GREE
Air comfort for all

XPAC R32

OWNER'S MANUAL

Outdoor Unit

MODELS:

GK-H05TC/NhA-D(U)
GK-H04TC/NhA-D(U)
GK-H03TC/NhA-D(U)
GK-H02TC/NhA-D(U)

Thank you for choosing our product.
Please read this Owner's Manual carefully before operation and retain it for future reference.

To download an electric version of this manual visit
https:/greecomfort.com/system-documentation/

CAT NO:GREE_XPAC_R32_OWNERS_MANUAL_08222025

To Users

Thank you for selecting Gree product. Please read this instruction manual carefully before installing and using the product, so as to master and correctly use the product. In order to guide you to correctly install and use our product and achieve expected operating effect, we hereby instruct as below:

(1) This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

(2) In order to ensure reliability of product, the product may consume some power under stand-by status for maintaining normal communication of system and preheating refrigerant and lubricant. If the product is not to be used for long, cut off the power supply; please energize and preheat the unit in advance before reusing it.

(3) Please properly select the model according to actual using environment, otherwise it may impact the using convenience.

(4) This product can't be installed at corrosive, inflammable or explosive environment or the place with special requirements, such as kitchen. Otherwise, it will affect the normal operation or shorten the service life of the unit, or even cause fire hazard or serious injury. As for above special places, please adopt special air conditioner with anti-corrosive or anti-explosion function.

(5) If the product needs to be installed, moved or maintained, please contact our designated dealer or local service center for professional support. Users should not disassemble or maintain the unit by themselves, otherwise it may cause relative damage, and our company will bear no responsibilities.

(6) All the illustrations and information in the instruction manual are only for reference. In order to make the product better, we will continuously conduct improvement and innovation. If there is adjustment in the product, please subject to actual product.

Exception Clauses

Manufacturer will bear no responsibilities when personal injury or property loss is caused by the following reasons:

(1) Damage the product due to improper use or misuse of the product.

(2) Alter, change, maintain or use the product with other equipment without abiding by the instruction manual of manufacturer.

(3) After verification, the defect of product is directly caused by corrosive gas.

(4) After verification, defects are due to improper operation during transportation of product.

(5) Operate, repair, maintain the unit without abiding by instruction manual or related regulations.

(6) After verification, the problem or dispute is caused by the quality specification or performance of parts and components that produced by other manufacturers.

(7) The damage is caused by natural calamities, bad using environment or force majeure.

Contents

This marking indicates that this product should not be disposed with other household wastes throughout the North America. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

1 Safety Precautions

⚠WARNING

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory--authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing. Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements. Recognize safety information. This is the safety--alert symbol ⚠.

When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: **DANGER**, **WARNING**, **CAUTION** and **NOTICE**. These words are used with the safety--alert symbol.

⚠ DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
⚠WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates important but not hazard-related information, used to indicate risk of property damage.
	Appliance filled with flammable magas R32.
	Before install the appliance, read the installation manual first.
	Before use the appliance, read the owner's manual first.
	Before repair the appliance, read the service manual first.

Electrical shock hazard:

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

⚠ WARNING	
(1)	The air conditioner should be grounded to avoid electric shock. Do not connect the ground wire to gas pipe, water pipe, lightning arrester or telephone wire.
(2)	The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.
(3)	The appliance shall be stored in a room without continuously operating open flames (for example an operating gas appliance) and ignition sources (for example an operating electric heater).
(4)	According to federal/state/local laws and regulations, all packages and transportation materials, including nails, metal or wooden parts, and plastic packing material, must be treated in a safe way.
(5)	The air conditioner should be at least 1.5m away from any inflammable surface.
(6)	The range of external static pressures(0-0.8 Inches W.C.) at which the appliance was tested(add-on heat pumps and ducted appliances with supplementary heaters only).
(7)	Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
(8)	The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.
(9)	Do not pierce or burn.
(10)	Be aware that refrigerants may not contain an odour.
(11)	Electric heating or the product need to be 5 feet away from other flammable materials or 1 foot away from the wall.
(12)	The material of plenum and ductwork must meet the standard NFPA 90B. The supply air plenum or duct must have a solid sheet metal bottom piece directly after the air handler unit with no openings, registers or flexible air ducts located in it. The first 6 inches of supply air plenum and ductwork must be constructed of sheet metal as required by NFPA 90B. Metal plenum of duct may be connected to the non-combustible floor base for downflow. Exposing combustible non-metal. material to the supply opening of a downflow unit can cause a fire resulting in property damage, personal injury or death. If flexible supply air ducts are used they may be located only in the side walls of the rectangular plenum, a minimum of 6 inches from the solid bottom.
(13)	All phases of this installation must conform to NATIONAL, STATE AND LOCAL CODES. If it is required for additional information, please contact your local distributor.

⚠ WARNING	
(1)	Please install according to this instruction manual. Installation must be performed in accordance with the requirement of NEC and CEC by authorized personnel only.
(2)	Any person who is involved with working on or breaking into a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognized assessment specification.
(3)	Servicing shall only be performed as recommended by the equipment manufacturer.
(4)	The appliance shall be installed in accordance with national wiring regulations.
(5)	The fixed wires connecting to the appliance must be configured with all-pole disconnection device under voltage grade III according to wiring rules.
(6)	Air conditioner should be stored with protective measures against mechanical damage caused by accident.
(7)	During installation, use the specialized accessories and components, otherwise water leakage, electric shock or fire hazard may occur.
(8)	Please install the air conditioner in a secure place that can withstand the weight of air conditioner. Insecure installation may cause the air conditioner falling down and lead to injury.
(9)	Be sure to adopt independent power circuit. If the power cord is damaged, it must be repaired by the manufacturer, service agent or other professional agents.
(10)	The air conditioner can be cleaned only after it is turned off and power-disconnected, otherwise electric shock may occur.
(11)	The air conditioner is not intended to be cleaned or maintained by children without supervision.
(12)	Do not alter the setting of pressure sensor or other protective devices. If the protective devices are short-circuited or changed against rules, fire hazard or even explosion may occur.
(13)	Do not operate the air conditioner with wet hands. Do not wash or sprinkle water on the air conditioner, otherwise malfunction or electric shock will occur.
(14)	Do not dry the filter with naked flame or an air blower; otherwise the filter will be out of shape.
(15)	If the unit is to be installed in a small space, please adopt protective measures to prevent the concentration of refrigerant from exceeding the allowable safety limit; excessive refrigerant leakage may lead to explosion.
(16)	The unit must be permanently grounded. Failure to do so can lead to electrical shock causing personal injury or death.

NOTICE	
(1)	Do not put a finger or other objects into the air inlet or return air grill.
(2)	Please adopt safety protection measures before touching the refrigerant pipe; otherwise your hands may be hurt.
(3)	Please arrange the drain pipe according to the instruction manual.
(4)	Never stop the air conditioner by directly cutting off the power.
(5)	Never install the air conditioner in the following places: a) Places with oil smoke or volatile liquid: plastic parts may deteriorate and fall off or even cause water leakage. b) Places with corrosive gas: copper pipe or the welding parts may be corroded and cause refrigerant leakage.
(6)	Adopt proper measures to protect the air conditioner from small animals because they may damage the electric components and cause malfunction of the air conditioner.

NOTICE	
(1)	If thermostat is to be used, it should be connected first before powering up the unit, otherwise the thermostat may not be able to use.
(2)	Only use soft dry cloth or slightly wet cloth with neutral detergent to clean the casing of the air conditioner.
(3)	Before operating the unit under low temperature, connect it to power for 8 hours. If it is stopped for a short time, for example, one night, do not cut off the power (This is to protect the compressor).
(4)	In order to ensure the reliability of the compressor, the unit force the compressor run for at least 6 minutes every time the compressor turns on, regardless of the room temperature. Therefore, it is necessary to select a thermostat having the minimum run time for the compressor or delaying a few minutes to turn the indoor unit off after the outdoor unit is shut down or stopped at the temperature point, in order to avoid that the indoor unit is turned off by the thermostat while the out unit is running which can result in the malfunction of the air conditioner.

2 Product Introduction

2.1 Product Description

The unit is completely assembled, piped and wired at the factory to provide one-piece shipment and rigging. Each unit is pressurized with a holding charge of R32 for storage and shipping.

The compact design, attractive appearance, outstanding anti-rust cabinet and quiet operation make these units suitable for homes, offices, restaurants, residences or similar places.

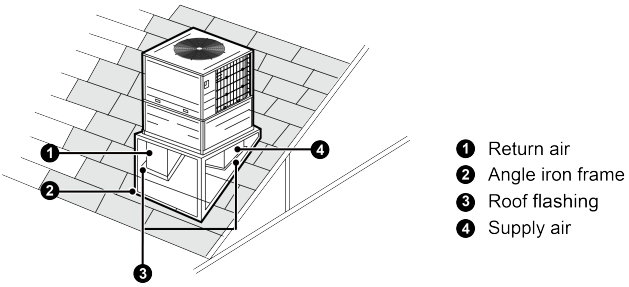


Fig.1

2.2 Operating Range

Mode	Outdoor Condition (DB Temperature)
Cooling	23˚F(-5˚C) ~ 125˚F(52˚C)
Heating	-22˚F(-30˚C) ~ 75.2˚F(24˚C)

2.3 Standard Accessory Parts

The standard accessory parts listed below are furnished and should be used as required.

No.	Name	Appearance	Q'ty	Usage
1	Wired controller		1	To control the unit

3 Installation

3.1 Installation Preparation

3.1.1 Checking Product Received

After receiving the product, please check if there is any damage caused by transportation. Shipping damage is the responsibility of the carrier. Verify the model number, specifications and accessories are correct prior to installation. The distributor or manufacturer will not accept claims from dealers for transportation damage or installation of incorrectly shipped units.

3.1.2 Before Installation

Carefully read all instructions for the installation prior to installing product. Make sure each step or procedure is understood and any special considerations are taken

into account before starting installation. Assemble all tools, hardware and supplies needed to complete the installation. Some items may need to be purchased locally. Make sure everything needed to install the product is on hand before starting.

3.1.3 Codes & Regulations

This product is designed and manufactured to comply with national codes. It is installer's responsibilities to install the product in accordance with such codes and/or any prevailing local codes/regulations. The manufacturer assumes no responsibilities for equipment installed in violation of any codes or regulations.

3.1.4 Replacement Parts

When reporting shortages or damages, or ordering repair parts, give the complete product model and serial numbers as stamped on the product. Replacement parts for this product are available through your contractor or local distributor.

3.1.5 Selection of Installation Location

⚠ WARNING	
①	The unit must be installed where strong enough to withstand the weight of the unit and fixed securely, otherwise the unit would topple or fall off.
②	Do not install where there is the danger of combustible gas leakage.
③	Do not install the unit at a place with leakage of inflammable gas.

Selection of installation location (Select a location pursuant to the following condition).

(1) Noise and air flow produced by the air conditioner will not disturb the neighbors.

(2) Select a location that is safe and away from animals and plants. If not, please add safety fences to protect the unit.

(3) Install at a place with good ventilation. Make sure the air conditioner stays at a well-ventilated place with no obstacles nearby that may obstruct the air inlet and outlet.

(4) The installation location should be able to withstand the weight and vibration of air conditioner and allow the installation to be carried out safely.

(5) Avoid installing at a place with leakage of inflammable gas, oil smoke or corrosive gas.

(6) Keep it away from strong wind because strong wind will affect the condenser fan and lead to insufficient air flow volume and thus affecting the unit's performance.

(7) Away from any object that may get the air conditioner generating noise.

(8) Install the air conditioner at a place where condensate can be easily drained.

(9) Do not install the air conditioner near the bedroom, otherwise the noise of the unit operation may disturbing to building occupants.

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

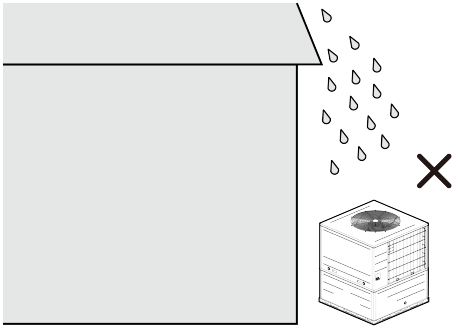


Fig.2

(11) Do not install the air conditioner in a corrosive environment, otherwise it may shorten the life, or negatively affect the performance of the unit.

(12) Installation requirements in snowy areas:

1) Install the air conditioner on a stand which more than 20 in.(500mm) higher than the expected snow fall to prevent it from being covered by snow.
2) Attach snow hood and snow guard.
3) Do not install the air conditioner at a place where a snowdrift is generated.
4) Remove the air inlet grille to prevent snow from accumulating on it.

Unit: inch(mm)

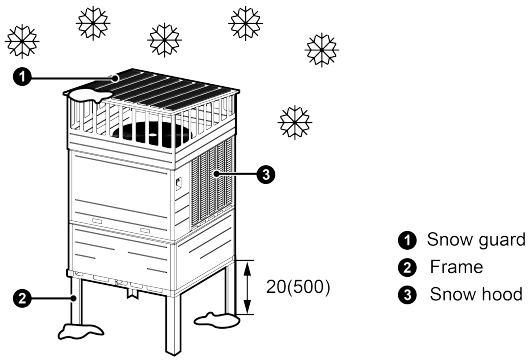


Fig.3

3.1.6 Physical Dimension

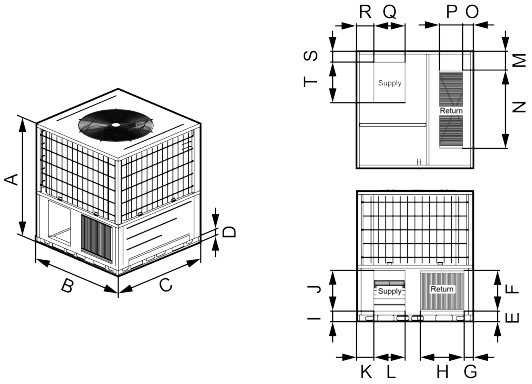


Fig.4

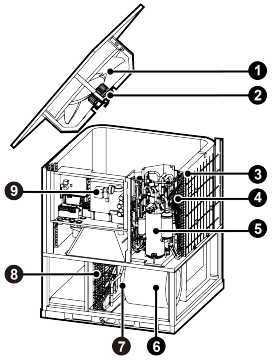
Unit: inch(mm)

Dimension	A	B	C	D				
	49-1/4 (1250)	44 (1120)	44 (1120)	2-1/2 (65)				
	Side air vents							
	E	size of air return		G	I	size of air supply		K
		F	H			J	L	
GK-H05TC/NhA-D(U) GK-H04TC/NhA-D(U)	4 (101)	15-3/8 (390)	16-1/2 (420)	3-3/8 (87)	4 (101)	15-3/8 (390)	11-3/4 (300)	6-1/2 (166)
	Buttom air vents							
	M	size of air return		O	R	size of air supply		S
		N	P			Q	T	
	7-7/8 (199)	28 (711)	9 (228)	3-3/4 (96)	6-1/2 (166)	11-3/4 (300)	15-3/8 (390)	4 (103)

Dimension	A	B	C	D				
	49-1/4 (1250)	44 (1120)	35-7/16 (900)	2-1/2 (65)				
	Side air vents							
	E	size of air return		G	I	size of air supply		K
		F	H			J	L	
GK-H03TC/NhA-D(U) GK-H02TC/NhA-D(U)	4-7/16 (113)	17-8/16 (445)	16-9/16 (420)	3-7/16 (87)	3-15/16 (101)	15-6/16 (390)	11-13/16 (300)	6-3/16 (157)
	Buttom air vents							
	M	size of air return		O	R	size of air supply		S
		N	P			Q	T	
	5-14/16 (149)	23-1/16 (586)	8-10/16 (219)	3-11/16 (93)	6-3/16 (156)	11-14/16 (302)	13-12/16 (350)	3-10/16 (92)

NOTE: Above diagrams may be different from actual mode.

3.1.7 Names of Main Parts



1. Condensate fan
2. Condensate motor
3. Condenser assy
4. Service valves
5. Compressor
6. Evaporation fan
7. Evaporation motor
8. Evaporator assy
9. Electric box assy

Fig.5

3.1.8 Diagram of Unit Installation Space and Location

Diagram of installation space and location (Notice: for best performance of the unit, make sure its installation space conforms to the following installation dimensions).

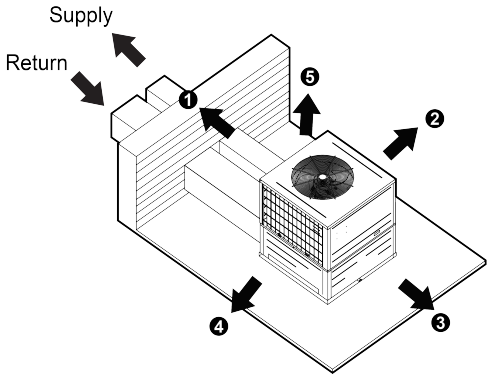


Fig.6

NOTE: Above diagrams may be different from actual model.

IMENSION(Minimum)	Installation Clearances	
	inch	mm
1	24	610
2	8	203
3	20	508
4	24	610
5	60	1524

NOTE: Refer to local code requirements for additional clearance requirements.

3.1.9 Minimum Room Area

No.	Refrigerant perfusion(kg)	Minimum Room Area(m^2)	Minimum Room Area(ft^2)
1	4.25	12.7	135.9
2	5.8	17.3	185.5

NOTES:

(1) The room area is calculated according to the height of 2.2m. Minimum room height is 2.2m.

(2) This manual is only applicable to a single room.

(3) Correct the minimum room area of the space Amin by multiplying by an altitude adjustment factor (AF) based on for building site ground level altitude (Halt) in meters.

Halt	0	200	400	600	800	1000	1200	1400	1600
AF	1.00	1.00	1.00	1.00	1.02	1.05	1.07	1.10	1.12
Halt	1600	1800	2000	2200	2400	2600	2800	3000	3200
AF	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.40

3.1.10 Minimum Circulation Airflow

Model	Minimum circulation airflow(m^3/h)
GK-H05TC/NhA-D(U)	569
GK-H04TC/NhA-D(U)	569
GK-H03TC/NhA-D(U)	417
GK-H02TC/NhA-D(U)	417

3.1.11 About the Refrigerant Sensor

The unit is equipped with a refrigerant sensor. The sensor has a lifetime of 15 years.

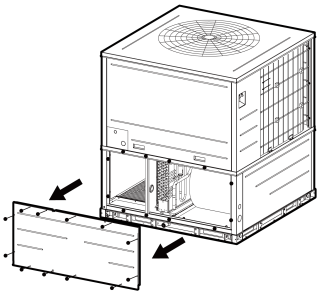
At the end of lifetime or when the sensor fault, the mainboard or wired controller displays error code "FE", and emits an alarm sound. And the fan of the indoor unit will be forced to open, stop the outdoor unit.

When the sensor detects refrigerant leak, the mainboard or wired controller displays error code "EA", and emits an alarm sound. And the fan of the indoor unit will be forced to open, stop the outdoor unit.

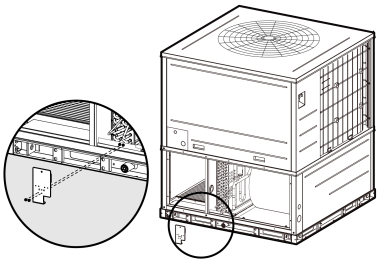
The alarm can be canceled by operating the “On/Off” button of the wired controller or remote control. The indoor unit fan will keep running and the system cannot operate until the leakage is repaired.

If the refrigerant sensor is damaged, the refrigerant sensor of the refrigerant detection system can only be replaced with the particular sensor which is specified by the manufacturer. Replace the refrigerant sensor as follows:

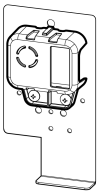
① Remove the Side plate.



② Remove the Holder.



③ Replace the refrigerant leakage sensor with a new one.



Where a single remote refrigerant sensor is used in a room with multiple units, all units in the room which do not have a dedicated refrigerant detection system shall take the same actions. When an ITE COOLING APPLIANCE or PARTIAL UNIT'S REFRIGERANT DETECTION SYSTEMS for an appliances refrigerant circuit resets to a safe condition the unit shall not be allowed to initiate NORMAL OPERATIONS until all REFRIGERANT DETECTION SYSTEM systems in the CIRCULATION AIRFLOW have been reset.

Where a single REMOTE REFRIGERANT DETECTION system sensor is used in a room with multiple units, this requirement shall apply to all units in the room which do not have a dedicated REFRIGERANT DETECTIONSYSTEM.

"LEAK DETECTION SYSTEM installed. Unit must be powered except for service."

Continuous air circulation required for proper functioning. Unit must be powered except for service.

3.2 Unit Installation

3.2.1 Curb-mounted installation

(1) Install curb.

NOTE: The manufacturer does not supply roof curb. Please refer to Figure 7 for roof curb reference dimensions.

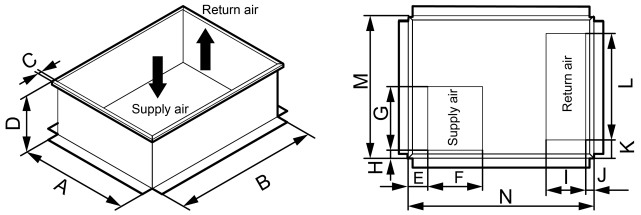


Fig.7

Unit: inch(mm)

Dimension	A	B	C	D	E
GK-H05TC/NhA-D(U) GK-H04TC/NhA-D(U)	37-5/8 (956)	38-7/16 (976)	1 (25)	14 (356)	4-11/16 (119.5)
GK-H03TC/NhA-D(U) GK-H02TC/NhA-D(U)	29 (736)	38-7/16 (976)	1 (25)	14 (356)	4-1/4 (109)

Dimension	F	G	H	I	J
GK-H05TC/NhA-D(U) GK-H04TC/NhA-D(U)	11-13/16 (300)	15-3/8 (390)	2-3/16 (56)	8-3/4 (223)	2-3/16 (55)
GK-H03TC/NhA-D(U) GK-H02TC/NhA-D(U)	11-7/8 (302)	13-3/4 (350)	1-3/4 (45)	8-5/8 (219)	1-3/4 (46)

Dimension	K	L	M	N
GK-H05TC/NhA-D(U) GK-H04TC/NhA-D(U)	5-1/4 (133)	29-1/2 (750)	39-5/8 (1006)	40-3/8 (1026)
GK-H03TC/NhA-D(U) GK-H02TC/NhA-D(U)	4 (102)	23 (586)	30-15/16 (786)	40-3/8 (1026)

(2) Field fabricate ductwork inside curb. Secure supply and return ducts to roof curb and building structure.

(3) Rig and place unit.

(4) Convert unit to vertical duct connection.

(5) Install condensate drain piping.

(6) Make electrical connections.

3.2.2 Pad-mounted installation

(1) Prepare pad and unit supports.

(2) Rig and place unit.

(3) Convert unit to horizontal duct connection.

(4) Field fabricate ductwork at unit duct openings.

(5) Install condensate drain piping.

(6) Make electrical connections.

3.2.3 Rigging and Lifting

Do not remove the unit's package materials before installation. Keep unit upright and do not drop. Rig the unit by attaching chain or cable slings to the lifting holes in base rails.

Place the unit on roof curb and maintain the clearance between the roof curb and the base rail inside at 1/4inch. (6.4mm)

After unit is position, remove rigging skids and package materials.

Unit: inch(mm)

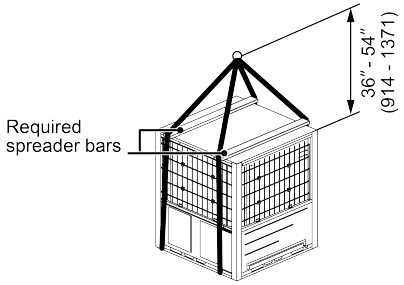


Fig.8

NOTICE	
(1)	Spreader bars must required in order to prevent rigging straps from damaging unit.
(2)	All panels must be in place when rigging.
(3)	The height between the top of unit and the rigging cables' connection point should be 36-54inch (914-1371mm).

3.2.4 Horizontal duct and Vertical duct conversation

To convert to horizontal duct configuration, remove screws from side duct opening covers (see Fig. 9) and remove covers.

To convert to vertical duct configuration, remove screws from base pan duct opening covers (see Fig. 10) and remove covers.

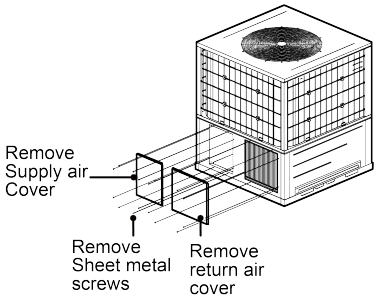


Fig.9 horizontal duct

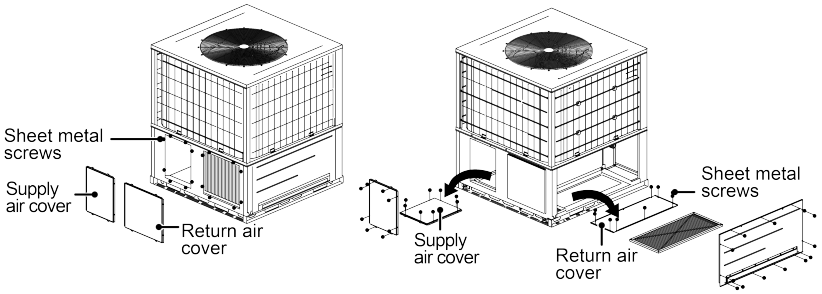


Fig.10 vertical duct

3.2.5 Installation of Condensate Pipe

(1) Condensate drain side is pitched lower than the opposite side. (see Fig. 11)

(2) When shipped out from factory, both the condensate outlets are blocked by rubber plug. So before installation, please take the rubber plug out.

(3) Condensate removal is performed by attaching a PVC pipe to the drain pan and terminated in accordance with local or state Plumbing/HVAC codes.

(4) The condensate pipe shall be installed with an inclining angel of 5~10°, so as to facilitate the drainage of condensate.

(5) As the inside of the unit is in the negative pressure status, it is required to set up a backwater elbow. The requirement is: A=B≥P/10+20(mm). P is the absolute pressure inside the unit. The unit of the pressure is Pa.

(6) After the electrical installation is completed, carry out the testing of the drainage system.

(7) It is not allowed to connect the condensate drain pipe into waste pipe or other pipelines which are likely to produce corrosive or peculiar smell to prevent the smell from entering indoors or corrupt the unit.

(8) It is not allowed to connect the condensate drain pipe into rain pipe to prevent rain water from pouring in and cause property loss or personal injury.

(9) Condensate drain pipe should be connected into special drain system for air conditioner.

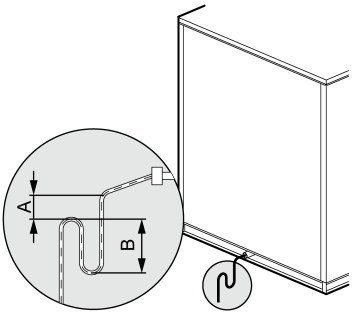


Fig.11

Model	Drain connection size(inch)
GK-H05TC/NhA-D(U)	3/4"(NPT)
GK-H04TC/NhA-D(U)	
GK-H03TC/NhA-D(U)	
GK-H02TC/NhA-D(U)	

3.2.6 Dip Switch Instruction

The unit can be connected to a wired controller or a thermostat, and only one of them can be connected. When the dip switch “SA1” is “0000”, the operation command of the wired controller is valid for the unit; When the dip switch “SA1” is not “0000”, the thermostat operation command is valid for the unit and it is not support to the unit connected to the centralized controller.

The unit is equipped with a wired controller as standard, and the default setting of the dip switch “SA1” is “0000”. When it is necessary to replace the thermostat, the dip switch “SA1” should be dialed according to the required speed when the air conditioner is powered off.

3.2.6.1 Fan Speed Adjustment Guidance

When the wired controller connected with the unit (dip switch “SA1”: “00”), different static pressure levels can be adjusted, and the fan speeds of different static pressure levels are as follows：

Static pressure level	Super	High	Middle	Low
4	Speed 8	Speed 6	Speed 5	Speed 4
5	Speed 9	Speed 7	Speed 6	Speed 5
6	Speed 10	Speed 8	Speed 7	Speed 6
7	Speed 11	Speed 9	Speed 8	Speed 7
8	Speed 12	Speed 10	Speed 9	Speed 8
9	Speed 13	Speed 11	Speed 10	Speed 9

The default static pressure level from factory of the unit is 5, different static pressure levels can be press “MENU/OK” button on the homepage to enter into menu page to select “Set” to go to set page. Select “Parameter Setting” at the set page to go into parameter setting page.

After that, press “∧” or “∨” button to switch the items, select “Indoor Fan Static Pressure”. When selecting the parameter, press “<” or “>” to switch the setting value(4, 5, 6, 7, 8, 9).

Press “MENU/OK” button to save corresponding setting items. If the setting can’t be confirmed, switching the item can restore the previous setting value.

When the unit is connected to the thermostat, the dip switch “SA1” is not “0000”. Setting different positions of the dip switch is correspond to different speeds, and each combination is correspond to a speed. The relationship between combination and speeds are as follows:

Level	Dip switch SA1			
	4	3	2	1
Speed 4	0	1	0	0
Speed 5	0	1	0	1
Speed 6	0	1	1	0
Speed 7	0	1	1	1
Speed 8	1	0	0	0
Speed 9	1	0	0	1
Speed 10	1	0	1	0

Level	Dip switch SA1			
	4	3	2	1
Speed 11	1	0	1	1
Speed 12	1	1	0	0
Speed 13	1	1	0	1

NOTE: “0” means dip switch to “on”, “1” means dip switch to number.

3.2.6.2 Fan Performance Data

External static pressure should stay within the minimum and maximum limits shown in the table below in order to ensure proper operation of both cooling, heating, and electric heating operation.

Unit: CFM

Model	GK-H05TC/NhA-D(U),GK-H04TC/NhA-D(U)								
Level	Static pressure: Inches W.C.(Pa)								
	0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
Speed 4	1517	/	/	/	/	/	/	/	/
Speed 5	-	1464	/	/	/	/	/	/	/
Speed 6	-	1533	/	/	/	/	/	/	/
Speed 7	-	-	1517	/	/	/	/	/	/
Speed 8	-	-	1533	/	/	/	/	/	/
Speed 9	-	-	-	1525	/	/	/	/	/
Speed 10	-	-	-	-	1517	/	/	/	/
Speed 11	-	-	-	-	-	1558	1492	/	/
Speed 12	-	-	-	-	-	1566	1525	1480	1410
Speed 13	-	-	-	-	-	1591	1538	1497	1470

Unit: CFM

Model	GK-H03TC/NhA-D(U),GK-H02TC/NhA-D(U)								
Level	Static pressure: Inches W.C.(Pa)								
	0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
Speed 4	1216	/	/	/	/	/	/	/	/
Speed 5	1293	/	/	/	/	/	/	/	/
Speed 6	1368	1264	/	/	/	/	/	/	/
Speed 7	1447	1348	1230	/	/	/	/	/	/
Speed 8	1501	1436	1327	1195	/	/	/	/	/

Model	GK-H03TC/NhA-D(U),GK-H02TC/NhA-D(U)								
Level	Static pressure: Inches W.C.(Pa)								
	0 (0)	0.1 (25)	0.2 (50)	0.3 (75)	0.4 (100)	0.5 (125)	0.6 (150)	0.7 (175)	0.8 (200)
Speed 9	1506	1464	1417	1383	/	/	/	/	/
Speed 10	1498	1466	1423	1378	1280	/	/	/	/
Speed 11	1514	1472	1424	1385	1344	1303	/	/	/
Speed 12	1505	1467	1420	1375	1340	1303	1258	/	/
Speed 13	1510	1463	1424	1380	1340	1297	1258	1216	/

NOTE:

① "/" denotes that the static pressure is out of range, air volume drop may affect the performance and reliability. Prohibition of use.

② "-" denotes that the air volume is out of range, may lead to over-load and unstable operation of the fan motor. Prohibition of use.

③ Underline "_" indicates that electric heating is not allowed.

3.3 Ductwork

This unit is designed for a complete supply and return ductwork system.

⚠WARNING

Field ductwork must meet the National Fire Protection Association NFPA 90A, NFPA 90B and any applicable local ordinance.

Sheet metal ductwork run in unconditioned spaces must be insulated and covered with a vapor barrier. Fibrous ductwork may be used if constructed and installed in accordance with SMACNA Construction Standard on Fibrous Glass Ducts. Ductwork must comply with National Fire Protection Association as tested by U/L Standard 181 for Class I Air Ducts. Check local codes for requirements on ductwork and insulation.

Duct system must be designed within the range of external static pressure the unit is designed to operate against. It is important that the system airflow be adequate. Make sure supply and return ductwork, grills, special filters, accessories, etc. are accounted for in total resistance. See fan performance data in this manual.

Do not operate the unit without all ductwork completed.

Do not operate this product without all ductwork attached.

Inadequate ductwork that restricts airflow can result in improper performance and compressor or heater failure. Ductwork is to be constructed in a manner that

limits restrictions and maintains suitable air velocity. Ductwork is to be sealed to the unit in a manner that will prevent leakage.

Return ductwork: Do not terminate the return ductwork in an area that can introduce toxic or objectionable fumes/odors into the ductwork. The return ductwork is to be introduced into the air handler bottom (up flow configuration).

Return Air Filters: Each installation must include a return air filter. This filtering may be performed at the air handler or externally such as a return air filter grille.

3.4 Electric Heater

The unit listed in this manual do not have factory installed electric heat. Electric heat is available as an accessory. Please refer to installation instructions provided with heater kit for the correct installation procedure.

⚠WARNING Refer to the “Electric heater kits installation” section of this manual and the instructions provided with the heater kit for the correct installation procedure.

⚠WARNING The electrical characteristics of the unit, the electric heater kit, and the supply power should be identical. This unit does not have factory installed electric heater. Electric heater is available as an accessory. If installing this option, the only heater kits that can be used are the series as indicated below. It is forbidden to use the electric heater other than those recommended.

⚠WARNING Installation and debugging when attention to verify the switch sequence of electrical heating and fan, ensure the fan must be turned on when electric heating operation and ensure the electric heating is turned off before the fan to avoid unsafe.

⚠WARNING Refer to the “Fan Performance Data” section of this manual, otherwise it is possible to cause an exception and dry risk of electric heating.

⚠WARNING The supply ducts that are 5 feet away from electric heating must be at least 1 feet away from other combustibles or walls.

3.4.1 Electric Heater Kits Available

SN.	Heater kit model	Code	Description	Ref. unit use(ton)
1	LYQ-08-F	320004060232	Circuit breaker, 6kW heat strip	3.0/5.0

SN.	Heater kit model	Code	Description	Ref. unit use(ton)
2	LYQ-08-G	320004060233	Circuit breaker, 9kW heat strip	3.0/5.0
3	LYQ-08-H	320004060234	Circuit breaker, 12kW heat strip	3.0/5.0

3.4.2 Electric Heater Kits Installation

⚠CAUTION

(1) Ensure that all power supply is disconnected prior to installing the heater kit.

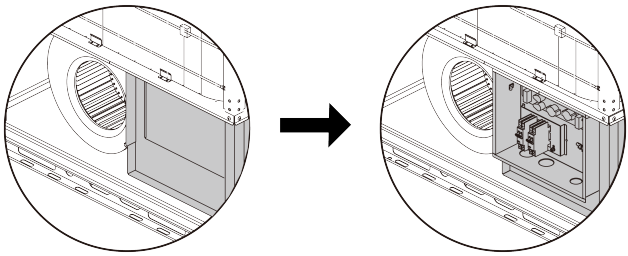
(2) A means of strain relief and conductor protection must be provided at the supply wire entrance into cabinet.

(3) Use copper conductors only.

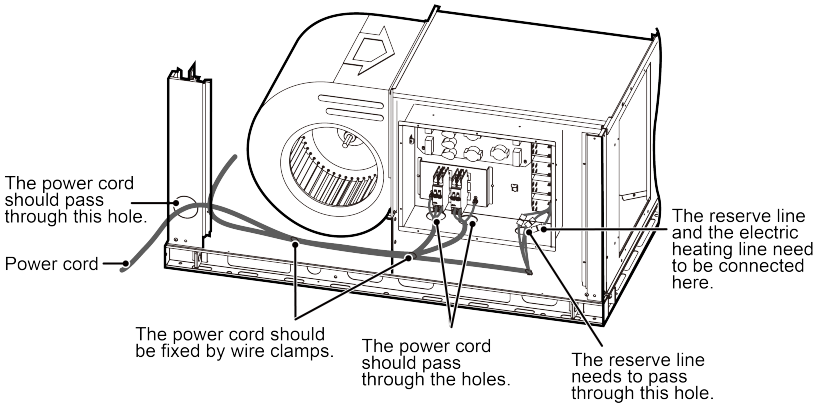
(4) Installation must follow national electric code and other applicable codes.

(5) If this appliance is installed in an enclosed area such as a garage or utility room with any carbon monoxide producing appliance, ensure the area is properly ventilated.

1) Refer to the Table for appropriate heater kit.
2) Check any physical damage, do not install damaged heater kit.
3) Remove the access panel from unit.
4) Remove cover plate from unit.
5) Slide the heater kit in to the slot and secure element plate with previously removed screws.
6) Insert power leads into the circuit breaker lugs.
7) Connect ground wire to ground lug.
8) Knock off the hole in the stand column. If electric heater is not installed, do not knock off the holes; otherwise, may affect the performance and reliability.
9) Replace access panel and check operation.



10) Connection of power cords and reserve lines.



3.5 Electrical Installation

3.5.1 Electrical Parameters

Model	Power supply	Fuse capacity (A)	Maximum over-current protection(A)	Minimum circuit ampacity(A)
GK-H05TC/NhA-D(U) GK-H04TC/NhA-D(U)	208/230V-1Ph-60Hz	45	45	39.1
GK-H03TC/NhA-D(U) GK-H02TC/NhA-D(U)	208/230V-1Ph-60Hz	40	40	35

⚠WARNING

The electrical installation for the air conditioner should observe the following requirements:

① The electrical installation must be conducted by professionals in compliance with local laws and regulations and the instructions in this manual. The electric circuit must be equipped with a circuit breaker and air switch both with sufficient capacity.

② The unit's operating power must be within the nominal range stated in the instruction manual. Use a specialized power circuit for the air conditioner. Do not draw power from another power circuit.

③ The air conditioner circuit should be at least 1.5m away from any inflammable surface.

④ The external power cords, the wired controller wires (or the thermostat wires) and unit must be effectively fixed.

⑤ The external power cords, the wired controller wires (or the thermostat wires)

and unit can't directly contact any hot objects. For example: they must not contact chimney pipes, warm gas pipes or other hot objects.

⑥ The external power cords, the wired controller wires (or the thermostat wires) and unit must not be squeezed. Never pull, stretch or bend the wires.

⑦ The external power cords, the wired controller wires (or the thermostat wires) and unit must not collide with any metal beam or edge on the ceiling, or touch any metal burrs or sharp metal edge around.

⑧ Connect wires correspondingly by referring to the circuit diagram labeled on the unit or electric box. Screws must be tightened up. Slipped screws must be replaced by specialized flat-head screws.

⑨ Wiring terminals should be connected firmly to the terminal board. Loose connection is forbidden.

⑩ The wire gauge of power cords should be large enough. Damaged power cords or other wires must be replaced by specialized wires. Wiring work must be done according to national wiring rules and regulations.

⑪ The unit has a heating four-way valve.

⑫ All wires must go through the tube.

3.5.2 Connect Wiring to the Terminals

(1) For solid wires (as shown below):

1) Use wire cutters to cut off the wire end and then peel away about 25mm of the insulation layer.
2) Use a screwdriver to unscrew the terminal screw on the terminal board.
3) Use nippers to bend the solid wire into a ring that fits the terminal screw.
4) Form a proper ring and then put it on the terminal board. Use a screwdriver to tighten up the terminal screw.

(2) For strand wires (as shown below):

1) Use wire cutters to cut off the wire end and then peel away about 10mm of the insulation layer.
2) Use a screwdriver to unscrew the terminal screw on the terminal board.
3) Use a round terminal fastener or clamp to fix the round terminal firmly on the peeled wire end.

4) Locate the round terminal conduit. Use a screwdriver to replace it and tighten up the terminal screw (as shown below).

Unit: inch(mm)

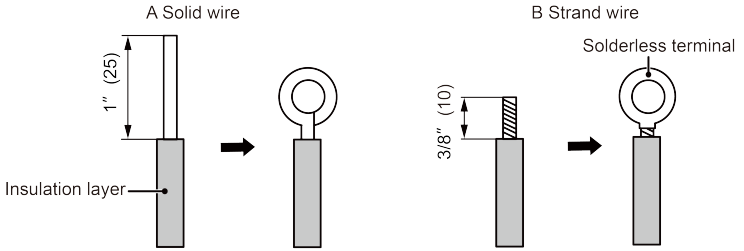


Fig.12

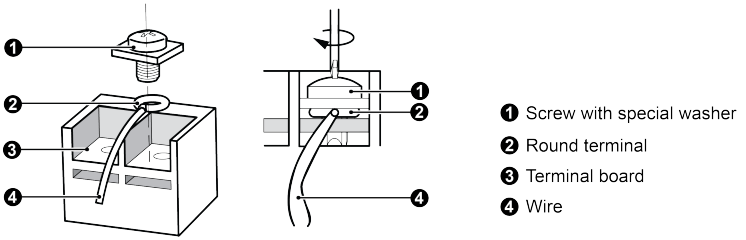


Fig.13

(3) How to connect the wired controller wires, the thermostat wires and power cords?

Lead the wired controller wires (or the thermostat wires) and power cords through the insulation tube (as shown in the following figure).

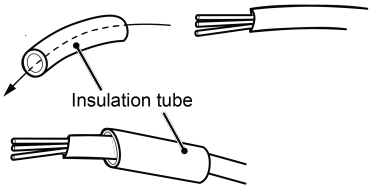
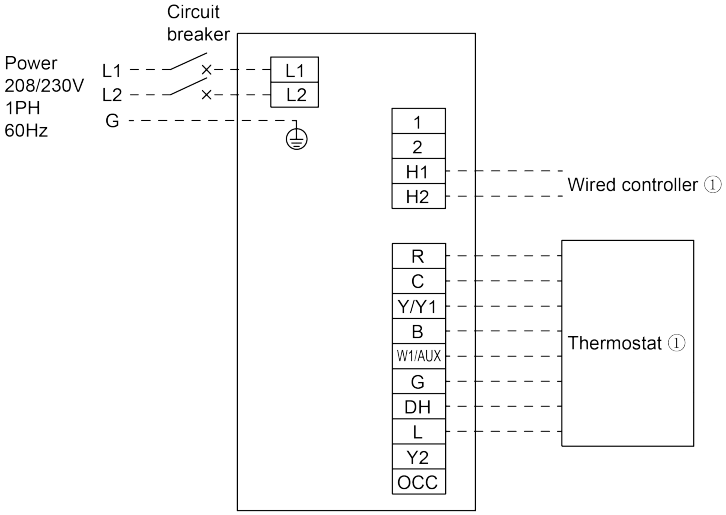


Fig.14

⚠ WARNING	
①	Before working, please check whether the units are powered on.
②	Wrong wire connection may burn the electrical components.
③	Connect the wires firmly to the wiring box. Incomplete installation may lead to fire hazard.
④	Ground wire should be connected.

3.6 Wiring Diagram

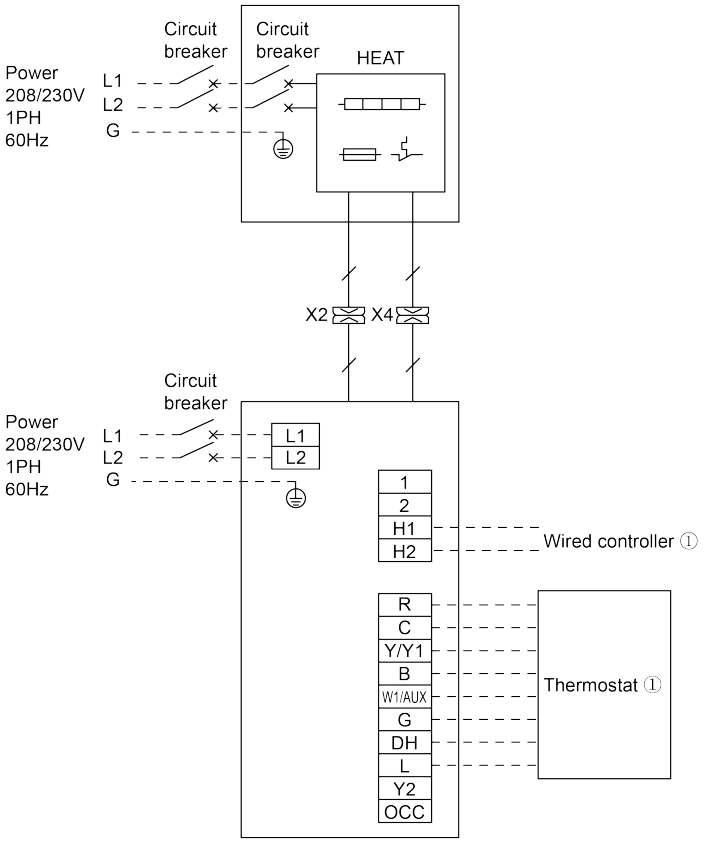
Without electric heater



Note:
① The unit can only be connected to a thermostat or wire controller.

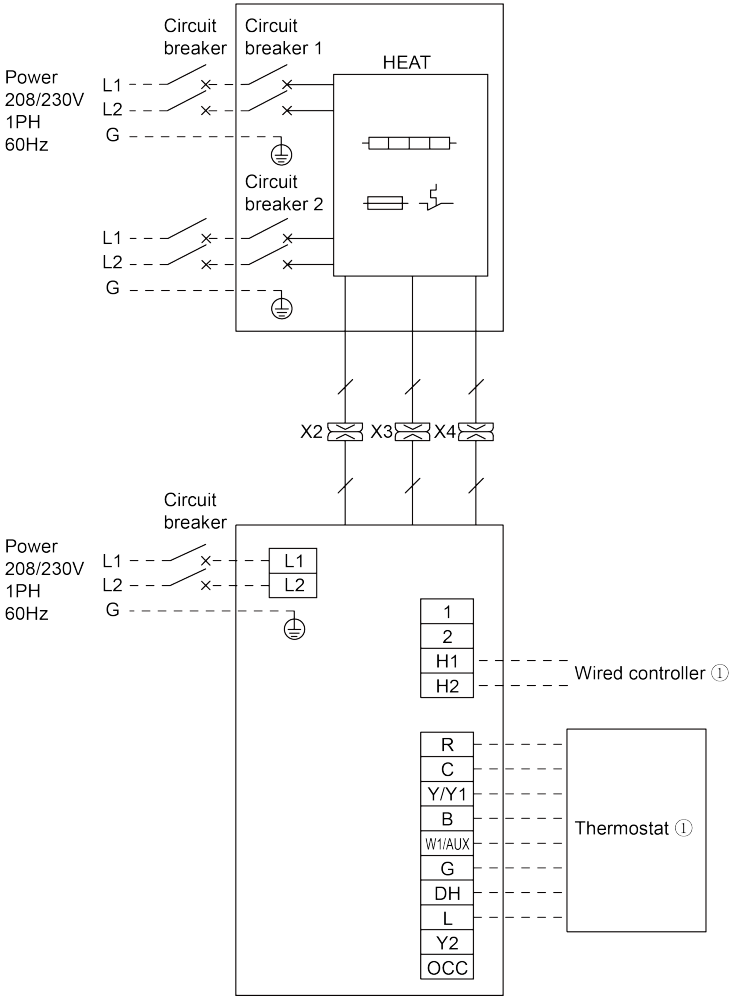
Fig.15

With electric heater



Note:
① The unit can only be connected to a thermostat or wire controller.

Fig.16 (with LYQ-08-F)



Note:
① The unit can only be connected to a thermostat or wire controller.

Fig.17 (with LYQ-08-G,LYQ-08-H)

NOTE:

① R means 24V AC power supply.

② C means 24V common.

③ Y/Y1 means Compressor control signal.

④ B which is energized under the heating mode means 4-way valve control signal.

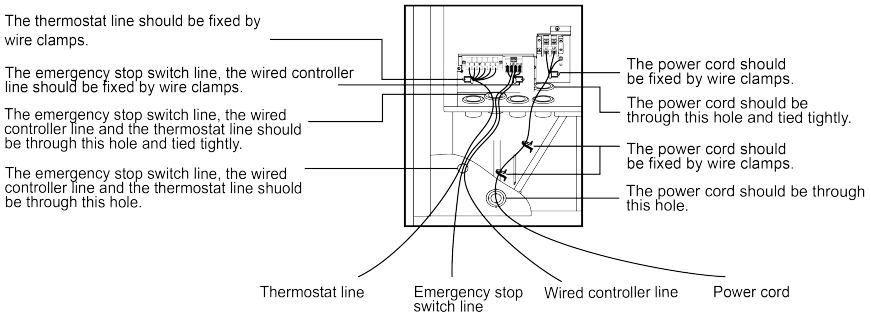
⑤ W1/AUX means heater control signal.

⑥ G means indoor side fan signal.

⑦ DH means dry signal.

⑧ L means refrigerant leakage protection signal.

3.7 Engineering Wiring Diagram



Note: ① If there is no emergency stop switch, please ignore its wiring.
② The unit can only be connected to a thermostat or a wired controller.

Fig.18

3.8 Check after Installation

Check items	Possible events due to improper installation
Is the main body installed securely?	The unit may fall down, vibrate or produce noise.
Did you do water leakage test?	Cooling capacity may become unsatisfactory.
Is the unit well insulated from heat?	Condensate, water drops may occur.
Does water drainage go well?	Condensate, water drops may occur.
Is the voltage consistent with that stated on the nameplate?	The unit may fail or its components may get burned.
Are the wires and pipes installed correctly?	The unit may fail or its components may get burned.
Has the unit been safely grounded?	Risk of electric leakage.
Do the specifications of wires comply with the requirement?	The unit may fail or its components may get burned.
Is there any obstacle blocking the air inlet and outlet of the units?	Cooling capacity may become unsatisfactory.

3.9 Test Running

Preparation before connecting the power:

(1) Power must not be connected if the installation work is not completed.

(2) Control circuit is correct and all the wires are firmly connected.

(3) The inside of the unit should be clean. Take irrelevant objects out if there is any.

Operation after connecting the power:

(1) If all the above works are finished, power on the unit.

(2) If the outside temperature is more than 30℃, heating mode can't be enabled.

(3) Before test operation, make sure unit is power on and compressor has been preheated for more than 8 hours. Touch the unit to check whether it's normally preheated. Start test operation after unit is normally preheated, otherwise compressor might be damaged. Debugging must be performed by professional technicians or under the guide of professional technicians.

(4) Make sure the units can run normally.

(5) If there's sound of liquid shock when the compressor is running, then stop the air conditioner immediately. Wait until the electric heating belt is heated enough, and then restart the air conditioner.

NOTICE
① If you use thermostat to turn off the unit and then immediately turn the unit on again, compressor will need 3min to restart. Even if you press "ON/OFF" button on the thermostat, it won't be started up right away.
② If there's no display on the thermostat, it's probably because the connection wires between the units and the thermostat are not connected. Please check again.

4 Troubleshooting

If your air-conditioning unit suffers from abnormal operation or failure, please first check the following points before repair.

Failure	Possible cause	Solution
The unit can not be started.	The power supply does not connect or improper phase sequence.	Connect the power supply or change two random phase.

Failure	Possible cause	Solution
The unit can not be started.	Electrical leakage of air-conditioning unit causes tripping of leakage switch.	Contact the nearest service center.
	The voltage is too low.	Contact the dealer.
	The control loop has failure.	Contact the nearest service center.
The unit operates for a while and then stops.	Air outlet port or intake port of the unit is blocked.	Remove the obstacles.
	There is obstacle in front of the condenser.	Remove the obstacles.
	The control loop is abnormal.	Contact the nearest service center.
Poor cooling effect.	Air filter is dirty.	Clean air filter.
	Air outlet port or intake port of indoor side or outdoor side is blocked.	Move the obstacles.
	Too many persons or a heat source in the Room.	If possible, clear heat sources.
	Doors or windows are open.	Close windows and doors.
	Refrigerant leakage.	Contact the nearest service center.
	Some model unit has a High Pressure Switch which is welded on discharge pipe. When the switch goes into effect, the power supply of compressor will be shut off.	Find and manual reset the High Pressure. Switch which is welded on discharge pipe.

NOTE: After carrying out the check of the above items and taking relevant measures to solve the problems found but the air-conditioning unit still does not function well, please stop the operation of the unit immediately and contact the nearest service center. Only ask professional serviceman to check and repair the unit.

5 Code List

No.	Code	Error or status
1	A1	Outdoor Fan IPM Module Protection
2	A5	Outdoor Condenser Inlet Pipe Temperature Sensor Error
3	A6	Malfunction from Fan driving part to main-control communication
4	A8	Overheat protection of Fan radiator
5	A9	Fan radiator sensor malfunction
6	AA	Fan AC current protection (input side)
7	Ab	Fan Drive Board Module Reset

No.	Code	Error or status
8	Ac	Outdoor Fan Startup Failure
9	Ad	Outdoor Fan Out-of-phase Protection
10	AE	Outdoor Fan Current Detecting Circuit Error
11	AF	Fan PFC abnormality
12	AH	Fan DC busbar over voltage protection
13	AJ	Outdoor Fan Non-synchronism Protection
14	AL	Fan DC busbar under voltage protection
15	An	Fan Drive Storage chip malfunction
16	AP	Fan AC input voltage abnormality
17	Ar	Fan driver board environment temperature sensor malfunction
18	AU	Fan Charge circuit malfunction
19	b2	Subcooler Gas Inlet Temperature Sensor Error
20	b3	Subcooler Gas Outlet Temperature Sensor Error
21	b4	Subcooler Liquid Outlet Temperature Sensor Error
22	C0	Communication Error between Indoor Unit and Wired Controller
23	C1	Indoor Ambient Temperature Sensor Error
24	C3	Outdoor Condenser Middle Pipe Temperature Sensor Error
25	C4	ODU Jumper Cap Error
26	C6	Discharge Temperature Sensor Error
27	C8	Compressor DIP Switch/Jumper Cap Error
28	C9	Compressor Drive Storage Chip Error
29	CA	Inlet pipe temperature sensor of evaporator error
30	Cb	Outlet pipe temperature sensor of evaporator error
31	Cd	Abnormal Electrical Level of Selected Port
32	CE	Wired Controller Temperature Sensor Error
33	dJ	AC Phase Sequence Protection (phase loss or phase reversal)
34	E0	Indoor Fan Error
35	e1	High Pressure Sensor Error
36	E1	System High Pressure Protection
37	E2	Freeze Protection
38	e3	Low Pressure Sensor Error
39	E3	Refrigerant Lacking Protection or System Low Pressure Protection
40	E4	Discharge Protection
41	EA	Refrigerant Leakage
42	EE	Memory Chip Read and Write Error
43	EH	Electric Heater Operation Error

No.	Code	Error or status
44	EL	Emergency Operation Stop
45	F3	Outdoor Ambient Temperature Sensor Error
46	FE	Malfunction of Refrigerant Sensor
47	FJ	Air Outlet Temperature Sensor Error
48	H5	Module Current Protection
49	H7	Compressor Non-synchronism
50	HC	PFC Overcurrent Error
51	L3	Outdoor Fan 1 Error
52	L4	Wired Controller Power Supply Circuit Failure
53	L5	Wired Controller Power Supply Overcurrent Protection
54	L6	Group-controlled IDU Quantity Inconsistency
55	LA	Outdoor Fan 2 Error
56	Lc	Startup Failure
57	LE	Compressor Stalling
58	LF	Overspeed
59	oE	Other Error of Compressor
60	P0	Drive Module Reset
61	P5	Overcurrent of Compressor Phase Current
62	P6	Drive Board Communication Error
63	P7	Module Temperature Sensor Circuit Error
64	P8	Module Temperature Protection
65	P9	AC Contactor Protection
66	PA	ODU AC Current Protection
67	Pd	Sensor Connection Protection (current sensor hasn't been connected to corresponding U phase or V phase)
68	PE	Temperature Shifting Protection
69	PF	Drive Board Ambient Temperature Sensor Error
70	PH	High Voltage Protection of DC Bus
71	PL	Low Voltage Protection of DC Bus
72	PP	DC Input Voltage Error
73	PU	Capacitor Charging Error
74	q0	Low Voltage Protection or Voltage Drop Error of Inverter Indoor Fan Drive DC Bus
75	q1	High Voltage Protection of Inverter Indoor Fan Drive DC Bus
76	q2	Inverter Indoor Fan AC Current Protection (input side)
77	q3	Inverter Indoor Fan Drive IPM Module Protection
78	q4	Inverter Indoor Fan Drive PFC Protection

No.	Code	Error or status
79	q5	Inverter Indoor Fan Startup Failure
80	q6	Inverter Indoor Fan Out-of-phase Protection
81	q7	Inverter Indoor Fan Drive Module Reset
82	q8	Inverter Indoor Fan Overcurrent Protection
83	q9	Inverter Indoor Fan Power Protection
84	qA	Inverter Indoor Fan Drive Current Detecting Circuit Error
85	qb	Inverter Indoor Fan Non-synchronism Protection
86	qC	Main Control and Inverter Indoor Fan Drive Communication Error
87	qd	Inverter Indoor Fan Drive Module High Temperature Protection
88	qE	Inverter Indoor Fan Drive Module Temperature Sensor Error
89	qF	Inverter Indoor Fan Drive Storage Chip Error
90	qH	Inverter Indoor Fan Drive Charging Circuit Error
91	qL	Inverter Indoor Fan Drive AC Input Voltage Abnormal Protection
92	qo	Inverter Indoor Fan Drive Electric Box Temperature Sensor Error
93	qp	Inverter Indoor Fan Drive AC Input Zero-crossing Protection
94	U1	Compressor Phase Current Circuit Detecting Error
95	U2	Compressor Phase Loss/Phase Reversal/Out of Phase
96	U9	Fan AC contractor protection or input zero crossing error
97	UL	Outdoor Fan Overcurrent Protection
98	UP	Fan power protection
99	08	Defrosting
100	09	Oil return

NOTE: If several errors happen at the same time, error codes will show on the display repeatedly.

6 Maintenance

To protract the life of the air-conditioning unit, check and maintain the unit regularly with a qualified service person.

6.1 Cleaning the Air Filter

(1) Do not disassemble the air filter when cleaning it. Otherwise failure may be caused.

(2) If the unit used in a dusty environment, it should clean the air filter more frequently.

6.2 Drainage Pipe

Periodically check if the drainage pipe is blocked to smooth the condensate water.

6.3 Cleaning the Heat Exchanger

Heat exchanger shall be cleaned regularly, which is at least once every two months. You can use a dust catcher with nylon brush to clean away the dust on the heat exchanger. If compressed air source is available, it also can be used to clean the heat exchanger. Do not clean it with water.

6.4 Notice before Seasonal Use

(1) Check whether air inlets and air outlets of units are blocked.
(2) Check whether ground connection is reliable or not.
(3) Check whether air filter is properly installed.
(4) If unit starts up after not operating for a long time, it should be power on 8 hours before operation starts so as to preheat the outdoor compressor.
(5) Check whether unit is securely installed. If there is any problem, please contact Greek authorized service center.

6.5 Maintenance after Seasonal Use

(1) Disconnect power of the entire system.
(2) Clean the air filter and outer case of units.
(3) Clean away the dust and obstacles.
(4) If unit has rust, please apply some paint to it so as to prevent the rust from growing.

6.6 Parts Replacement

Parts and components can be obtained from nearby Gree office or Gree distributor.

NOTES!

When you are conducting air tightness test and leakage test, do not mix oxygen, C_2H_2 or other dangerous gas into the refrigerant circuit. Otherwise, it may lead to danger. Use nitrogen or refrigerant to conduct the tests.

For appliances using A2L refrigerants, connected via an air duct system to one or more rooms, the supply and return air shall be directly ducted to the space. Open areas such as false ceilings shall not be used as a return air duct field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected information that the refrigerant detection system refrigerant sensors shall only be replaced with refrigerant sensors specified by the appliance manufacturer.

7 After-sales Service

If there's quality defect or other problems in the product, please contact Gree local after-sales service department for help.

Warranty must be based on the following conditions:

(1) Product's initial startup must be performed by professional technicians from Gree service center or persons assigned by Gree.

(2) Only Gree spare parts are used.

(3) All instructions of unit operation and maintenance in this manual must be strictly followed according to set period and set frequency.

(4) Any breach of the above conditions will disable the warranty.

8 Unventilated Areas

⚠WARNING

If appliances with A2L REFRIGERANTS connected via an air duct system to one or more rooms are installed in a room with an area less than Amin, that room shall be without continuously operating open flames (for example an operating gas appliance) or other POTENTIAL IGNITION SOURCES (for example an operating electric heater, hot surfaces). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest.

Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 648℃ and electric switching devices.

That only auxiliary devices approved by the appliance manufacturer or

declared suitable with the refrigerant shall be installed in connecting ductwork. The manufacturer can list in the instructions all approved auxiliary devices by the manufacturer and model number for use with the specific appliance, if those devices have a potential to become an ignition source.

9 Qualification of Workers

The manual shall contain specific information about the required qualification of the working personnel for maintenance, service and repair operations. Every working procedure that affects safety means shall only be carried out by competent persons.

NOTE: Information about competence of service personnel is given in informative Annex.

Examples for such working procedures are:

(1) Breaking into the refrigerating circuit;

(2) Opening of sealed components;

(3) Opening of ventilated enclosures.

10 Transportation, Marking and Storage for Units that Employ Flammable Refrigerants

10.1 General

The following information is provided for units that employ FLAMMABLE REFRIGERANTS.

10.2 Transport of Equipment Containing Flammable Refrigerants

Attention is drawn to the fact that additional transportation regulations may exist with respect to equipment containing flammable gas. The maximum number of pieces of equipment or the configuration of the equipment permitted to be transported together will be determined by the applicable transport regulations.

10.3 Marking of Equipment Using Signs

Signs for similar appliances used in a work area are generally addressed by local regulations and give the minimum requirements for the provision of safety and/ or health signs for a work location.

All required signs are to be maintained and employers should ensure that employees receive suitable and sufficient instruction and training on the meaning of appropriate safety signs and the actions that need to be taken in connection with these signs.

The effectiveness of signs should not be diminished by too many signs being placed together.

Any pictograms used should be as simple as possible and contain only essential details.

10.4 Disposal of Equipment Using Flammable Refrigerants

See national regulations.

10.5 Storage of Equipment/Appliances

The storage of the appliance should be in accordance with the applicable regulations or instructions, whichever is more stringent.

10.6 Storage of Packed (Unsold) Equipment

Storage package protection should be constructed in such a way that mechanical damage to the equipment inside the package will not cause a leak of the REFRIGERANT CHARGE.

The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.

11 Information on Servicing

11.1 General

The manual shall contain specific information for service personnel according to 11.2 to 11.10.

11.2 Checks to the Area

Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimised. For repair to the REFRIGERATING SYSTEM,11.3 to 11.7 shall be completed prior to conducting work on the system.

11.3 Work Procedure

Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.

11.4 General Work Area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

11.5 Checking for Presence of Refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

11.6 Presence of Fire Extinguisher

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

11.7 No Ignition Sources

No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

11.8 Ventilated Area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

11.9 Checks to the Refrigerating Equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

(1) The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;

(2) The ventilation machinery and outlets are operating adequately and are not obstructed;

(3) If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;

(4) Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;

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

11.10 Checks to Electrical Devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Initial safety checks shall include:

(1) That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;

(2) That no live electrical components and wiring are exposed while charging, recovering or purging the system;

(3) That there is continuity of earth bonding.

Only auxiliary devices approved by the appliance manufacturer or declared

suitable with the refrigerant shall be installed in connecting ductwork for duct connected appliances, false ceilings or drop ceilings may be used as a return air plenum if a REFRIGERANT DETECTION SYSTEM is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint.

11.11 Pipe Installation

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

That after completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected.

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

12 Sealed Electrical Components shall be Replaced

13 Intrinsically Safe Components must be Replaced

14 Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

15 Detection of Flammable Refrigerants

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

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

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

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

NOTE Examples of leak detection fluids are

(1) Bubble method.

(2) Fluorescent method agents.

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to Clause 16.

16 Removal and Evacuation

When breaking into the refrigerant circuit to make repairs or for any other purpose, conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to: The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times.

–Safely remove refrigerant following local and national regulations;

–Evacuate;

–Purge the circuit with inert gas (optional for A2L);

–Evacuate (optional for A2L);

–Continuously flush or purge with inert gas when using flame to open circuit;

–Open the circuit.

Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

17 Charging Procedures

In addition to conventional charging procedures, the following requirements shall be followed.

(1) Ensure that contamination of different refrigerants does not occur when using charging equipment.

(2) Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.

(3) Cylinders shall be kept in an appropriate position according to the instructions.

(4) Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.

(5) Label the system when charging is complete (if not already).

(6) Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

18 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

(1) Become familiar with the equipment and its operation) Isolate system electrically.

(2) Before attempting the procedure, ensure that:

1) Mechanical handling equipment is available, if required, for handling refrigerant cylinders;

2) All personal protective equipment is available and being used correctly;

3) The recovery process is supervised at all times by a competent person;

4) Recovery equipment and cylinders conform to the appropriate standards.

(3) Pump down refrigerant system, if possible.

(4) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

(5) Make sure that cylinder is situated on the scales before recovery takes place.

(6) Start the recovery machine and operate in accordance with instructions.

(7) Do not overfill cylinders (no more than 80 % volume liquid charge).

(8) Do not exceed the maximum working pressure of the cylinder, even temporarily.

(9) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

(10) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

19 Labelling

Equipment shall be labelled stating that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

20 Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders. If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

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