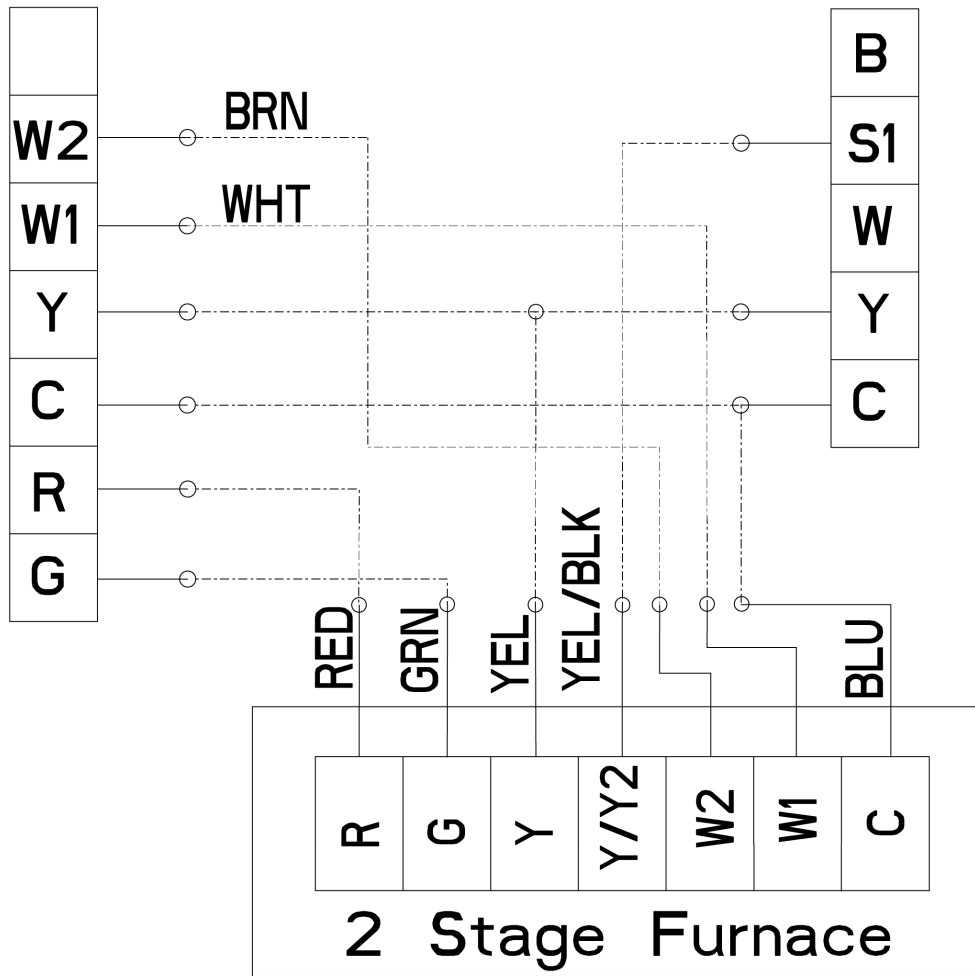


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Figure 14: HMGC2 ACC VS ECM

Room Thermostat

Air Conditioner



A1824-001

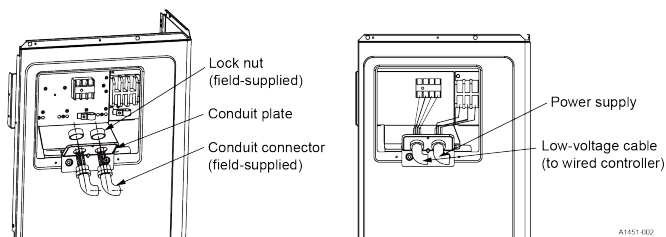
Connecting HMCG22B24 and HMCG22B36 wiring

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: HMCG22B24 and HMCG22B36 wiring



Connecting HMCG22B48 and HMCG22B60 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: HMCG22B48 and HMCG22B60 wiring (1)

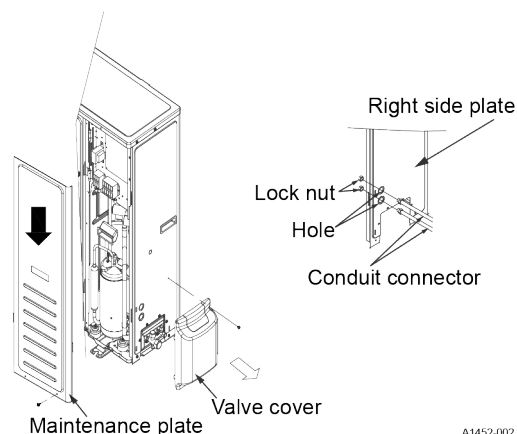


Figure 17: HMCG22B48 and HMCG22B60 wiring (2)

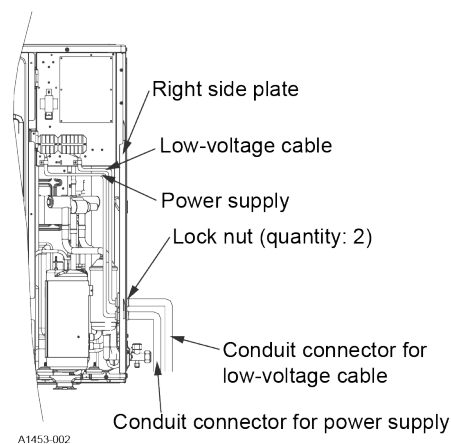
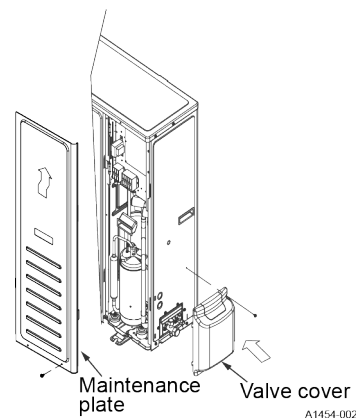


Figure 18: HMCG22B48 and HMCG22B60 wiring (3)



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)
HMCG22B24	208/230 V~ /60 Hz	25	30	3 x 12 AWG	3 x 18 AWG	25
HMCG22B36	208/230 V~ /60 Hz	35	30	3 x 10 AWG	3 x 18 AWG	35
HMCG22B48, HMCG22B60	208/230 V~ /60 Hz	50	30	3 x 8 AWG	3 x 18 AWG	50

*where required by code


① Note: Maximum running current (A): refer to the nameplate.

① 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.

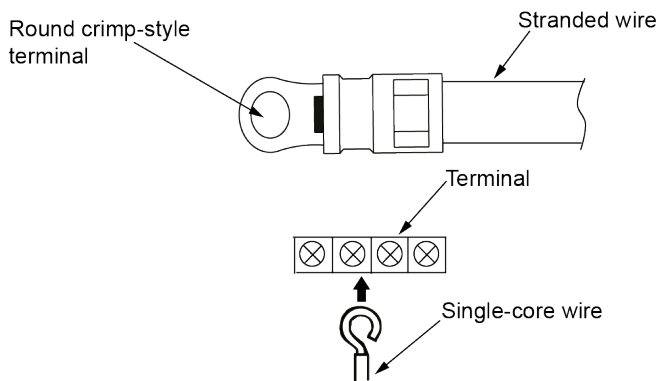
 **NOTICE**

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

 **CAUTION**


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

Figure 19: Connecting the power supply



A1455-002

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).

Performing a test run

About this task:

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

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.

⚠ 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: Outdoor unit - HMC22B24 and HMC22B36

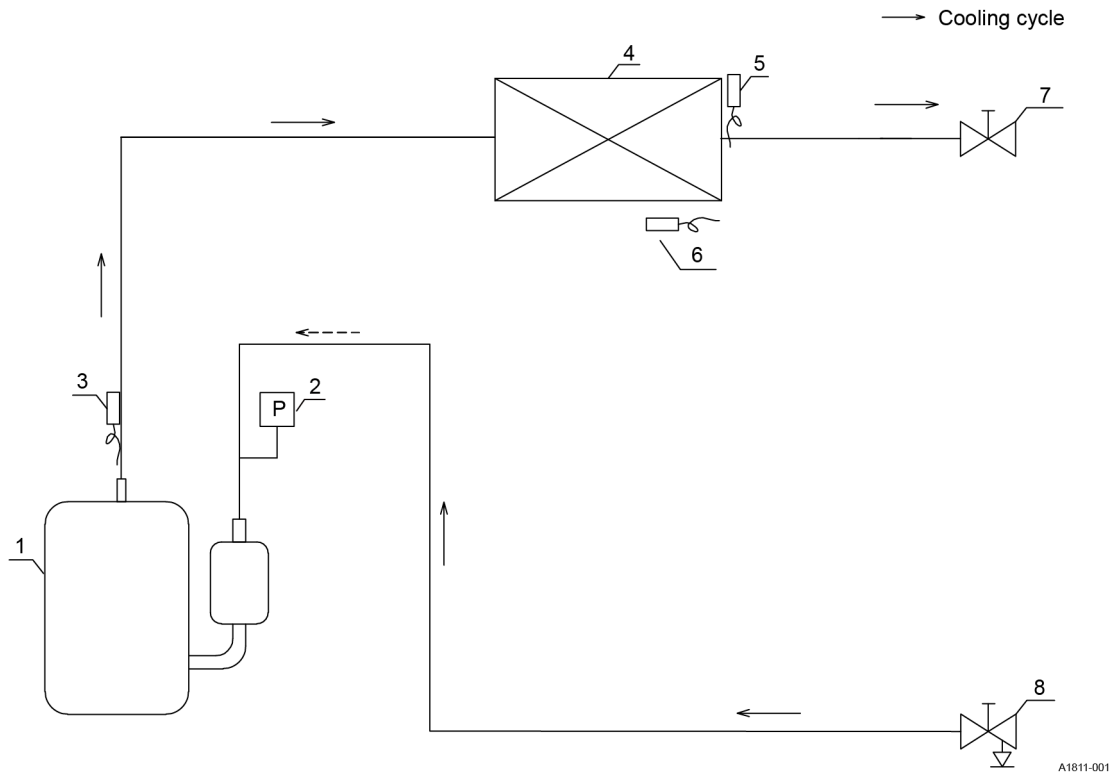


Table 6: List of components

No.	Description	No.	Description
1	Compressor	5	Coil temperature sensor
2	Pressure sensor	6	Ambient temperature sensor
3	Discharge temperature sensor	7	Stop valve (liquid)
4	Outdoor heat exchanger	8	Stop valve (vapor)

Figure 21: Outdoor unit - HMC22B48 and HMC22B60

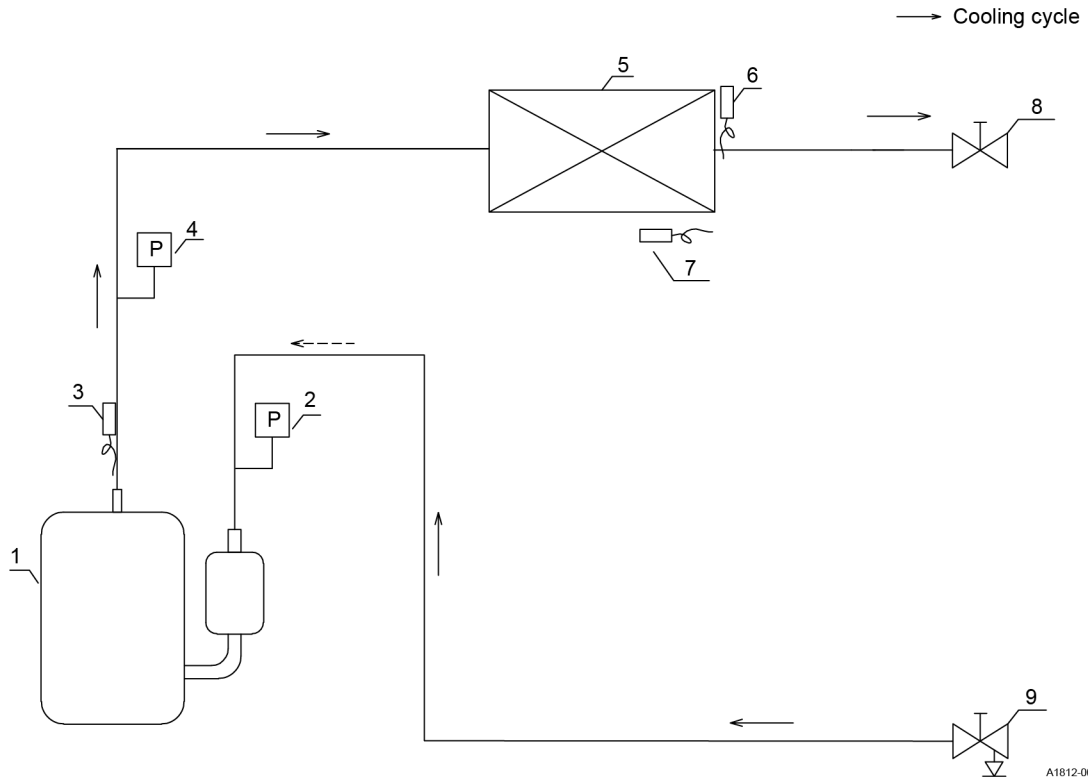


Table 7: List of components

No.	Description	No.	Description
1	Compressor	6	Coil temperature sensor
2	Pressure sensor	7	Ambient temperature sensor
3	Discharge temperature sensor	8	Stop valve (liquid)
4	High pressure switch	9	Stop valve (vapor)
5	Outdoor heat exchanger		

Wiring diagrams



WARNING

High voltage

The outdoor power supply must be disconnected before maintenance. After disconnecting the power supply, wait for the LED power indicator on the outdoor control board to turn off before performing electrical work.

Figure 22: HMC22B24 and HMC22B36 electrical wiring diagram

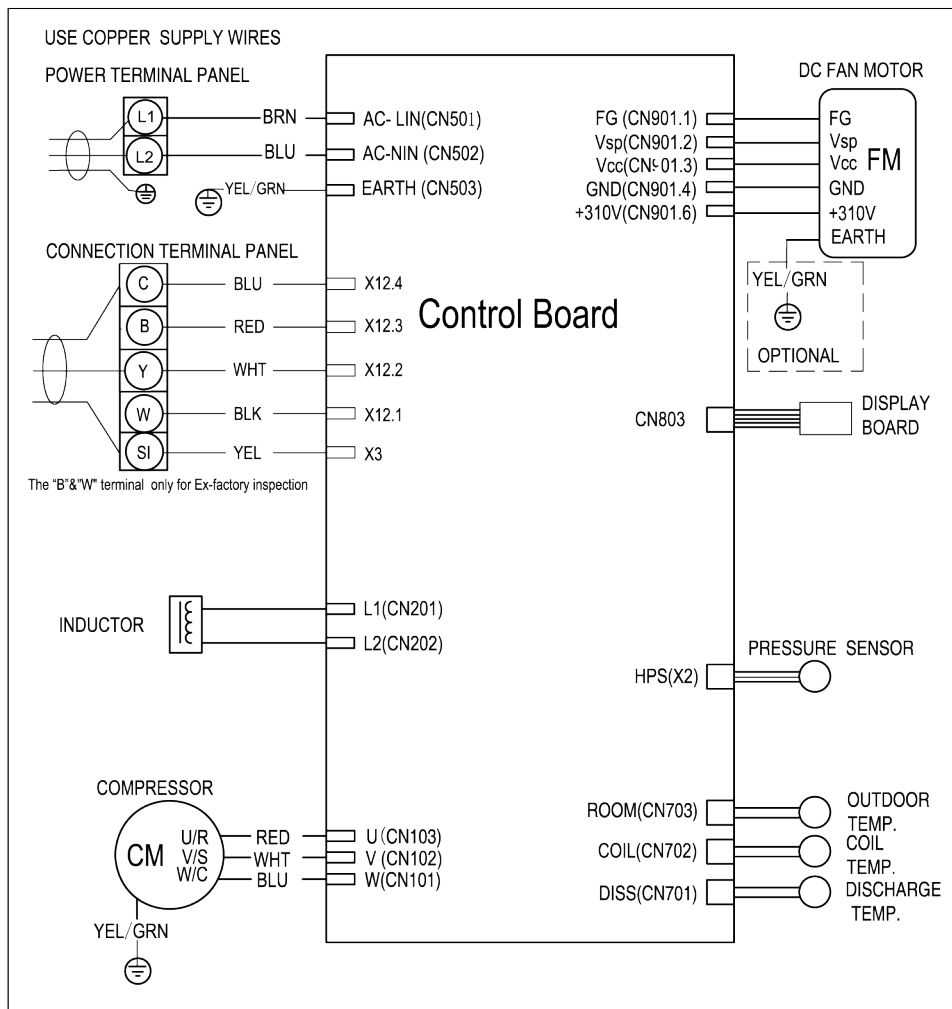
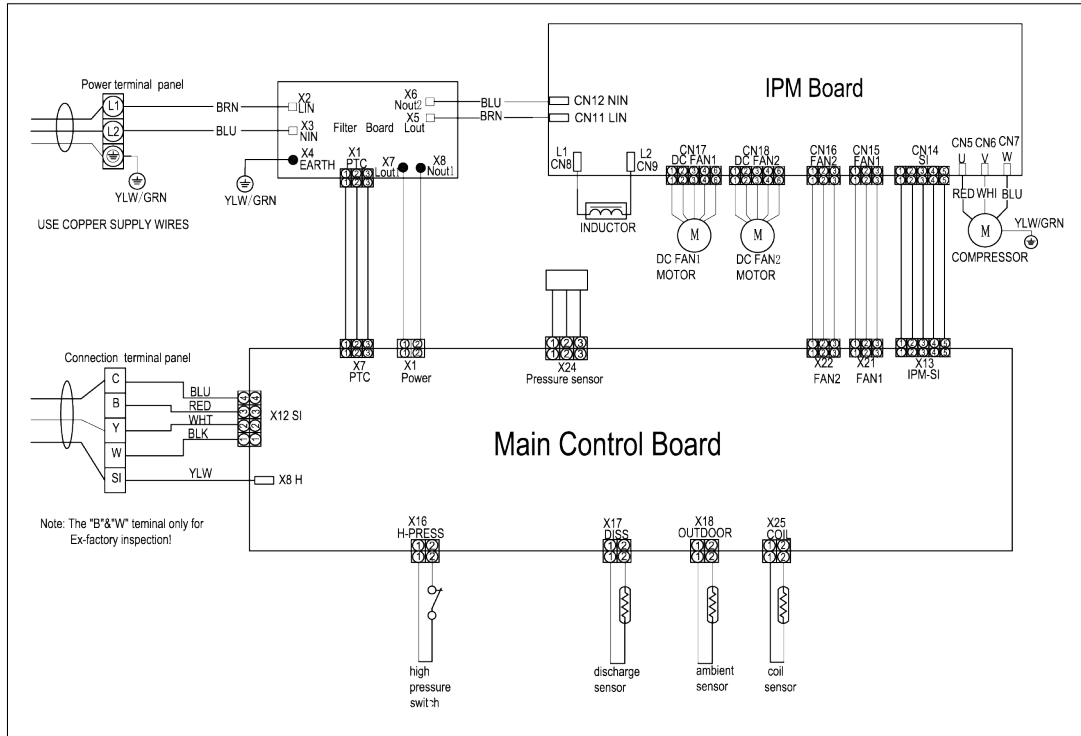


Figure 23: HMG22B48 and HMG22B60 electrical wiring diagram

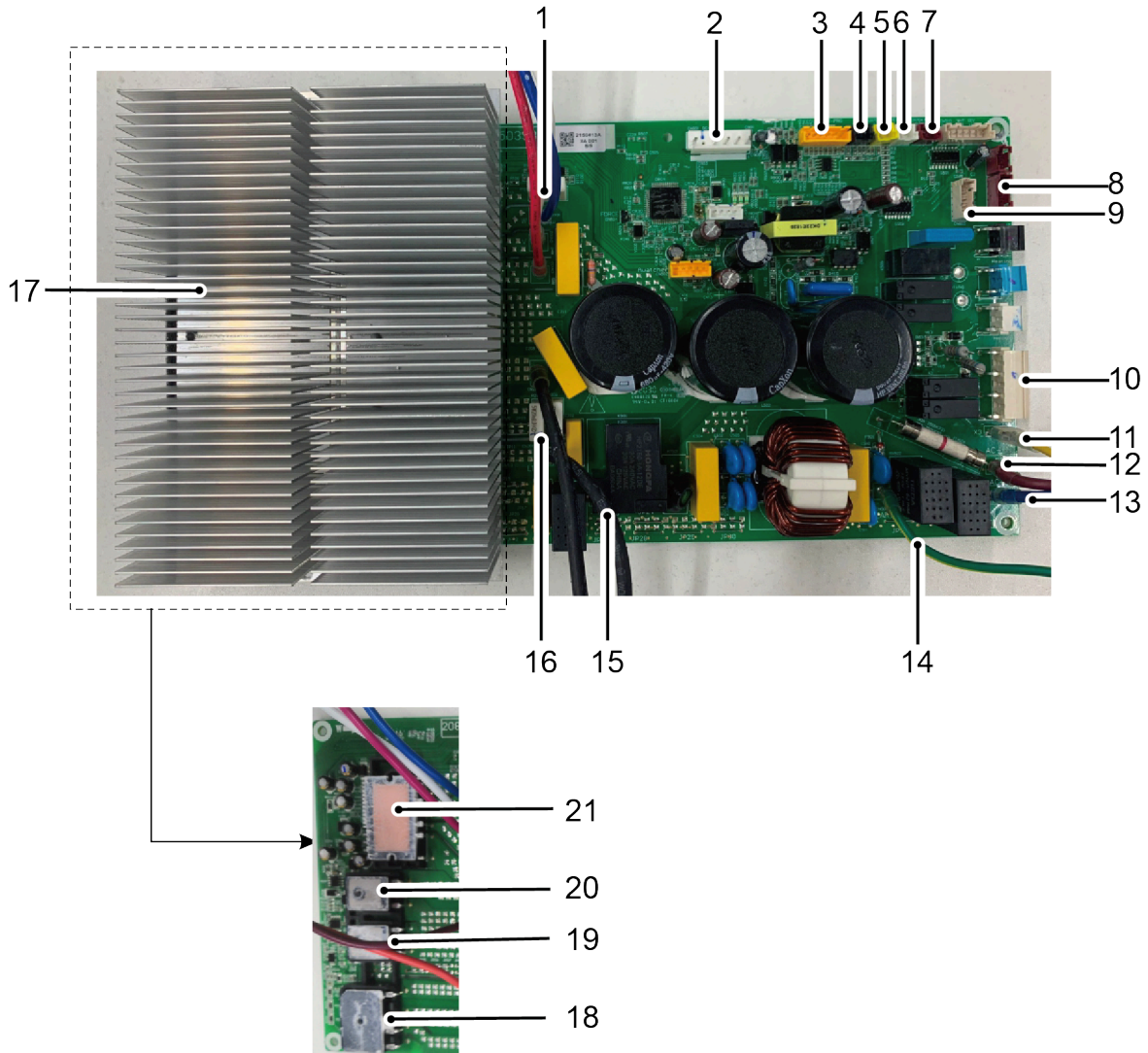


A1814-001

For DIP switch settings, see [Setting the DIP switch of the outdoor unit.](#)

Control board

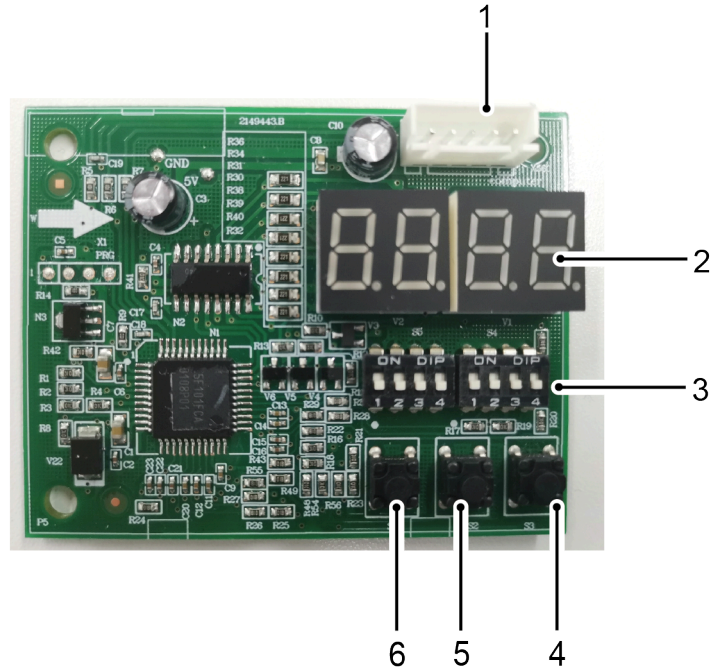
Figure 24: Main control board - HMCG22B24 and HMCG22B36



A1816-001

No.	Description	No.	Description
1	Compressor	12	AC power L in
2	DC fan	13	AC power N in
3	EE	14	GND
4	Coil temperature sensor	15	Reactor L2
5	Ambient temperature sensor	16	Reactor L1
6	Discharge temperature sensor	17	Radiator
7	Overheat protector	18	Rectifier bridge
8	SW	19	IGBT
9	Computer checker / 7 segment display board	20	Diode
10	Communication signal	21	IPM
11	SI		—

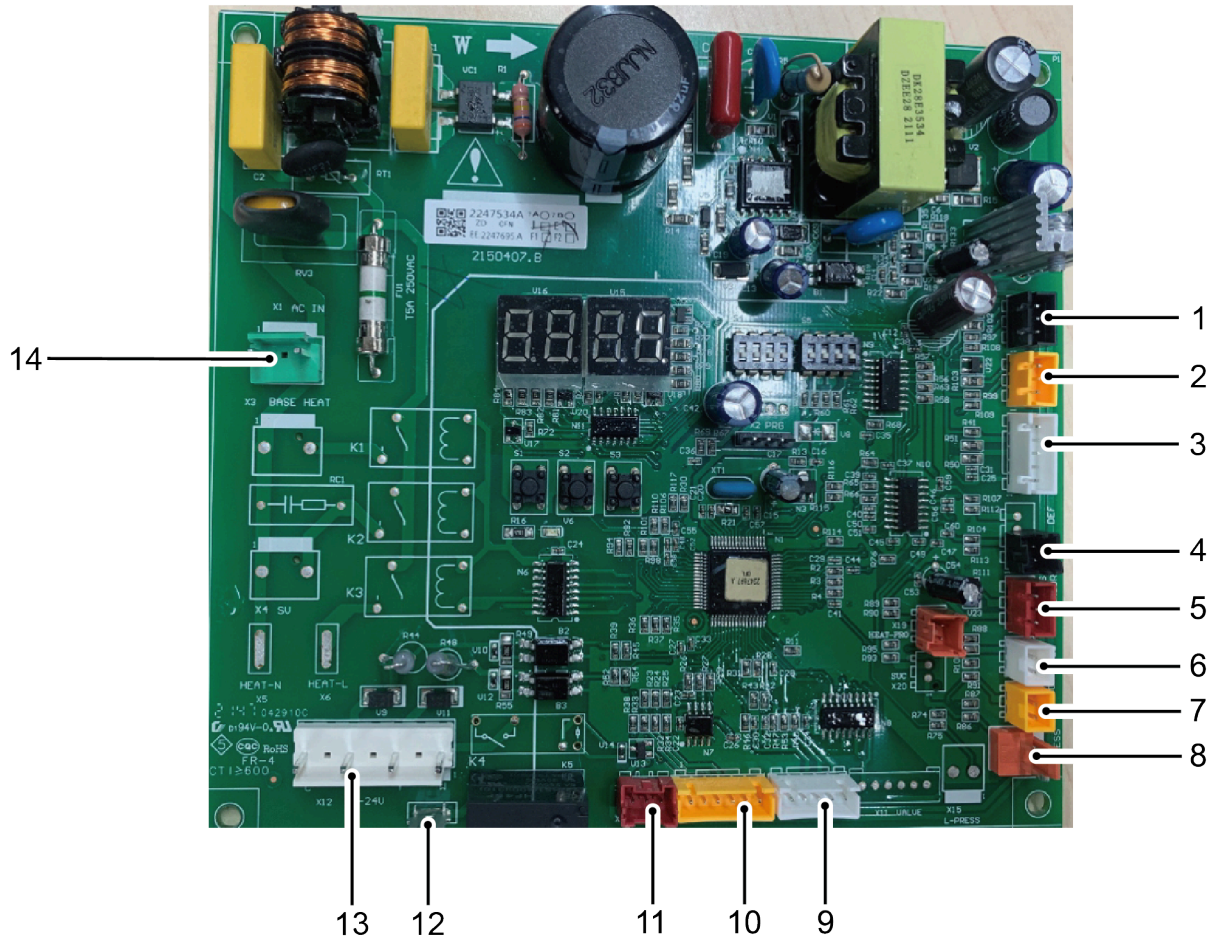
Figure 25: 7-segment display board - HMC22B24 and HMC22B36



A1817-001

No.	Description	No.	Description
1	To outdoor control board	4	S3-decrease button
2	7-segment display	5	S2-increase button
3	DIP switch	6	S1-select button

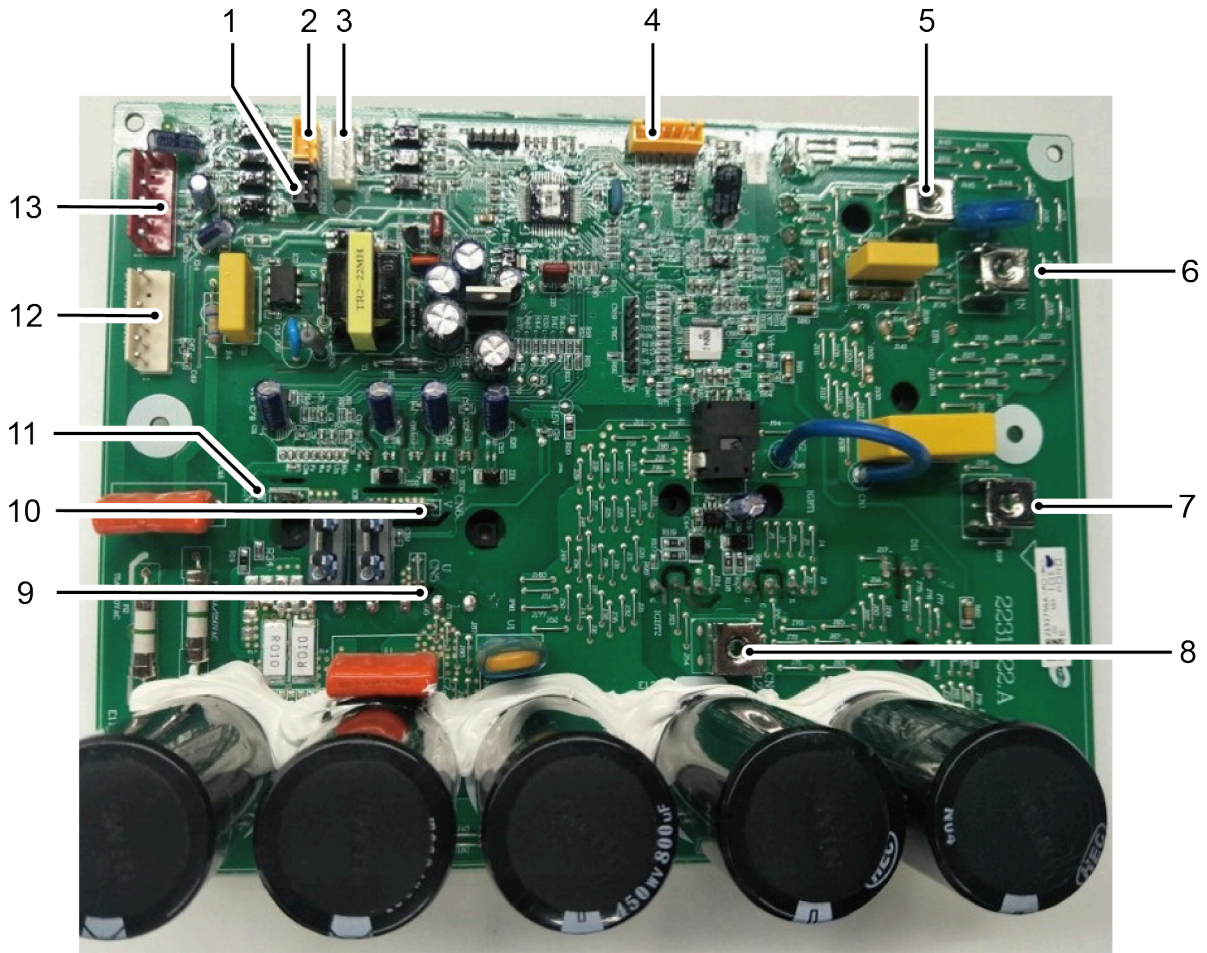
Figure 26: Main control board - HMC22B48 and HMC22B60



A1818-001

No.	Description	No.	Description
1	DC fan Driver1	8	High pressure switch
2	DC fan Driver2	9	Checker
3	IPM-SI	10	EEPROM
4	Coil temperature sensor	11	PTC control signal
5	Pressure sensor	12	SI signal
6	Discharge temperature sensor	13	Communication signal
7	Ambient temperature sensor	14	AC power

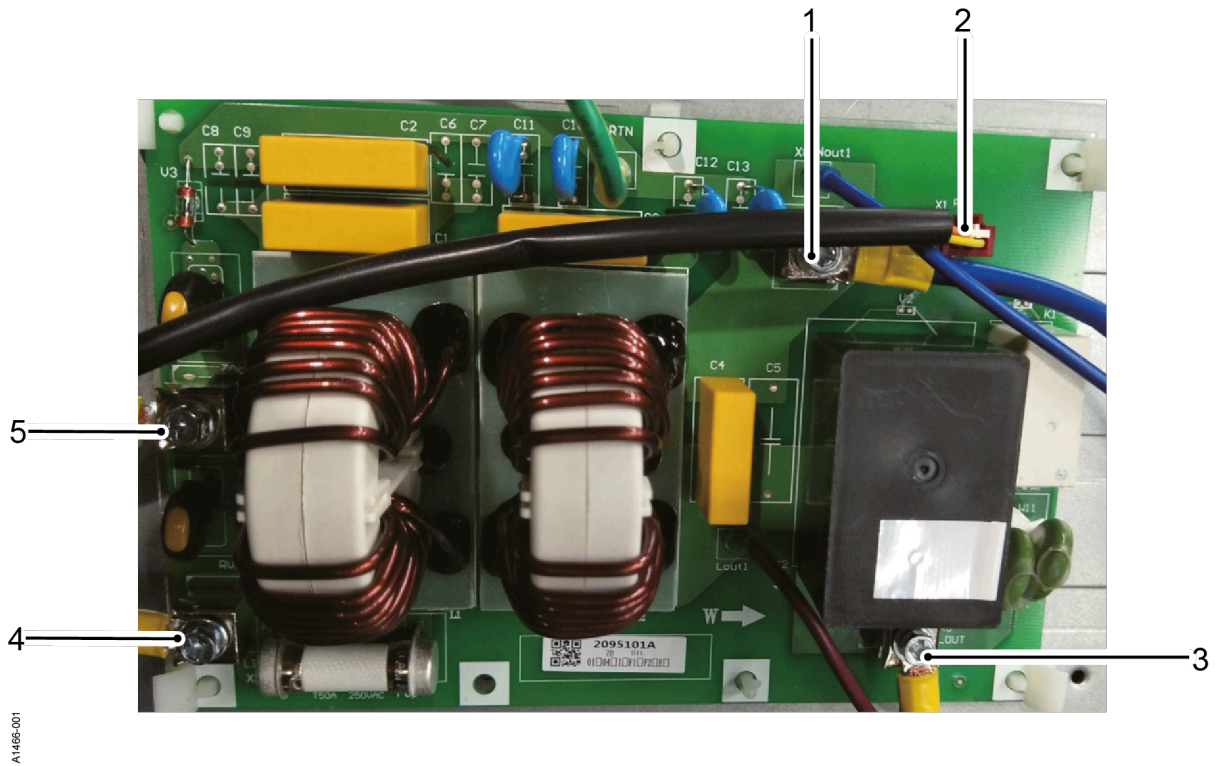
Figure 27: Drive board



A1819 001

No.	Description	No.	Description
1	DC fan signal	8	Reactor L2
2	DC fan signal	9	Compressor U
3	IPM-SI	10	Compressor V
4	EEPROM	11	Compressor W
5	N in	12	DC fan 1
6	L in	13	DC fan 2
7	Reactor L1		—

Figure 28: Filter board



A1486-001

No.	Description	No.	Description
1	N out	4	L in
2	PTC control signal	5	N in
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 Table 8.

Note: DIP switch setting is optional.

Table 8: Dip switch setting

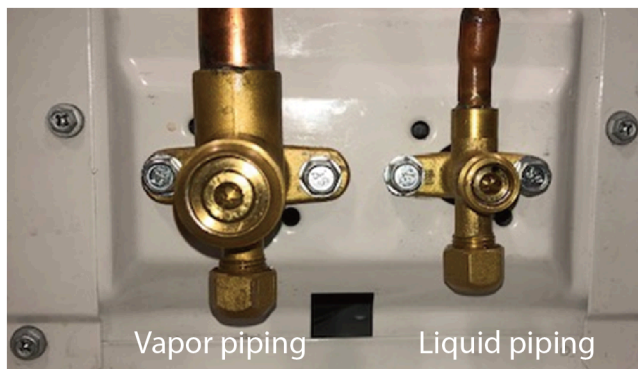
Serial number	Dip switch	Function	Remark
1	SW4-1	—	—
2	SW4-2	Refrigerant recovery	On: active Off: inactive
3	SW4-3	—	—
4	SW4-4	—	—
5	SW5-1	Energy management	On: active Off: inactive
6	SW5-2	—	—
7	SW5-3	SI control	On: old control Off: new control
8	SW5-4	—	—

Activating pump down mode

The compressor runs with a target frequency and without any protection when the frequency rises. 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 29.

Figure 29: 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 Table 8.
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 29.
8. Remove line voltage power from the outdoor section.

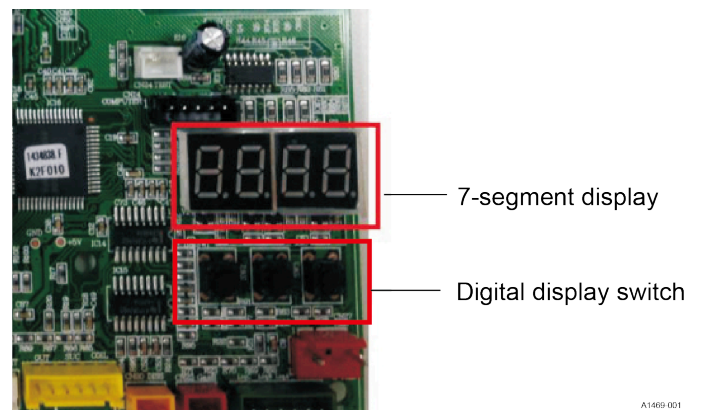
Note: Make sure to switch back the dip switch setting after the refrigerant recovery operation. If not, the unit enters the refrigerant recovery mode again after powering on.

i 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.

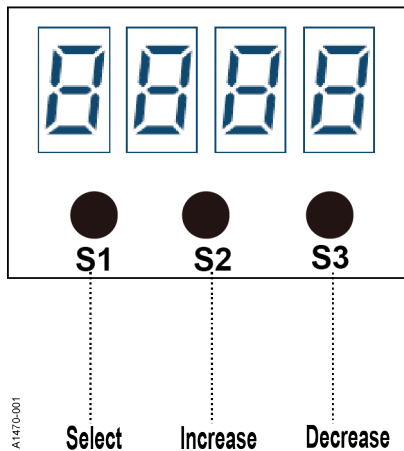
Running a parameter query

Figure 30: 7-segment display query



A1469-001

Figure 31: 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.

① **Note:** Selecting the parameter code for 3 s automatically displays the parameter content.

Table 9: Parameters - HMC22B24/HMCG22B36

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
P.7	Outdoor ambient temperature
P.8	Outdoor coil 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
P.21	Target exhaust overheating

Table 10: Parameters - HMC22B48/HMCG22B60

Parameter code	Description
0	Protection code or fault code
P.1	Compressor target frequency

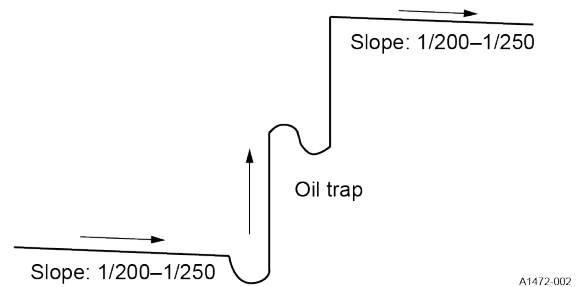
Table 10: Parameters - HMC22B48/HMCG22B60

Parameter code	Description
P.2	Compressor driving frequency
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.24	Discharge temperature
H.1	DSH actual value
H.2	DSH target value
H.3	Target pressure in cooling mode [Actual pressure (= the displayed value/100)]
H.4	Target pressure in heating mode [Actual pressure (= the displayed value/100)]
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 32: Oil trap



① **Note:**

1. To avoid storing too much oil in the oil trap and to ensure better cooling 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.
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.
6. **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.
7. **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 11: Outdoor compressor discharge temperature sensor

T [°C]	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 12: Outdoor ambient and coil temperature sensor

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 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:

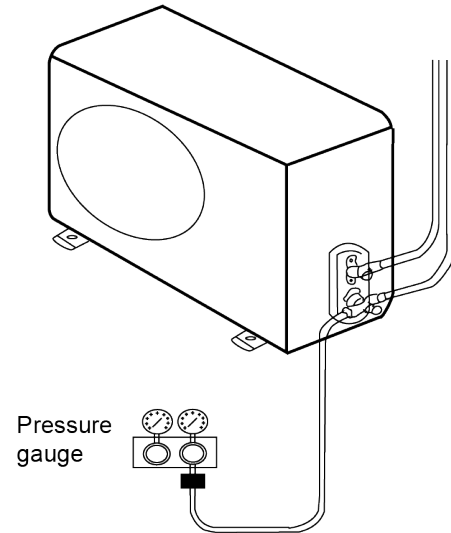
- The compressor is running.
- The outdoor section is installed in a well-ventilated area.

Tool

Pressure gauge:

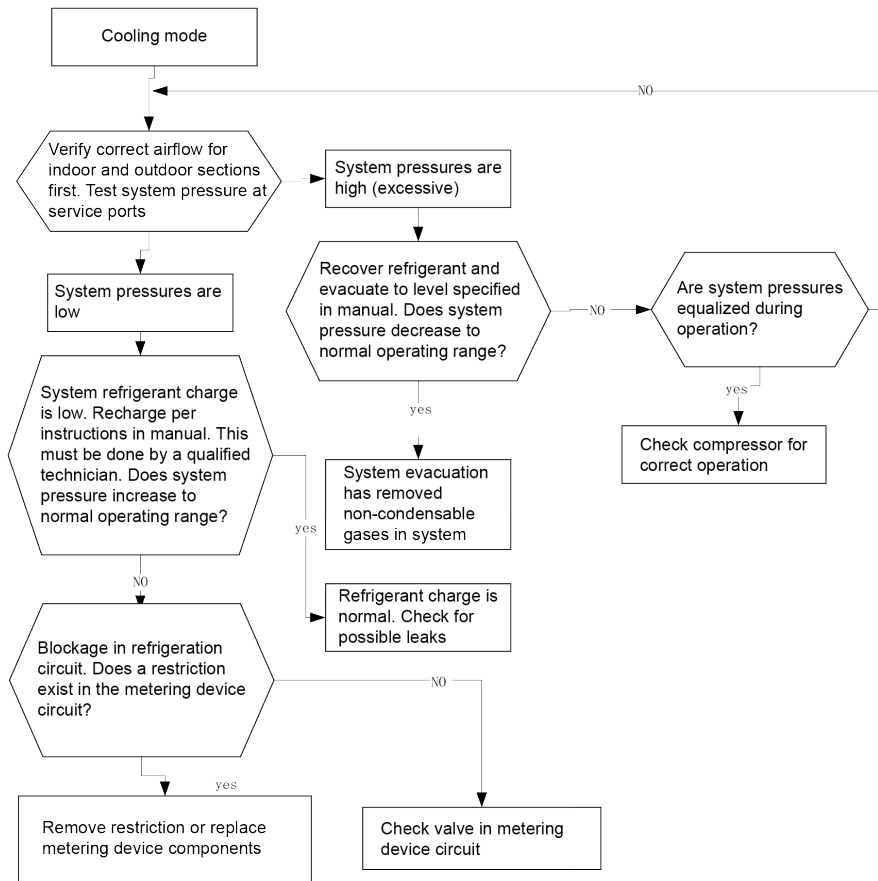
- See: Tube defrost
- Feel: The difference between the tube's temperature
- Test: Test pressure

Figure 33: Refrigerant system



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Figure 34: Cooling mode flow chart



A1620-001

Fault codes

Table 13: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
1	Outdoor ambient temperature sensor fault	<ol style="list-style-type: none"> 1. The outdoor ambient temperature sensor has a poor connection. 2. The outdoor ambient temperature sensor has failed. 3. The sampling circuit has failed. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. The outdoor coil temperature sensor has a poor connection. 2. The outdoor coil temperature sensor has failed. 3. Sensor circuit failure. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Replace the electrical control board components. 2. Normal protection. 3. Replace the compressor. 4. See Table 14. 	
4	EEprom data error	<ol style="list-style-type: none"> 1. EE components fails. 2. EE components control circuit fails. 3. EE components are inserted incorrectly. 	<ol style="list-style-type: none"> 1. Replace the board. 2. Replace the outdoor control board components. 3. Reset the EE components. 	

Table 13: 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)	<ol style="list-style-type: none"> 1. Indoor unit airflow restriction. 2. The room temperature is too low in cooling 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. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	
13	Compressor overheat protector device	<ol style="list-style-type: none"> 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 valve failure. 6. Outdoor control board failure. 	<ol style="list-style-type: none"> 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. 	

Table 13: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
14	The high-pressure switch operation or unit is turned off for high-pressure protection	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Reconnect the wiring of the high-pressure switch. 2. Replace the high-pressure switch. 3. Replace the outdoor control board. 4. See Table 14. 	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	<ol style="list-style-type: none"> 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 outdoor control board is abnormal. 	<ol style="list-style-type: none"> 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 outdoor control board. 	Applies to models with low-pressure switch or pressure sensor.
16	Overload protection in cooling mode	System overload	See Table 14.	
17	Discharge temperature sensor fault	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Reconnect the wiring of the discharge temperature sensor. 2. Replace the discharge temperature sensor. 3. Replace the outdoor control board. 	
18	AC voltage is abnormal	<ol style="list-style-type: none"> 1. The AC voltage is >275 V or <160 V. 2. The AC voltage of the sampling circuit on the drive board is abnormal. 	<ol style="list-style-type: none"> 1. Normal protection, check the supply power. 2. Replace the drive board. 	
19	Suction temperature sensor fault	<ol style="list-style-type: none"> 1. The wiring of the suction temperature sensor has a poor connection. 2. The suction temperature sensor has failed. 3. Sensor circuit failure. 	<ol style="list-style-type: none"> 1. Reconnect the suction pressure sensor wiring. 2. Replace the suction pressure sensor. 3. Replace the outdoor control board. 	

Table 13: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
43	High-pressure sensor fault	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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 15 and Table 16 for drive fault codes.	
46	IPM and control board communication fault	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	
47	Excessive discharge temperature fault	<ol style="list-style-type: none"> 1. Low refrigerant charge. 2. Low charge due to extended lineset. 3. Metering system failure. 4. Excessive outdoor ambient temperature. 	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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 13: Outdoor unit fault codes

Fault code	Fault description	Possible reasons for fault	Resolution	Comments
49	Outdoor DC fan motor fault (lower fan motor)	<ol style="list-style-type: none"> The DC fan motor connection is poor. The wiring to the DC fan motor has failed. The DC fan motor has failed. The drive circuit of the lower DC fan motor has failed. Outdoor airflow blockage. 	<ol style="list-style-type: none"> Replace the DC fan motor wiring. Replace the DC fan motor. Replace the DC fan motor. Replace the drive board of the fan motor. Resolve the outdoor unit airflow restriction. 	
91	Unit stops due to IPM board overheating fault	<ol style="list-style-type: none"> The outdoor ambient temperature is too high. The speed of the outdoor fan motor is too low. The outdoor unit is not installed in accordance with the installation instructions. The supply power is too low. 	<ol style="list-style-type: none"> Normal protection. Check the fan motor and replace if necessary. Reinstall the outdoor unit in accordance with the installation instructions. Normal protection. 	
96	Low charge	Inadequate system charge	Recover the refrigerant and charge the refrigerant. Refer to the <i>Tabular Data Sheet</i> .	

① 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 14: 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 15: Drive fault code - 24k/36k

Fault code	Fault description	Possible reasons for fault	Resolution
1	Inverter DC voltage overload fault	<ol style="list-style-type: none"> The power supply input is too high or too low. Drive board fault. 	<ol style="list-style-type: none"> Check the power supply. Change the drive board.
2	Inverter DC low-voltage fault		
3	Inverter AC current overload fault		
4	Out-of-step detection	<ol style="list-style-type: none"> Compressor phase lost. Bad drive board components. Compressor insulation fault. 	<ol style="list-style-type: none"> Check the compressor wire connection. Change the drive board. Change the compressor.
5	Loss phase detection fault (speed pulsation)		
6	Loss phase detection fault (current imbalance)		
7	Inverter IPM fault (edge)	<ol style="list-style-type: none"> System overload or current overload. Drive board fault. Compressor oil shortage, serious wear of crankshaft. Compressor insulation fault. 	<ol style="list-style-type: none"> Check the system. Change the drive board. Change the compressor. 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	<ol style="list-style-type: none"> The power supply is not stable. Instantaneous power off. Drive board failure. 	<ol style="list-style-type: none"> Check the power supply. N/A Change the drive board.
12	PFC overload current detection of failure	<ol style="list-style-type: none"> System overload, current is too high. Drive board fails. PFC fails. 	<ol style="list-style-type: none"> Check the system. Change the drive board. Change the PFC.
13	DC voltage detected abnormal	<ol style="list-style-type: none"> The input voltage is too high or too low. Drive board fails. 	<ol style="list-style-type: none"> Check the power supply. 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 failure		
20	Temperature abnormal		
21	Shunt resistance unbalance adjustment fault		
22	Communication failure	<ol style="list-style-type: none"> Communication wire connection is poor. Drive board fails. Control board fails. 	<ol style="list-style-type: none"> Check the wiring. Change the drive board. Change the control board.
23	Incorrect motor parameters	Initialization is abnormal.	Reset the power supply.
26	DC voltage mutation error	<ol style="list-style-type: none"> The power input changes suddenly. Drive board fails. 	<ol style="list-style-type: none"> Check the power supply to provide stable power supply. Change the drive board.

Table 15: Drive fault code - 24k/36k

Fault code	Fault description	Possible reasons for fault	Resolution
27	D axis current control error	<ol style="list-style-type: none"> 1. System overload, phase current is too high. 2. Drive board fails. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. System overloads, phase current is too high. 2. Drive board fails. 	<ol style="list-style-type: none"> 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.
29	Saturation error of D axis current control integral	<ol style="list-style-type: none"> 1. Momentary system overload. 2. The compressor parameter is not suitable. 3. Drive board fails. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Momentary system overload. 2. The compressor parameter is not suitable. 3. Drive board fails. 	<ol style="list-style-type: none"> 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.	<ol style="list-style-type: none"> 1. Change the EEPROM. 2. Change the drive board.

Table 16: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
1	Q axis current detection, failure in drive control	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Compressor voltage default phase. 2. Bad drive board components. 3. The compressor insulation has failed. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Bad drive board components. 2. Compressor shaft clamping. 3. The compressor insulation has failed. 	<ol style="list-style-type: none"> 1. Change the drive board. 2. Change the compressor. 3. Change the compressor.

Table 16: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
5	IPM FO output fault	<ol style="list-style-type: none"> 1. System overload or current overload. 2. Drive board fails. 3. Compressor oil shortage, serious wear of crankshaft. 4. The compressor insulation has failed. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Communication wire connection is poor. 2. Drive board fault. 3. Control board fault. 	<ol style="list-style-type: none"> 1. Check the wiring. 2. Change the drive board. 3. Change the control board.
7	AC voltage, overload voltage	<ol style="list-style-type: none"> 1. The supply voltage input is too high or too low. 2. Drive board fails. 	<ol style="list-style-type: none"> 1. Check the power supply. 2. Change the drive board.
8	DC voltage, overload voltage	<ol style="list-style-type: none"> 1. The supply voltage input is too high. 2. Drive board fault. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Power supply abnormal, power frequency out of range. 2. Drive board fails. 	<ol style="list-style-type: none"> 1. Check the system. 2. Change the drive board.
12	Products of single-phase PFC overcurrent, FO output low level	<ol style="list-style-type: none"> 1. System overload, current is too large. 2. Drive board fault. 3. PFC fault. 	<ol style="list-style-type: none"> 1. Check the system. 2. Change the drive board. 3. Change PFC.
	Inverter overcurrent (3-phase power supply outdoor sections)	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Check the system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.
13	Inverter overcurrent	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Check the system. 2. Change the drive board. 3. Change the compressor. 4. Change the compressor.

Table 16: Drive fault code - 48k/60k

Fault code	Fault description	Possible reasons for fault	Resolution
14	PFC overcurrent (single-phase outdoor section)	<ol style="list-style-type: none"> 1. System overload, current is too large. 2. Drive board fault. 3. PFC fault. 	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 1. 3-phase voltage imbalance. 2. 3-phase power supply phase lost. 3. The power supply wiring is incorrect. 4. Drive board fault. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. The power supply is not stable. 2. Instantaneous power failure. 3. Drive board fault. 	<ol style="list-style-type: none"> 1. Check the power supply. 2. No fault. 3. Change the drive board.
16	Low DC voltage 200 V	<ol style="list-style-type: none"> 1. The voltage input is too low. 2. Drive board fault. 	<ol style="list-style-type: none"> 1. Check the power supply. 2. Change the drive board.
18	Driver board read EE data error	<ol style="list-style-type: none"> 1. EEPROM has no data or data error. 2. EEPROM circuit fault. 	<ol style="list-style-type: none"> 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 17: Troubleshooting for normal malfunction

Malfunction	Possible reasons for malfunction	Suggested action
Outdoor section does not start	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.

Table 17: Troubleshooting for normal malfunction

Malfunction	Possible reasons for malfunction	Suggested action
Poor cooling	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. The drainage pipe is blocked or broken. 2. The insulation of the refrigerant piping is inadequate. 	<ol style="list-style-type: none"> 1. Change the drainage pipe. 2. Correct the refrigeration piping insulation.

LED-displayed fault codes - HMC22B24/HMCG22B36

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.

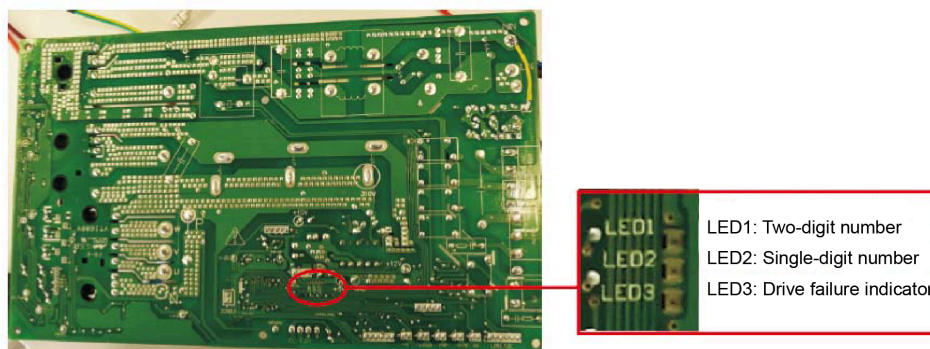
When LED3 is on, LED1 and LED 2 indicate the drive control fault code.

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 35: LED lamps



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Figure 36: Example - outdoor main control fault 32

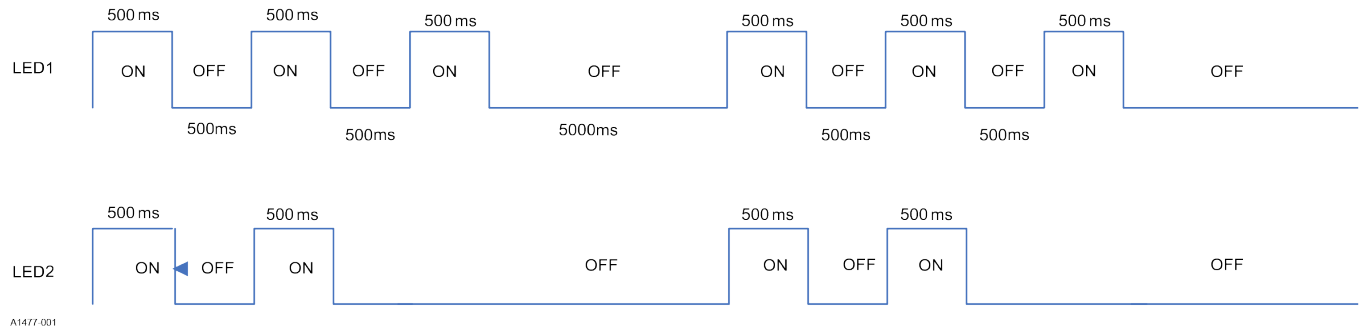


Figure 37: Example - outdoor drive fault 32

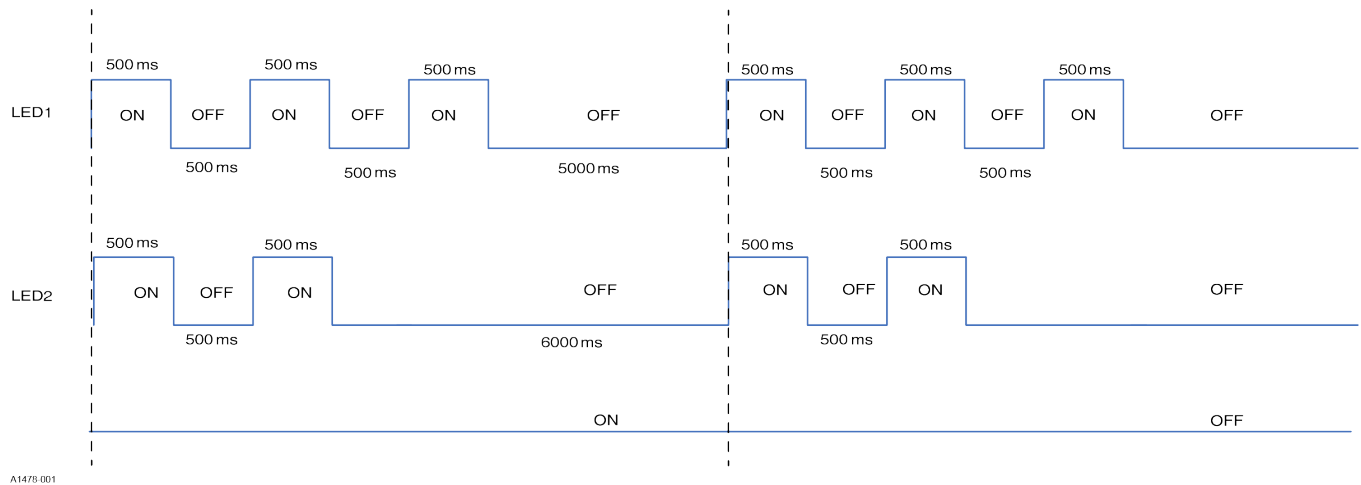
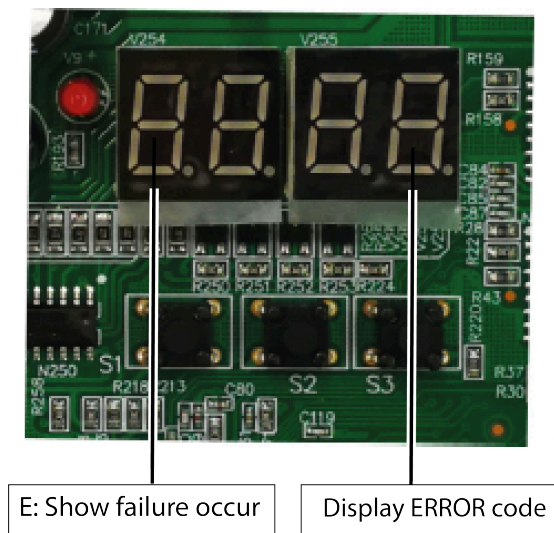
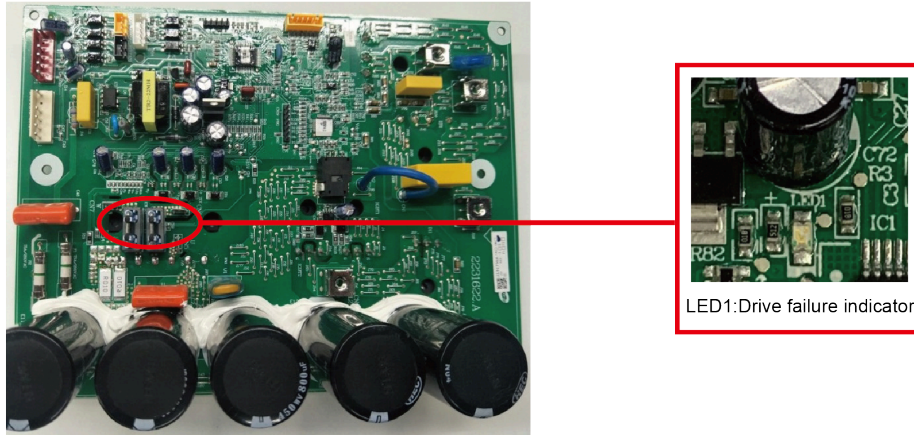


Figure 38: Main control fault display - HMCG22B48/HMCG22B60



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

Figure 39: Drive fault code display



A1821-001

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

Figure 40: Start-up sheet - page 1

Air Conditioning and Heating Start-Up Sheet
Proper start-up is critical to customer comfort and equipment longevity

Start-Up Date

Technician Performing Start-Up Installing Contractor Name

Owner Information

Name Address

City State or Province Zip or Postal Code

Equipment Data Upflow Downflow Horizontal Left Horizontal Right

Indoor Unit Model # Indoor Unit Serial #

Indoor Coil Model # Indoor Coil Serial #

Outdoor Unit Model # Outdoor Unit Serial #

Filter, Thermostat, Accessories

Filter Type Filter Size Filter Location(s)

Thermostat Type Other System Equipment and Accessories

Connections -- Per Installation Instructions and Local Codes

Unit is level Supply plenum and return ducts are connected and sealed Refrigerant piping complete and leak tested
 Gas piping is connected (if applicable) Vent system is connected (if applicable)
 Condensate drain for indoor coil properly connected Condensate drain for furnace (if applicable)

Electrical: Line Voltage

Indoor unit (volts AC) Outdoor unit (volts AC) Overcurrent Protection Breaker / Fuses Amperes

Ground wire is connected Polarity is correct (120vac indoor units) black is L1 (hot), white is N (neutral)

Electrical: Low Voltage Thermostat wiring complete Heat anticipator recommended value

Heat anticipator is set to the recommended value listed in the Installation Instructions

Low voltage values: "R" and "C" at Indoor unit control board (volts AC) "R" and "C" Outdoor unit control board (volts AC)

Heating Set-Up (if applicable)

Heating Type Electric Air Handler Natural Gas LP Gas (Requires LP Conversion Kit)

Inlet Gas Pressure (in. w.c.) Manifold Gas Pressure (in. w.c.) LP Gas Conversion Kit Part # Used

Calculated input in btuh - clock the gas meter (Nat Gas Only) LP Kit Installed By

Electric Heat Kit Part # (if applicable) KW installed Rated BTU/H (furnaces)

Venting (if applicable) Venting system properly sized, within the limitations of the charts in the installation instructions.

Intake Size # of 90 Degree Ells # of 45 Degree Ells Length

Exhaust Size # of 90 Degree Ells # of 45 Degree Ells Length

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Figure 41: Start-up sheet - page 2

Airflow Setup							
Blower type and set-up	Variable speed ECM (circle 0 or 1)	Heat	0 / 1	0 / 1			
		Low cool	0 / 1	0 / 1	0 / 1		
		High cool	0 / 1	0 / 1	0 / 1		
		Delay	0 / 1	0 / 1			
		Stage 1 kW	0 / 1	0 / 1			
		Heat kit selection	0 / 1	0 / 1	0 / 1	0 / 1	
	Standard ECM	HP heating/cooling Y1	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
		HP heating/cooling Y/Y2	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
		Electric heat speed	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
		Continuous fan speed	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Supply static (in. W.C.)	<input style="width: 40px;" type="text"/>	Supply air dry bulb temperature	<input style="width: 40px;" type="text"/>	Outside air dry bulb temperature	<input style="width: 40px;" type="text"/>		
Return static (in. W.C.)	<input style="width: 40px;" type="text"/>	Return air dry bulb temperature	<input style="width: 40px;" type="text"/>	Return air wet bulb temperature	<input style="width: 40px;" type="text"/>		
Total external static pressure	<input style="width: 40px;" type="text"/>	Temperature drop	<input style="width: 40px;" type="text"/>	Supply air wet bulb temperature	<input style="width: 40px;" type="text"/>		
Other switches (check all that apply)							
HUMIDISTAT <input type="radio"/> YES <input type="radio"/> NO AC/HP <input type="radio"/> AC <input type="radio"/> HP CONT FAN <input type="radio"/> 40% <input type="radio"/> 60% <input type="radio"/> 80% <input type="radio"/> 100%							
Refrigerant Charge and Metering Device							
<input type="radio"/> R-407C <input type="radio"/> R-410A <input type="radio"/> TXV <input type="radio"/> Fixed Orifice		Additional Lineset Length <input style="width: 40px;" type="text"/>	Adder per foot - lbs. <input style="width: 40px;" type="text"/>		Oz. <input style="width: 40px;" type="text"/>		
# Elbows <input style="width: 40px;" type="text"/>		# 45s <input style="width: 40px;" type="text"/>		Total Added - lbs. <input style="width: 40px;" type="text"/>		Oz. <input style="width: 40px;" type="text"/>	
Orifice Size <input style="width: 40px;" type="text"/>	Liquid Line Temp <input style="width: 40px;" type="text"/>	High Side Pressure <input style="width: 40px;" type="text"/>	Suction Line Temp <input style="width: 40px;" type="text"/>	Low Side Pressure <input style="width: 40px;" type="text"/>			
TXV # <input style="width: 40px;" type="text"/>	Subcooling <input style="width: 40px;" type="text"/>		Superheat <input style="width: 40px;" type="text"/>				
Cycle Test							
<input type="checkbox"/> Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems							
<input type="checkbox"/> Operate the unit through a cooling cycles, noting and correcting any problems							
<input type="checkbox"/> Operate the unit through several heating cycles (if applicable) from the thermostat, noting and correcting any problems							
Clean Up							
<input type="checkbox"/> Installation debris disposed of and indoor and outdoor areas cleaned up?							
Owner Education							
<input type="checkbox"/> Provide owner with the owner's manual							
<input type="checkbox"/> Explain operation of system to equipment owner							
<input type="checkbox"/> Explain thermostat use and programming (if applicable) to owner							
<input type="checkbox"/> Explain the importance of regular filter replacement and equipment maintenance							
Comments Section							
Page 2 of 2 (9/6/22)							

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