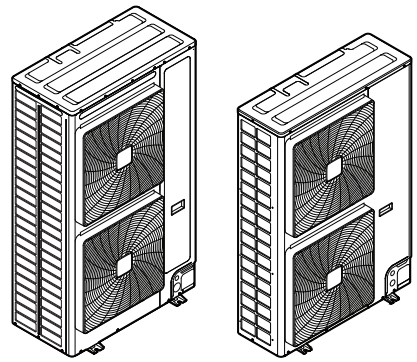
Installer and user reference guide

VRV 5-S system air conditioner



RXYSA8AMY1B
RXYSA10AMY1B
RXYSA12AMY1B

Table of contents

1 About this document

Target audience

Authorised installers + end users

INFORMATION

This appliance is intended to be used by expert or trained users in shops, in light industry, and on farms, or for commercial and household use by lay persons.

Documentation set

This document is part of a documentation set. The complete set consists of:

- **General safety precautions:**
  - Safety instructions that you must read before installing
  - Format: paper (in the box of the outdoor unit)
- **Outdoor unit installation and operation manual:**
  - Installation and operation instructions
  - Format: paper (in the box of the outdoor unit)
- **Installer and user reference guide:**
  - Preparation of the installation, reference data,…
  - Detailed step-by-step instructions and background information for basic and advanced usage
  - Format: Digital files on https://www.daikin.eu. Use the search function to find your model.

The latest revision of the supplied documentation is published on the regional Daikin website and is available via your dealer.

The original instructions are written in English. All other languages are translations of the original instructions.

1.1 Meaning of warnings and symbols

DANGER

Indicates a situation that results in death or serious injury.

DANGER: RISK OF ELECTROCUTION

Indicates a situation that could result in electrocution.

DANGER: RISK OF BURNING/SCALDING

Indicates a situation that could result in burning/scalding because of extreme hot or cold temperatures.

DANGER: RISK OF EXPLOSION

Indicates a situation that could result in explosion.

WARNING

Indicates a situation that could result in death or serious injury.

WARNING: FLAMMABLE MATERIAL

CAUTION

Indicates a situation that could result in minor or moderate injury.

NOTICE

Indicates a situation that could result in equipment or property damage.

INFORMATION

Indicates useful tips or additional information.

Symbols used on the unit:

Symbol	Explanation
	Before installation, read the installation and operation manual, and the wiring instruction sheet.
	Before performing maintenance and service tasks, read the service manual.
	For more information, see the installer and user reference guide.
	The unit contains rotating parts. Be careful when servicing or inspecting the unit.

Symbols used in the documentation:

Symbol	Explanation
	Indicates a figure title or a reference to it. **Example:** "1–3 Figure title" means "Figure 3 in chapter 1".
	Indicates a table title or a reference to it. **Example:** "1–3 Table title" means "Table 3 in chapter 1".

2 General safety precautions

2.1 For the installer

2.1.1 General

If you are NOT sure how to install or operate the unit, contact your dealer.

DANGER: RISK OF BURNING/SCALDING

- Do NOT touch the refrigerant piping, water piping or internal parts during and immediately after operation. It could be too hot or too cold. Give it time to return to normal temperature. If you MUST touch it, wear protective gloves.
- Do NOT touch any accidental leaking refrigerant.

WARNING

Improper installation or attachment of equipment or accessories could result in electrical shock, short-circuit, leaks, fire or other damage to the equipment. ONLY use accessories, optional equipment and spare parts made or approved by Daikin unless otherwise specified.

WARNING

Make sure installation, testing and applied materials comply with applicable legislation (on top of the instructions described in the Daikin documentation).

WARNING

Tear apart and throw away plastic packaging bags so that nobody, especially children, can play with them. **Possible consequence:** suffocation.

WARNING

Provide adequate measures to prevent that the unit can be used as a shelter by small animals. Small animals that make contact with electrical parts can cause malfunctions, smoke or fire.

CAUTION

Wear adequate personal protective equipment (protective gloves, safety glasses,...) when installing, maintaining or servicing the system.

CAUTION

Do NOT touch the air inlet or aluminium fins of the unit.

CAUTION

- Do NOT place any objects or equipment on top of the unit.
- Do NOT sit, climb or stand on the unit.

NOTICE

Works executed on the outdoor unit are best done under dry weather conditions to avoid water ingress.

In accordance with the applicable legislation, it might be necessary to provide a logbook with the product containing at least: information on maintenance, repair work, results of tests, stand-by periods,...

Also, at least, following information MUST be provided at an accessible place at the product:

- Instructions for shutting down the system in case of an emergency
- Name and address of fire department, police and hospital
- Name, address and day and night telephone numbers for obtaining service

In Europe, EN378 provides the necessary guidance for this logbook.

2.1.2 Installation site

- Provide sufficient space around the unit for servicing and air circulation.
- Make sure the installation site withstands the weight and vibration of the unit.
- Make sure the area is well ventilated. Do NOT block any ventilation openings.
- Make sure the unit is level.

Do NOT install the unit in the following places:

- In potentially explosive atmospheres.
- In places where there is machinery that emits electromagnetic waves. Electromagnetic waves may disturb the control system, and cause malfunction of the equipment.
- In places where there is a risk of fire due to the leakage of flammable gases (example: thinner or gasoline), carbon fibre, ignitable dust.
- In places where corrosive gas (example: sulphurous acid gas) is produced. Corrosion of copper pipes or soldered parts may cause the refrigerant to leak.

2.1.3 Refrigerant — in case of R410A or R32

If applicable. See the installation manual or installer reference guide of your application for more information.

DANGER: RISK OF EXPLOSION

Pump down – Refrigerant leakage. If you want to pump down the system, and there is a leak in the refrigerant circuit:

- Do NOT use the unit's automatic pump down function, with which you can collect all refrigerant from the system into the outdoor unit. **Possible consequence:** Self-combustion and explosion of the compressor because of air going into the operating compressor.
- Use a separate recovery system so that the unit's compressor does NOT have to operate.

WARNING

During tests, NEVER pressurise the product with a pressure higher than the maximum allowable pressure (as indicated on the nameplate of the unit).

WARNING

Take sufficient precautions in case of refrigerant leakage. If refrigerant gas leaks, ventilate the area immediately. Possible risks:

- Excessive refrigerant concentrations in a closed room can lead to oxygen deficiency.
- Toxic gas might be produced if refrigerant gas comes into contact with fire.

WARNING

ALWAYS recover the refrigerant. Do NOT release them directly into the environment. Use a vacuum pump to evacuate the installation.

WARNING

Make sure there is no oxygen in the system. Refrigerant may ONLY be charged after performing the leak test and the vacuum drying.

Possible consequence: Self-combustion and explosion of the compressor because of oxygen going into the operating compressor.

NOTICE

- To avoid compressor breakdown, do NOT charge more than the specified amount of refrigerant.
- When the refrigerant system is to be opened, refrigerant MUST be treated according to the applicable legislation.

NOTICE

Make sure refrigerant piping installation complies with applicable legislation. In Europe, EN378 is the applicable standard.

NOTICE

Make sure the field piping and connections are NOT subjected to stress.

NOTICE

After all the piping has been connected, make sure there is no gas leak. Use nitrogen to perform a gas leak detection.

- In case recharge is required, see the nameplate or the refrigerant charge label of the unit. It states the type of refrigerant and necessary amount.
- Whether the unit is factory charged with refrigerant or non-charged, in both cases you might need to charge additional refrigerant, depending on the pipe sizes and pipe lengths of the system.
- ONLY use tools exclusively for the refrigerant type used in the system, this to ensure pressure resistance and prevent foreign materials from entering into the system.
- Charge the liquid refrigerant as follows:

If	Then
A siphon tube is present (i.e., the cylinder is marked with "Liquid filling siphon attached")	Charge with the cylinder upright. 

If	Then
A siphon tube is NOT present	Charge with the cylinder upside down. 

- Open refrigerant cylinders slowly.
- Charge the refrigerant in liquid form. Adding it in gas form may prevent normal operation.

CAUTION

When the refrigerant charging procedure is done or when pausing, close the valve of the refrigerant tank immediately. If the valve is NOT closed immediately, remaining pressure might charge additional refrigerant. **Possible consequence:** Incorrect refrigerant amount.

2.1.4 Electrical

DANGER: RISK OF ELECTROCUTION

- Turn OFF all power supply before removing the switch box cover, connecting electrical wiring or touching electrical parts.
- Disconnect the power supply for more than 10 minutes, and measure the voltage at the terminals of main circuit capacitors or electrical components before servicing. The voltage MUST be less than 50 V DC before you can touch electrical components. For the location of the terminals, see the wiring diagram.
- Do NOT touch electrical components with wet hands.
- Do NOT leave the unit unattended when the service cover is removed.

WARNING

If NOT factory installed, a main switch or other means for disconnection, having a contact separation in all poles providing full disconnection under overvoltage category III condition, MUST be installed in the fixed wiring.

WARNING

- ONLY use copper wires.
- Make sure the field wiring complies with the national wiring regulations.
- All field wiring MUST be performed in accordance with the wiring diagram supplied with the product.
- NEVER squeeze bundled cables and make sure they do NOT come in contact with the piping and sharp edges. Make sure no external pressure is applied to the terminal connections.
- Make sure to install earth wiring. Do NOT earth the unit to a utility pipe, surge absorber, or telephone earth. Incomplete earth may cause electrical shock.
- Make sure to use a dedicated power circuit. NEVER use a power supply shared by another appliance.
- Make sure to install the required fuses or circuit breakers.
- Make sure to install an earth leakage protector. Failure to do so may cause electrical shock or fire.
- When installing the earth leakage protector, make sure it is compatible with the inverter (resistant to high frequency electric noise) to avoid unnecessary opening of the earth leakage protector.

WARNING

- After finishing the electrical work, confirm that each electrical component and terminal inside the switch box is connected securely.
- Make sure all covers are closed before starting up the unit.

CAUTION

- When connecting the power supply: connect the earth cable first, before making the current-carrying connections.
- When disconnecting the power supply: disconnect the current-carrying cables first, before separating the earth connection.
- The length of the conductors between the power supply stress relief and the terminal block itself MUST be as such that the current-carrying wires are tautened before the earth wire is in case the power supply is pulled loose from the stress relief.

NOTICE

Precautions when laying power wiring:

- Do NOT connect wiring of different thicknesses to the power terminal block (slack in the power wiring may cause abnormal heat).
- When connecting wiring which is the same thickness, do as shown in the figure above.
- For wiring, use the designated power wire and connect firmly, then secure to prevent outside pressure being exerted on the terminal board.
- Use an appropriate screwdriver for tightening the terminal screws. A screwdriver with a small head will damage the head and make proper tightening impossible.
- Over-tightening the terminal screws may break them.

Install power cables at least 1 meter away from televisions or radios to prevent interference. Depending on the radio waves, a distance of 1 meter may NOT be sufficient.

NOTICE

ONLY applicable if the power supply is three-phase, and the compressor has an ON/OFF starting method.

If there exists the possibility of reversed phase after a momentary black out and the power goes ON and OFF while the product is operating, attach a reversed phase protection circuit locally. Running the product in reversed phase can break the compressor and other parts.

3 Specific installer safety instructions

Always observe the following safety instructions and regulations.

Installation site (see "17.1 Preparing the installation site" [▸ 77])

WARNING

Follow the service space dimensions in this manual to install the unit correctly. See "27.1 Service space: Outdoor unit" [▸ 168].

WARNING

Tear apart and throw away plastic packaging bags so that nobody, especially children, can play with them. **Possible consequence:** suffocation.

CAUTION

Excessive refrigerant concentrations in a closed room can lead to oxygen deficiency.

WARNING

If the appliance contains R32 refrigerant, the floor area of the room in which the appliance is stored shall be at least 429 m².

WARNING

If one or more rooms are connected to the unit using a duct system, make sure:

- there are no operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater) in case the floor area is less than the minimum floor area A (m²).
- no auxiliary devices, which may be a potential ignition source, are installed in the duct work (example: hot surfaces with a temperature exceeding 700°C and electric switching device);
- only auxiliary devices approved by the manufacturer are used in the duct work;
- air inlet AND outlet are connected directly to the same room by ducting. Do NOT use spaces such as a false ceiling as a duct for the air inlet or outlet.

Opening and closing the unit (see "17.2 Opening and closing the unit" [▸ 82])

DANGER: RISK OF BURNING/SCALDING

DANGER: RISK OF ELECTROCUTION

DANGER: RISK OF ELECTROCUTION

Do NOT leave the unit unattended when the service cover is removed.

Mounting the outdoor unit (see "17.3 Mounting the outdoor unit" [▸ 83])

WARNING

Fixing method of the outdoor unit MUST be in accordance with the instructions from this manual. See "17.3 Mounting the outdoor unit" [▸ 83].

Connecting the refrigerant piping (see "18.2 Connecting the refrigerant piping" [▶ 93])

WARNING

Field piping MUST be in accordance with the instructions from this manual. See "18 Piping installation" [▶ 86].

CAUTION

Piping MUST be installed according to instructions given in "18 Piping installation" [▶ 86]. Only mechanical joints (e.g. braze+flare connections) that are compliant with the latest version of ISO14903 can be used.

Low temperature solder alloys shall not be used for pipe connections.

CAUTION

- Do NOT use mineral oil on flared part.
- Do NOT reuse piping from previous installations.
- NEVER install a drier to this unit to guarantee its lifetime. The drying material may dissolve and damage the system.

CAUTION

Install the refrigerant piping or components in a position where they are unlikely to be exposed to any substance which may corrode components containing refrigerant, unless the components are constructed of materials that are inherently resistant to corrosion or are suitably protected against corrosion.

WARNING

Take sufficient precautions in case of refrigerant leakage. If refrigerant gas leaks, ventilate the area immediately. Possible risks:

- Excessive refrigerant concentrations in a closed room can lead to oxygen deficiency.
- Toxic gas might be produced if refrigerant gas comes into contact with fire.

WARNING

ALWAYS recover the refrigerant. Do NOT release them directly into the environment. Use a vacuum pump to evacuate the installation.

WARNING

During tests, NEVER pressurise the product with a pressure higher than the maximum allowable pressure (as indicated on the nameplate of the unit).

CAUTION

Do NOT vent gases into the atmosphere.

WARNING

Any gas or oil remaining inside the stop valve may blow off the pinched piping.

Failure to observe the instructions in procedure below properly may result in property damage or personal injury, which may be serious depending on the circumstances.

WARNING

NEVER remove the pinched piping by brazing.

Any gas or oil remaining inside the stop valve may blow off the pinched piping.

Charging refrigerant (see "19 Charging refrigerant" [▶ 107])

WARNING

- The refrigerant inside the unit is mildly flammable, but normally does NOT leak. If the refrigerant leaks in the room and comes in contact with fire from a burner, a heater, or a cooker, this may result in fire, or the formation of a harmful gas.
- Turn OFF any combustible heating devices, ventilate the room, and contact the dealer where you purchased the unit.
- Do NOT use the unit until a service person confirms that the part from which the refrigerant leaked has been repaired.

WARNING

Charging of refrigerant MUST be in accordance with the instructions from this manual. See "19 Charging refrigerant" [▶ 107].

WARNING

- Only use R32 as refrigerant. Other substances may cause explosions and accidents.
- R32 contains fluorinated greenhouse gases. Its global warming potential (GWP) value is 675. Do NOT vent these gases into the atmosphere.
- When charging refrigerant, ALWAYS use protective gloves and safety glasses.

Electrical installation (see "20 Electrical installation" [▶ 115])

WARNING

Electrical wiring MUST be in accordance with the instructions from:

- This manual. See "20 Electrical installation" [▶ 115].
- The wiring diagram, which is delivered with the unit, located at the inside of the service cover. For a translation of its legend, see "27.3 Wiring diagram: Outdoor unit" [▶ 171].

WARNING

The appliance MUST be installed in accordance with national wiring regulations.

CAUTION

Do NOT push or place redundant cable length into the unit.

WARNING

- If the power supply has a missing or wrong N-phase, equipment might break down.
- Establish proper earthing. Do NOT earth the unit to a utility pipe, surge absorber, or telephone earth. Incomplete earthing may cause electrical shocks.
- Install the required fuses or circuit breakers.
- Secure the electrical wiring with cable ties so that the cables do NOT come in contact with sharp edges or piping, particularly on the high-pressure side.
- Do NOT use taped wires, extension cords, or connections from a star system. They can cause overheating, electrical shocks or fire.
- Do NOT install a phase advancing capacitor, because this unit is equipped with an inverter. A phase advancing capacitor will reduce performance and may cause accidents.

WARNING

- All wiring MUST be performed by an authorised electrician and MUST comply with the national wiring regulation.
- Make electrical connections to the fixed wiring.
- All components procured on-site and all electrical construction MUST comply with the applicable legislation.

WARNING

The electrical components shall only be replaced with parts specified by the appliance manufacturer. Replacement with other parts may result in the ignition of refrigerant in the event of a leak.

WARNING

If the supply cord is damaged, it MUST be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

WARNING

ALWAYS use multicore cable for power supply cables.

CAUTION

- When connecting the power supply: connect the earth cable first, before making the current-carrying connections.
- When disconnecting the power supply: disconnect the current-carrying cables first, before separating the earth connection.
- The length of the conductors between the power supply stress relief and the terminal block itself MUST be as such that the current-carrying wires are tautened before the earth wire is in case the power supply is pulled loose from the stress relief.

Commissioning (see "22 Commissioning" [▸ 145])

WARNING

Commissioning MUST be in accordance with the instructions from this manual. See "22 Commissioning" [▸ 145].

CAUTION

Do NOT perform the test operation while working on the indoor unit(s).

When performing the test operation, NOT ONLY the outdoor unit, but the connected indoor unit will operate as well. Working on an indoor unit while performing a test operation is dangerous.

CAUTION

Do NOT insert fingers, rods or other objects into the air inlet or outlet. Do NOT remove the fan guard. When the fan is rotating at high speed, it will cause injury.

Troubleshooting (see "25 Troubleshooting" [▸ 158])

WARNING

- When carrying out an inspection on the switch box of the unit, ALWAYS make sure that the unit is disconnected from the mains. Turn off the respective circuit breaker.
- When a safety device was activated, stop the unit and find out why the safety device was activated before resetting it. NEVER shunt safety devices or change their values to a value other than the factory default setting. If you are unable to find the cause of the problem, call your dealer.

WARNING

Prevent hazards due to inadvertent resetting of the thermal cut-out: power to this appliance MUST NOT be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly turned ON and OFF by the utility.

3.1 Instructions for equipment using R32 refrigerant

A2L

WARNING: MILDLY FLAMMABLE MATERIAL

The refrigerant inside this unit is mildly flammable.

WARNING

- Do NOT pierce or burn refrigerant cycle parts.
- Do NOT use cleaning materials or means to accelerate the defrosting process other than those recommended by the manufacturer.
- Be aware that the refrigerant inside the system is odourless.

WARNING

The appliance shall be stored/installed as follows:

- in such a way as to prevent mechanical damage.
- in a well-ventilated room without continuously operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater).
- in a room with dimensions as specified in "16 Special requirements for R32 units" [▸ 60].

WARNING

Make sure installation, servicing, maintenance and repair comply with instructions from Daikin and with applicable legislation (for example national gas regulation) and are executed ONLY by authorised persons.

WARNING

- Take precautions to avoid excessive vibration or pulsation to refrigeration piping.
- Protect the protection devices, piping and fittings as much as possible against adverse environmental effects.
- ALWAYS support the piping at distances of 1 m and 2 m from the SV unit and directly connected indoor units to the outdoor unit.
- Provide space for expansion and contraction of long runs of piping.
- Design and install piping in refrigerating systems such as to minimise the likelihood of hydraulic shock damaging the system.
- Mount the indoor equipment and pipes securely and protect them to avoid accidental rupture of equipment or pipes in case of events such as moving furniture or reconstruction activities.

CAUTION

Do NOT use potential sources of ignition in searching for or detection of refrigerant leaks.

NOTICE

- Do NOT re-use joints and copper gaskets which have been used already.
- Joints made in the installation between parts of the refrigerant system shall be accessible for maintenance purposes.

See "To determine the charge limit" [▸ 72] to check if your system meets the requirement for charge limitation.

For the user

4 User safety instructions

Always observe the following safety instructions and regulations.

In this chapter

4.1 General

WARNING

If you are NOT sure how to operate the unit, contact your installer.

WARNING

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.

Children SHALL NOT play with the appliance.

Cleaning and user maintenance SHALL NOT be made by children without supervision.

WARNING

To prevent electrical shocks or fire:

- Do NOT rinse the unit.
- Do NOT operate the unit with wet hands.
- Do NOT place any objects containing water on the unit.

CAUTION

- Do NOT place any objects or equipment on top of the unit.
- Do NOT sit, climb or stand on the unit.

- Units are marked with the following symbol:

This means that electrical and electronic products may NOT be mixed with unsorted household waste. Do NOT try to dismantle the system yourself: dismantling the system, treatment of the refrigerant, of oil and of other parts MUST be done by an authorised installer and MUST comply with applicable legislation.

Units MUST be treated at a specialised treatment facility for reuse, recycling and recovery. By ensuring this product is disposed of correctly, you will help to prevent potential negative consequences for the environment and human health. For more information, contact your installer or local authority.

- Batteries are marked with the following symbol:

This means that the batteries may NOT be mixed with unsorted household waste. If a chemical symbol is printed beneath the symbol, this chemical symbol means that the battery contains a heavy metal above a certain concentration.

Possible chemical symbols are: Pb: lead (>0.004%).

Waste batteries MUST be treated at a specialised treatment facility for reuse. By ensuring waste batteries are disposed of correctly, you will help to prevent potential negative consequences for the environment and human health.

4.2 Instructions for safe operation

WARNING

Make sure installation, servicing, maintenance, repair and applied materials follow the instructions from Daikin (including all documents listed in “Documentation set”) and, in addition, comply with applicable legislation and are performed by qualified persons only. In Europe and areas where IEC standards apply, EN/IEC 60335-2-40 is the applicable standard.

WARNING

Do NOT install operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater) in the ductwork.

CAUTION

- NEVER touch the internal parts of the controller.
- Do NOT remove the front panel. Some parts inside are dangerous to touch and appliance problems may happen. For checking and adjusting the internal parts, contact your dealer.

CAUTION

Do NOT operate the system when using a room fumigation-type insecticide. Chemicals could collect in the unit, and endanger the health of people who are hypersensitive to chemicals.

CAUTION

It is unhealthy to expose your body to the air flow for a long time.

WARNING

This unit contains electrical and hot parts.

WARNING

Before operating the unit, be sure the installation has been carried out correctly by an installer.

Maintenance and service (see "9 Maintenance and service" [▶ 38])

WARNING

The unit is equipped with a refrigerant leak detection system for safety.

To be effective, the unit MUST be electrically powered at all times after installation, except for maintenance.

WARNING

NEVER replace a fuse with a fuse of a wrong ampere ratings or other wires when a fuse blows out. Use of wire or copper wire may cause the unit to break down or cause a fire.

WARNING

If the supply cord is damaged, it MUST be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

CAUTION

Do NOT insert fingers, rods or other objects into the air inlet or outlet. Do NOT remove the fan guard. When the fan is rotating at high speed, it will cause injury.

CAUTION: Pay attention to the fan!

It is dangerous to inspect the unit while the fan is running.

Make sure to turn OFF the main switch before executing any maintenance task.

CAUTION

After a long use, check the unit stand and fitting for damage. If damaged, the unit may fall and result in injury.

About the refrigerant (see "9.2 About the refrigerant" [▸ 38])

WARNING: MILDLY FLAMMABLE MATERIAL

The refrigerant inside this unit is mildly flammable.

WARNING

- The refrigerant inside the unit is mildly flammable, but normally does NOT leak. If the refrigerant leaks in the room and comes in contact with fire from a burner, a heater, or a cooker, this may result in fire, or the formation of a harmful gas.
- Turn OFF any combustible heating devices, ventilate the room, and contact the dealer where you purchased the unit.
- Do NOT use the unit until a service person confirms that the part from which the refrigerant leaked has been repaired.

WARNING

The appliance shall be stored in a room without continuously operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater).

WARNING

- Do NOT pierce or burn refrigerant cycle parts.
- Do NOT use cleaning materials or means to accelerate the defrosting process other than those recommended by the manufacturer.
- Be aware that the refrigerant inside the system is odourless.

After-sales service and warranty (see "9.3 After-sales service" [▸ 39])

WARNING

- Do NOT modify, disassemble, remove, reinstall or repair the unit yourself as incorrect dismantling or installation may cause an electrical shock or fire. Contact your dealer.
- In case of accidental refrigerant leaks, make sure there are no naked flames. The refrigerant itself is entirely safe, non-toxic and mildly flammable, but it will generate toxic gas when it accidentally leaks into a room where combustible air from fan heaters, gas cookers, etc. is present. Always have qualified service personnel confirm that the point of leakage has been repaired or corrected before resuming operation.

Troubleshooting (see "10 Troubleshooting" [▸ 41])

WARNING

Stop operation and shut OFF the power if anything unusual occurs (burning smells etc.).

Leaving the unit running under such circumstances may cause breakage, electrical shock or fire. Contact your dealer.

WARNING

The unit is equipped with a refrigerant leak detection system for safety.

To be effective, the unit MUST be electrically powered at all times after installation, except for maintenance.

CAUTION

NEVER expose little children, plants or animals directly to the airflow.

CAUTION

Do NOT touch the heat exchanger fins. These fins are sharp and could result in cutting injuries.

5 About the system

The VRV 5-S uses R32 refrigerant which is rated as A2L and is mildly flammable. For compliance with the requirements for enhanced tightness refrigerating systems and IEC60335-2-40 the installer must take extra measures. For more information, see "3.1 Instructions for equipment using R32 refrigerant" [▸ 17].

The indoor unit part of this VRV 5-S heat pump system can be used for heating/cooling applications. The type of indoor unit which can be used depends on the outdoor units series.

In general following type of indoor units can be connected to a VRV 5-S heat pump system (not exhaustive list, depending on outdoor unit model and indoor unit model combinations):

- VRV direct expansion indoor units (air to air applications).
- EKVDX (air-to-air applications): VAM-J8 required.
- AHU (air-to-air applications): EKEXVA kit is required.
- Air curtain (air-to-air applications). See the combination table in the databook for more information.
- Airhandling unit connection in pair to VRV 5-S heat pump outdoor unit is supported.
- Airhandling unit connection in multi to VRV 5-S heat pump outdoor unit is supported, even combined with VRV direct expansion indoor unit(s).
- Multi tenant option is not allowed for floor standing indoor units (e.g. FXNA) connected to VRV 5-S heat pump outdoor unit.

WARNING

- Do NOT modify, disassemble, remove, reinstall or repair the unit yourself as incorrect dismantling or installation may cause an electrical shock or fire. Contact your dealer.
- In case of accidental refrigerant leaks, make sure there are no naked flames. The refrigerant itself is entirely safe, non-toxic and mildly flammable, but it will generate toxic gas when it accidentally leaks into a room where combustible air from fan heaters, gas cookers, etc. is present. Always have qualified service personnel confirm that the point of leakage has been repaired or corrected before resuming operation.

WARNING

The unit is equipped with a refrigerant leak detection system for safety.

To be effective, the unit MUST be electrically powered at all times after installation, except for short service periods.

NOTICE

Do NOT use the system for other purposes. In order to avoid any quality deterioration, do NOT use the unit for cooling precision instruments, food, plants, animals, or works of art.

NOTICE

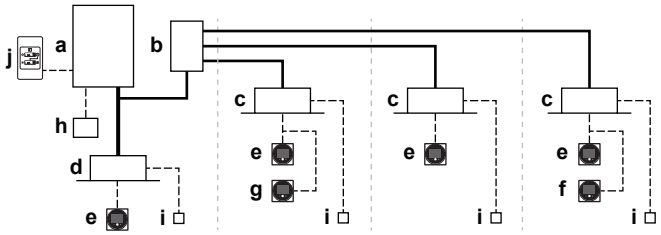
For future modifications or expansions of your system:

A full overview of allowable combinations (for future system extensions) is available in technical engineering data and should be consulted. Contact your installer to receive more information and professional advice.

5.1 System layout

INFORMATION

The following figure is an example and may NOT completely match your system layout.



a Heat pump outdoor unit
b Safety valve unit (SV)
c VRV direct expansion (DX) indoor unit
d VRV direct expansion (DX) indoor unit (direct connection from outdoor to indoor)
e Remote controller in **normal mode**
f Remote controller in **alarm only mode**
g Remote controller in **supervisor mode** (mandatory in some situations)
h Centralised controller (optional)
i Option PCB (optional)
j Cool/heat changeover remote control switch (optional)
—— Refrigerant piping
----- Interconnection and user interface wiring
—— Direct connection of indoor units to the outdoor unit

6 User interface

CAUTION

- NEVER touch the internal parts of the controller.
- Do NOT remove the front panel. Some parts inside are dangerous to touch and appliance problems may happen. For checking and adjusting the internal parts, contact your dealer.

This operation manual offers a non-exhaustive overview of the main functions of the system.

Detailed information on required actions to achieve certain functions can be found in the dedicated installation and operation manual of the indoor unit.

Refer to the operation manual of the installed user interface.

7 Operation

In this chapter

7.1 Before operation

CAUTION

See "4 User safety instructions" [▶ 20] to acknowledge all related safety instructions.

NOTICE

NEVER inspect or service the unit by yourself. Ask a qualified service person to perform this work.

NOTICE

Turn ON the power 6 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

This operation manual is for the following systems with standard control. Before initiating operation, contact your dealer for the operation that corresponds to your system type and mark. If your installation has a customised control system, ask your dealer for the operation that corresponds to your system.

Operation modes (depending on indoor unit type):

- Heating and cooling (air to air).
- Fan only operation (air to air).

Dedicated functions exist depending on the type of indoor unit, refer to dedicated installation/operation manual for more information.

7.2 Operation range

Use the system in the following temperature and humidity ranges for safe and effective operation.

	Cooling	Heating
Outdoor temperature	–5~52°C DB	–20~21°C DB –20~15.5°C WB
Indoor temperature	21~32°C DB 14~25°C WB	15~27°C DB
Indoor humidity	≤80%[a]	

[a] To avoid condensation and water dripping out of the unit. If the temperature or the humidity is beyond these conditions, safety devices may be put in action and the air conditioner may not operate.

Above operation range is only valid in case direct expansion indoor units are connected to the VRV 5-S system.

Special operation ranges are valid in case of using AHU. They can be found in the installation/operation manual of the dedicated unit. Latest information can be found in the technical engineering data.

7.3 Operating the system

7.3.1 About operating the system

- Operation procedure varies according to the combination of outdoor unit and user interface.
- To protect the unit, turn on the main power switch 6 hours before operation.
- If the main power supply is turned off during operation, operation will restart automatically after the power turns back on again.

7.3.2 About cooling, heating, fan only, and automatic operation

- Changeover cannot be made with a user interface whose display shows  "changeover under centralised control" (refer to installation and operation manual of the user interface).
- When the display  "changeover under centralised control" flashes, refer to "7.6.1 About setting the master user interface" [▸ 34].
- The fan may keep on running for about 1 minute after the heating operation stops.
- The air flow rate may adjust itself depending on the room temperature or the fan may stop immediately. This is not a malfunction.

7.3.3 About the heating operation

It may take longer to reach the set temperature for general heating operation than for cooling operation.

The following operation is performed in order to prevent the heating capacity from dropping or cold air from blowing.

Defrost operation

In heating operation, freezing of the outdoor unit's air cooled coil increases over time, restricting the energy transfer to the outdoor unit's coil. Heating capability decreases and the system needs to go into defrost operation to be able to remove

frost from the outdoor unit's coil. During defrost operation the heating capacity on the indoor unit side will temporarily drop until defrosting is completed. After defrosting, the unit will regain its full heating capacity.

The indoor unit will stop fan operation, the refrigerant cycle will reverse and energy from inside the building will be used to defrost the outdoor unit coil.

The indoor unit will indicate defrost operation on the display .

Hot start

In order to prevent cold air from blowing out of an indoor unit at the start of heating operation, the indoor fan is automatically stopped. The display of the user interface shows . It may take some time before the fan starts. This is not a malfunction.

INFORMATION

- The heating capacity drops when the outside temperature falls. If this happens, use another heating device together with the unit. (When using together with appliances that produce open fire, ventilate the room constantly). Do not place appliances that produce open fire in places exposed to the air flow from the unit or under the unit.
- It takes some time to heat up the room from the time the unit is started since the unit uses a hot-air circulating system to heat the entire room.
- If the hot air rises to the ceiling, leaving the area above the floor cold, we recommend that you use the circulator (the indoor fan for circulating air). Contact your dealer for details.

7.3.4 To operate the system (WITHOUT cool/heat changeover remote control switch)

1 Press the operation mode selector button on the user interface several times and select the operation mode of your choice.

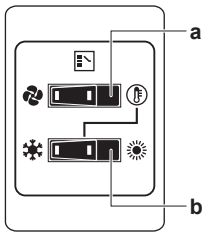
- Cooling operation
- Heating operation
- Fan only operation

2 Press the ON/OFF button on the user interface.

Result: The operation lamp lights up and the system starts operating.

7.3.5 To operate the system (WITH cool/heat changeover remote control switch)

Overview of the changeover remote control switch



a FAN ONLY/AIR CONDITIONING SELECTOR SWITCH

Set the switch to for fan only operation or to for heating or cooling operation.

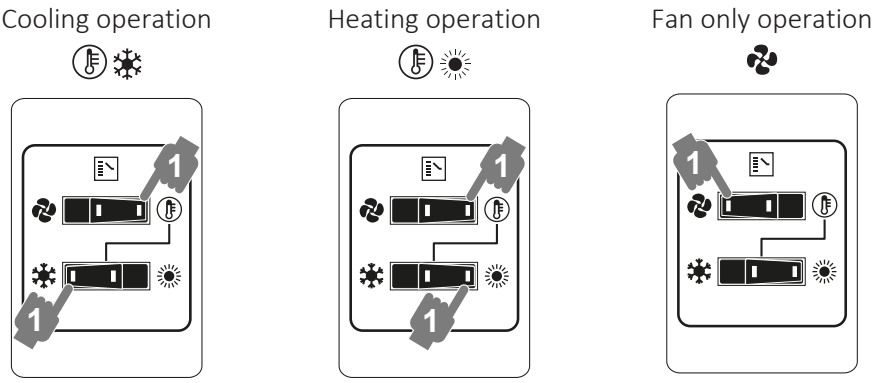
b COOL/HEAT CHANGEOVER SWITCH

Set the switch to for cooling or to for heating

Note: In case a cool/heat changeover remote control switch is used, the position of DIP switch 1 (DS1-1) on the main PCB needs to be switched to the ON position.

To start

1 Select operation mode with the cool/heat changeover switch as follows:



2 Press the ON/OFF button on the user interface.

Result: The operation lamp lights up and the system starts operating.

To stop

3 Press the ON/OFF button on the user interface once again.

Result: The operation lamp goes out and the system stops operating.

> **NOTICE**
>
> Do not turn off power immediately after the unit stops, but wait for at least 5 minutes.

To adjust

For programming temperature, fan speed and air flow direction refer to the operation manual of the user interface.

7.4 Using the dry program

7.4.1 About the dry program

- The function of this program is to decrease the humidity in your room with minimal temperature decrease (minimal room cooling).
- The micro computer automatically determines temperature and fan speed (cannot be set by the user interface).
- The system does not go into operation if the room temperature is low (<20°C).

7.4.2 To use the dry program (WITHOUT cool/heat changeover remote control switch)

To start

1 Press the operation mode selector button on the user interface several times and select (program dry operation).

2 Press the ON/OFF button of the user interface.

Result: The operation lamp lights up and the system starts operating.

3 Press the air flow direction adjust button (only for double-flow, multi-flow, corner, ceiling-suspended and wall-mounted). Refer to "7.5 Adjusting the air flow direction" [▸ 33] for details.

To stop

4 Press the ON/OFF button on the user interface once again.

Result: The operation lamp goes out and the system stops operating.

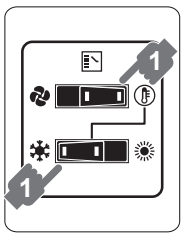
NOTICE

Do not turn off power immediately after the unit stops, but wait for at least 5 minutes.

7.4.3 To use the dry program (WITH cool/heat changeover remote control switch)

To start

1 Select cooling operation mode with the cool/heat changeover remote control switch.



2 Press the operation mode selector button on the user interface several times and select (program dry operation).

3 Press the ON/OFF button of the user interface.

Result: The operation lamp lights up and the system starts operating.

4 Press the air flow direction adjust button (only for double-flow, multi-flow, corner, ceiling-suspended and wall-mounted). Refer to "7.5 Adjusting the air flow direction" [▸ 33] for details.

To stop

5 Press the ON/OFF button on the user interface once again.

Result: The operation lamp goes out and the system stops operating.

NOTICE

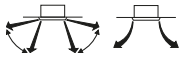
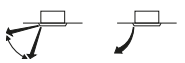
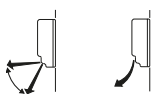
Do not turn off power immediately after the unit stops, but wait for at least 5 minutes.

7.5 Adjusting the air flow direction

Refer to the operation manual of the user interface.

7.5.1 About the air flow flap

Air flow flap types:

-  Double flow + multi-flow units
-  Corner units
-  Ceiling suspended units
-  Wall-mounted units

For the following conditions, a micro computer controls the air flow direction which may be different from the display.

Cooling	Heating
▪ When the room temperature is lower than the set temperature.	▪ When starting operation. ▪ When the room temperature is higher than the set temperature. ▪ At defrost operation.
▪ When operating continuously at horizontal air flow direction. ▪ When continuous operation with downward air flow is performed at the time of cooling with a ceiling-suspended or a wall-mounted unit, the micro computer may control the flow direction, and then the user interface indication will also change.	

The air flow direction can be adjusted in one of the following ways:

- The air flow flap itself adjusts its position.
- The air flow direction can be fixed by the user.
- Automatic and desired position .

WARNING

NEVER touch the air outlet or the horizontal blades while the swing flap is in operation. Fingers may become caught or the unit may break down.

NOTICE

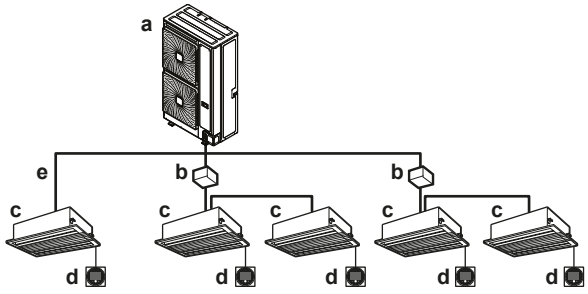
- The movable limit of the flap is changeable. Contact your dealer for details. (only for double-flow, multi-flow, corner, ceiling-suspended and wall-mounted).
- Avoid operating in the horizontal direction . It may cause dew or dust to settle on the ceiling or flap.

7.6 Setting the master user interface

7.6.1 About setting the master user interface

INFORMATION

The following figure is an example and may NOT completely match your system layout.



a Outdoor unit
b SV unit
c VRV DX indoor unit
d User interface
e Direct connection to VRV DX indoor unit

When the system is installed as shown in the figure above, it is necessary to – for each subsystem – designate one of the user interfaces as the master user interface.

The displays of slave user interfaces show (changeover under centralised control) and slave user interfaces automatically follow the operation mode directed by the master user interface.

Only the master user interface can select heating or cooling mode (cooling/heating masterhood).

7.6.2 To designate the master user interface

1. Press the operation mode selector button of the current master user interface for 4 seconds. In case this procedure was not yet performed, the procedure can be executed on the first user interface operated.

   Result: The display showing (changeover under centralised control) of all slave user interfaces connected to the same outdoor unit flashes.

2. Press the operation mode selector button of the controller that you wish to designate as the master user interface.

   Result: Designation is completed. This user interface is designated as the master user interface and the display showing (changeover under centralised control) vanishes. The displays of other user interfaces show (changeover under centralised control).

Refer to the operation manual of the user interface.

7.7 About control systems

This system provides two other control systems beside individual control system (one user interface controls one indoor unit). Confirm the following if your unit is of the following control system type:

Type	Description
Group control system	One user interface controls up to 10 indoor units. All indoor units are equally set.
Two user interface control system	Two user interfaces control one indoor unit (in case of group control system, one group of indoor units). The unit is individually operated.

NOTICE

Contact your dealer in case of changing the combination or setting of group control and two user interface control systems.

8 Energy saving and optimum operation

Observe the following precautions to ensure the system operates properly.

- Adjust the air outlet properly and avoid direct air flow to room inhabitants.
- Adjust the room temperature properly for a comfortable environment. Avoid excessive heating or cooling.
- Prevent direct sunlight from entering a room during cooling operation by using curtains or blinds.
- Ventilate often. Extended use requires special attention to ventilation.
- Keep doors and windows closed. If the doors and windows remain open, air will flow out of your room causing a decrease in the cooling or heating effect.
- Be careful NOT to cool or heat too much. To save energy, keep the temperature setting at a moderate level.
- NEVER place objects near the air inlet or the air outlet of the unit. Doing so may cause a reduced heating/cooling effect or stop operation.
- When the display shows  (time to clean the air filter), ask a qualified service person to clean the filters. (Refer to "Maintenance" in the indoor unit manual.)
- Keep the indoor unit and user interface at least 1 m away from televisions, radios, stereos, and other similar equipment. Failing to do so may cause static or distorted pictures.
- Do NOT place items under the indoor unit, as they may be damaged by water.
- Condensation may form if the humidity is above 80% or if the drain outlet gets blocked.

This heat pump system is equipped with advanced energy saving functionality. Depending on the priority, emphasis can be put on energy saving or comfort level. Several parameters can be selected, resulting in the optimal balance between energy consumption and comfort for the particular application.

Several patterns are available and roughly explained below. Contact your installer or dealer for advice or to modify the parameters to the needs of your building.

Detailed information is given for the installer in the installation manual. He can help you to realize the best balance between energy consumption and comfort.

In this chapter

8.1 Available main operation methods

Basic

The refrigerant temperature is fixed independent from the situation.

Automatic

The refrigerant temperature is set depending on the outdoor ambient conditions. As such adjusting the refrigerant temperature to match the required load (which is also related to the outdoor ambient conditions).

E.g., when your system is operating in cooling, you do not need as much cooling under low outdoor ambient temperatures (e.g., 25°C) as under high outdoor ambient temperatures (e.g., 35°C). Using this idea, the system automatically starts increasing its refrigerant temperature, automatically reducing the delivered capacity and increasing the system's efficiency.

Hi-sensible/economic (cooling/heating)

The refrigerant temperature is set higher/lower (cooling/heating) compared to basic operation. The focus under high sensible mode is comfort feeling for the customer.

The selection method of indoor units is important and has to be considered as the available capacity is not the same as under basic operation.

For details concerning to Hi-sensible applications, please contact your installer.

8.2 Available comfort settings

For each of above modes a comfort level can be selected. The comfort level is related to the timing and the effort (energy consumption) which is put in achieving a certain room temperature by temporarily changing the refrigerant temperature to different values in order to achieve requested conditions more quickly.

- Powerful
- Quick
- Mild
- Eco

9 Maintenance and service

In this chapter

9.1 Precautions for maintenance and service

CAUTION

See "4 User safety instructions" [▸ 20] to acknowledge all related safety instructions.

NOTICE

NEVER inspect or service the unit by yourself. Ask a qualified service person to perform this work.

NOTICE

Do NOT wipe the controller operation panel with benzine, thinner, chemical dust cloth, etc. The panel may get discoloured or the coating peeled off. If it is heavily dirty, soak a cloth in water-diluted neutral detergent, squeeze it well and wipe the panel clean. Wipe it with another dry cloth.

9.2 About the refrigerant

CAUTION

See "4 User safety instructions" [▸ 20] to acknowledge all related safety instructions.

This product contains fluorinated greenhouse gases. Do NOT vent gases into the atmosphere.

Refrigerant type: R32

Global warming potential (GWP) value: 675

Periodical inspections for refrigerant leaks may be required depending on the applicable legislation. Contact your installer for more information.

NOTICE

Applicable legislation on **fluorinated greenhouse gases** requires that the refrigerant charge of the unit is indicated both in weight and CO_2 equivalent.

Formula to calculate the quantity in CO_2 equivalent tonnes: GWP value of the refrigerant × total refrigerant charge [in kg]/1000

Contact your installer for more information.

9.3 After-sales service

9.3.1 Recommended maintenance and inspection

Since dust collects when using the unit for several years, performance of the unit will deteriorate to some extent. As taking apart and cleaning interiors of units requires technical expertise and in order to ensure the best possible maintenance of your units, we recommend to enter into a maintenance and inspection contract on top of normal maintenance activities. Our network of dealers has access to a permanent stock of essential components in order to keep your unit in operation as long as possible. Contact your dealer for more information.

When asking your dealer for an intervention, always state:

- The complete model name of the unit.
- The manufacturing number (stated on the nameplate of the unit).
- The installation date.
- The symptoms or malfunction, and details of the defect.

WARNING

- Do NOT modify, disassemble, remove, reinstall or repair the unit yourself as incorrect dismantling or installation may cause an electrical shock or fire. Contact your dealer.
- In case of accidental refrigerant leaks, make sure there are no naked flames. The refrigerant itself is entirely safe, non-toxic and mildly flammable, but it will generate toxic gas when it accidentally leaks into a room where combustible air from fan heaters, gas cookers, etc. is present. Always have qualified service personnel confirm that the point of leakage has been repaired or corrected before resuming operation.

9.3.2 Recommended maintenance and inspection cycles

Be aware that the mentioned maintenance and replacement cycles do not relate to the warranty period of the components.

Component	Inspection cycle	Maintenance cycle (replacements and/or repairs)
Electric motor	1 year	20,000 hours
PCB		25,000 hours
Heat exchanger		5 years
Sensor (thermistor, etc.)		5 years
User interface and switches		25,000 hours
Drain pan		8 years
Expansion valve		20,000 hours
Solenoid valve		20,000 hours

The table assumes the following conditions of use:

- Normal use without frequent starting and stopping of the unit. Depending on the model, we recommend not starting and stopping the machine more than 6 times/hour.
- Operation of the unit is assumed to be 10 hours/day and 2,500 hours/year.

NOTICE

- The table indicates main components. Refer to your maintenance and inspection contract for more details.
- The table indicates recommended intervals of maintenance cycles. However, in order to keep the unit operational as long as possible, maintenance work may be required sooner. Recommended intervals can be used for appropriate maintenance design in terms of budgeting maintenance and inspection fees. Depending on the content of the maintenance and inspection contract, inspection and maintenance cycles may in reality be shorter than listed.

9.3.3 Shortened maintenance and replacement cycles

Shortening of "maintenance cycle" and "replacement cycle" needs to be considered in following situations:

The unit is used in locations where:

- Heat and humidity fluctuate out of the ordinary.
- Power fluctuation is high (voltage, frequency, wave distortion, etc.) (the unit cannot be used if power fluctuation is outside the allowable range).
- Bumps and vibrations are frequent.
- Dust, salt, harmful gas or oil mist such as sulphurous acid and hydrogen sulfide may be present in the air.
- The machine is started and stopped frequently or operation time is long (sites with 24 hour air-conditioning).

Recommended replacement cycle of wear parts

Component	Inspection cycle	Maintenance cycle (replacements and/or repairs)
Air filter	1 year	5 years
High efficiency filter		1 year
Fuse		10 years
Crankcase heater		8 years
Pressure containing parts		In case of corrosion, contact your local dealer.

NOTICE

- The table indicates main components. Refer to your maintenance and inspection contract for more details.
- The table indicates recommended intervals of replacement cycles. However, in order to keep the unit operational as long as possible, maintenance work may be required sooner. Recommended intervals can be used for appropriate maintenance design in terms of budgeting maintenance and inspection fees. Contact your dealer for details.

INFORMATION

Damage due to taking apart or cleaning interiors of units by anyone other than our authorised dealers may not be included in the warranty.

10 Troubleshooting

If one of the following malfunctions occurs, take the measures shown below and contact your dealer.

WARNING

Stop operation and shut OFF the power if anything unusual occurs (burning smells etc.).

Leaving the unit running under such circumstances may cause breakage, electrical shock or fire. Contact your dealer.

The system MUST be repaired by a qualified service person.

Malfunction	Measure
If a safety device such as a fuse, a breaker or an earth leakage breaker frequently actuates or the ON/OFF switch does NOT properly work.	Turn OFF the main power switch.
The operation switch does NOT work well.	Turn OFF the power supply.
If the user interface display indicates the unit number, the operation lamp flashes and the malfunction code appears.	Notify your installer and report the malfunction code.

If the system does NOT operate properly except for the above mentioned cases and none of the above mentioned malfunctions is evident, investigate the system in accordance with the following procedures.

Malfunction	Measure
If a refrigerant leak occurs (error code R0/CH)	▪ Actions will be taken by the system. Do NOT turn OFF the power supply. ▪ Notify your installer and report the malfunction code.
If the system does not operate at all.	▪ Check if there is no power failure. Wait until power is restored. If power failure occurs during operation, the system automatically restarts immediately after power is restored. ▪ Check if no fuse has blown or breaker is activated. Change the fuse or reset the breaker if necessary.
If the system goes into fan only operation, but as soon as it goes into heating or cooling operation, the system stops.	▪ Check if air inlet or outlet of outdoor or indoor unit is not blocked by obstacles. Remove any obstacles and make sure the air can flow freely. ▪ Check if the user interface display shows ⚠ on the home screen. Refer to the installation and operation manual delivered with the indoor unit.

Malfunction	Measure
The system operates but cooling or heating is insufficient.	▪ Check if air inlet or outlet of outdoor or indoor unit is not blocked by obstacles. Remove any obstacles and make sure the air can flow freely. ▪ Check if the air filter is not clogged (refer to "Maintenance" in the indoor unit manual). ▪ Check the temperature setting. ▪ Check the fan speed setting on your user interface. ▪ Check for open doors or windows. Close doors and windows to prevent wind from coming in. ▪ Check if there are too many occupants in the room during cooling operation. Check if the heat source of the room is excessive. ▪ Check if direct sunlight enters the room. Use curtains or blinds. ▪ Check if the air flow angle is proper.

After checking all the items above, if it is impossible to fix the problem yourself, contact your installer and state the symptoms, the complete model name of the unit (with manufacturing number if possible) and the installation date.

In this chapter

10.1 Error codes: Overview

In case a malfunction code appears on the indoor unit user interface display, contact your installer and inform the malfunction code, the unit type, and serial number (you can find this information on the nameplate of the unit).

For your reference, a list with malfunction codes is provided. You can, depending on the level of the malfunction code, reset the code by pushing the ON/OFF button. If not, ask your installer for advice.

Main code	Contents
A0	External protection device was activated

Main code	Contents
A0-11	The R32 sensor in one of the indoor units has detected a refrigerant leak[a]
A0-20	The R32 sensor in one of the SV unit has detected a refrigerant leak.
A0/CH	Safety system error (leak detection)[a]
A1	EEPROM failure (indoor)
A3	Drain system malfunction (indoor/SV unit)
A6	Fan motor malfunction (indoor)
A7	Swing flap motor malfunction (indoor)
A9	Expansion valve malfunction (indoor)
AF	Drain malfunction (indoor unit)
AH	Filter dust chamber malfunction (indoor)
AJ	Capacity setting malfunction (indoor)
C1	Transmission malfunction between main PCB and sub PCB (indoor)
C4	Heat exchanger thermistor malfunction (indoor; liquid)
C5	Heat exchanger thermistor malfunction (indoor; gas)
C9	Suction air thermistor malfunction (indoor)
CA	Discharge air thermistor malfunction (indoor)
CE	Movement detector or floor temperature sensor malfunction (indoor)
CH-01	R32 sensor malfunction in one of the indoor units[a]
CH-02	R32 sensor end of lifetime in one of the indoor units[a]
CH-05	R32 sensor end of lifetime<6 months in one of the indoor units[a]
CH-10	Waiting for indoor unit R32 sensor replacement input[a]
CH-20	Waiting for SV unit replacement input
CH-21	SV unit R32 sensor malfunction
CH-22	Less than 6 months before the SV unit R32 sensor end of lifetime
CH-23	SV unit R32 sensor end of lifetime
CJ	User interface thermistor malfunction (indoor)
E1	PCB malfunction (outdoor)
E2	Current leakage detector was activated (outdoor)
E3	High pressure switch was activated
E4	Low pressure malfunction (outdoor)
E5	Compressor lock detection (outdoor)
E7	Fan motor malfunction (outdoor)
E9	Electronic expansion valve malfunction (outdoor)
EA-27	SV unit damper malfunction

Main code	Contents
F3	Discharge temperature malfunction (outdoor)
F4	Abnormal suction temperature (outdoor)
H3	High pressure switch malfunction
H7	Fan motor malfunction (outdoor)
H9	Ambient temperature sensor malfunction (outdoor)
J3	Discharge temperature sensor malfunction (outdoor)
J5	Suction temperature sensor malfunction (outdoor)
J6	De-icing temperature sensor malfunction (outdoor) or heat exchanger gas temperature sensor malfunction (outdoor)
J7	Liquid temperature sensor (after subcool HE) malfunction (outdoor)
J8	Liquid temperature sensor (coil) malfunction (outdoor)
J9	Gas temperature sensor (after subcool HE) malfunction (outdoor)
JA	High pressure sensor malfunction (S1NPH)
JC	Low pressure sensor malfunction (S1NPL)
L1	INV PCB abnormal
L4	Fin temperature abnormal
L5	INV PCB abnormal
L8	Compressor over current detected
L9	Compressor lock (startup)
LC	Transmission outdoor unit - inverter: INV transmission trouble
P1	INV unbalanced power supply voltage
P4	Fin thermistor malfunction
PJ	Capacity setting malfunction (outdoor)
U0	Abnormal low pressure drop, faulty expansion valve
U1	Reversed power supply phase malfunction
U2	INV voltage power shortage
U3	System test run not yet executed
U4	Faulty wiring indoor/SV unit/outdoor
U5	Abnormal user interface - indoor communication
U7	Faulty wiring to outdoor/outdoor
U9	Warning because there is an error on another unit (indoor/SV unit)
UA	Connection malfunction over indoor units or type mismatch
UA-55	System lock
UA-57	External ventilation input error
UC	Centralised address duplication

Main code	Contents
UE	Malfunction in communication centralised control device - indoor unit
UF	Faulty wiring indoor/SV unit
UH	Auto address malfunction (inconsistency)
UJ-37	Airflow rate below the legal limit (for EKEA/EKVDX)

[a] The error code is only shown on the user interface of the indoor unit where the error occurs.

10.2 Symptoms that are NOT system malfunctions

The following symptoms are NOT system malfunctions:

10.2.1 Symptom: The system does not operate

- The air conditioner does not start immediately after the ON/OFF button on the user interface is pressed. If the operation lamp lights, the system is in normal condition. To prevent overloading of the compressor motor, the air conditioner starts 5 minutes after it is turned ON again in case it was turned OFF just before. The same starting delay occurs after the operation mode selector button was used.
- If "Under Centralised Control" is displayed on the user interface, pressing the operation button causes the display to blink for a few seconds. The blinking display indicates that the user interface cannot be used.
- The system does not start immediately after the power supply is turned on. Wait one minute until the microcomputer is prepared for operation.

10.2.2 Symptom: Cool/Heat cannot be changed over

- When the display shows  (changeover under centralised control), it shows that this is a slave user interface.
- When the cool/heat changeover remote control switch is installed and the display shows  (changeover under centralised control), this is because cool/ heat changeover is controlled by the cool/ heat changeover remote control switch. Ask your dealer where the remote control switch is installed.

10.2.3 Symptom: Fan operation is possible, but cooling and heating do not work

Immediately after the power is turned on. The micro computer is getting ready to operate and is performing a communication check with the indoor unit(s). Please wait 12 minutes maximally until this process is finished.

10.2.4 Symptom: The fan speed does not correspond to the setting

The fan speed does not change even if the fan speed adjustment button is pressed. During heating operation, when the room temperature reaches the set temperature, the outdoor unit goes off and the indoor unit changes to whisper fan speed. This is to prevent cold air blowing directly on occupants of the room. The fan speed will not change even when another indoor unit is in heating operation, if the button is pressed.

10.2.5 Symptom: The fan direction does not correspond to the setting

The fan direction does not correspond with the user interface display. The fan direction does not swing. This is because the unit is being controlled by the micro computer.

10.2.6 Symptom: White mist comes out of a unit (Indoor unit)

- When humidity is high during cooling operation. If the interior of an indoor unit is extremely contaminated, the temperature distribution inside a room becomes uneven. It is necessary to clean the interior of the indoor unit. Ask your dealer for details on cleaning the unit. This operation requires a qualified service person.
- Immediately after the cooling operation stops and if the room temperature and humidity are low. This is because warm refrigerant gas flows back into the indoor unit and generates steam.

10.2.7 Symptom: White mist comes out of a unit (Indoor unit, outdoor unit)

When the system is changed over to heating operation after defrost operation. Moisture generated by defrost becomes steam and is exhausted.

10.2.8 Symptom: The user interface reads "U4" or "U5" and stops, but then restarts after a few minutes

This is because the user interface is intercepting noise from electric appliances other than the air conditioner. The noise prevents communication between the units, causing them to stop. Operation automatically restarts when the noise ceases. A power reset may help to remove this error.

10.2.9 Symptom: Noise of air conditioners (Indoor unit)

- A "zeen" sound is heard immediately after the power supply is turned on. The electronic expansion valve inside an indoor unit starts working and makes the noise. Its volume will reduce in about one minute.
- A continuous low "shah" sound is heard when the system is in cooling operation or at a stop. When the drain pump (optional accessories) is in operation, this noise is heard.
- A "pishi-pishi" squeaking sound is heard when the system stops after heating operation. Expansion and contraction of plastic parts caused by temperature change make this noise.
- A low "sah", "choro-choro" sound is heard while the indoor unit is stopped. When another indoor unit is in operation, this noise is heard. In order to prevent oil and refrigerant from remaining in the system, a small amount of refrigerant is kept flowing.

10.2.10 Symptom: Noise of air conditioners (Indoor unit, outdoor unit)

- A continuous low hissing sound is heard when the system is in cooling or defrost operation. This is the sound of refrigerant gas flowing through both indoor and outdoor units.
- A hissing sound which is heard at the start or immediately after stopping operation or defrost operation. This is the noise of refrigerant caused by flow stop or flow change.

10.2.11 Symptom: Noise of air conditioners (Outdoor unit)

When the tone of operating noise changes. This noise is caused by the change of frequency.

10.2.12 Symptom: Dust comes out of the unit

When the unit is used for the first time in a long time. This is because dust has gotten into the unit.

10.2.13 Symptom: The units can give off odours

The unit can absorb the smell of rooms, furniture, cigarettes, etc., and then emit it again.

10.2.14 Symptom: The outdoor unit fan does not spin

During operation, the speed of the fan is controlled in order to optimise product operation.

10.2.15 Symptom: The display shows "88"

This is the case immediately after the main power supply switch is turned on and means that the user interface is in normal condition. This continues for 1 minute.

10.2.16 Symptom: The compressor in the outdoor unit does not stop after a short heating operation

This is to prevent refrigerant from remaining in the compressor. The unit will stop after 5 to 10 minutes.

10.2.17 Symptom: The inside of an outdoor unit is warm even when the unit has stopped

This is because the crankcase heater is warming the compressor so that the compressor can start smoothly.

10.2.18 Symptom: Hot air can be felt when the indoor unit is stopped

Several different indoor units are being run on the same system. When another unit is running, some refrigerant will still flow through the unit.

11 Relocation

Contact your dealer to remove and reinstall the entire unit. Moving units requires technical expertise.

12 Disposal

This unit uses hydrofluorocarbon. Contact your dealer when discarding this unit. It is required by law to collect, transport and discard the refrigerant in accordance with the "hydrofluorocarbon collection and destruction" regulations.

NOTICE

Do NOT try to dismantle the system yourself: dismantling of the system, treatment of the refrigerant, oil and other parts MUST comply with applicable legislation. Units MUST be treated at a specialised treatment facility for reuse, recycling and recovery.

13 Technical data

13.1 Eco Design requirements

Follow the steps below to consult the Energy Label – Lot 21 data of the unit and outdoor/indoor combinations.

1 Open the following webpage: https://energylabel.daikin.eu/

2 To continue, choose:

- "Continue to Europe" for the international website.
- "Other country" for a country related site.

Result: You are directed to the "Seasonal efficiency" webpage.

3 Under "Eco Design – Ener LOT 21", click "Generate your data".

Result: You are directed to the "Seasonal efficiency (LOT 21)" webpage.

4 Follow the instructions on the webpage to select the correct unit.

Result: When the selection is done, the LOT 21 datasheet can be viewed as a PDF or a HTML webpage.

INFORMATION

Other documents (e.g. manuals, ...) can also be consulted from the resulting webpage.

For the installer

14 About the box

Keep the following in mind:

- At delivery, the unit MUST be checked for damage and completeness. Any damage or missing parts MUST be reported immediately to the claims agent of the carrier.
- Bring the packed unit as close as possible to its final installation position to prevent damage during transport.
- Prepare in advance the path along which you want to bring the unit to its final installation position.
- When handling the unit, take into account the following:

  Fragile.

  Keep the unit upright in order to avoid compressor damage.

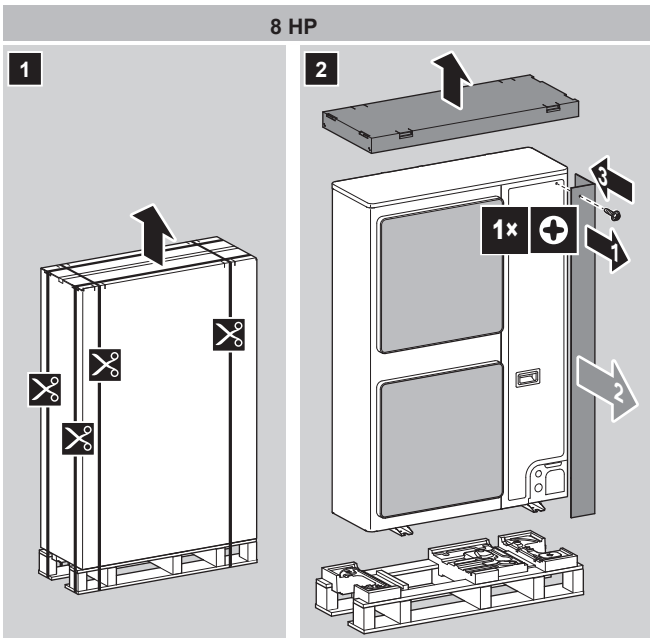
In this chapter

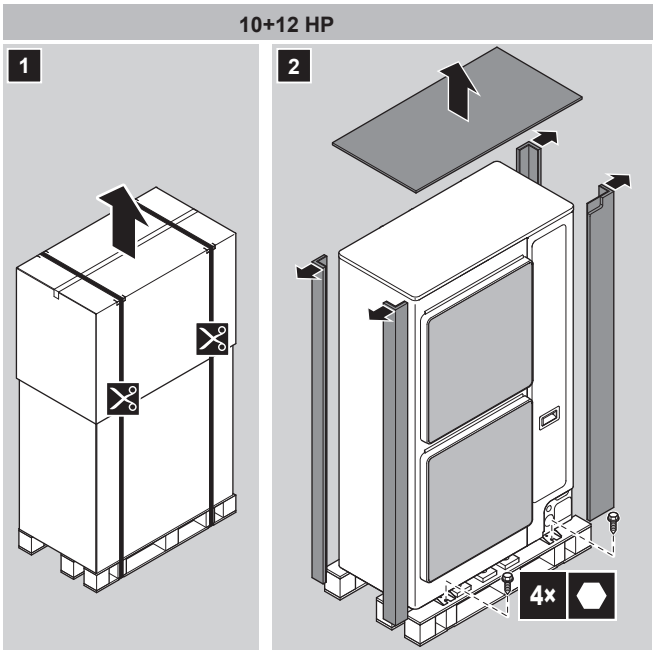
14.1 To unpack the outdoor unit

NOTICE

For 8 HP model: Make sure that the screw removed for the packaging is reinstalled in the front of the unit. This is important because the screw is longer than screws used for the side and back of the unit, where it can damage heat exchanger fins or pipes.

Note: This product is not designed for repacking. In case of repacking, contact your dealer.



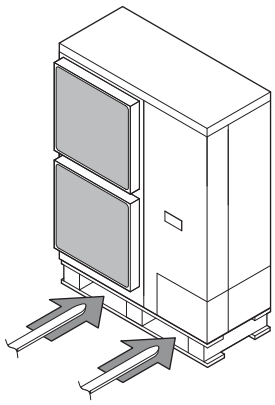


14.2 To handle the outdoor unit

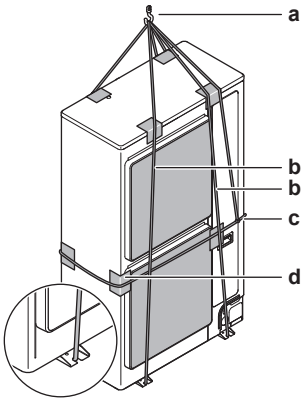
CAUTION

To avoid injury, do NOT touch the air inlet or aluminium fins of the unit.

Forklift. If the unit remains on its pallet, you can also use a forklift.



Crane. For 10+12 HP models, you can also use a crane and lift the unit as follows:

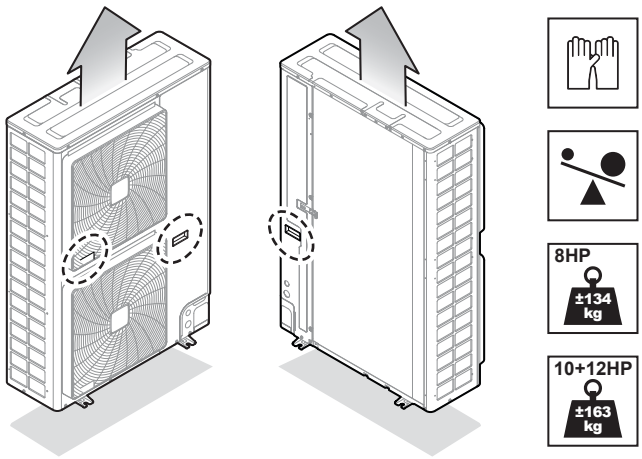


- **a** Lifting hook
- **b** Two vertical ropes (at least 8 m and Ø20 mm) to lift the unit
- **c** One horizontal rope (also fixed to the lifting hook) to prevent the unit from dropping
- **d** Protective material (rags, soft material) between the ropes and the casing to protect the casing

WARNING

The unit's center of gravity deviates to the right side (compressor side). If you lift the unit using a crane and you do not fix a horizontal rope to the lifting hook as shown, the unit might drop.

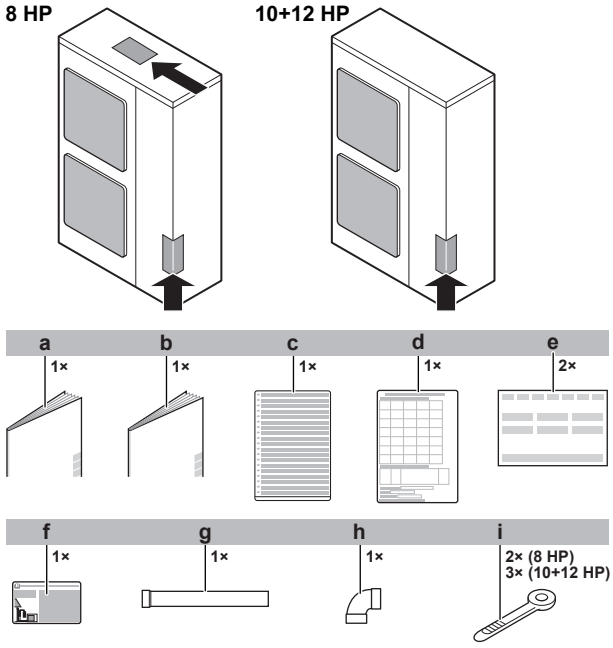
Carry the unit slowly as shown:



14.3 To remove the accessories from the outdoor unit

1 Remove the service cover. See "17.2.2 To open the outdoor unit" [▸ 82].

2 Remove the accessories.



a General safety precautions
b Outdoor unit installation and operation manual
c Multilingual fluorinated greenhouse gases label
d Installation information leaflet
e Declaration of conformity
f Fluorinated greenhouse gases label
g Gas piping accessory 1 (only for 10 HP: Ø19.1 mm)
h Gas piping accessory 2 (8 HP: Ø19.1 mm; 10+12 HP: Ø22.2 mm)
i Cable tie (8 HP: 2×; 10+12 HP: 3×)

14.4 To remove the transportation stay

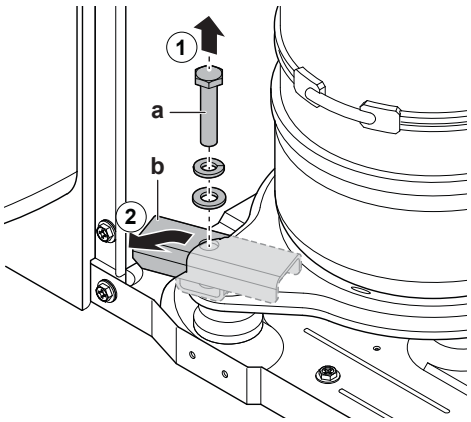
NOTICE

If the unit is operated with the transportation stay attached, abnormal vibration or noise may be generated.

The transportation stay for protecting the unit during transport must be removed. Proceed as shown in the figure and procedure below.

1 Remove the bolt (a) and washers.

2 Remove the transportation stay (b) as shown in the figure below.



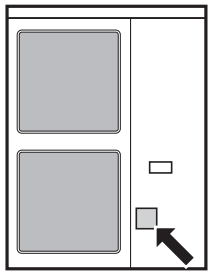
a Bolt
b Transportation stay

15 About the units and options

In this chapter

15.1 Identification label: Outdoor unit

Location



Model identification

Example: R X Y S A 10 AM Y1 B [*]

Code	Explanation
R	Outdoor air cooled
X	Heat pump (no continuous heating)
Y	Single module
S	S series
A	Refrigerant R32
8~12	Capacity class
AM	Model series
Y1	Power supply
B	European market
[*]	Minor model change indication

15.2 About the outdoor unit

This installation manual concerns the VRV 5-S, full inverter driven, heat pump system.

These units are intended for outdoor installation and aimed for air to air heat pump applications.

Specification		
Capacity	Heating	25~37.5 kW
	Cooling	22.4~33.5 kW

Specification		
Ambient design temperature	Heating	–20~21°C DB –20~15.5°C WB
	Cooling	–5~52°C DB

15.3 System layout

WARNING

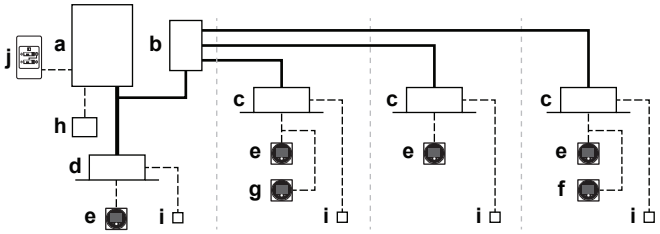
The installation MUST comply with the requirements that apply to this R32 equipment. For more information, see "16 Special requirements for R32 units" [▸ 60].

INFORMATION

The following figure is an example and may NOT completely match your system layout.

INFORMATION

Not all combinations of indoor units are allowed, for guidance, see "15.4.2 Possible combinations of indoor units" [▸ 58].



a Heat pump outdoor unit
b Safety valve unit (SV)
c VRV direct expansion (DX) indoor unit
d VRV direct expansion (DX) indoor unit (direct connection from outdoor to indoor)
e Remote controller in **normal mode**
f Remote controller in **alarm only mode**
g Remote controller in **supervisor mode** (mandatory in some situations)
h Centralised controller (optional)
i Option PCB (optional)
j Cool/heat changeover remote control switch (optional)
—— Refrigerant piping
----- Interconnection and user interface wiring
—— Direct connection of indoor units to the outdoor unit

15.4 Combining units and options

INFORMATION

Certain options may NOT be available in your country.

15.4.1 About combining units and options

NOTICE

To be sure your system setup (outdoor unit+indoor unit(s)) will work, you have to consult the latest technical engineering data for the VRV 5-S heat pump.

This heat pump system can be combined with several types of indoor units and is intended for R32 use only.

For an overview of available units you can consult the product catalogue.

An overview is given indicating the allowed combinations of indoor units and outdoor units. Not all combinations are allowed. They are subject to rules (combination between outdoor units, indoor units and remote controllers, etc.) mentioned in the technical engineering data.

15.4.2 Possible combinations of indoor units

In general following type of indoor units can be connected to a VRV 5-S heat pump system. The list is non-exhaustive and is depending on both outdoor unit model and indoor unit model combinations.

- VRV direct expansion indoor units (air to air applications).
- EKVDX (air-to-air applications): VAM-J8 required.
- AHU (air-to-air applications): EKEXVA kit is required.
- Air curtain (air-to-air applications). See the combination table in the databook for more information.
- Airhandling unit connection in pair to VRV 5-S heat pump outdoor unit is supported.
- Airhandling unit connection in multi to VRV 5-S heat pump outdoor unit is supported, even combined with VRV direct expansion indoor unit(s).
- Multi tenant option is not allowed for floor standing indoor units (e.g. FXNA) connected to VRV 5-S heat pump outdoor unit.

15.4.3 Possible options for the outdoor unit

INFORMATION

Refer to the technical engineering data for the latest option names.

Refrigerant branching kit

Description	Model name
Refnet header	KHRQ22M29H (inch)
	KHRA22M65H (inch)
	KHRQM22M29H9 (mm)
	KHRAM22M65H (mm)
Refnet joint	KHRQ22M20TA (inch)
	KHRQ22M29T9 (inch)
	KHRA22M65T (inch)
	KHRQM22M20T (mm)
	KHRQM22M29T (mm)
	KHRAM22M65T (mm)

For the selection of the optimal branching kit, please refer to "18.1.5 To select refrigerant branch kits" [▸ 89].

Cool/heat selector (KRC19-26A)

To control the cooling or heating operation from a central location.

A surface-mounting kit (KJB111A) is available for installing the switch onto a wall.

For connecting the cool/heat selector switch to the outdoor unit, see "20.4 To connect the cool/heat selector switch option" [▸ 126].

External control adaptor (DTA104A61/62)

To instruct specific operation with an external input coming from a central control the external control adaptor can be used. Instructions (group or individual) can be instructed for low noise operation and power consumption limitation operation.

The external control adapter has to be installed in the indoor unit.

16 Special requirements for R32 units

In this chapter

16.1 Installation space requirements

WARNING

If the appliance contains R32 refrigerant, the floor area of the room in which the appliance is stored shall be at least 429 m².

NOTICE

- The pipework shall be securely mounted and guarded protected from physical damage.
- Keep the pipework installation to a minimum.

16.2 System layout requirements

The VRV 5-S uses R32 refrigerant which is rated as A2L and is mildly flammable.

To comply with the requirements of enhanced tightness refrigerating systems of the IEC 60335-2-40, this system is equipped with an alarm in the remote controller and shut-off valves in the SV unit. Both safety measures are installation specific and can be determined using the requirements mentioned in this manual. The SV unit is prearranged for a ventilated enclosure as countermeasure. In case the requirements of this manual are followed, no additional safety measures are needed.

A big range of charge and room area combinations is allowed thanks to the countermeasures that are implemented in the system by default.

Follow the installation requirements below to ensure that the complete system is compliant to legislation.

Outdoor unit installation

The outdoor unit must be installed outside. For indoor installation of the outdoor unit, additional measures can be necessary to comply with the applicable legislation.

A terminal for external output is available in the outdoor unit. This SVS output can be used when additional countermeasures are needed. The SVS output is a contact on terminal X2M that closes in case a leak is detected, failure or disconnection of an R32 sensor (located in the indoor unit or SV unit).

For more information about the SVS output, see "20.3 To connect the external outputs" [▸ 125].

Indoor unit installation

NOTICE

If one or more rooms are connected to the unit using a duct system, make sure air inlet AND outlet are connected directly to the same room by ducting. Do NOT use spaces such as a false ceiling as a duct for the air inlet or outlet.

For installation of the indoor unit, refer to the installation and operation manual delivered with the indoor unit. For compatibility of indoor units refer to the latest version of the technical data book of this unit.

Depending on the room size in which the indoor unit is installed and the total amount of refrigerant in the system, other safety measures are necessary for indoor units. See "16.3 To determine the required safety measures" [▸ 62].

An optional output PCB for the indoor unit can be added to provide output for external device. The output PCB will trigger in case a leak is detected, the R32 sensor fails or when the sensor is disconnected. For exact model name see option list of the indoor unit. For more information about this option, refer to the installation manual of the optional output PCB.

Piping requirements

CAUTION

Piping MUST be installed according to instructions given in "18 Piping installation" [▸ 86]. Only mechanical joints (e.g. braze+flare connections) that are compliant with the latest version of ISO14903 can be used.

Low temperature solder alloys shall not be used for pipe connections.

For piping installed in the occupied space, make sure that the piping is protected against accidental damage. Piping should be checked according to the procedure as mentioned in "18.3 Checking the refrigerant piping" [▸ 101].

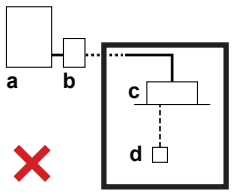
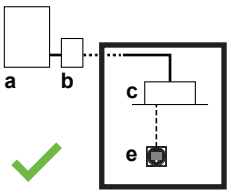
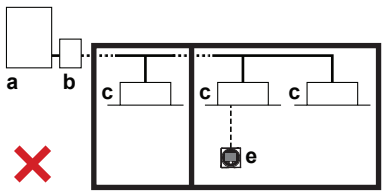
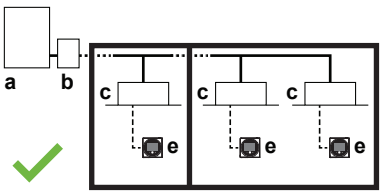
Remote controller requirements

For installation of the remote controller, please refer to the installation and operation manual delivered with the remote controller. Each indoor unit must be connected with a R32 safety system compatible remote controller (e.g. BRC1H52/82* or later type). These remote controllers have implemented safety measures that will warn the user visually and audibly in case of a leak.

For installation of the remote controller, it is mandatory to follow the requirements.

1. Only a safety system compatible remote controller can be used. See technical data sheet for remote controller compatibility (e.g. BRC1H52/82*).
2. Each indoor unit must be connected to a separate remote controller. In case indoor units are operating under group control, it is possible to use one remote controller.

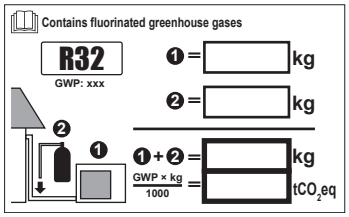
Examples

1	Remote controller is not R32 safety system compatible.	
		
2	Indoor units without remote controller are not allowed.	
		

a Outdoor unit
b SV unit
c Indoor unit
d Remote controller NOT compatible with R32 safety system
e Remote controller compatible with R32 safety system
✕ NOT allowed
✓ Allowed

16.3 To determine the required safety measures

Step 1 – Determine the total amount of refrigerant in the system. Use the values on the unit nameplate to determine the total amount of refrigerant in the system.



Total charge=Factory charge ❶[a]+additional charge ❷[b]

[a] The factory charge value can be found on the nameplate.
[b] The R value (additional refrigerant to be charged) is calculated in "19.4 To determine the additional refrigerant amount" [▸ 109].

NOTICE

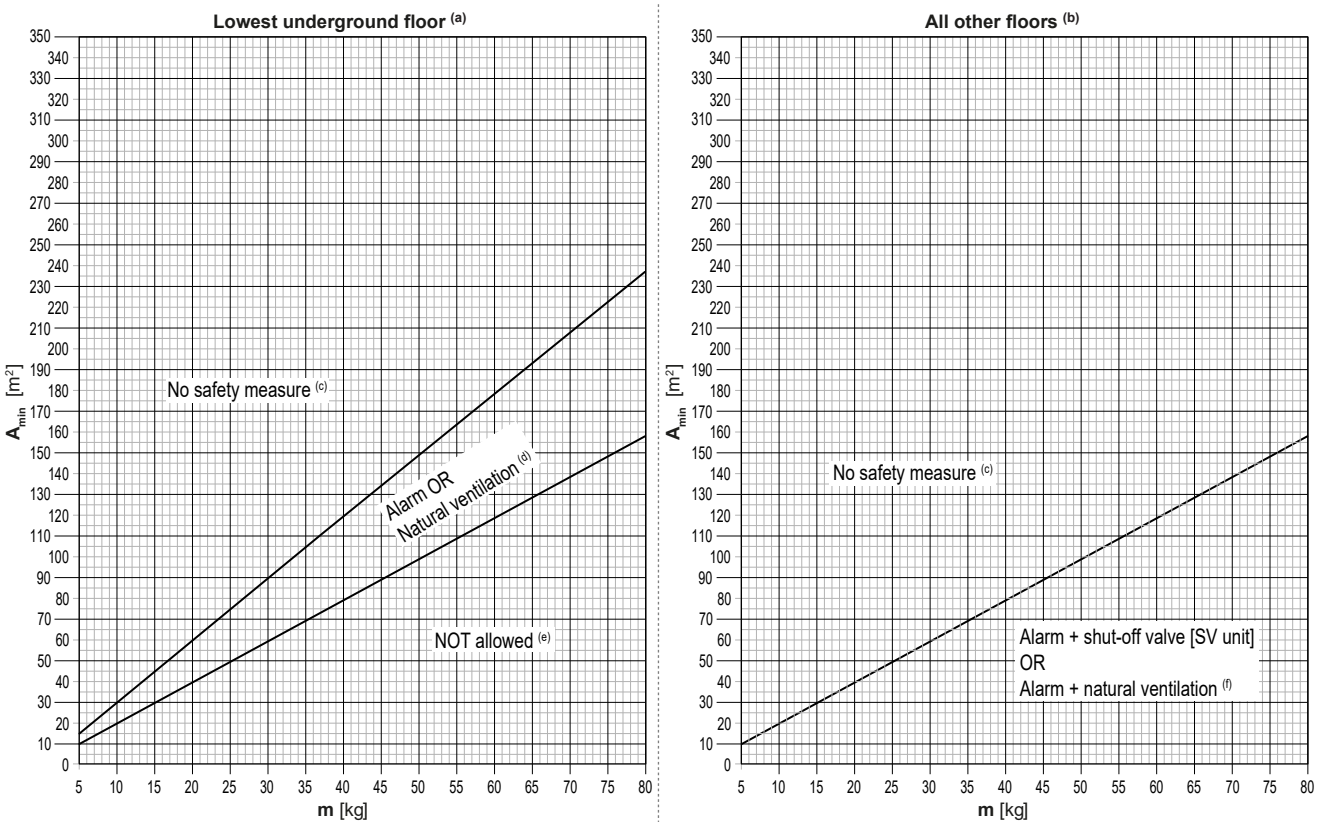
The total refrigerant charge amount in the system MUST always be lower than 79.8 kg.

Step 2 – Determine the smallest area out of:

- The room where an indoor unit is installed
- Each of the rooms served by a ducted indoor unit installed in a different room

The room area can be determined by projecting the walls, doors and partitions to the floor and calculating the enclosed area. Spaces connected by only false ceilings, ductwork, or similar connections are not considered a single space.

Step 3 – Use the graphs or tables below to determine the required safety measures for the indoor unit.



m [kg]	A_{min} [m²]		
	Lowest underground floor (a)		All other floors (b)
	No safety measure (c)	Alarm OR Natural Ventilation (d)	No safety measure (c)
5	15	10	10
6	18	12	12
7	21	14	14
8	24	16	16
9	27	18	18
10	30	20	20
11	33	22	22
12	36	24	24
13	39	26	26
14	42	28	28
15	45	30	30
16	48	32	32
17	51	34	34
18	54	36	36
19	57	38	38
20	60	40	40
21	63	42	42
22	66	44	44
23	69	46	46
24	72	48	48
25	75	50	50
26	77	52	52
27	80	54	54
28	83	56	56
29	86	58	58
30	89	60	60
31	92	62	62
32	95	64	64
33	98	66	66
34	101	68	68
35	104	70	70
36	107	72	72
37	110	74	74
38	113	76	76
39	116	77	77
40	119	79	79
41	122	81	81
42	125	83	83

m [kg]	A_{min} [m²]		
	Lowest underground floor (a)		All other floors (b)
	No safety measure (c)	Alarm OR Natural Ventilation (d)	No safety measure (c)
43	128	85	85
44	131	87	87
45	134	89	89
46	137	91	91
47	140	93	93
48	143	95	95
49	146	97	97
50	149	99	99
51	152	101	101
52	154	103	103
53	157	105	105
54	160	107	107
55	163	109	109
56	166	111	111
57	169	113	113
58	172	115	115
59	175	117	117
60	178	119	119
61	181	121	121
62	184	123	123
63	187	125	125
64	190	127	127
65	193	129	129
66	196	131	131
67	199	133	133
68	202	135	135
69	205	137	137
70	208	139	139
71	211	141	141
72	214	143	143
73	217	145	145
74	220	147	147
75	223	149	149
76	226	151	151
77	229	153	153
78	231	154	154
79	234	156	156
80	237	158	158

m Total refrigerant charge in the system [kg]
A_{min} Minimum room area [m²]
(a) Lowest underground floor (=Lowest underground floor)
(b) All other floors (=All other floors)
(c) No safety measure (=No safety measure)
(d) Alarm OR Natural ventilation (=Alarm OR Natural ventilation)
(e) NOT allowed (=NOT allowed)
(f) Alarm + shut-off valve [SV unit] OR Alarm + natural ventilation (=Alarm + shut-off valve [SV unit] OR Alarm + natural ventilation)

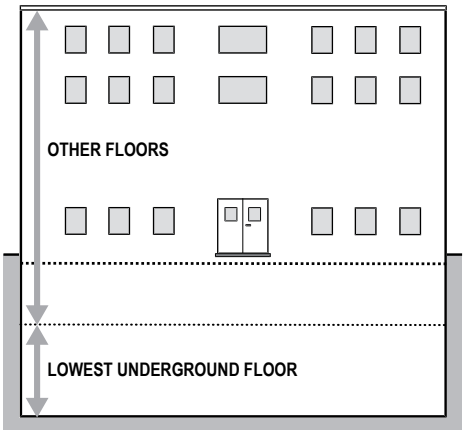
Use the total amount of refrigerant in the system and the smallest area of the room in which the indoor unit is installed/conditioning to check which safety measure is required.

Note: When "No safety measure" is required, it is still allowed to apply natural ventilation or alarm or shut-off valve (SV unit) if wanted. Follow the respective instructions as described further below.

Note: When natural ventilation is required, it is still allowed to apply alarm or shut-off valve (SV unit) if wanted. Follow the respective instructions as described further below.

Note: When alarm + natural ventilation is required as safety measure in other floors, it is also allowed to apply alarm + shut-off valve (SV unit). Follow the instructions described further below.

Use the first graph (Lowest underground floor[a]) in case the indoor unit is installed/conditioning in the lowest underground floor of a building. For other floors, use the second graph (All other floors[b]).



The graphs and table are based on an installation height of the indoor unit up to 2.2 m (bottom of the indoor unit or bottom of the duct openings). See "17.1.1 Installation site requirements of the outdoor unit" [▸ 77].

If the installation height is more than 2.2 m, different boundaries for the applicable safety measures can apply. To know which safety measure is required in case the installation height is more than 2.2 m, refer to the online tool (VRV Xpress).

NOTICE

Indoor units and the bottom of duct openings cannot be installed lower than 1.8 m from the lowest point of the floor, except for floor standing indoor units (e.g. FXNA)

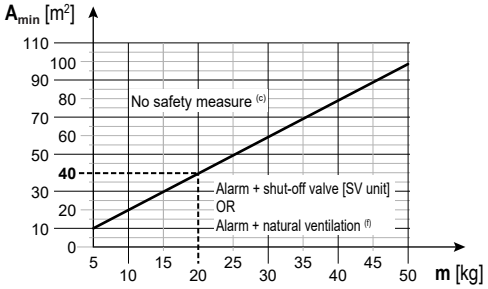
Example

The total amount of refrigerant in the VRV system is 20 kg. All indoor units are installed in spaces that do NOT belong to the lowest underground floor of the building. The space in which the first indoor unit is installed has a room area of 50 m², the space in which the second indoor unit is installed has a room area of 15 m².

- Based on the graph for "All other floors" (All other floors), the room area limit is **40 m²** for No safety measure" (No safety measures).
- This means that the following safety measures are required:

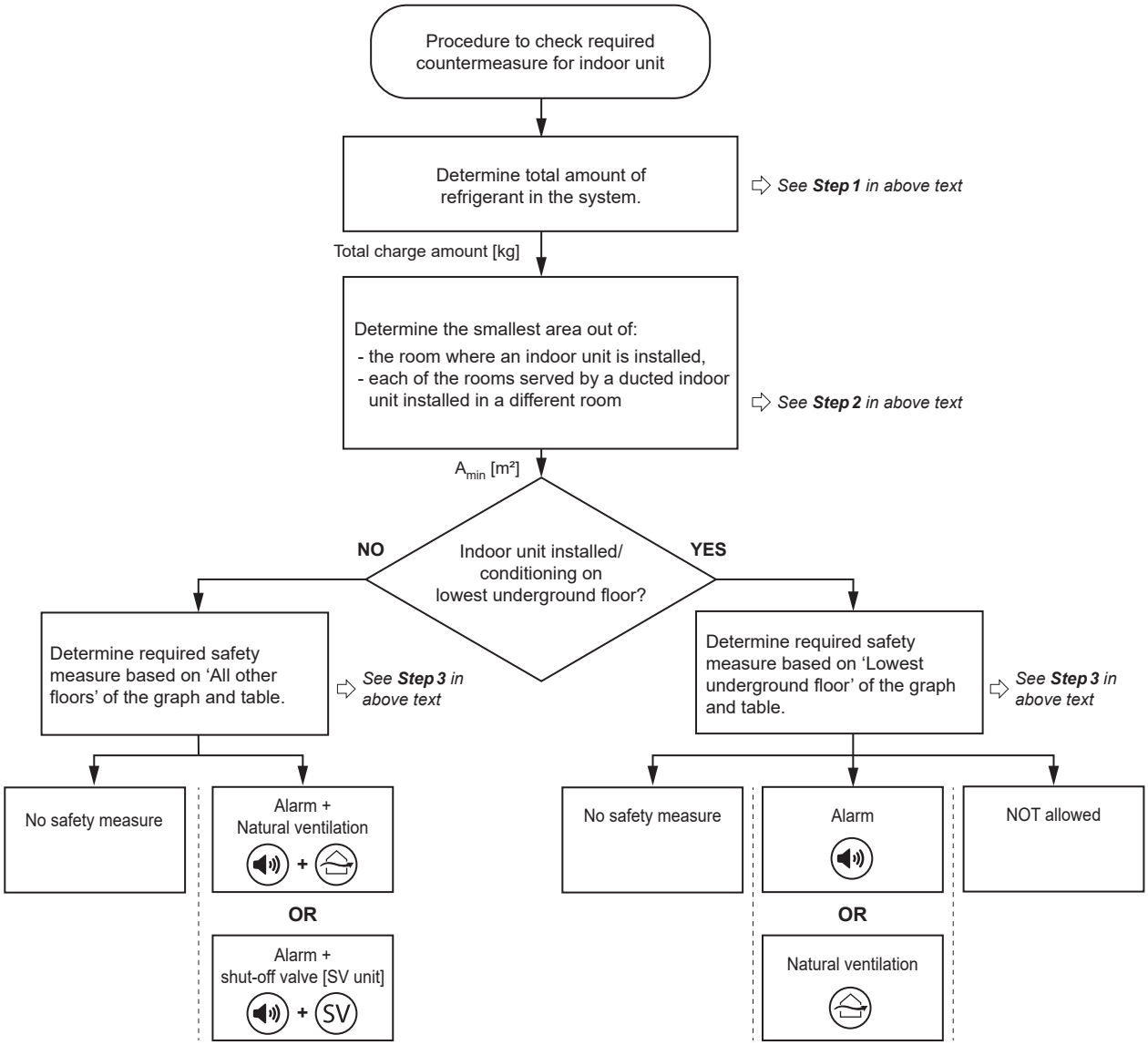
SV unit	Room area	Required safety measure
1	A=50 m²≥40 m²	No safety measures

SV unit	Room area	Required safety measure
2	A=15 m²<40 m²	Alarm + natural ventilation OR Alarm + shut-off valve (SV unit)



m Total refrigerant charge in the system [kg]
A_{min} Minimum room area [m²]
(a) Lowest underground floor (=Lowest underground floor)
(b) All other floors (=All other floors)
(c) No safety measure (=No safety measure)
(d) Alarm OR Natural ventilation (=Alarm OR Natural ventilation)
(e) NOT allowed (=NOT allowed)
(f) Alarm + shut-off valve [SV unit] OR Alarm + natural ventilation (=Alarm + shut-off valve [SV unit] OR Alarm + natural ventilation)

16.3.1 Overview: flowchart



Note: The flowchart is an overview. Always refer to the full text mentioned in this manual for clear understanding and detailed explanation.

16.4 Safety measures

16.4.1 No safety measure

When the room area is sufficiently large, no safety measures are required. This also includes an indoor unit installed in the lowest underground floor.

Therefore the R32 safety system in the indoor unit in a sufficiently large room can be deactivated (active by default) by changing the setting in the user interface as shown below:

Field settings

No safety measure				
Setting	**1st code**	**Function**	**2nd code**	**Description**
15/25	13	R32 leak safety system setting	01	Disabled

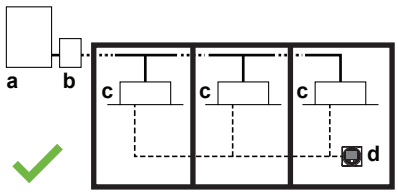
Note: For more information, see "21.1.8 Indoor unit field setting" [▶ 139].

WARNING

Deactivating the setting (15/25) is NOT allowed for floor standing indoor units (e.g. FXNA).

Group control

Group control is allowed up to a maximum of 10 indoor units connected to different ports or connected to the same port:



a Outdoor unit
b SV unit
c Indoor units with no safety measure
d Remote controller compatible with R32 safety system
✓ Allowed

16.4.2 Alarm

WARNING

Do NOT use 'Alarm' as the ONLY safety measure in case the indoor unit is installed in an occupied space where people are restricted in their movement. Combine or use another safety measure.

R32 safety system compatible remote controllers (e.g. BRC1H52/82* or later type) used with the indoor units have a built-in alarm as a safety measure. For installation of the remote controller, please refer to the installation and operation manual delivered with the remote controller.

Each indoor unit must be connected with a R32 safety system compatible remote controller (e.g. BRC1H52/82* or later type). These remote controllers have implemented safety measures that will warn the user visually and audibly in case of a leak.

For installation of the remote controller, it is mandatory to follow the requirements.

1. Only a safety system compatible remote controller can be used. See technical data sheet for remote controller compatibility (e.g. BRC1H52/82*).
2. Each indoor unit must be connected to a separate remote controller. In case indoor units are operating under group control, it is possible to only use one remote controller per room.
3. The remote controller put in the room served by the indoor unit must be in 'fully functional' or 'alarm only' mode. In case the indoor unit is serving a different room than where it is installed, a remote controller is required in both installed and served room. For details about the different remote controller modes and how to set up, please check the note below or refer to the installation and operation manual delivered with the remote controller.

4 For buildings where sleeping facilities are offered (e.g. hotel), where persons are restricted in their movements (e.g. hospitals), an uncontrolled number of persons is present or buildings where people are not aware of the safety precautions it is mandatory to install one of the following devices at a location with 24-hour monitoring:

- a supervisor remote controller
- or a centralised controller. E.g., iTM with external alarm via WAGO module, iTM with built-in alarm, …

Note: The remote controllers with built-in alarm will generate a visible and audible warning. E.g. the BRC1H52/82* remote controllers can generate an alarm of 65 dB (sound pressure, measured at 1 m distance of the alarm). Sound data is available in the technical data sheet of the remote controller. **The alarm should always be 15 dB louder than the background noise of the room.**

A field supply external alarm with a sound output 15 dB louder than the background noise of the room MUST be installed in the following cases:

- The sound output of the remote controller is not sufficient to guarantee the 15 dB difference. This alarm can be connected to the SVS output channel of the outdoor unit or the SV unit, or to the optional output PCB of the indoor unit of that specific room. The outdoor SVS will trigger for any R32 leak detected in the complete system. For SV units and indoor units, SVS is only triggered when its own R32 sensor detects a leak. For more information on the SVS output signal, see "20.3 To connect the external outputs" [▸ 125].
- A centralised controller without built-in alarm is used, or the sound output of the centralised controller with built-in alarm is not sufficient to guarantee the 15 dB difference. Please refer to the installation manual of the centralised controller for the correct procedure to install the external alarm.

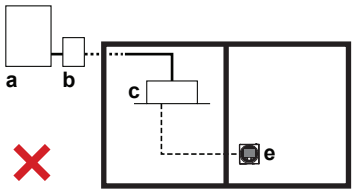
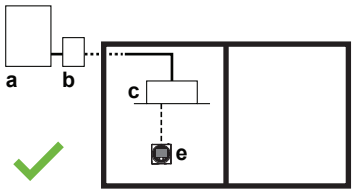
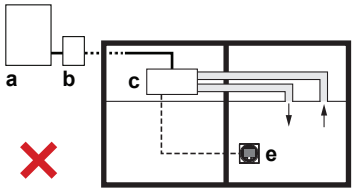
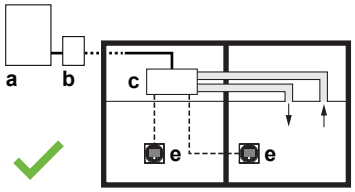
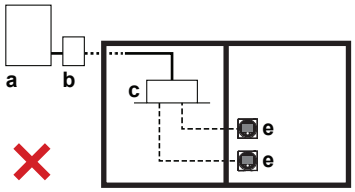
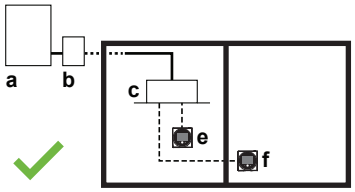
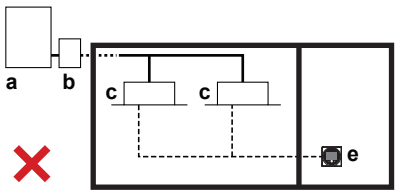
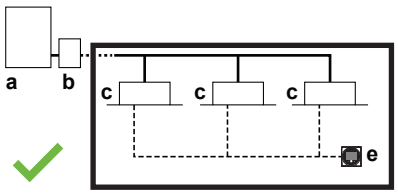
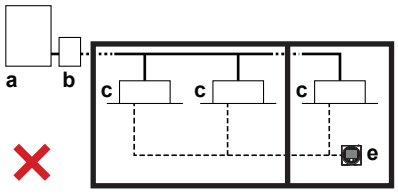
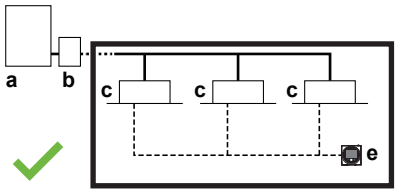
Note: Depending on configuration, the remote controller is operable in three possible modes. Each mode offers different controller functionality. For detailed information about setting the operation mode of the remote controller and its function, please refer to the installer and user reference guide of the remote controller.

Mode	Function
Fully functional	The controller is fully functional. All normal functionality is available. **This controller can be master or slave.**
Alarm only	The controller only acts as leak detection alarm (for a single indoor unit). No functionality is available. The remote controller should always be put in the same room as the indoor unit. **This controller can be master or slave.**
Supervisor	The controller only acts as leak detection alarm (for the whole system, i.e. multiple indoor units and their respective controllers). No other functionality is available. The remote controller should be placed at a supervised location. **This remote controller can only be the slave.** **Note:** In order to add a supervisor remote controller to the system, a field setting must be set on remote controller and outdoor unit. Indoor units and SV units need to be assigned an address number.

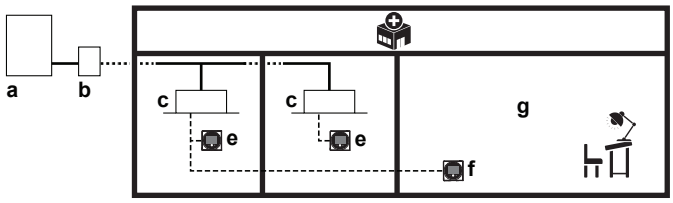
Note: Incorrect use of remote controllers can result in occurrence of error codes, non-operating system or system that is not compliant to applicable legislation.

Note: Some centralised controllers can also be used as supervisor remote controller. For further details on installation, please refer to the installation manual of the centralised controllers.

Examples

1	In case of one R32 safety system compatible remote controller, it should be the master and in the same room of the indoor unit.	
		
2	In case a ducted indoor unit serves a different room than where it is installed, both supply and return air MUST be directly ducted to that room. The room area and remote controller rules MUST be followed for both installed and served room.	
		
3	In case of two R32 safety system compatible remote controllers, at least one remote controller should be in the room of the indoor.	
		
4	Group control is allowed up to a maximum of 10 indoor units connected to different ports or connected to the same port. At least one R32 safety system compatible remote controller should be in the room of the indoors.	
		
5	All indoor units under group control need to be conditioning the same room.	
		

6	A remote controller installed at a supervised location: ▪ In room: master remote controller in fully functional OR alarm only ▪ In supervisor room: supervisor remote controller



a Outdoor unit
b SV unit
c Indoor unit
d Remote controller NOT compatible with R32 safety system
e Remote controller compatible with R32 safety system
f Remote controller in supervisor mode
g Supervisor room
✕ NOT allowed
✓ Allowed

16.4.3 Natural ventilation

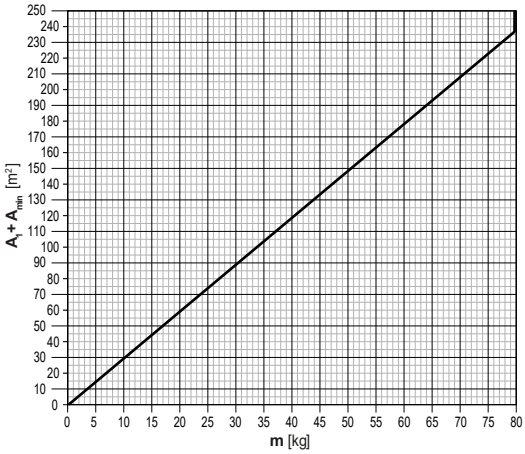
Natural ventilation is a safety measure where ventilation is made to a place where sufficient air is available to dilute the leaked refrigerant such as a large space.

The natural ventilation safety measure can be applied by following the steps below:

Step 1 – Determine total room area, which is the total area of the space that has natural ventilation **and** the space in which the indoor unit is installed/conditioning:

The respective room area can be determined by projecting the walls, doors and partitions to the floor and calculating the enclosed area. Spaces connected only through false ceilings, ductwork, or similar connections are not considered a single space.

Step 2 – Use the graph or table below to determine the total refrigerant charge limit:



A_1+A_{min} [m²]	m [kg]
10	3.3
20	6.7
30	10.1
40	13.5
50	16.8
60	20.2
70	23.6
80	27.0
90	30.3
100	33.7
110	37.1
120	40.5
130	43.9
140	47.2
150	50.6
160	54.0
170	57.4
180	60.7
190	64.1
200	67.5
210	70.9
220	74.2
230	77.6
236	79.6
237	79.8
240	79.8
250	79.8

m Total refrigerant charge limit in the system [kg]
$\mathbf{A_1}$ Area of the room with natural ventilation [m²]
$\mathbf{A_{min}}$ Minimum room area of the space in which the indoor unit is installed/conditioning [m²]

Note: Round down the derived values.

The graphs and table are based on an installation height of the indoor unit up to 2.2 m (bottom of indoor unit or bottom of duct openings).

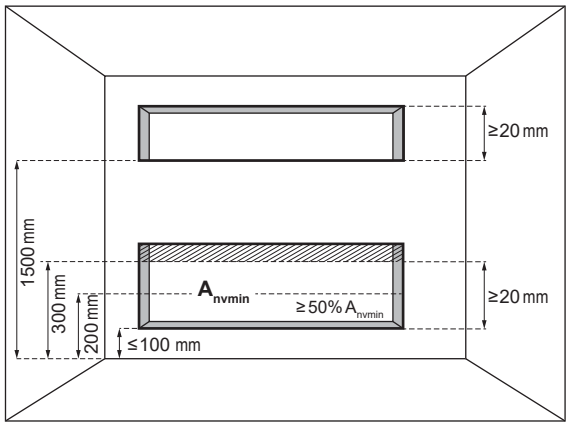
If the installation height is more than 2.2 m, higher total refrigerant charge limit of the system can apply. To know the total refrigerant charge limit of the system in case the installation height is more than 2.2 m, refer to the online tool (VRV Xpress).

Step 3 – The total amount of refrigerant in the system MUST be less than the refrigerant charge limit derived from the graph above. If NOT, natural ventilation safety measure is not allowed.

Step 4 – The partition between two rooms on the same floor MUST meet one of the following two requirements for natural ventilation.

1 Rooms on the same floor that are connected with a permanent opening that extends to the floor and is intended for people to walk through.

2 Rooms on the same floor connected with permanent openings that fulfil the requirements listed below. The openings must consist out of two parts to allow air circulation for natural ventilation.



A_{nvmin} Minimal natural ventilation area

For the lower opening:

- It is not an opening to the outside
- The opening cannot be closed
- The opening must be ≥0.012 m² (A_{nvmin})
- The area of any openings above 300 mm from the floor does not count when determining A_{nvmin}
- At least 50% of A_{nvmin} is less than 200 mm above the floor
- The bottom of the lower opening is ≤100 mm from the floor
- The height of the opening is ≥20 mm

For the upper opening:

- It is not an opening to the outside
- The opening cannot be closed
- The opening must be ≥0.006 m² (50% of A_{nvmin})
- The bottom of the upper opening must be ≥1500 mm above the floor
- The height of the opening is ≥20 mm

Note: The requirement for the upper opening can be met by false ceilings, ventilation ducts or similar arrangements that provide an airflow path between the connected rooms.

NOTICE

Indoor units and the bottom of duct openings cannot be installed lower than 1.8 m from the lowest point of the floor, except for floor standing indoor units (e.g. FXNA)

Example

The total amount of refrigerant in the VRV system is 20 kg. The VRV system has two indoor units which are installed in a space that does not belong to the lowest underground floor of the building. The space in which the indoor units are installed has a room area of 25 m². An adjacent room has a room area of 45 m² to which air circulation is possible through a partition that meets one of the two requirements in the above text. The safety measure chosen is *Alarm + Natural ventilation* (based on the total amount of refrigerant and room area from the graph for "All other floors").

1. To apply the *Alarm* safety measure, see "16.4.2 Alarm" [▸ 67].
2. In addition, apply the *Natural ventilation* safety measure: total room areas of installed room and adjacent room where natural ventilation can be made: 25 m²+45 m²=70 m²

Result: Total refrigerant charge limit for the system determined using the graph for natural ventilation is **23.6 kg**.

Total amount of refrigerant in the system (20 kg) < Total refrigerant charge limit (23.6 kg), which means that the safety measure can be applied.

16.4.4 Shut-off valves

In case shut-off valves are required as a safety measure, SV unit which has shut-off valves needs to be installed to reduce the amount of refrigerant leakage in to the room where the indoor unit is installed.

For installation of the SV unit, refer to the installation and operation manual delivered with the SV unit.

The maximum amount of charge limit and so the maximum capacity class of indoor unit which is allowed to install in the room is determined as below.

About the charge limit

The charge limit must be determined separately for **each SV unit branch pipe port**.

This is possible because of the shut-off valves in the SV unit. The maximum amount of refrigerant that can escape in case of a leak is determined by the piping length and indoor heat exchanger size. This is directly linked to the downstream indoor unit capacity of this piping section.

In case a leak is detected in an indoor unit, the shut-off valves in the SV unit of the respective port will close. The piping section with the leak is now shut off from the rest of the system and the amount of refrigerant that can leak is significantly reduced.

Note: When two branch pipe ports are combined in order to form a single branch pipe port (e.g. FXMA200/250), they must be considered as a single branch pipe port.

To determine the charge limit

Step 1 – Determine the smallest area out of:

- Each of the rooms served by SV unit branch pipe port where an indoor unit is installed
- Each of the rooms served by a ducted indoor unit installed in a different room

The room area can be determined by projecting the walls, doors and partitions to the floor and calculate the enclosed area. Spaces connected by only false ceilings, ductwork, or similar connections are NOT considered a single space.

The area of the smallest room calculated above is used in the next step to determine the maximum allowable indoor capacity that can be connected to that port.

Step 2 – Use the table below to determine the maximum total indoor unit capacity (sum of all connected indoor units) that is allowed for a single SV unit branch pipe port. In case a ducted indoor unit is serving a different room than where it is installed, the restrictions of the room area apply to both the indoor installation room and the conditioned room separately. Supply and return air shall be directly ducted to that room.

Area of installed/conditioned room [m²]	Maximum total indoor unit capacity class		
	1 indoor unit per branch pipe port[a]	2~5 indoor units per branch pipe port	
		40 m after 1st branch[b]	90 m after 1st branch[c]
<5	—	—	—
5	10	—	—
6	25	—	—
7	32	—	—
8	40	—	—
9	71	—	—
10	80	—	—
11	80	20	—
12	80	25	—
13	80	32	—
14	80	32	—
15	125	40	—
20	200	50	40
25	250	71	71
30	250	125	125
35	250	200	200
40	250	200	200
≥45	250	250	250

[a] One indoor unit connected to a single branch pipe port.

[b] Two to five indoor units connected to a single branch pipe port, 40 m after first refrigerant branch.

[c] Two to five indoor units connected to a single branch pipe port, 90 m after first refrigerant branch (size-up of liquid pipe, see "18.1 Preparing refrigerant piping" [▸ 86]).

Notes:

- The values in the table are under the assumption of worst case indoor unit volume and 40 m piping between indoor and SV unit and an installation height up to 2.2 m (bottom of indoor unit or bottom of duct openings). In VRV Xpress it is possible to add custom piping lengths, installation heights above 2.2 m and custom indoor units which can lead to lower minimum room area requirements.
- In case the capacity class allowed per branch pipe port is bigger than 140, use SV1A unit or combine two ports while using SV4~8A. For more information and installation of the SV unit, please refer to the installation and operation manual delivered with the SV unit.
- In case multiple indoor units are connected to the same branch pipe port, the sum of the connected indoor unit capacity classes needs to be equal or less than the value indicated in the table.

- In case indoor units connected to the same branch pipe port are split over different rooms, the area of the smallest room needs to be considered.
- Round down the derived values.

Step 3 – The total indoor capacity connected to a branch pipe port (or pair of branch pipe ports in case of FXMA200/250) **MUST** be equal or less than the capacity limit that is derived from the table.

If NOT, change the installation and repeat all of the above steps.

Possible changes:

- Increase the area of smallest room (installed & conditioned) connected to the same branch pipe port.
- Reduce the indoor capacity connected to the same branch pipe port to equal or below the limit.
- Split indoor capacity over two separate branch pipe ports.
- Fine tune system with more detailed calculations in VRV Xpress.

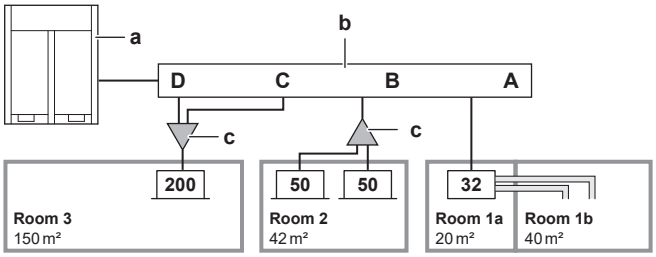
Example

VRV system serving three rooms via one SV unit. Room 1 (20 m²) is served by one indoor unit (32 class) connected to port **A**. Room 2 (42 m²) is served by two indoor units (2×50 class) connected to port **B** (no extension and liquid pipe size up has been done). Room 3 (150 m²) is served by one indoor unit (200 class) connected to ports **C** and **D**.

Port **A** is connected to an indoor unit installed in room 1a, that is serving a different room (room 1b) than where it is installed. The smallest room size needs to be considered: 20 m². Use the table under **Step 2** to find the maximum capacity class limit of the indoor unit: 140. The selected indoor unit is 32 → **OK**.

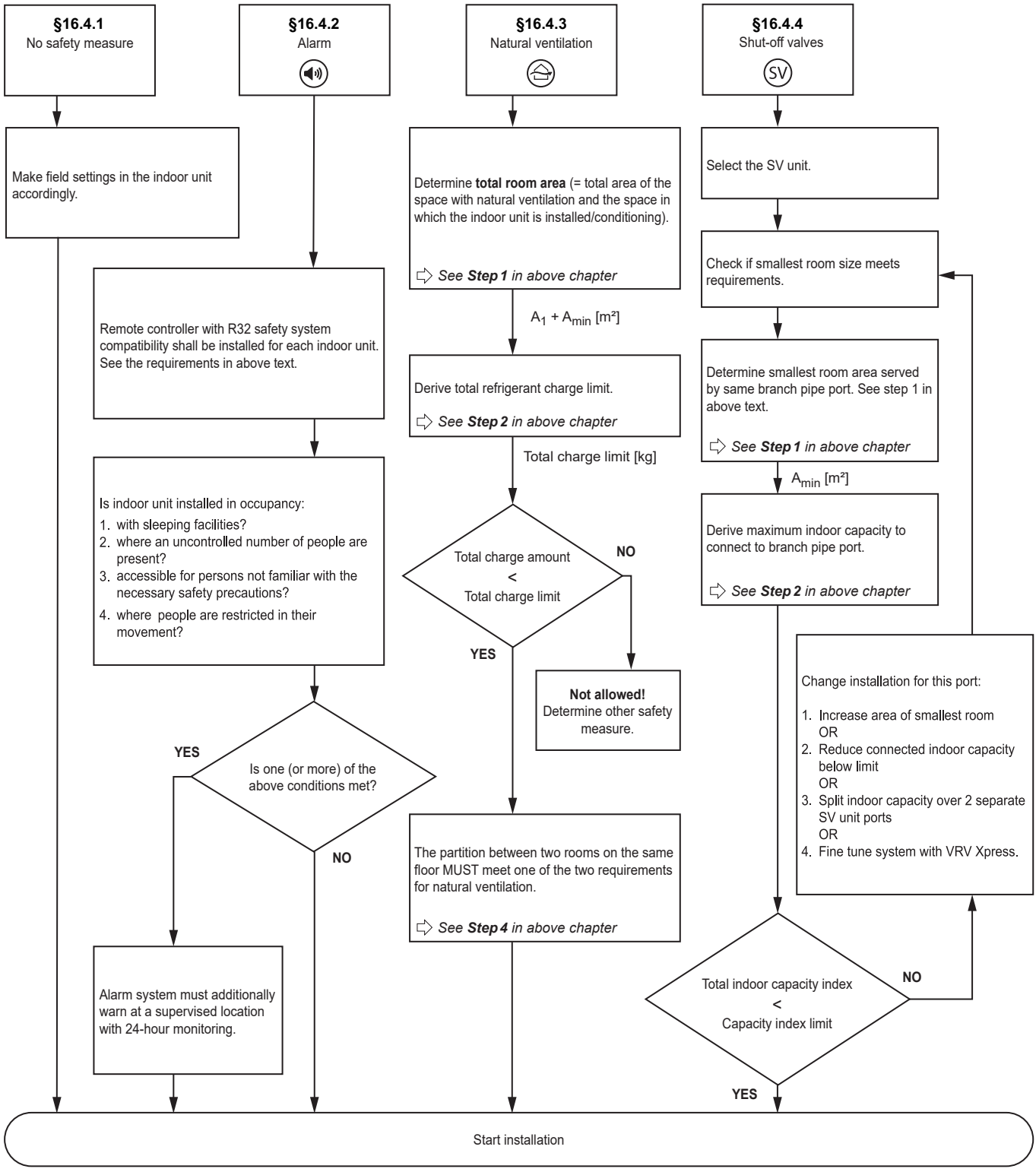
Port **B** only serves room 2: use the table under **Step 2** to find the maximum capacity class limit of the sum of the indoor units. 42 m² is rounded down to 40 m²: 200. The sum of both indoor units is exactly 100 → **OK**.

Ports **C** and **D** are combined and must be considered as one branch pipe. They only serve room 3: Use the table under **Step 2** to find the maximum capacity class limit of the indoor unit: 250. The selected indoor unit is 200 → **OK**.



A~D Branch pipe port A~D
a Outdoor unit
b SV unit
c Indoor branch kit (refnet)
Room Room
32/50/200 Indoor unit capacity

16.4.5 Overview: flowchart

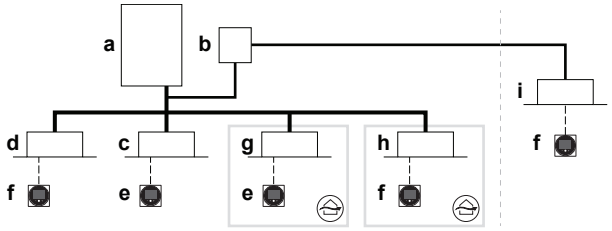


Note: The flowchart is an overview. Always refer to the full text mentioned in this manual for clear understanding and detailed explanation.

16.5 Combinations of safety measures

It is possible to combine indoor units with different safety measures (no safety measures, alarm and/or natural ventilation, alarm and shut-off valves) in the same system.

Example



a Heat pump outdoor unit
b Safety valve unit (SV)
c Indoor unit with no safety measure
d Indoor unit with alarm safety measure
e Remote controller in normal mode (R32 safety deactivated)
f Remote controller in normal mode (R32 safety activated)
g Indoor unit with natural ventilation safety measure
h Indoor unit with alarm + natural ventilation safety measure
i Indoor unit with alarm + shut-off valves safety measure
—— Refrigerant piping
----- Interconnection and user interface wiring
—— Direct connection of indoor units to the outdoor unit

17 Unit installation

WARNING

The installation MUST comply with the requirements that apply to this R32 equipment. For more information, see "16 Special requirements for R32 units" [▸ 60].

In this chapter

17.1 Preparing the installation site

WARNING

The appliance shall be stored in a room without continuously operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater).

WARNING

The appliance shall be stored/installed as follows:

- in such a way as to prevent mechanical damage.
- in a well-ventilated room without continuously operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater).
- in a room with dimensions as specified in "16 Special requirements for R32 units" [▸ 60].

Choose an installation location with sufficient space to transport the unit in and out of the site.

Do NOT install the unit in places often used as work place. In case of construction works (e.g. grinding works) where a lot of dust is created, the unit MUST be covered.

17.1.1 Installation site requirements of the outdoor unit

INFORMATION

Also read the following requirements:

- General installation site requirements. See "2 General safety precautions" [▸ 8].
- Service space requirements. See Technical data.
- Refrigerant piping requirements (length, height difference). See "18.1.1 Refrigerant piping requirements" [▸ 86].

INFORMATION

Equipment meets the requirement for commercial and light-industrial location when professionally installed and maintained.

- The outdoor unit is designed for outdoor installation only, and for the following ambient temperatures:

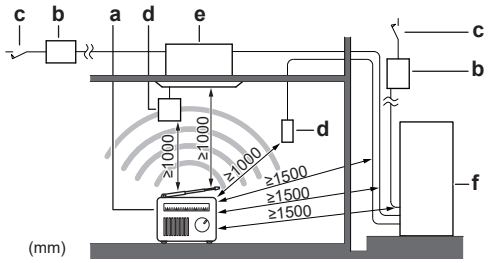
Heating	–20~21°C DB –20~15.5°C WB
Cooling	–5~52°C DB

Note: For indoor installation of the outdoor unit, check the applicable legislation.

NOTICE

The equipment described in this manual may cause electronic noise generated from radio-frequency energy. The equipment complies with specifications that are designed to provide reasonable protection against such interference. However, there is no guarantee that interference will not occur in a particular installation.

It is therefore recommended to install the equipment and electric wires in such a way that they keep a proper distance from stereo equipment, personal computers, etc.



a Personal computer or radio
b Fuse
c Earth leakage protector
d User interface
e Indoor unit (for illustrative purposes only)
f Outdoor unit

- In places with weak reception, keep distances of 3 m or more to avoid electromagnetic disturbance of other equipment and use conduit tubes for power and transmission lines.
- Provide sufficient space around the unit for servicing and air circulation.
- Make sure the installation site withstands the weight and vibration of the unit.
- Make sure the area is well ventilated. Do NOT block any ventilation openings.
- Make sure the unit is level.
- Select a place where rain can be avoided as much as possible.
- Ensure that in the event of a water leak, no damage occurs to the installation space or its surroundings.
- Be sure that the air inlet of the unit is not positioned towards the main wind direction. Frontal wind will disturb the operation of the unit. If necessary, use a screen to block the wind.
- Ensure that water cannot cause any damage to the location by adding water drains to the foundation and by preventing water traps in the construction.
- Choose a location where the operation noise or the hot/cold air discharged from the unit will not disturb anyone and the location is selected according the applicable legislation.

- Heat exchanger fins are sharp and injury is possible. Choose an installation location where there is no risk for injury (especially in areas where children play).

Do NOT install the unit in the following places:

- In potentially explosive atmospheres.
- In places where there is machinery that emits electromagnetic waves. Electromagnetic waves may disturb the control system, and cause malfunction of the equipment.
- In places where there is a risk of fire due to the leakage of flammable gases (example: thinner or gasoline), carbon fibre, ignitable dust.
- In places where corrosive gas (example: sulphurous acid gas) is produced. Corrosion of copper pipes or soldered parts may cause the refrigerant to leak.
- In places where a mineral oil mist, spray or vapour may be present in the atmosphere. Plastic parts may deteriorate and fall off or cause water leakage.
- Sound sensitive areas (e.g. near a bedroom), so that the operation noise will cause no trouble.

  Note: If the sound is measured under actual installation conditions, the measured value might be higher than the sound pressure level mentioned in Sound spectrum in the data book due to environmental noise and sound reflections.

INFORMATION

The sound pressure level is less than 70 dBA.

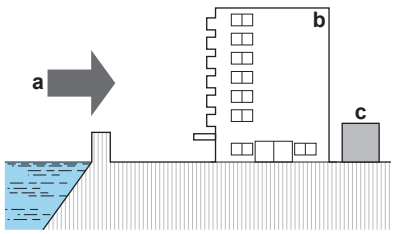
It is NOT recommended to install the unit in the following places because it may shorten the life of the unit:

- Where the voltage fluctuates a lot
- In vehicles or vessels
- Where acidic or alkaline vapour is present

Seaside installation. Make sure the outdoor unit is NOT directly exposed to sea winds. This is to prevent corrosion caused by high levels of salt in the air, which might shorten the life of the unit.

Install the outdoor unit away from direct sea winds.

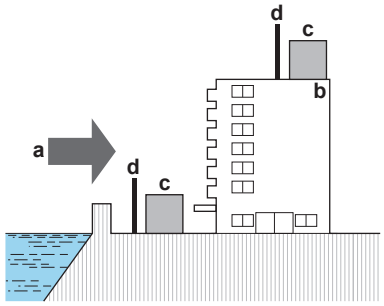
Example: Behind the building.



a Sea wind
b Building
c Outdoor unit

If the outdoor unit is exposed to direct sea winds, install a windbreaker.

- Height of windbreaker ≥1.5× height of outdoor unit
- Mind the service space requirements when installing the windbreaker.



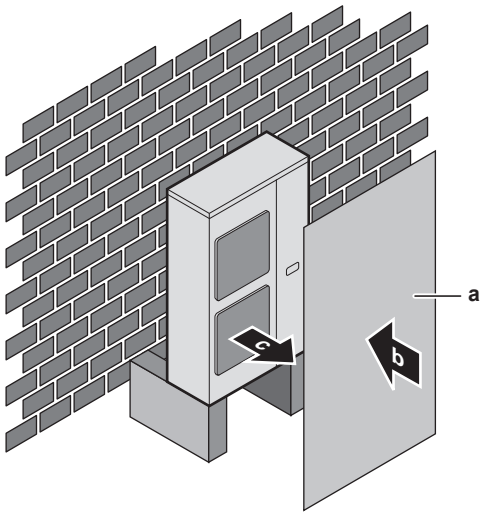
a Sea wind
b Building
c Outdoor unit
d Windbreaker

Strong winds (≥18 km/h) blowing against the outdoor unit's air outlet causes short circuit (suction of discharge air). This may result in:

- deterioration of the operational capacity;
- frequent frost acceleration in heating operation;
- disruption of operation due to decrease of low pressure or increase of high pressure;
- a broken fan (if a strong wind blows continuously on the fan, it may start rotating very fast, until it breaks).

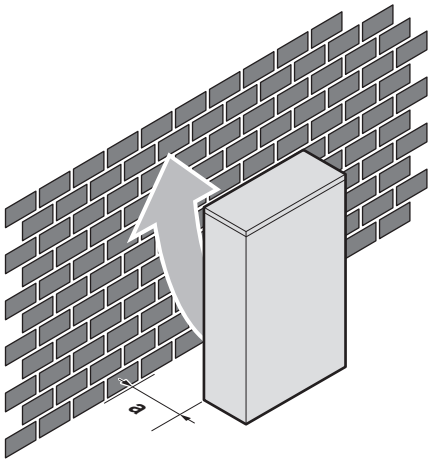
It is recommended to install a baffle plate when the air outlet is exposed to wind.

It is recommended to install the outdoor unit with the air inlet facing the wall and NOT directly exposed to the wind.



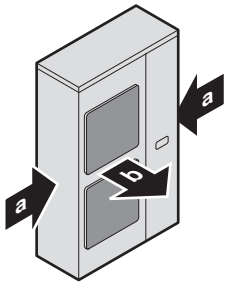
a Baffle plate
b Prevailing wind direction
c Air outlet

Turn the air outlet side towards the building's wall, fence or screen.



a Make sure there is enough installation space

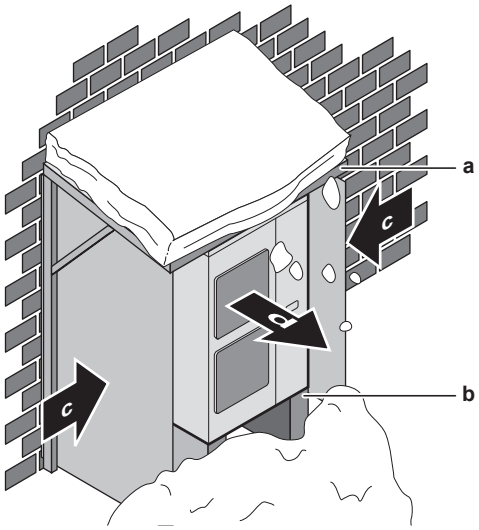
Set the air outlet side at a right angle to the direction of the wind.



a Prevailing wind direction
b Air outlet

17.1.2 Additional installation site requirements of the outdoor unit in cold climates

Protect the outdoor unit against direct snowfall and take care that the outdoor unit is NEVER snowed up.

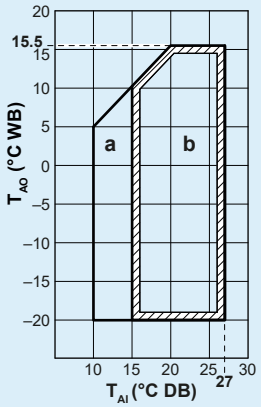


a Snow cover or shed
b Pedestal (minimum height=150 mm)
c Prevailing wind direction
d Air outlet

Snow might build up and freeze between the heat exchanger and the casing of the unit. This might decrease the operating efficiency. For instructions on how to prevent this (after mounting of the unit), see "17.3.3 To provide drainage" [▸ 84].

NOTICE

When operating the unit **in heating** in a low outdoor ambient temperature with high humidity conditions, make sure to take precautions to keep the drain holes of the unit free by using proper equipment.



a: Warming up operation range; **b**: Heating operation range; $\mathbf{T}_{AI}$: Ambient indoor temperature; $\mathbf{T}_{AO}$: Ambient outdoor temperature

If the unit is selected to operate at ambient temperatures lower than –5°C for 5 days or longer, with relative humidity levels exceeding 95%, we recommend to apply a Daikin range specifically designed for such application and/or to contact your dealer for further advice.

17.2 Opening and closing the unit

17.2.1 About opening the units

At certain times, you have to open the unit. **Example:**

- When connecting the electrical wiring
- When maintaining or servicing the unit

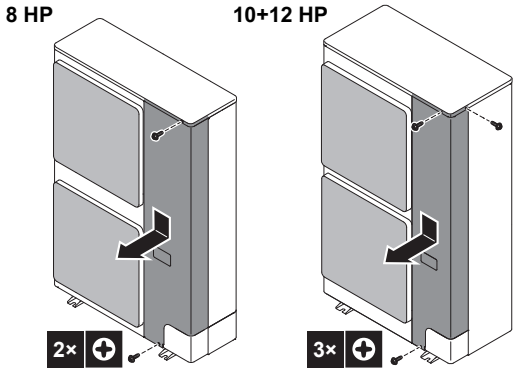
DANGER: RISK OF ELECTROCUTION

Do NOT leave the unit unattended when the service cover is removed.

17.2.2 To open the outdoor unit

DANGER: RISK OF ELECTROCUTION

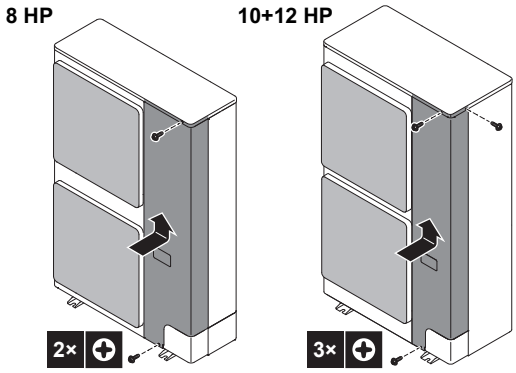
DANGER: RISK OF BURNING/SCALDING



17.2.3 To close the outdoor unit

NOTICE

When closing the outdoor unit cover, make sure that the tightening torque does NOT exceed 4.1 N•m.



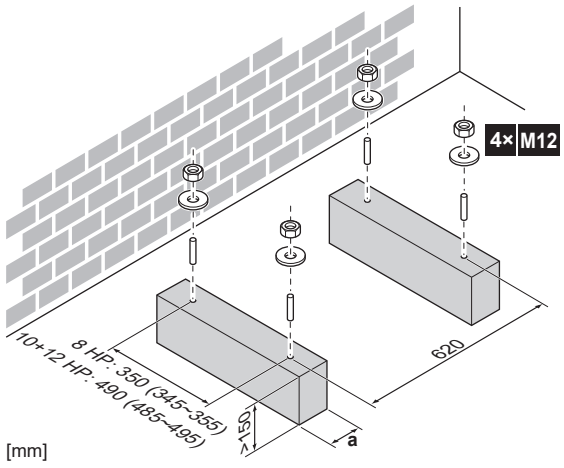
17.3 Mounting the outdoor unit

17.3.1 To provide the installation structure

Check the strength and level of the installation ground so that the unit will not cause any operating vibration or noise.

Fix the unit securely by means of foundation bolts in accordance with the foundation drawing.

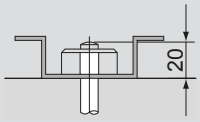
Prepare four sets of anchor bolts, nuts, and washers (field supply) as follows:



a Make sure not to cover the drain holes of the bottom plate of the unit.

INFORMATION

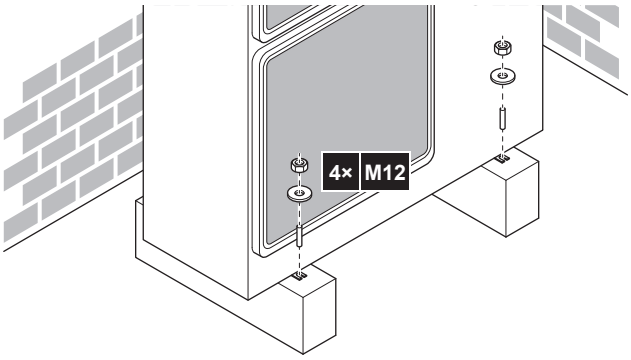
The recommended height of the upper protruding part of the bolts is 20 mm.



NOTICE

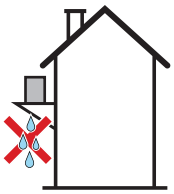
Fix the outdoor unit to the foundation bolts using nuts with resin washers (a). If the coating on the fastening area is stripped off, the metal can rust easily.

17.3.2 To install the outdoor unit



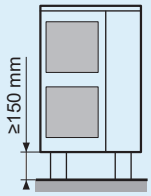
17.3.3 To provide drainage

- Make sure that condensation water can be evacuated properly.
- Install the unit on a base to make sure that there is proper drainage in order to avoid ice accumulation.
- Prepare a water drainage channel around the foundation to drain waste water away from the unit.
- Avoid drain water flowing over the footpath, so that it does NOT become slippery in case of ambient freezing temperatures.
- If you install the unit on a frame, install a waterproof plate within 150 mm of the bottom side of the unit in order to prevent water from getting into the unit and to avoid drain water dripping (see the following figure).

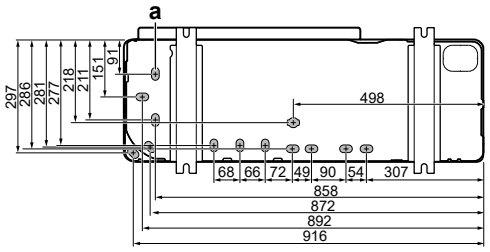
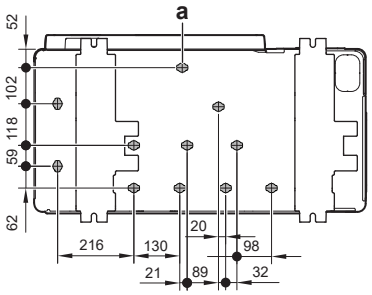


NOTICE

If drain holes of the outdoor unit are covered by a mounting base or by floor surface, raise the unit to provide a free space of more than 150 mm under the outdoor unit.



Drain holes (dimensions in mm)

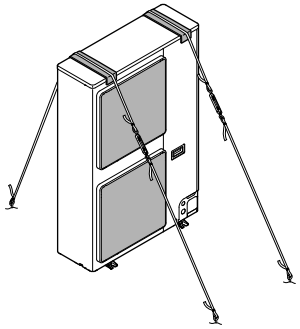
Model	Bottom view [mm]
RXYSA8	
RXYSA10 + RXYSA12	

a Drain holes

17.3.4 To prevent the outdoor unit from falling over

In case the unit is installed in places where strong wind can tilt the unit, take following measure:

1. Prepare 2 cables as indicated in the following illustration (field supply).
2. Place the 2 cables over the outdoor unit.
3. Insert a rubber sheet between the cables and the outdoor unit to prevent the cables from scratching the paint (field supply).
4. Attach the ends of the cables.
5. Tighten the cables.



18 Piping installation

CAUTION

See "3 Specific installer safety instructions" [▸ 13] to make sure this installation complies with all safety regulations.

In this chapter

18.1 Preparing refrigerant piping

18.1.1 Refrigerant piping requirements

NOTICE

The piping and other pressure-containing parts shall be suitable for refrigerant. Use phosphoric acid deoxidised seamless copper for refrigerant piping.

INFORMATION

Also read the precautions and requirements in the "2 General safety precautions" [▸ 8].

- Foreign materials inside pipes (including oils for fabrication) must be ≤30 mg/10 m.

18.1.2 Refrigerant piping material

Piping material

Phosphoric acid deoxidised seamless copper

Flare connections

Only use annealed material.

Piping temper grade and thickness

Outer diameter (Ø)	Temper grade	Thickness (t)[a]	
6.4 mm (1/4") 9.5 mm (3/8") 12.7 mm (1/2")	Annealed (O)	≥0.80 mm	
15.9 mm (5/8")	Annealed (O)	≥0.99 mm	
19.1 mm (3/4") 22.2 mm (7/8")	Half hard (1/2H)	≥0.80 mm	
25.4 mm (1")	Half hard (1/2H)	≥0.88 mm	

[a] Depending on the applicable legislation and the maximum working pressure of the unit (see "PS High" on the unit name plate), larger piping thickness might be required.

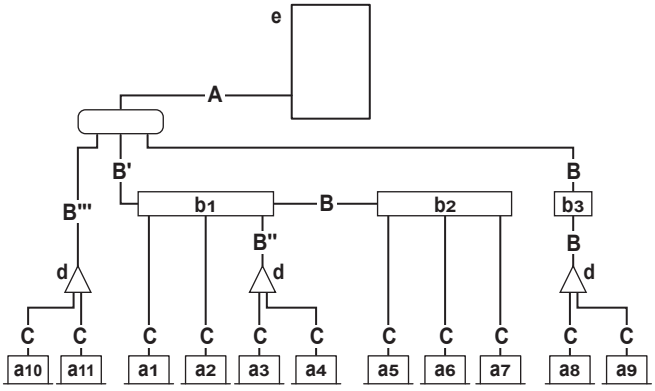
18.1.3 Refrigerant piping insulation

- Use polyethylene foam as insulation material:
  - with a heat transfer rate between 0.041 and 0.052 W/mK (0.035 and 0.045 kcal/mh°C)
  - with a heat resistance of at least 120°C
- Insulation thickness:

Ambient temperature	Humidity	Minimum thickness
≤30°C	75% to 80% RH	15 mm
>30°C	≥80% RH	20 mm

18.1.4 To select the piping size

Determine the proper size using the following tables and reference figure (only for indication).



a1~a11 VRV DX indoor units
b1~b3 SV units
c First branch kit (header)
d Indoor branch kit (refnet)
e VRV 5-S outdoor unit
A~C Piping

A: Piping between outdoor unit and (first) refrigerant branch kit

Choose from the following table in accordance with the outdoor unit capacity type. In case there is no first indoor branch kit (c), pipe A is connected to the first SV unit or VRV DX indoor unit.

HP class	Piping outer diameter [mm]	
	Gas pipe	Liquid pipe
8~10	19.1	9.5
12	22.2	12.7

B: Piping between refrigerant branch kit and SV units OR between two refrigerant branch kits OR between two SV units

Choose from the following table in accordance with the indoor unit total capacity type, connected downstream. Do not let the connection piping exceed the refrigerant piping size chosen by the general system model name.

Example:

- Downstream capacity for B' = [capacity index of unit a1] + [unit a2] + [unit a3] + [unit a4] + [unit a5] + [unit a6] + [unit a7]
- Downstream capacity for B'' = [capacity index of unit a3] + [unit a4]
- Downstream capacity for B''' = [capacity index of unit a10] + [unit a11]

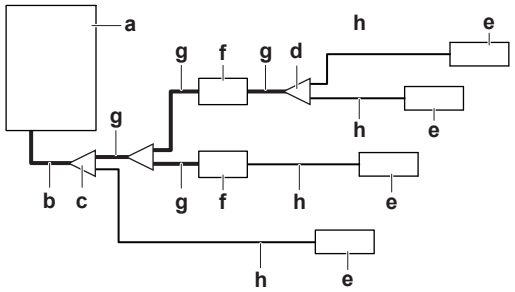
Indoor unit capacity index	Piping outer diameter [mm]	
	Gas pipe	Liquid pipe
<150	15.9	9.5
150≤x<290	19.1	
290≤x<390	22.2	12.7

C: Piping between refrigerant branch kit or SV unit and indoor unit

Pipe size for direct connection to indoor unit must be the same as the connection size of the indoor unit (in case indoor unit is VRV DX indoor).

Indoor unit capacity index	Piping outer diameter [mm]	
	Gas pipe	Liquid pipe
10~32	9.5	6.4
40~80	12.7	
100~140	15.9	9.5
200~250	19.1	

Size-up of piping



a Outdoor unit
b Main pipes (size up if equivalent length >90 m)
c First refrigerant branch kit (refnet)
d Last refrigerant branch kit (refnet)
e Indoor unit
f SV unit
g Piping between first and last refrigerant branch kit (size-up may be required)
h Piping between last refrigerant branch kit and indoor unit

If a size-up of the piping is required, refer to the table below:

Size up – outer diameter [mm]		
HP class	**Gas piping**	**Liquid piping**
8~10	19.1 → 22.2	9.5 → 12.7
12	22.2 → 25.4[a]	12.7 → 15.9

[a] If the size-up size of 25.4 mm is NOT available, you must use the standard size. It is not allowed to size-up to 28.6 mm due to legal requirements.

- In case the required pipe sizes (inch sizes) are not available, it is also allowed to use other diameters (mm sizes), taken the following into account:
  - Select the pipe size nearest to the required size.
  - Use the suitable adapters for the changeover from inch to mm pipes (field supply).
  - The additional refrigerant calculation has to be adjusted as mentioned in "19.4 To determine the additional refrigerant amount" [▸ 109].
- Size-up of both main pipes is required when the equivalent pipe length between outdoor and indoor units is 90 m or more.

18.1.5 To select refrigerant branch kits

Refrigerant refnets

For piping example, refer to "18.1.4 To select the piping size" [▸ 87].

- When using refnet joints at the first branch counted from the outdoor unit side, choose from the following table in accordance with the capacity of the outdoor unit (example: refnet joint c).

HP class	Refrigerant branch kit
8~12	KHRQ22M29T9 (inch)
	KHRQM22M29T (mm)

- For refnet joints other than the first branch, select the proper branch kit model based on the total capacity index of all indoor units connected after the refrigerant branch.

Indoor unit capacity index	Refrigerant branch kit
<200	KHRQ22M20TA (inch)
	KHRQM22M20T (mm)
200≤x<290	KHRQ22M29T9 (inch)
	KHRQM22M29T (mm)
290≤x<390	KHRA22M65T (inch)
	KHRAM22M65T (mm)

- Concerning refnet headers, choose from the following table in accordance with the total capacity of all the indoor units connected below the refnet header.

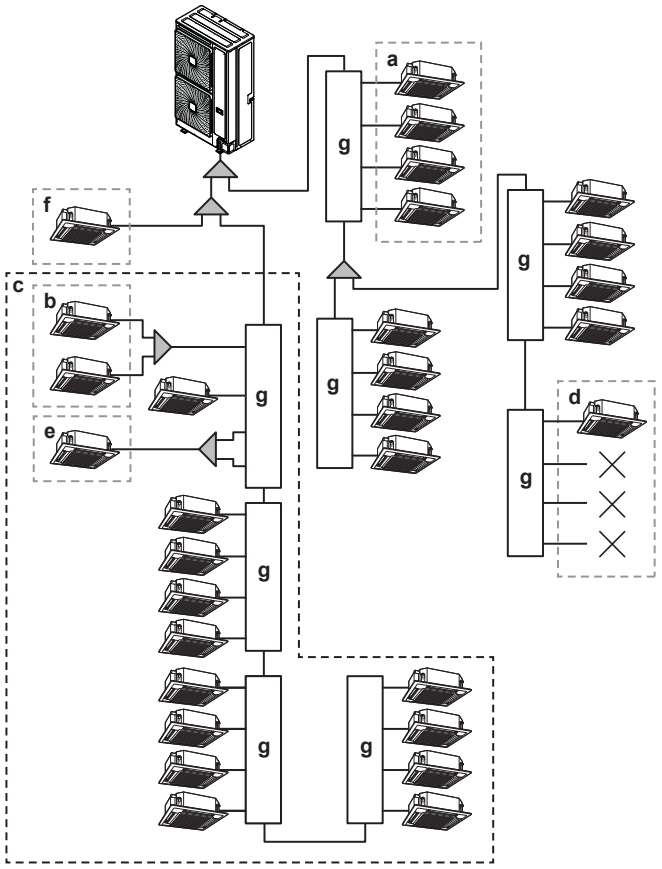
Indoor unit capacity index	Refrigerant branch kit
<290	KHRQ22M29H (inch)
	KHRQM22M29H9 (mm)
290≤x<390	KHRA22M65H (inch)
	KHRAM22M65H (mm)

INFORMATION

Maximum 8 branches can be connected to a header.

18.1.6 Installation limitations

The illustration and table below show the installation limitations.



a, b See table below.

c Maximum limit of 16 downstream ports of SV units in refrigerant flow-through. Unused ports must also be counted. E.g. 16 ports=SV8A+SV4A+SV4A.

d At least one indoor unit must be connected to a SV unit (SV6A and SV8A: always start from one of the first four ports).

e Combine two ports when indoor unit capacity is over 140 except when SV1A is used. Refer to the table below.

f Direct connection to the outdoor unit. For more information, see "18 Piping installation" [▸ 86].

g SV unit

Description	Model			
	SV1	SV4	SV6	SV8
Maximum number of connectable indoor units per SV unit (**a**)	5	20	30	40
Maximum number of connectable indoor units per SV unit branch (**b**)	5			
Maximum capacity index of connectable indoor units per SV unit (**a**)	250	400	600	650
Maximum capacity index of connectable indoor units per branch (**b**)	250	140		
Maximum capacity index of connectable indoor units per branch if two branches are combined (**e**)	—	250		

Description	Model			
	SV1	SV4	SV6	SV8
Maximum capacity index of indoor units connected to SV units in refrigerant flow-through (**c**)	650			
Maximum number of allowable SV units in refrigerant flow-through (**c**)	4			
Maximum number of ports of SV units in refrigerant flow-through (**c**)	16			
Maximum number of indoor units connected to SV units in refrigerant flow-through (**c**)	64			

18.1.7 Refrigerant piping length and height difference

Make sure the piping installation does not exceed the maximum allowable pipe length, the allowable level difference, and the allowable length after branching. To illustrate the piping length requirements, two cases are discussed in the chapters below. They describe both standard and non-standard outdoor unit combinations with VRV DX indoor units.

Definitions

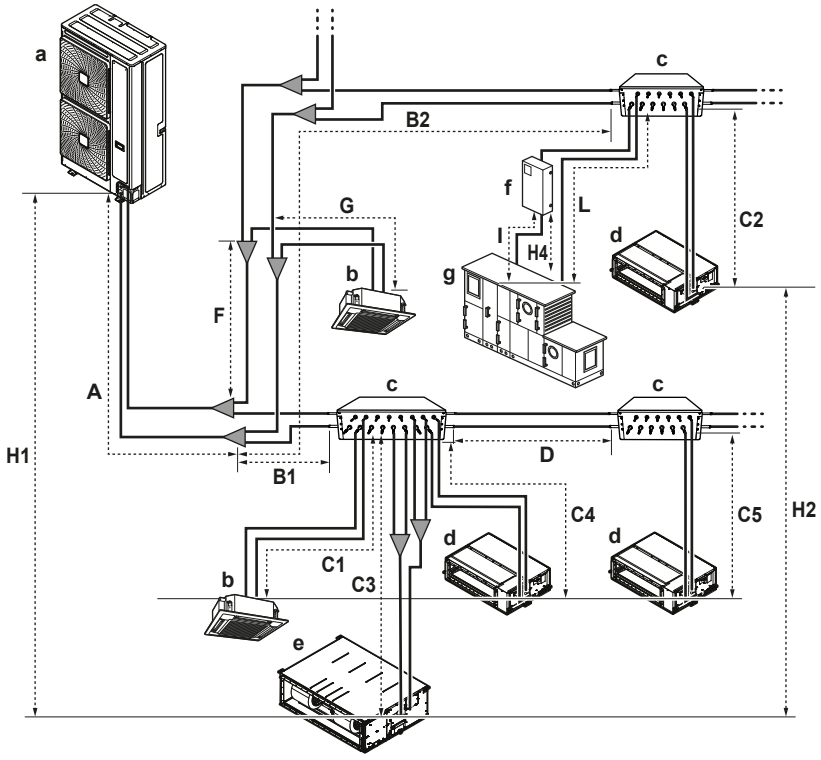
Term	Definition
Actual piping length	Pipe length between outdoor and indoor units
Equivalent piping length	Pipe length between outdoor and indoor units, including the equivalent length of the piping accessories
Total actual piping length	Total piping length, from the outdoor to all indoor units

Equivalent length of the piping accessories

Accessory	Equivalent length [m]
Refnet joint	0.5 m
Refnet header	1 m
SV unit branch pipe	6.7 m

Total downstream indoor unit capacity	Equivalent length of SV unit [m]			
	SV1A	SV4A	SV6A	SV8A
<150	0.49	0.49	0.53	0.53
150≤x<290	0.49	0.49	0.58	0.58
290≤x<390	1.71	1.71	1.86	1.86

Connection with VRV DX indoor units and/or air handling units



a Outdoor unit
b VRV DX indoor unit
c Safety valve unit (SV)
d VRV DX indoor unit (duct)
e VRV DX indoor unit (large duct)
f EKEXVA-kit
g Air handling unit (AHU)

		Maximum piping length		
		Longest pipe from the outdoor unit	**Longest pipe after the first branch or SV unit**	**Total piping length**
VRV DX	8 HP	100 m/130 m[(a)]	40 m[(b)]	300 m[(c)]
	10-12 HP	120 m/150 m[(a)]	40 m[(b)]	
AHU	Pair	50 m/55 m[(d)(e)]	—	
	Multi[(f)]		40 m[(b)]	
	Mix[(g)]			

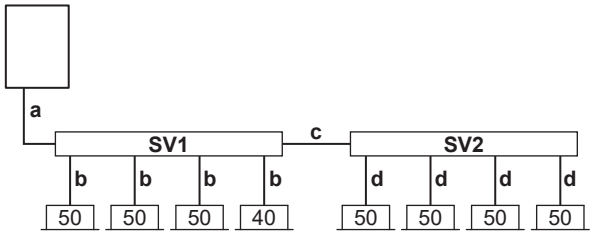
[(a)] (actual/equivalent length); maximum: (A+B1+C1, A+B2+C2, A+B1+C3, A+B1+C4, A+B1+D+C5, A+F+G)
[(b)] (actual length); maximum: (B1+C1, B2+C2, B1+C3, B1+C4, B1+D+C5, F+G, B2+L)
[(c)] (actual length) maximum: A+B1+B2+C1+C2+C3+C4+C5+D+F+G+L
[(d)] (actual/equivalent length); maximum: (A+B2+L)
[(e)] The allowable minimum length is 5 m.
[(f)] Multiple air handling units (AHU)(EKEXVA+EKEA kits)
[(g)] Mix of air handling units

		Maximum height difference	
		Indoor to outdoor[(a)]	**Indoor to indoor**
VRV DX	8 HP	50 m/40 m	15 m
	10-12 HP		

		Maximum height difference	
		Indoor to outdoor[a]	Indoor to indoor
AHU	Pair	40 m/40 m	—
	Multi[b]		15 m
	Mix[c]		

[a] (outdoor above indoor/indoor above outdoor)
[b] Multiple air handling units (AHU)(EKEXVA+EKEA kits)
[c] Mix of air handling units

Example



SV1 SV unit 1 (SV4A)
SV2 SV unit 2 (SV4A)
a 20 m
b 10 m
c 15 m
d 10 m

1 The equivalent length for an indoor unit connected to SV1 is the sum of:
- a=20 m,
- b=10 m,
- equivalent length of branch pipe=6.7 m,
- and the equivalent length of SV1 depending on the total downstream Capacity Index as indicated in the table above: CI 390 → 1.71 m.

20+10+(6.7+1.71)=38.41 m

2 The equivalent length for an indoor unit connected to SV2 is the sum of:
- a=20 m,
- c=15 m,
- d=10 m,
- equivalent length of branch pipe=6.7 m,
- the equivalent length of SV1 depending on total downstream Capacity Index as indicated in the table above: CI 390 → 1.71 m,
- and the equivalent length of SV2 depending on total downstream Capacity Index as indicated in the table above: CI 200 → 0.49 m.

20+15+10+(1.71)+(6.7+0.49)=53.9 m

18.2 Connecting the refrigerant piping

18.2.1 About connecting the refrigerant piping

Before connecting the refrigerant piping

Make sure the outdoor and indoor units are mounted.

Typical workflow

Connecting the refrigerant piping involves:

- Connecting the refrigerant piping to the outdoor unit
- Connecting refrigerant branch kits
- Connecting the refrigerant piping to the indoor units (see the installation manual of the indoor units)
- Insulating the refrigerant piping
- Keeping in mind the guidelines for:
  - Pipe bending
  - Brazing
  - Using the stop valves
  - Removing pinched pipes

18.2.2 Precautions when connecting the refrigerant piping

INFORMATION

Also read the precautions and requirements in the following chapters:

- "2 General safety precautions" [▸ 8]
- "18.1 Preparing refrigerant piping" [▸ 86]

DANGER: RISK OF BURNING/SCALDING

NOTICE

NEVER install a drier to this unit to guarantee its lifetime. The drying material may dissolve and damage the system.

NOTICE

Take the following precautions on refrigerant piping into account:

- Avoid anything but the designated refrigerant to get mixed into the refrigerant cycle (e.g. air).
- Only use R32 when adding refrigerant.
- Only use installation tools (e.g. manifold gauge set) that are exclusively used for R32 installations to withstand the pressure and to prevent foreign materials (e.g. mineral oils and moisture) from mixing into the system.
- Protect the piping as described in the following table to prevent dirt, liquid or dust from entering the piping.
- Use caution when passing copper tubes through walls.

Unit	Installation period	Protection method
Outdoor unit	>1 month	Pinch the pipe
	<1 month	Pinch or tape the pipe
Indoor unit	Regardless of the period	

NOTICE

Do NOT open the refrigerant stop valve before checking the refrigerant piping. When you need to charge additional refrigerant it is recommended to open the refrigerant stop valve after charging.

18.2.3 Pipe bending guidelines

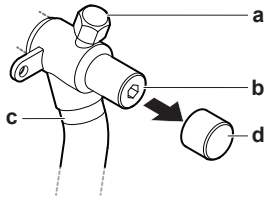
Use a pipe bender for bending. All pipe bends should be as gentle as possible (bending radius should be 30~40 mm or larger).

18.2.4 Using the stop valve and service port

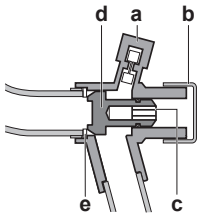
To handle the stop valve

Take the following guidelines into account:

- The gas and liquid stop valves are factory closed.
- Make sure to keep all stop valves open during operation.
- The figures below show the name of each part required in handling the stop valve.



a Service port and service port cover
b Stop valve
c Field piping connection
d Dust cap

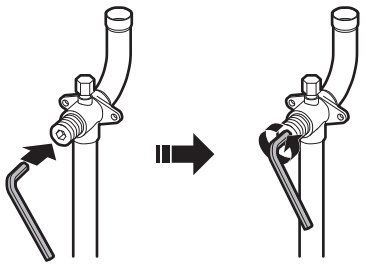


a Service port
b Dust cap
c Hexagon hole
d Shaft
e Seal

- Do NOT apply excessive force to the stop valve. Doing so may break the valve body.

To open the stop valve

1. Remove the dust cap.
2. Insert a hexagon wrench into the stop valve.
3. FULLY turn the stop valve counterclockwise and tighten until the correct tightening torque value is achieved (see "Tightening torques" [▸ 96]).



NOTICE

Stop valves need to be opened on torque specified in this manual. It is not allowed to turn valve "a quarter turn" back when opening it.

4 Install the dust cap.

Result: The valve is now open.

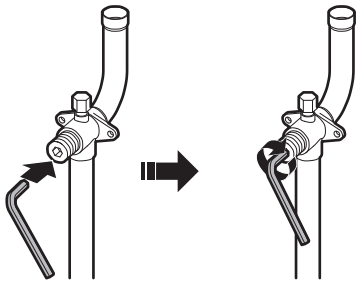
NOTICE

Reinstall dust cap to prevent aging of O-ring and risk of leakage.

To close the stop valve

1 Remove the stop valve cover.

2 Insert a hexagon wrench into the stop valve and turn the stop valve clockwise.



3 When the stop valve cannot be turned any further, stop turning.

4 Install the stop valve cover.

Result: The valve is now closed.

To handle the service port

- Always use a charge hose equipped with a valve depressor pin, since the service port is a Schrader type valve.
- After handling the service port, make sure to tighten the service port cover securely. For the tightening torque, refer to the table below.
- Check for refrigerant leaks after tightening the service port cover.

Tightening torques

Stop valve size [mm]	Tightening torque [N•m][(a)]		
	Valve body	Hexagonal wrench	Service port
Ø9.5	5~7	4 mm	10.7~14.7
Ø12.7	8~10		
Ø15.9	14~16	6 mm	
Ø19.1	19~21	8 mm	
Ø25.4			

[a] When opening or closing.

18.2.5 To remove the pinched pipes

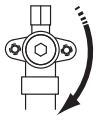
WARNING

Any gas or oil remaining inside the stop valve may blow off the pinched piping.

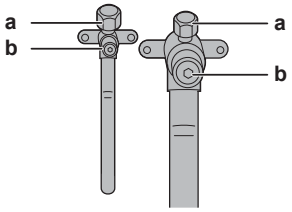
Failure to observe the instructions in procedure below properly may result in property damage or personal injury, which may be serious depending on the circumstances.

Use the following procedure to remove the pinched piping:

1. Make sure that the stop valves are fully closed.



2. Connect the vacuuming/recovery unit through a manifold to the service port of all stop valves.



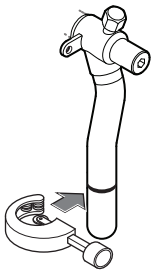
a Service port
b Stop valve

3. Recover gas and oil from the pinched piping by using a recovery unit.

CAUTION

Do NOT vent gases into the atmosphere.

4. When all gas and oil is recovered from the pinched piping, disconnect the charge hose and close the service ports.
5. Cut off the lower part of the gas and liquid stop valve pipes along the black line. Use an appropriate tool (e.g. a pipe cutter).



WARNING

NEVER remove the pinched piping by brazing.

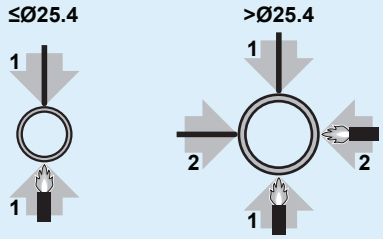
Any gas or oil remaining inside the stop valve may blow off the pinched piping.

6 Wait until all oil has dripped out before continuing with the connection of the field piping in case the recovery was not complete.

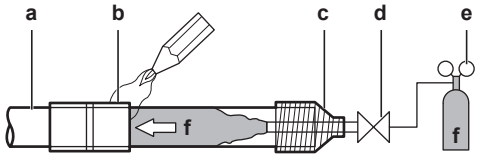
18.2.6 To braze the pipe end

NOTICE

Precautions when connecting field piping. Add brazing material as shown in the figure.



- When brazing, blow through with nitrogen to prevent creation of large quantities of oxidised film on the inside of the piping. This film adversely affects valves and compressors in the refrigerating system and prevents proper operation.
- Set the nitrogen pressure to 20 kPa (0.2 bar) (just enough so it can be felt on the skin) with a pressure-reducing valve.



a Refrigerant piping
b Part to be brazed
c Taping
d Manual valve
e Pressure-reducing valve
f Nitrogen

- Do NOT use anti-oxidants when brazing pipe joints. Residue can clog pipes and break equipment.
- Do NOT use flux when brazing copper-to-copper refrigerant piping. Use phosphor copper brazing filler alloy (BCuP), which does NOT require flux.

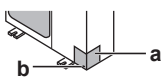
  Flux has an extremely harmful influence on refrigerant piping systems. For instance, if chlorine based flux is used, it will cause pipe corrosion or, in particular, if the flux contains fluorine, it will deteriorate the refrigerant oil.
- ALWAYS protect the surrounding surfaces (e.g. insulation foam) from heat when brazing.

18.2.7 To connect the refrigerant piping to the outdoor unit

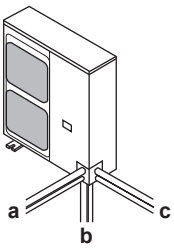
- **Piping length.** Keep field piping as short as possible.
- **Piping protection.** Protect the field piping against physical damage.

1 Do the following:

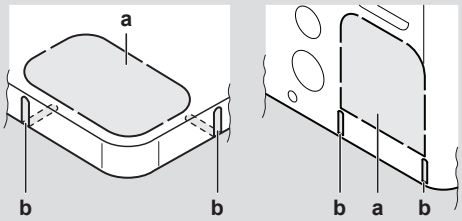
- Remove the service cover. See "17.2.2 To open the outdoor unit" [▸ 82].
- Remove the piping intake plate (a) with screw (b).



2 Choose a piping route (a, b or c).



INFORMATION



- Punch out the knockout (a) in the bottom plate or cover plate by tapping on the attachment points with a flat head screwdriver and a hammer.
- Optionally, cut out the slits (b) with a metal saw.

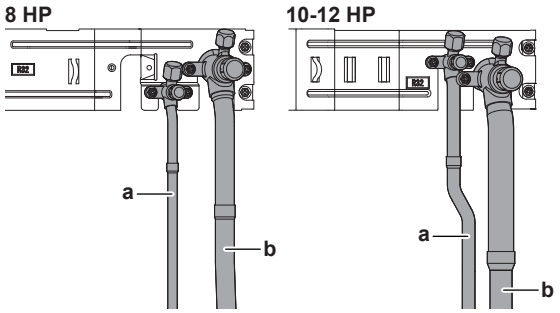
NOTICE

Precautions when making knockout holes:

- Avoid damaging the casing and underlying piping.
- After making the knockout holes, we recommend to remove the burrs and paint the edges and areas around the edges using repair paint to prevent rusting.
- When passing electrical wiring through the knockout holes, wrap the wiring with protective tape to prevent damage.

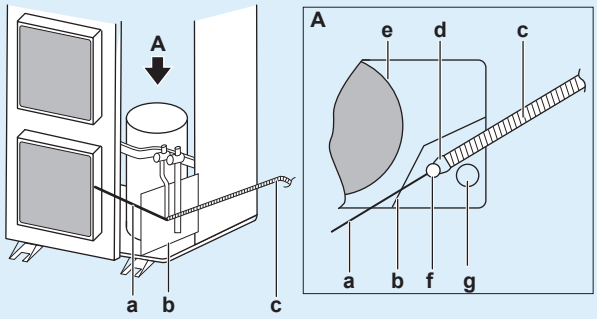
3 Do the following:

- Connect the liquid pipe (a) to the liquid stop valve. (brazing)
- Connect the gas pipe (b) to the gas stop valve. (brazing)



NOTICE

When brazing: First braze the liquid side piping, then the gas side piping. Enter the electrode from the front of the unit and the welding torch from the right side to braze with the flames facing outside and avoid the compressor sound insulation and other piping.



a Electrode

b Burning-resistant plate

c Welding torch

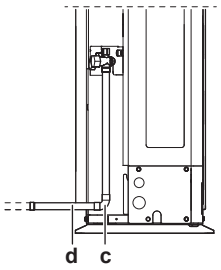
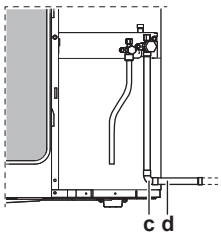
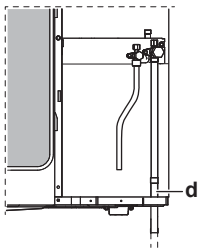
d Flames

e Compressor sound insulation

f Liquid side piping

g Gas side piping

- Connect the gas piping accessories c and d (d: only for 10 HP). There are three possibilities:

To the front	To the side	Downwards
		

WARNING

Provide adequate measures to prevent that the unit can be used as a shelter by small animals. Small animals that make contact with electrical parts can cause malfunctions, smoke or fire.

NOTICE

Make sure to open the stop valves after installing the refrigerant piping and performing vacuum drying. Running the system with the stop valves closed may break the compressor.

NOTICE

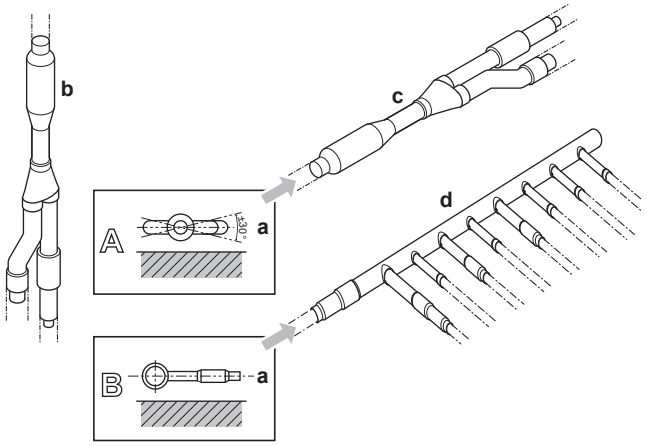
- Be sure to use the supplied accessory pipes when carrying out piping work in the field.
- Be sure that the field installed piping does not touch other pipes, the bottom panel or side panel. Especially for the bottom and side connection, be sure to protect the piping with suitable insulation, to prevent it from coming into contact with the casing.

The connections to the branch kits are the responsibility of the installer (field piping).

18.2.8 To connect the refrigerant branching kit

For installation of the refrigerant branching kit, refer to the installation manual delivered with the kit.

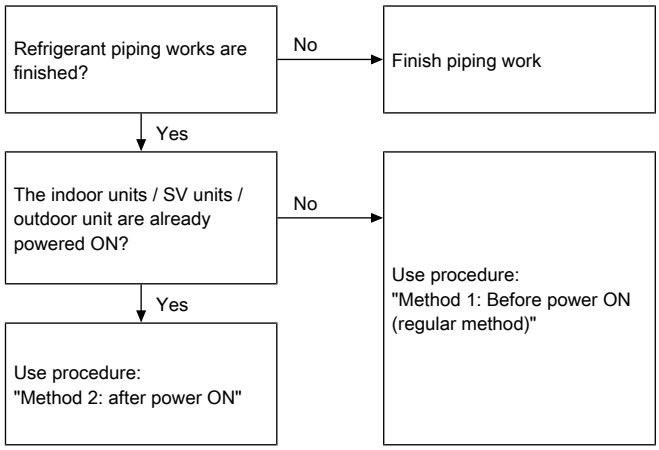
- Mount the refnet joint so that it branches either horizontally or vertically.
- Mount the refnet header so that it branches horizontally.



a Horizontal surface
b Refnet joint mounted vertically
c Refnet joint mounted horizontally
d Header

18.3 Checking the refrigerant piping

18.3.1 About checking the refrigerant piping



It is very important that all refrigerant piping work is done before the units (outdoor, SV unit or indoor) are powered on. When the units are powered on, the expansion valves will initialise. This means that the valves will close.

NOTICE

Leak test and vacuum drying of field piping, SV units and indoor units is impossible when field expansion valves are closed.

Method 1: Before power ON

If the system has not yet been powered on, no special action is required to perform the leak test and the vacuum drying.

Method 2: After power ON

If the system has already been powered on, activate setting [2-21] (refer to "21.1.3 To access mode 1 or 2" [▸ 129]). This setting will open field expansion valves to guarantee a refrigerant piping pathway and make it possible to perform the leak test and the vacuum drying.

DANGER: RISK OF ELECTROCUTION

NOTICE

Make sure that all indoor units and SV units connected to the outdoor unit are powered on.

NOTICE

Wait to apply setting [2-21] until the outdoor unit has finished the initialisation.

Leak test and vacuum drying

Checking the refrigerant piping involves:

- Checking for any leakages in the refrigerant piping.
- Performing vacuum drying to remove all moisture, air or nitrogen in the refrigerant piping.

If there is a possibility of moisture being present in the refrigerant piping (for example, water may have entered the piping), first carry out the vacuum drying procedure below until all moisture has been removed.

All piping inside the unit has been factory tested for leaks.

Only field installed refrigerant piping needs to be checked. Therefore, make sure that all the outdoor unit stop valves are firmly closed before performing leak test or vacuum drying.

NOTICE

Make sure that all (field supplied) field piping valves are OPEN (not outdoor unit stop valves!) before you start leak test and vacuuming.

For more information on the state of the valves, refer to "18.3.3 Checking refrigerant piping: Setup" [▸ 103].

18.3.2 Checking refrigerant piping: General guidelines

Connect the vacuum pump through a manifold to the service port of all stop valves to increase efficiency (refer to "18.3.3 Checking refrigerant piping: Setup" [▸ 103]).

NOTICE

Use a 2-stage vacuum pump with a non-return valve or a solenoid valve that can evacuate to a gauge pressure of –100.7 kPa (–1.007 bar).

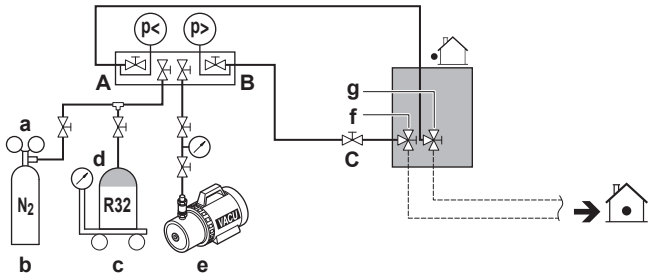
NOTICE

Make sure the pump oil does not flow oppositely into the system while the pump is not working.

NOTICE

Do NOT purge the air with refrigerants. Use a vacuum pump to evacuate the installation.

18.3.3 Checking refrigerant piping: Setup



a Pressure reducing valve
b Nitrogen
c Weighing scales
d Refrigerant R32 tank (siphon system)
e Vacuum pump
f Liquid line stop valve
g Gas line stop valve
A Valve A
B Valve B
C Valve C

Valve	Status
Valve A	Open
Valve B	Open
Valve C	Open
Liquid line stop valve	Close
Gas line stop valve	Close

NOTICE

Indoor units should also be leak and vacuum tested. Keep any possible (field supplied) field piping valves open as well.

18.3.4 To perform a leak test

The leak test must satisfy the specifications of EN378-2.

Vacuum leak test

1. Evacuate the system from the liquid and gas piping to a gauge pressure of –100.7 kPa (–1.007 bar) for more than 2 hours.
2. Once reached, turn off the vacuum pump and check that the pressure does not rise for at least 1 minute.
3. Should the pressure rise, the system may either contain moisture (see vacuum drying below) or have leaks.

Pressure leak test

1. Break the vacuum by pressurising with nitrogen gas to a minimum gauge pressure of 0.2 MPa (2 bar). Never set the gauge pressure higher than the maximum operation pressure of the unit, i.e. 4.0 MPa (40 bar).
2. Test for leaks by applying a bubble test solution to all piping connections.
3. Discharge all nitrogen gas.

NOTICE

ALWAYS use a recommended bubble test solution from your wholesaler.

NEVER use soap water:

- Soap water may cause cracking of components, such as flare nuts or stop valve caps.
- Soap water may contain salt, which absorbs moisture that will freeze when the piping gets cold.
- Soap water contains ammonia which may lead to corrosion of flared joints (between the brass flare nut and the copper flare).

18.3.5 To perform vacuum drying

NOTICE

The connections to the indoor units and all indoor units should also be leak and vacuum tested. Keep, if existing, all (field supplied) field valves to the indoor units open as well.

Leak test and vacuum drying should be done before the power supply is set to the unit. If not, see "18.3.1 About checking the refrigerant piping" [▶ 101] for more information.

To remove all moisture from the system, proceed as follows:

1. Evacuate the system for at least 2 hours to a target vacuum of –100.7 kPa (–1.007 bar)(5 Torr absolute).
2. Check that, with the vacuum pump turned off, the target vacuum is maintained for at least 1 hour.
3. Should you fail to reach the target vacuum within 2 hours or maintain the vacuum for 1 hour, the system may contain too much moisture. In that case, break the vacuum by pressurising with nitrogen gas to a gauge pressure of 0.05 MPa (0.5 bar) and repeat steps 1 to 3 until all moisture has been removed.
4. Depending on whether you want to immediately charge refrigerant through the refrigerant charge port or first pre-charge a portion of refrigerant through the liquid line, either open the outdoor unit stop valves, or keep them closed. See "19.5 To charge refrigerant" [▶ 111] for more information.

INFORMATION

After opening the stop valve, it is possible that the pressure in the refrigerant piping does NOT increase. This might be caused by e.g. the closed state of the expansion valve in the outdoor unit circuit, but does NOT present any problem for correct operation of the unit.

18.3.6 To insulate the refrigerant piping

After finishing the leak test and vacuum drying, the piping must be insulated. Take into account the following points:

- Make sure to insulate the connection piping and refrigerant branch kits entirely.
- Be sure to insulate the liquid and gas piping (for all units).
- Use heat resistant polyethylene foam which can withstand a temperature of 70°C for liquid piping and polyethylene foam which can withstand a temperature of 120°C for gas piping.
- Reinforce the insulation on the refrigerant piping according to the installation environment.

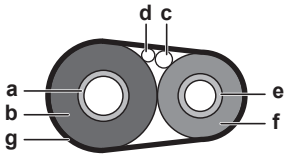
Ambient temperature	Humidity	Minimum thickness
≤30°C	75% to 80% RH	15 mm
>30°C	≥80% RH	20 mm

Between outdoor and indoor unit

NOTICE

It is recommended that the refrigerant piping between indoor and outdoor unit is installed in a ducting or the refrigerant piping is wrapped with finishing tape.

1 Insulate and fix the refrigerant piping and cables as follows:

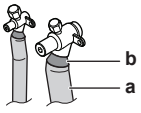


a Gas pipe
b Gas pipe insulation
c Interconnection cable
d Field wiring (if applicable)
e Liquid pipe
f Liquid pipe insulation
g Finishing tape

2 Install the service cover.

Inside the outdoor unit

To insulate the refrigerant piping, proceed as follows:



a Insulation material
b Caulking etc.

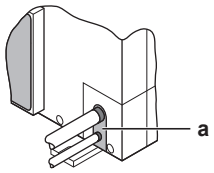
1 Insulate the liquid and gas piping.
2 Wind heat insulation around the curves, and then cover it with vinyl tape.
3 Make sure the field piping does not touch any compressor components.
4 Seal the insulation ends (sealant etc.) (b, see above).
5 Where necessary, wrap the field piping with vinyl tape to protect the insulation against sharp edges.
6 If the outdoor unit is installed above the indoor unit, cover the stop valves with sealing material to prevent condensed water on the stop valves from moving to the indoor unit.

NOTICE

Any exposed piping can cause condensation.

7 Reattach the service cover and the piping intake plate.

8 Seal all gaps to prevent snow and small animals from entering the system.



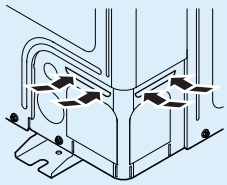
a Seal

WARNING

Provide adequate measures to prevent that the unit can be used as a shelter by small animals. Small animals that make contact with electrical parts can cause malfunctions, smoke or fire.

NOTICE

Do not block the air vents. This could affect air circulation inside the unit.



18.3.7 To check for leaks after charging refrigerant

After charging refrigerant in the system an additional leak test must be performed. Refer to "19.8 To check refrigerant piping joints for leaks after charging refrigerant" [▸ 114].

19 Charging refrigerant

In this chapter

19.1 Precautions when charging refrigerant

INFORMATION

Also read the precautions and requirements in the following chapters:

- General safety precautions
- Preparation

WARNING

- Only use R32 as refrigerant. Other substances may cause explosions and accidents.
- R32 contains fluorinated greenhouse gases. Its global warming potential (GWP) value is 675. Do NOT vent these gases into the atmosphere.
- When charging refrigerant, ALWAYS use protective gloves and safety glasses.

NOTICE

If the power of some units is turned off, the charging procedure cannot be finished properly.

NOTICE

Turn ON the power 6 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

NOTICE

If operation is performed within 12 minutes after the indoor and outdoor unit(s) are powered on, the compressor will not operate before the communication is established in a correct way between outdoor unit(s) and indoor unit(s).

NOTICE

Before starting charging procedures, check if the 7-segment display indication of the outdoor unit A1P PCB is as normal (see "21.1.3 To access mode 1 or 2" [▸ 129]). If a malfunction code is present, see "25.3 Solving problems based on error codes" [▸ 158].

NOTICE

Make sure the connected indoor unit(s) are recognised (see setting [1-10] in "21.1.6 Mode 1: monitoring settings" [▸ 132]).

NOTICE

In case of maintenance and the system (outdoor unit+field piping+indoor unit(s)) does not contain any refrigerant any more (e.g., after refrigerant reclaim operation), the unit has to be charged with its original amount of refrigerant (refer to the nameplate on the unit) and the determined additional refrigerant amount.

NOTICE

- Ensure that contamination of different refrigerants does not occur when using charging equipment.
- Charging hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating system is earthed prior to charging the system with refrigerant. See "20.2 To connect the electrical wiring to the outdoor unit" [▸ 123].
- Label the system when charging is complete.
- Extreme care shall be taken not to overfill the refrigerating system.

NOTICE

Prior to charging 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.

19.2 About charging refrigerant

The outdoor unit is factory charged with refrigerant, but depending on the field piping you have to charge additional refrigerant.

Before charging refrigerant

Make sure the outdoor unit's **external** refrigerant piping is checked (leak test, vacuum drying).

Typical workflow

Charging additional refrigerant typically consists of the following stages:

1. Determining how much you have to charge additionally.
2. Charging additional refrigerant (pre-charging and/or charging).
3. Filling in the fluorinated greenhouse gases label, and fixing it to the inside of the outdoor unit.

19.3 About the refrigerant

CAUTION

See "3 Specific installer safety instructions" [▸ 13] to acknowledge all related safety instructions.

This product contains fluorinated greenhouse gases. Do NOT vent gases into the atmosphere.

Refrigerant type: R32

Global warming potential (GWP) value: 675

Periodical inspections for refrigerant leaks may be required depending on the applicable legislation. Contact your installer for more information.

NOTICE

Applicable legislation on **fluorinated greenhouse gases** requires that the refrigerant charge of the unit is indicated both in weight and CO_2 equivalent.

Formula to calculate the quantity in CO_2 equivalent tonnes: GWP value of the refrigerant × total refrigerant charge [in kg]/1000

Contact your installer for more information.

19.4 To determine the additional refrigerant amount

WARNING

The maximum indoor capacity index which can be connected to a SV unit port is determined based on the smallest room served by that port.

In case the system serves the lowest underground floor of a building, there is an extra limit to the maximum allowable total refrigerant amount. This maximum refrigerant amount is determined based on the area of the smallest room on the lowest underground floor.

See "16 Special requirements for R32 units" [▸ 60] to determine the maximum allowable total refrigerant amount.

INFORMATION

For final charge adjustment in the test laboratory, please contact your local dealer.

INFORMATION

Note down the amount of additional refrigerant that is calculated here, for later use on the additional refrigerant charge label. See "19.7 To fix the fluorinated greenhouse gases label" [▸ 113].

NOTICE

The refrigerant charge of the system must be less than 79.8 kg. For factory charge, refer to the unit name plate.

Formula:

$R = [(X_1 \times \mathbf{Ø15.9}) \times 0.16 + (X_2 \times \mathbf{Ø12.7}) \times 0.10 + (X_3 \times \mathbf{Ø9.5}) \times 0.053 + (X_4 \times \mathbf{Ø6.4}) \times 0.020] + A$

- **R** Additional refrigerant to be charged [kg] (rounded off to one decimal place)
- **$X_{1...4}$** Total length [m] of liquid piping size at **Øa**
- **A** Parameter A (see below)

INFORMATION

When using more than one SV unit, add the sum of the individual SV unit charge factors.

- **Parameter A:** Individual SV unit charge factors

Model	Parameter A
SV1A	0.4 kg
SV4A	0.5 kg

Model	Parameter A
SV6A	0.7 kg
SV8A	0.9 kg

Metric piping. When using metric piping, replace the weight factors in the formula by the ones from the following table:

Inch piping		Metric piping	
Piping	**Weight factor**	**Piping**	**Weight factor**
Ø6.4 mm	0.020	Ø6 mm	0.016
Ø9.5 mm	0.053	Ø10 mm	0.058
Ø12.7 mm	0.10	Ø12 mm	0.088
Ø15.9 mm	0.16	Ø15 mm	0.14
		Ø16 mm	0.16

Connection ratio requirements. When selecting indoor units, the connection ratio must comply with the following requirements. For more information, see the technical engineering data.

Other combinations than those mentioned in the table are not allowed.

Indoor units	Maximum[a]	Total CR[b]	Maximum total indoor unit capacity	CR per type[c]	
				VRV DX	AHU
VRV DX only	64	50~130%	390	50~130%	—
VRV DX + AHU (mix)	64	50~110%[d]	330	50~110%	0~60%
AHU only (pair+multi)	—	75[d]~110%	330	—	75[d]~110 %

[a] Maximum number allowed excluding SV units and including EKEXVA kits
[b] Total CR = Total indoor unit capacity connection ratio
[c] CR per type = Allowable capacity connection ratio per indoor unit type
[d] Additional restrictions might apply for connection ratio lower than 75% (65~110%). Please refer to the EKEA+EKEXVA manual.

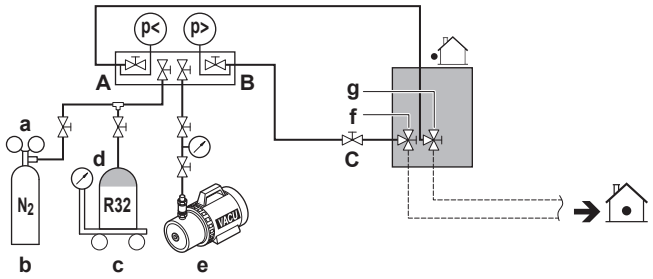
19.5 To charge refrigerant

To speed up the refrigerant charging process, it is in case of larger systems recommended to first pre-charge a portion of refrigerant through the liquid line before proceeding with the manual charging. It can be skipped, but charging will take longer then.

Pre-charging refrigerant

Pre-charging can be done without compressor operation, by connecting the refrigerant bottle to the service port of the liquid stop valve.

1 Connect as shown. Make sure that all outdoor unit stop valves, as well as valve A are closed.



a Pressure reducing valve
b Nitrogen
c Weighing scales
d Refrigerant R32 tank (siphon system)
e Vacuum pump
f Liquid line stop valve
g Gas line stop valve
A Valve A
B Valve B
C Valve C

2 Open valves C and B.

3 Pre-charge refrigerant until the determined additional refrigerant amount is reached or pre-charging is not possible anymore, and then close valves C and B.

4 Do one of the following:

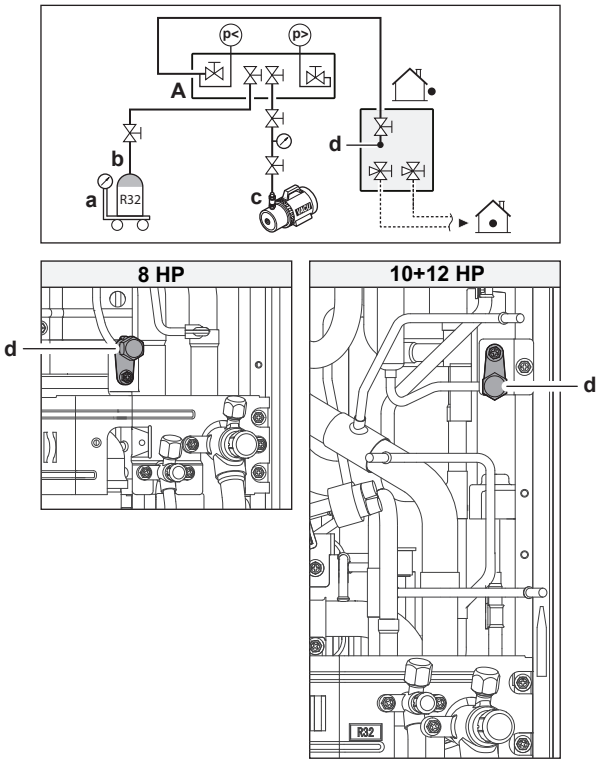
If	Then
The determined additional refrigerant amount is **reached**	Disconnect the manifold from the liquid line. You do not have to perform the "Charging refrigerant (in manual additional refrigerant charge mode)" instructions.
Too much refrigerant is charged	Recover refrigerant. Disconnect the manifold from the liquid line. You do not have to perform the "Charging refrigerant (in manual additional refrigerant charge mode)" instructions.

If	Then
The determined additional refrigerant amount is **not reached** yet	Disconnect the manifold from the liquid line. Continue with the "Charging refrigerant (in manual additional refrigerant charge mode)" instructions.

Charging refrigerant (in manual additional refrigerant charge mode)

The remaining additional refrigerant charge can be charged by operating the outdoor unit by means of the manual additional refrigerant charge mode.

5 Connect as shown. Make sure valve A is closed.



NOTICE

The refrigerant charging port is connected to the piping inside the unit. The unit's internal piping is already factory charged with refrigerant, so be careful when connecting the charge hose.

6 Open all outdoor unit stop valves. At this point, valve A must remain closed!

7 Take all the precautions mentioned in "21 Configuration" [▸ 128] and "22 Commissioning" [▸ 145] into account.

8 Turn on the power of the indoor unit(s) and outdoor unit.

9 Activate setting [2-20] to start the manual additional refrigerant charge mode. For details, see "21.1.7 Mode 2: field settings" [▸ 134].

Result: The unit will start operation.

INFORMATION

The manual refrigerant charge operation will automatically stop within 30 minutes. If charging is not completed after 30 minutes, perform the additional refrigerant charging operation again.

10 Open valve A.

11 Charge refrigerant until the remaining determined additional refrigerant amount is added, and then close valve A.

12 Press BS3 to stop the manual additional refrigerant charge mode.

NOTICE

Make sure to open all stop valves after (pre-) charging the refrigerant.

Operating with the stop valves closed will damage the compressor.

NOTICE

After adding the refrigerant, do not forget to close the lid of the refrigerant charging port. The tightening torque for the lid is 11.5 to 13.9 N•m.

19.6 Error codes when charging refrigerant

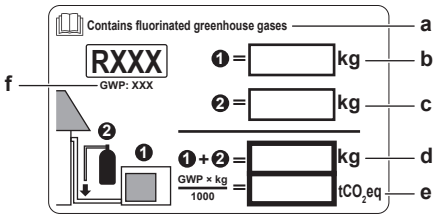
INFORMATION

If a malfunction occurs, the error code is displayed on the outdoor unit's 7-segments display and on the user interface of the indoor unit.

If a malfunction occurs, close valve A immediately. Confirm the malfunction code and take corresponding action, "25.3 Solving problems based on error codes" [▸ 158].

19.7 To fix the fluorinated greenhouse gases label

1 Fill in the label as follows:



a If a multilingual fluorinated greenhouse gases label is delivered with the unit (see accessories), peel off the applicable language and stick it on top of **a**.
b Factory refrigerant charge: see unit name plate
c Additional refrigerant amount charged
d Total refrigerant charge
e **Quantity of fluorinated greenhouse gases** of the total refrigerant charge expressed as tonnes CO_2 equivalent.
f GWP = Global Warming Potential

NOTICE

Applicable legislation on **fluorinated greenhouse gases** requires that the refrigerant charge of the unit is indicated both in weight and CO_2 equivalent.

Formula to calculate the quantity in CO_2 equivalent tonnes: GWP value of the refrigerant × total refrigerant charge [in kg] / 1000

Use the GWP value mentioned on the refrigerant charge label.

2 Fix the label on the inside of the outdoor unit. There is a dedicated place for it on the wiring diagram label.

19.8 To check refrigerant piping joints for leaks after charging refrigerant

Tightness test of field-made refrigerant joints indoors

1 Use a leakage test method with a minimum sensitivity of 5 g of refrigerant/year. Test leaks using a pressure of at least 0.25 times the maximum working pressure (see "PS High" on the unit nameplate).

If a leak is detected

1 Recover the refrigerant, repair the joint, and repeat the test.

2 Perform the leak tests see "18.3.4 To perform a leak test" [▸ 103].

3 Charge refrigerant.

4 Check for refrigerant leaks after charging (see above).

20 Electrical installation

CAUTION

See "3 Specific installer safety instructions" [▶ 13] to make sure this installation complies with all safety regulations.

In this chapter

20.1 About connecting the electrical wiring

Typical workflow

Connecting the electrical wiring typically consists of the following stages:

1. Making sure the power supply system complies with the electrical specifications of the units.
2. Connecting the electrical wiring to the outdoor unit.
3. Connecting the electrical wiring to the indoor unit.
4. Connecting the main power supply.

20.1.1 Precautions when connecting the electrical wiring

DANGER: RISK OF ELECTROCUTION

WARNING

The appliance MUST be installed in accordance with national wiring regulations.

WARNING

- All wiring MUST be performed by an authorised electrician and MUST comply with the national wiring regulation.
- Make electrical connections to the fixed wiring.
- All components procured on-site and all electrical construction MUST comply with the applicable legislation.

WARNING

ALWAYS use multicore cable for power supply cables.

INFORMATION

Also read the precautions and requirements in the "2 General safety precautions" [▸ 8].

WARNING

- If the power supply has a missing or wrong N-phase, equipment might break down.
- Establish proper earthing. Do NOT earth the unit to a utility pipe, surge absorber, or telephone earth. Incomplete earthing may cause electrical shocks.
- Install the required fuses or circuit breakers.
- Secure the electrical wiring with cable ties so that the cables do NOT come in contact with sharp edges or piping, particularly on the high-pressure side.
- Do NOT use taped wires, extension cords, or connections from a star system. They can cause overheating, electrical shocks or fire.
- Do NOT install a phase advancing capacitor, because this unit is equipped with an inverter. A phase advancing capacitor will reduce performance and may cause accidents.

CAUTION

Do NOT push or place redundant cable length into the unit.

NOTICE

The distance between the high voltage and low voltage cables should be at least 50 mm.

NOTICE

Do NOT operate the unit until the refrigerant piping is complete. Running the unit before the piping is ready will break the compressor.

NOTICE

If the power supply has a missing or wrong N-phase, equipment will break down.

NOTICE

Do NOT install a phase advancing capacitor, because this unit is equipped with an inverter. A phase advancing capacitor will reduce performance and may cause accidents.

NOTICE

NEVER remove a thermistor, sensor, etc., when connecting power wiring and transmission wiring. (If operated without thermistor, sensor, etc., the compressor may break down.)

NOTICE

- The reversed phase protection detector of this product only functions when the product starts up. Consequently reversed phase detection is not performed during normal operation of the product.
- The reversed phase protection detector is designed to stop the product in the event of an abnormality when the product is started up.
- Replace 2 of the 3 phases (L1, L2, and L3) during reverse-phase protection abnormality.

20.1.2 About the electrical wiring

It is important to keep the power supply and the interconnection wiring separated from each other. In order to avoid any electrical interference the distance between both wiring should always be at least 25 mm.

NOTICE

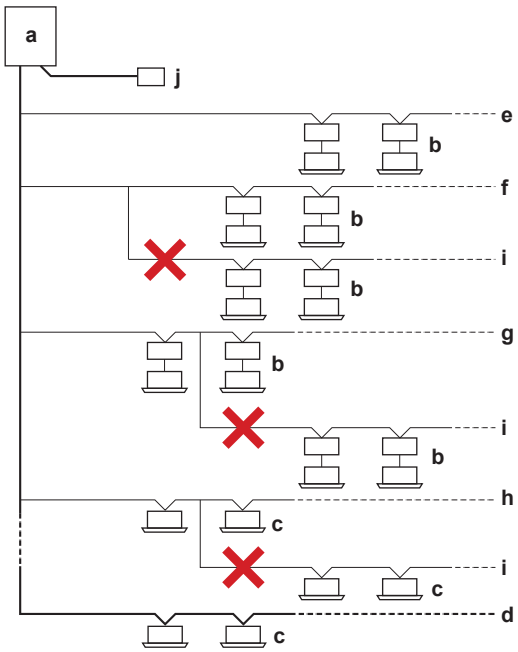
- Be sure to keep the power line and interconnection line apart from each other. Interconnection wiring and power supply wiring may cross, but may not run parallel.
- Interconnection wiring and power supply wiring may not touch internal piping (except the inverter PCB cooling pipe) in order to avoid wire damage due to high temperature piping.
- Firmly close the lid and arrange the electrical wires so as to prevent the lid or other parts from coming loose.

The interconnection wiring outside the unit should be wrapped and routed together with the field piping.

Interconnection wiring specification and limits[a][b]	
See "20.1.6 Specifications of standard wiring components" [▶ 122] for wiring requirements	
Maximum number of branches for unit-to-unit cabling	9
Maximum wiring length (distance between outdoor and furthest indoor unit)	300 m
Total wiring length (sum of distances between outdoor and all indoor units)	600 m
Maximum number of independent interconnectable systems	10
Interconnection wiring to cool/heat selector	500 m

[a] If the total interconnection wiring exceeds these limits, communication errors might occur.

[b] Sheathed and shielded cables are required for interconnection wiring between outdoor unit and SV unit AND between outdoor unit and indoor units that are directly connected to the outdoor unit. Wiring between SV unit and indoor units does not require shielded cables.



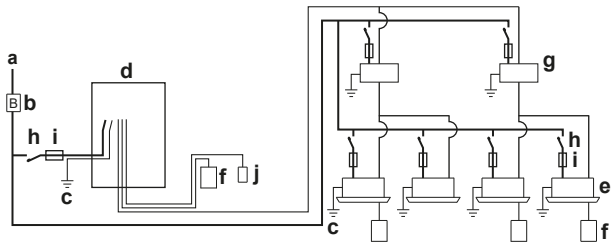
a Outdoor unit
b Indoor unit + SV unit
c Indoor unit (direct connection)
d Main line
e Branch line 1
f Branch line 2
g Branch line 3
h Branch line 4
i No branch is allowed after branch
j Central user interface (etc...)

NOTICE

Sheathed and shielded cables are required for interconnection wiring between:

- Outdoor unit and SV unit
- Outdoor unit and indoor units that are directly connected to the outdoor unit

Example:



a Field power supply (with earth leakage protector)
b Main switch
c Earth connection
d Outdoor unit
e Indoor unit
f User interface
g SV unit
h Circuit breaker
i Fuse
j Cool/heat selector

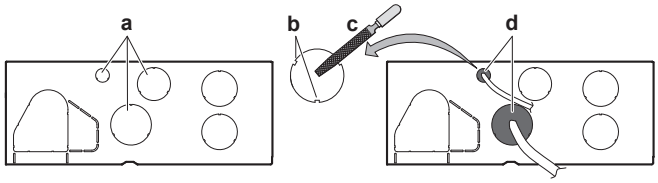
20.1.3 Guidelines for making knockout holes

Punch out the knockout by tapping on the attachment points with a flat head screwdriver and a hammer.

NOTICE

Precautions when making knockout holes:

- Avoid damaging the casing and underlying piping.
- After making the knockout holes, we recommend to remove the burrs and paint the edges and areas around the edges using repair paint to prevent rusting.
- When passing electrical wiring through the knockout holes, wrap the wiring with protective tape to prevent damage.



a Knockout hole
b Burr
c Remove burrs
d If there are any possibilities that small animals enter the system through the knockout holes, close the holes with packing materials (to be prepared on-site)

20.1.4 Guidelines when connecting the electrical wiring

NOTICE

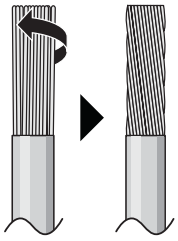
We recommend using solid (single-core) wires. If stranded wires are used, slightly twist the strands to consolidate the end of the conductor for either direct use in the terminal clamp or insertion in a round crimp-style terminal.

To prepare stranded conductor wire for installation

Method 1: Twisting conductor

1 Strip insulation (20 mm) from the wires.

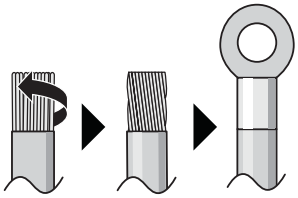
2 Slightly twist the end of the conductor to create a "solid-like" connection.



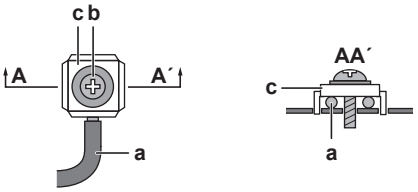
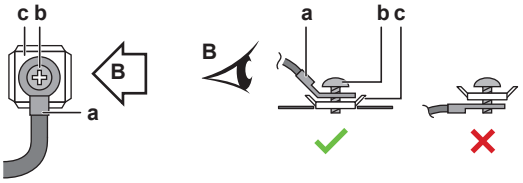
Method 2: Using round crimp-style terminal (recommended)

1 Strip insulation from wires and slightly twist the end of each wire.

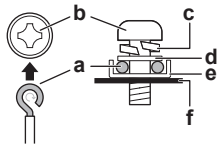
2 Install a round crimp-style terminal on the end of the wire. Place the round crimp-style terminal on the wire up to the covered part and fasten the terminal with the appropriate tool.



Use the following methods for installing wires:

Wire type	Installation method
Single-core wire Or Stranded conductor wire twisted to "solid-like" connection	 **a** Curled wire (single-core or twisted stranded conductor wire) **b** Screw **c** Flat washer
Stranded conductor wire with round crimp-style terminal	 **a** Terminal **b** Screw **c** Flat washer ✓ Allowed ✕ NOT allowed

For earth connections, use the following method:

Wire type	Installation method
Single-core wire Or Stranded conductor wire twisted to "solid-like" connection	 **a** Clockwise curled wire (single-core or twisted stranded conductor wire) **b** Screw **c** Spring washer **d** Flat washer **e** Coupling washer **f** Sheet metal

Tightening torques

Wiring	Screw size	Tightening torque
Transmission wiring	M3.5	0.8~0.97 N•m
Power supply wiring	8 HP: M5	2.2~2.7 N•m
	10+12 HP: M8	5.5~7.3 N•m

20.1.5 About electrical compliance

This equipment complies with:

- **EN/IEC 61000-3-12** provided that the short-circuit power S_{sc} is greater than or equal to the minimum S_{sc} value at the interface point between the user's supply and the public system.
  - EN/IEC 61000-3-12 = European/International Technical Standard setting the limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16 A and ≤75 A per phase.
  - It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected ONLY to a supply with a short-circuit power S_{sc} greater than or equal to the minimum S_{sc} value.

Model	Minimum S_{sc} value
RXYSA8	2685 kVA
RXYSA10	3137 kVA
RXYSA12	3422 kVA

20.1.6 Specifications of standard wiring components

Component		Outdoor unit		
		RXYSA8	RXYSA10	RXYSA12
Power supply cable	MCA[(a)]	18.5 A	22 A	24 A
	Voltage	380-415 / 400 V		
	Phase	3N~		
	Frequency	50/60 Hz		
	Wire size	5 core cable		
		Must comply with national wiring regulation.		
		Wire size based on the current, but not less than:		
		2.5 mm²		4 mm²
Interconnection cable	Voltage	220-240 V		
	Wire size	Only use harmonised wire providing double insulation and suitable for applicable voltage. 2-core shielded cable 0.75-1.5 mm²		
Recommended field fuse		25 A		32 A
Earth leakage circuit breaker/ residual current circuit breaker		Must comply with national wiring regulation.		

[(a)] MCA=Minimum circuit ampacity. Stated values are maximum values.

Please use the table above to specify the requirements for the power supply wiring.

NOTICE

When using residual current operated circuit breakers, be sure to use a high-speed type 300 mA rated residual operating current.

20.2 To connect the electrical wiring to the outdoor unit

CAUTION

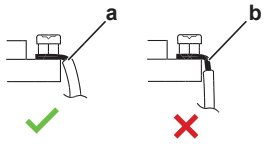
- When connecting the power supply: connect the earth cable first, before making the current-carrying connections.
- When disconnecting the power supply: disconnect the current-carrying cables first, before separating the earth connection.
- The length of the conductors between the power supply stress relief and the terminal block itself MUST be as such that the current-carrying wires are tautened before the earth wire is in case the power supply is pulled loose from the stress relief.

NOTICE

- Follow the wiring diagram (delivered with the unit, located at the inside of the service cover).
- Make sure the electrical wiring does NOT obstruct proper reattachment of the service cover.

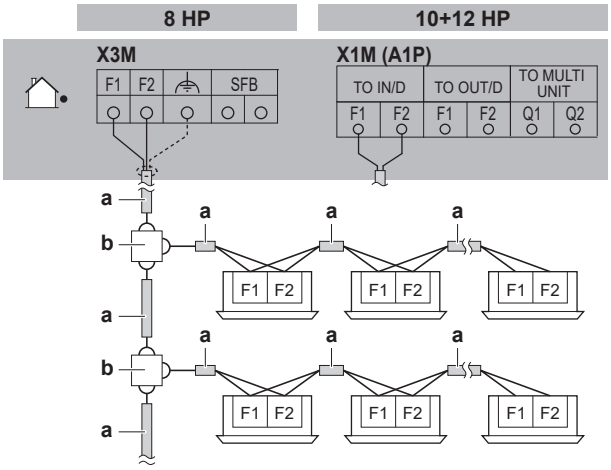
1 Remove the service cover. See "17.2.2 To open the outdoor unit" [▸ 82].

2 Strip insulation (20 mm) from the wires.



a Strip wire end to this point
b An excessive strip length may cause electrical shock or leakage

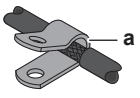
3 Connect the transmission wiring as follows:



a Use the conductor of sheathed wire (2 wire) (no polarity)
b Terminal board (field supply)

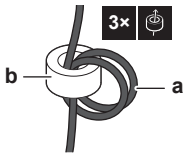
Note: The indoor F1/F2 interconnection cable MUST be shielded:

- 8 HP: the shielding is earthed (only at outdoor unit side of the cable) via the middle screw on the terminal X3M.
- 10+12 HP: the shielding is earthed (only at outdoor unit side of the cable) via a metal P-clamp. Strip the insulation up to the shielding mesh, to provide full contact of the earth with the shielding. See illustration below:



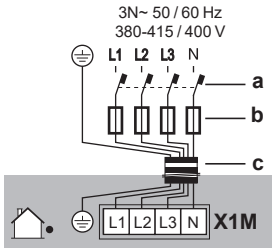
a P-clamp for cable shield earthing

Note: For 10+12 HP, the interconnection cable MUST pass through the ferrite core 3 times (3 passes, 2 turns). See illustration below:



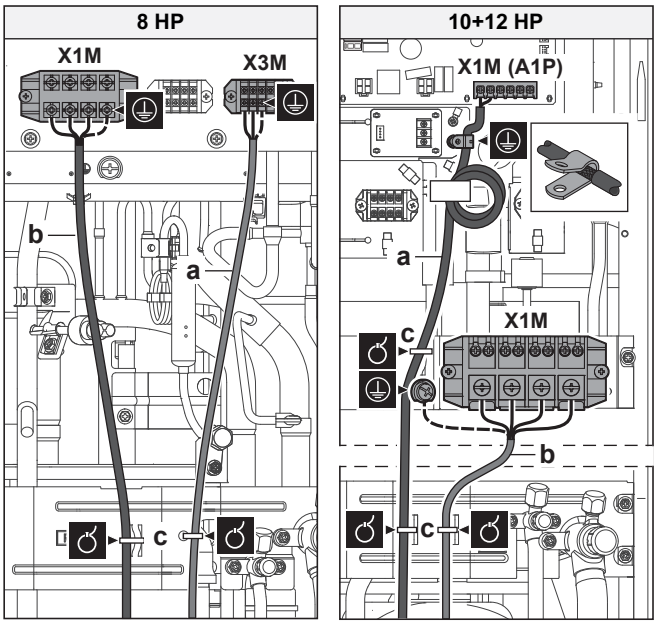
a Interconnection cable
b Ferrite core

4 Connect the power supply as follows:



a Earth leakage circuit breaker
b Fuse
c Power supply cable

5 Fix the cables (power supply and interconnection cable) with a cable tie to the stop valve attachment plate and route the wiring according to the illustration below.

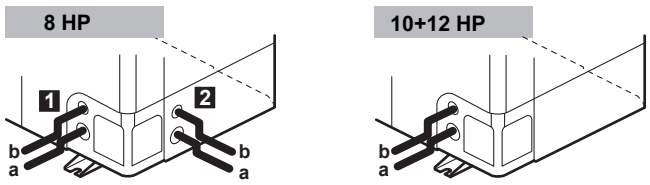


WARNING

Do NOT strip the outer cable jacket lower than the fixation point on the stop valve attachment plate.

6 Route the cables through the frame according to the illustration below.

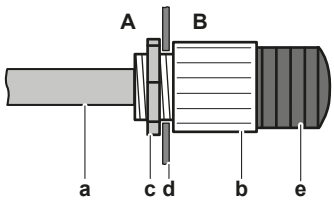
Note: for RXYSA8, choose one of the two possibilities to route the cables through the frame:



7 Remove the selected knockout holes by tapping on the attachment points with a flat head screwdriver and a hammer.

8 Install a cable protection in the knockout hole:

- It is recommended to install a PG type cable gland in the knockout hole.
- When you do not use a cable gland, protect the cables with vinyl tubes to prevent the edge of the knockout hole from cutting the wires:



A Inside of the outdoor unit
B Outside of the outdoor unit
a Cable
b Bush
c Nut
d Frame
e Tube

9 Route the cables out of the unit.

10 Reattach the service cover. See "17.2.3 To close the outdoor unit" [▸ 83].

11 Connect an earth leakage circuit breaker and fuse to the power supply line as specified in "20.1.6 Specifications of standard wiring components" [▸ 122].

20.3 To connect the external outputs

SVS and SVEO output

The SVS and SVEO outputs are contacts on terminal X2M.

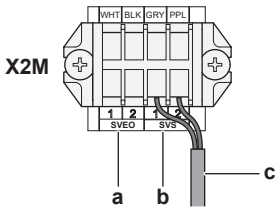
The SVS output is a contact on terminal X2M that closes in case a leak is detected, failure or disconnection of the R32 sensor (located in the SV unit or indoor unit).

The SVEO output is a contact on terminal X2M that closes in case of occurrence of general errors. See "10.1 Error codes: Overview" [▸ 42] and "25.3.1 Error codes: Overview" [▸ 159] for errors that will trigger this output.

Outdoor output connection requirements	
Voltage	220~240 V
Maximum current	0.5 A
Wire size	Only use harmonised wiring providing double insulation and suitable for the applicable voltage.
	2-core cable
	Minimum cable section of 0.75 mm²

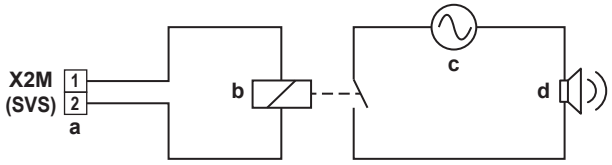
NOTICE

Do NOT use the outputs as a power source. Instead, use each output to energize a relay that controls the external circuit.



a SVEO output terminals (1 and 2)
b SVS output terminals (1 and 2)
c Cable to SVS output device (example)

Example:



a SVS output terminal
b Relay
c AC power supply 220~240 V AC
d External alarm

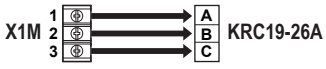
INFORMATION

Sound data about the refrigerant leakage alarm are available in the technical data sheet of the user interface. E.g. the BRC1H52* controller generates an alarm of 65 dB (sound pressure, measured at 1 m distance from the alarm).

20.4 To connect the cool/heat selector switch option

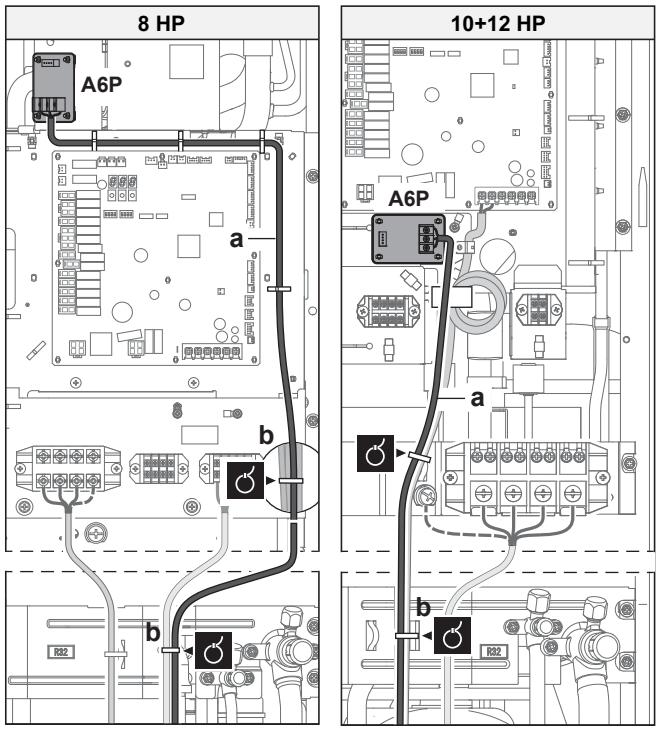
In order to control the cooling or heating operation from a central location, the following optional cool/heat selector switch (KRC19-26A) can be connected:

1 Connect the cool/heat selector switch to terminal X1M of the cool/heat selector PCB.

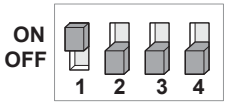


X1M Terminal on the PCB
KRC19-26A Cool/heat selector switch

2 Route the wires in the switchbox as shown:



3 Turn ON the DIP switch (DS1-1). See "21.1.2 Field setting components" [▸ 129] for more information on the DIP switch.



DS1 DIP switch 1

20.5 To check the insulation resistance of the compressor

NOTICE

If, after installation, refrigerant accumulates in the compressor, the insulation resistance over the poles can drop, but if it is at least 1 MΩ, then the unit will not break down.

- Use a 500 V mega-tester when measuring insulation.
- Do NOT use a mega-tester for low voltage circuits.

1 Measure the insulation resistance over the poles.

If	Then
≥1 MΩ	Insulation resistance is OK. This procedure is finished.
<1 MΩ	Insulation resistance is not OK. Go to the next step.

2 Turn ON the power and leave it on for 6 hours.

Result: The compressor will heat up and evaporate any refrigerant in the compressor.

3 Measure the insulation resistance again.

21 Configuration

DANGER: RISK OF ELECTROCUTION

INFORMATION

It is important that all information in this chapter is read sequentially by the installer and that the system is configured as applicable.

In this chapter

21.1 Making field settings

21.1.1 About making field settings

To continue the configuration of the VRV 5-S heat pump system, it is required to give some input to the PCB of the unit. This chapter will describe how manual input is possible by operating the push buttons on the PCB and reading the feedback from the 7-segment displays.

Next to making field settings it is also possible to confirm the current operation parameters of the unit.

Push buttons and DIP switches

Item	Description
Push buttons	By operating the push buttons it is possible to: ▪ Perform special actions (refrigerant charge, testrun, etc). ▪ Perform field settings (demand operation, low noise, etc).
DIP switches	By operating the DIP switches it is possible to: ▪ DS1 (1): COOL/HEAT selector (refer to the manual of the cool/heat selector switch). OFF=not installed=factory setting ▪ DS1 (2~4): NOT USED. DO NOT CHANGE THE FACTORY SETTING. ▪ DS2 (1~4): NOT USED. DO NOT CHANGE THE FACTORY SETTING.

See also:

- "21.1.2 Field setting components" [▸ 129]

Mode 1 and 2

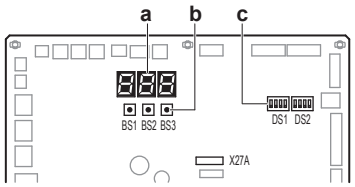
Mode	Description
Mode 1 (monitoring settings)	Mode 1 can be used to monitor the current situation of the outdoor unit. Some field setting contents can be monitored as well.
Mode 2 (field settings)	Mode 2 is used to change the field settings of the system. Consulting the current field setting value and changing the current field setting value is possible. In general, normal operation can be resumed without special intervention after changing field settings. Some field settings are used for special operation (e.g., one time operation, recovery/vacuuming setting, manual adding refrigerant setting, etc.). In such a case, it is required to abort the special operation before normal operation can restart. It will be indicated in below explanations.

See also:

- "21.1.3 To access mode 1 or 2" [▸ 129]
- "21.1.4 To use mode 1" [▸ 130]
- "21.1.5 To use mode 2" [▸ 131]
- "21.1.6 Mode 1: monitoring settings" [▸ 132]
- "21.1.7 Mode 2: field settings" [▸ 134]

21.1.2 Field setting components

Location of the 7-segment displays, buttons and DIP switches:



BS1 MODE: for changing the set mode
BS2 SET: for field setting
BS3 RETURN: for field setting
DS1, DS2 DIP switches
a 7-segment displays
b Push buttons
c DIP switches

21.1.3 To access mode 1 or 2

Initialisation: default situation

NOTICE

Turn ON the power 6 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

Turn on the power supply of the outdoor unit and all indoor units. When the communication between indoor units and outdoor unit(s) is established and normal, the 7-segment display indication state will be as below (default situation when shipped from factory).

Stage	Display
When turning on the power supply: blinking as indicated. First checks on power supply are executed (8~10 min).	
When no trouble occurs: lighted as indicated (1~2 min).	
Ready for operation: blank display indication as indicated.	

Off
Blinking
On

In case of malfunction, the malfunction code is displayed on the indoor unit user interface and the outdoor unit 7-segment display. Solve the malfunction code accordingly. The communication wiring should be checked at first.

Access

BS1 is used to switch between the default situation, mode 1 and mode 2.

Access	Action
Default situation	
Mode 1	▪ Push BS1 one time. 7-segment display indication changes to:  ▪ Push BS1 one more time to return to the default situation.
Mode 2	▪ Push BS1 for at least five seconds. 7-segment display indication changes to:  ▪ Push BS1 one more time (short) to return to the default situation.

INFORMATION

If you get confused in the middle of the process, push BS1 to return to the default situation (no indication on 7-segment displays: blank, see "21.1.3 To access mode 1 or 2" [▶ 129].

21.1.4 To use mode 1

Mode 1 is used to set basic settings and to monitor the status of the unit.

What	How
Changing and accessing the setting in mode 1	1 Push BS1 one time to select mode 1. 2 Push BS2 to select the required setting. 3 Push BS3 one time to access the selected setting's value.

What	How
To quit and return to the initial status	Push BS1.

Example:

Checking the content of parameter [1-10] (to know how many indoor units are connected to the system).

[Mode-Setting]=Value in this case is defined as: Mode=1; Setting=10; Value=the value we want to know/monitor.

1. Make sure the 7-segment display indication is in the default situation (normal operation).
2. Push BS1 one time.

   Result: Mode 1 is accessed: 
3. Push BS2 10 times (or press and hold BS2 until the display reaches 10, then release).

   Result: Mode 1 setting 10 is addressed: 
4. Push BS3 one time; the value which is returned (depending on the actual field situation), is the amount of indoor units which are connected to the system.

   Result: Mode 1 setting 10 is addressed and selected, return value is the monitored information.
5. Push BS1 one time to quit mode 1.

21.1.5 To use mode 2

Mode 2 is used to set field settings of the outdoor unit and system.

What	How
Changing and accessing the setting in mode 2	▪ Push BS1 for more than five seconds to select mode 2. ▪ Push BS2 to select the required setting. ▪ Push BS3 one time to access the selected setting's value.
To quit and return to the initial status	Push BS1.
Changing the value of the selected setting in mode 2	▪ Push BS1 for more than five seconds to select mode 2. ▪ Push BS2 to select the required setting. ▪ Push BS3 one time to access the selected setting's value. ▪ Push BS2 to select the required value of the selected setting. ▪ Push BS3 one time to validate the change. ▪ Push BS3 again to start operation with the chosen value.

Example:

Checking the content of parameter [2-18] (to activate or deactivate the high static pressure setting of the outdoor unit's fan).

[Mode-Setting]=Value in this case is defined as: Mode=2; Setting=18; Value=the value we want to know/change.

1 Make sure the 7-segment display indication is in the default situation (normal operation).

2 Push BS1 for more than five seconds.

Result: Mode 2 is accessed: 

3 Push BS2 18 times (or press and hold BS2 until the display reaches 18, then release).

Result: Mode 2 setting 18 is addressed: 

4 Push BS3 one time. The display shows the status of the setting (depending on the actual field situation). In the case of [2-18], the default value is "0", which means the ventilated enclosure function is deactivated.

Result: Mode 2 setting 18 is addressed and selected, return value is the current setting situation.

5 To change the value of the setting, push BS2 until the required value appears on the 7-segment display.

6 Push BS3 one time to validate the change.

7 Push BS3 to start operation according to the chosen setting.

8 Push BS1 one time to quit mode 2.

21.1.6 Mode 1: monitoring settings

[1-1]

Shows the status of low noise operation.

Low noise operation reduces the sound generated by the unit compared to nominal operating conditions.

[1-1]	Description
0	Unit is currently not operating under low noise restrictions.
1	Unit is currently operating under low noise restrictions.

Low noise operation can be set in mode 2. There are two methods to activate low noise operation of the outdoor unit system.

- The first method is to enable an automatic low noise operation during night time by field setting. The unit will operate at the selected low noise level during the selected time frames.
- The second method is to enable low noise operation based on an external input. For this operation an optional accessory is required.

[1-2]

Shows the status of power consumption limitation operation.

Power consumption limitation reduces the power consumption of the unit compared to nominal operating conditions.

[1-2]	Description
0	Unit is currently not operating under power consumption limitations.

[1-2]	Description
1	Unit is currently operating under power consumption limitation.

Power consumption limitation can be set in mode 2. There are two methods to activate power consumption limitation of the outdoor unit system.

- The first method is to enable a forced power consumption limitation by field setting. The unit will always operate at the selected power consumption limitation.
- The second method is to enable power consumption limitation based on an external input. For this operation an optional accessory is required.

[1-5] [1-6]

Code	Shows ...
[1-5]	The current T_e target parameter position
[1-6]	The current T_c target parameter position

For more information and advice about the impact of these settings, see "21.2 Energy saving and optimum operation" [▸ 139].

[1-10]

Shows the total number of connected indoor units.

It can be convenient to check if the total number of indoor units which are installed match the total number of indoor units which are recognised by the system. In case there is a mismatch, it is recommended to check the communication wiring path between outdoor and indoor units (F1/F2 communication line).

[1-17] [1-18] [1-19]

Code	Shows ...
[1-17]	The latest malfunction code
[1-18]	The 2nd last malfunction code
[1-19]	The 3rd last malfunction code

When the latest malfunction codes were reset by accident on an indoor unit user interface, they can be checked again through this monitoring settings.

For the content or reason behind the malfunction code see "25.3 Solving problems based on error codes" [▸ 158], where most relevant malfunction codes are explained. Detailed information about malfunction codes can be consulted in the service manual of this unit.

[1-40] [1-41]

Code	Shows ...
[1-40]	The current cooling comfort setting
[1-41]	The current heating comfort setting

See "21.2 Energy saving and optimum operation" [▸ 139] for more details about this setting.

21.1.7 Mode 2: field settings

[2-8]

T_e target temperature during cooling operation.

[2-8]	T_e target [°C]
0 (default)	Auto
2	6
3	7
4	8
5	9
6	10
7	11

For more information and advice about the impact of these settings, see "21.2 Energy saving and optimum operation" [▸ 139].

[2-9]

T_c target temperature during heating operation.

[2-9]	T_c target [°C]
0 (default)	Auto
1	41
2	42
3	43
4	44
5	45
6	46

For more information and advice about the impact of these settings, see "21.2 Energy saving and optimum operation" [▸ 139].

[2-12]

Enable the low noise function and/or power consumption limitation via external control adaptor (DTA104A61/62).

If the system needs to be running under low noise operation or under power consumption limitation conditions when an external signal is sent to the unit, this setting should be changed. This setting will only be effective when the optional external control adaptor (DTA104A61/62) is installed.

[2-12]	Description
0 (default)	Deactivated.
1	Activated.

[2-18]

Fan high static pressure setting.

In order to increase the static pressure the outdoor unit fan is delivering, this setting should be activated. For details about this setting, see technical specifications.

[2-18]	Description
0 (default)	Deactivated.
1	Activated.

[2-20]

Manual additional refrigerant charge/SV/indoor unit connection check

[2-20]	Description
0 (default)	Manual additional refrigerant charge deactivated.
1	Manual additional refrigerant charge activated. To stop the manual additional refrigerant charge operation (when the required additional refrigerant amount is charged), push BS3. If this function was not aborted by pushing BS3, the unit will stop its operation after 30 minutes. If 30 minutes was not sufficient to add the needed refrigerant amount, the function can be reactivated by changing the field setting again.
2	Perform a SV/indoor unit connection check. Perform a SV units and indoor units connection check where for each indoor unit is checked if the piping and communication wiring are connected to the same branch pipe port.

[2-21]

Refrigerant recovery/vacuuming mode.

In order to achieve a free pathway to reclaim refrigerant out of the system or to remove residual substances or to vacuum the system it is necessary to apply a setting which will open required valves in the refrigerant circuit so the reclaim of refrigerant or vacuuming process can be done properly.

[2-21]	Description
0 (default)	Deactivated.
1	Activated. To stop the refrigerant recovery/vacuuming mode, push BS3. If BS3 is not pushed, the system will remain in refrigerant recovery/vacuuming mode.

[2-22]

Automatic low noise setting and level during night time.

By changing this setting, you activate the automatic low noise operation function of the unit and define the level of operation. Depending on the chosen level, the noise level will be lowered. The start and stop moments for this function are defined under setting [2-26] and [2-27] (see descriptions below).

[2-22]	Description
0 (default)	Deactivated

[2-22]	Description	
1	Level 1	Level 5<Level 4<Level 3<Level 2<Level 1
2	Level 2	
3	Level 3	
4	Level 4	
5	Level 5	

[2-25]

Low noise operation level via the external control adaptor.

If the system needs to be running under low noise operation conditions when an external signal is sent to the unit, this setting defines the level of low noise that will be applied.

This setting will only be effective when the optional external control adaptor (DTA104A61/62) is installed and the setting [2-12] was activated.

[2-25]	Description	
1	Level 1	Level 5<Level 4<Level 3<Level 2<Level 1
2 (default)	Level 2	
3	Level 3	
4	Level 4	
5	Level 5	

[2-26]

Low noise operation start time.

This setting is used in conjunction with setting [2-22].

[2-26]	Start time automatic low noise operation (approximately)
1	20h00
2 (default)	22h00
3	24h00

[2-27]

Low noise operation stop time.

This setting is used in conjunction with setting [2-22].

[2-27]	Stop time automatic low noise operation (approximately)
1	6h00
2	7h00
3 (default)	8h00

[2-30]

Power consumption limitation level (step 1) via the external control adaptor (DTA104A61/62).

If the system needs to be running under power consumption limitation conditions when an external signal is sent to the unit, this setting defines the level power consumption limitation that will be applied for step 1. The level is according to the table.

[2-30]	Power consumption limitation (approximately)
1	60%
2	65%
3 (default)	70%
4	75%
5	80%
6	85%
7	90%
8	95%

[2-31]

Power consumption limitation level (step 2) via the external control adaptor (DTA104A61/62).

If the system needs to be running under power consumption limitation conditions when an external signal is sent to the unit, this setting defines the level power consumption limitation that will be applied for step 2. The level is according to the table.

[2-31]	Power consumption limitation (approximately)
1 (default)	40%
2	50%
3	55%

[2-32]

Forced, all time, power consumption limitation operation (no external control adaptor is required to perform power consumption limitation).

If the system always needs to be running under power consumption limitation conditions, this setting activates and defines the level power consumption limitation that will be applied continuously. The level is according to the table.

[2-32]	Restriction reference
0 (default)	Function not active.
1	Follows [2-30] setting.
2	Follows [2-31] setting.

[2-35]

Height difference setting.

[2-35]	Description
0	In case the outdoor unit is installed in the lowest position (indoor units are installed on a higher position than outdoor units) and the height difference between the highest indoor unit and the outdoor unit exceeds 40 m, the setting [2-35] should be changed to 0.

[2-35]	Description
1 (default)	—

Other changes/limitations to the circuit apply, for more information see "18.1.7 Refrigerant piping length and height difference" [▸ 91].

[2-45]

SV unit shut-off valve setting.

[2-45]	Description
0 (default)	Shut-off valve fully open
1	Shut-off valve fully closed

[2-54]

Indoor unit connection setting.

[2-54]	Description
0 (default)	Direct connection from outdoor to indoor unit is not possible
1	Direct connection from outdoor to indoor unit is allowed

[2-60]

Supervisor remote controller setting. A power reset is required to save this setting.

For details about the supervisor remote controller, see "16.2 System layout requirements" [▸ 60] or refer to the remote controller installation and user reference guide.

[2-60]	Description
0 (default)	No supervisor remote controller connected to the system
1	Supervisor remote controller connected to system

[2-81]

Cooling comfort setting.

This setting is used in conjunction with setting [2-8].

[2-81]	Cooling comfort setting
0	Eco
1 (default)	Mild
2	Quick
3	Powerful

For more information and advice about the impact of these settings, see "21.2 Energy saving and optimum operation" [▸ 139].

[2-82]

Heating comfort setting.

This setting is used in conjunction with setting [2-9].

[2-82]	Heating comfort setting
0	Eco
1 (default)	Mild

[2-82]	Heating comfort setting
2	Quick
3	Powerful

For more information and advice about the impact of these settings, see "21.2 Energy saving and optimum operation" [▸ 139].

21.1.8 Indoor unit field setting

15(25)-13

Safety system deactivation.

When the room where the indoor unit is installed is big enough that no safety measure is required, the R32 leak safety system in that indoor unit can be deactivated by this setting.

Safety system deactivation				
Setting	**1st code**	**Function**	**2nd code**	**Description**
15/25	13	R32 leak safety system setting	01	Disabled
			02	Enabled

21.2 Energy saving and optimum operation

This heat pump system is equipped with advanced energy saving functionality. Depending on the priority, emphasis can be put on energy saving or comfort level. Several parameters can be selected, resulting in the optimal balance between energy consumption and comfort for the particular application.

Several patterns are available and explained below. Modify the parameters to the needs of your building and to realize the best balance between energy consumption and comfort.

No matter which control is selected, variations on the behaviour of the system are still possible due to protection controls to keep the unit operating under reliable conditions. The intentional target, however, is fixed and will be used to obtain the best balance between energy consumption and comfort, depending on the application type.

21.2.1 Available main operation methods

Basic

The refrigerant temperature is fixed independent from the situation.

To activate this in...	Change...
Cooling operation	[2-8]=2
Heating operation	[2-9]=6

Automatic

The refrigerant temperature is set depending on the outdoor ambient conditions. As such adjusting the refrigerant temperature to match the required load (which is also related to the outdoor ambient conditions).

E.g., when your system is operating in cooling, you do not need as much cooling under low outdoor ambient temperatures (e.g., 25°C) as under high outdoor ambient temperatures (e.g., 35°C). Using this idea, the system automatically starts increasing its refrigerant temperature, automatically reducing the delivered capacity and increasing the system's efficiency.

E.g., when your system is operating in heating, you do not need as much heating under high outdoor ambient temperatures (e.g., 15°C) as under low outdoor ambient temperatures (e.g., –5°C). Using this idea, the system automatically starts decreasing its refrigerant temperature, automatically reducing the delivered capacity and increasing the system's efficiency.

To activate this in…	Change…
Cooling operation	[2-8]=0 (default)
Heating operation	[2-9]=0 (default)

Hi-sensible/economic (cooling/heating)

The refrigerant temperature is set higher/lower (cooling/heating) compared to basic operation. The focus under high sensible mode is comfort feeling for the customer.

The selection method of indoor units is important and has to be considered as the available capacity is not the same as under basic operation.

For details concerning to Hi-sensible applications, please contact your dealer.

To activate this in…	Change…
Cooling operation	[2-8] to the appropriate value, matching the requirements of the pre-designed system containing a high sensible solution.
Heating operation	[2-9] to the appropriate value, matching the requirements of the pre-designed system containing a high sensible solution.

[2-8]	T_e target (°C)
3	7
4	8
5	9
6	10
7	11

[2-9]	T_c target (°C)
1	41
3	43

21.2.2 Available comfort settings

For each of above modes a comfort level can be selected. The comfort level is related to the timing and the effort (energy consumption) which is put in achieving a certain room temperature by temporarily changing the refrigerant temperature to different values in order to achieve requested conditions more quickly.

Powerful

Overshoot (during heating operation) or undershoot (during cooling operation) is allowed compared to the requested refrigerant temperature, in order to achieve the required room temperature very fast. The overshoot is allowed from the start up moment.

When the request from the indoor units becomes more moderate, the system will eventually go to the steady state condition which is defined by the operation method above.

To activate this in...	Change...
Cooling operation	[2-81]=3 This setting is used in conjunction with setting [2-8].
Heating operation	[2-82]=3 This setting is used in conjunction with setting [2-9]

Quick

Overshoot (during heating operation) or undershoot (during cooling operation) is allowed compared to the requested refrigerant temperature, in order to achieve the required room temperature very fast. The overshoot is allowed from the start up moment.

When the request from the indoor units becomes more moderate, the system will eventually go to the steady state condition which is defined by the operation method above.

To activate this in...	Change...
Cooling operation	[2-81]=2 This setting is used in conjunction with setting [2-8].
Heating operation	[2-82]=2 This setting is used in conjunction with setting [2-9].

Mild

Overshoot (during heating operation) or undershoot (during cooling operation) is allowed compared to the requested refrigerant temperature, in order to achieve the required room temperature very fast. The overshoot is not allowed from the start up moment. The start up occurs under the condition which is defined by the operation mode above.

When the request from the indoor units becomes more moderate, the system will eventually go to the steady state condition which is defined by the operation method above.

Note: The start up condition is different from the powerful and quick comfort setting.

To activate this in...	Change...
Cooling operation	[2-81]=1 This setting is used in conjunction with setting [2-8].

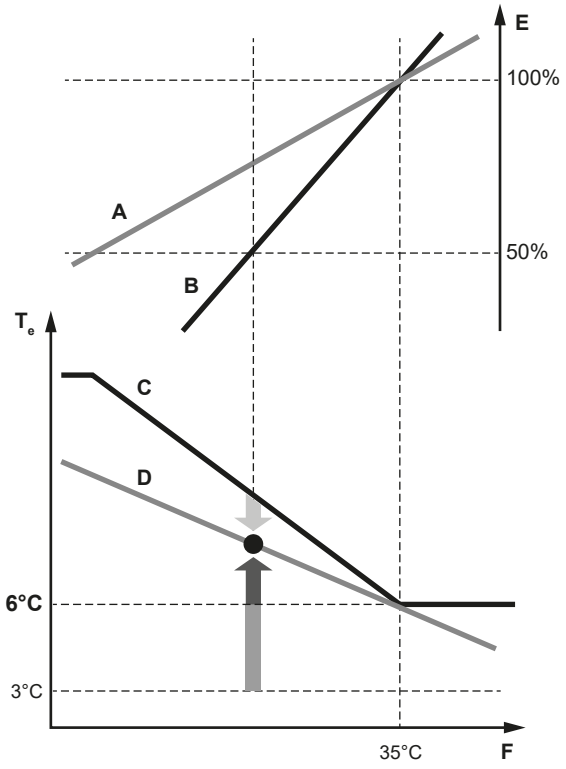
To activate this in…	Change…
Heating operation	[2-82]=1 This setting is used in conjunction with setting [2-9].

Eco

The original refrigerant temperature target, which is defined by the operation method (see above) is kept without any correction, unless for protection control.

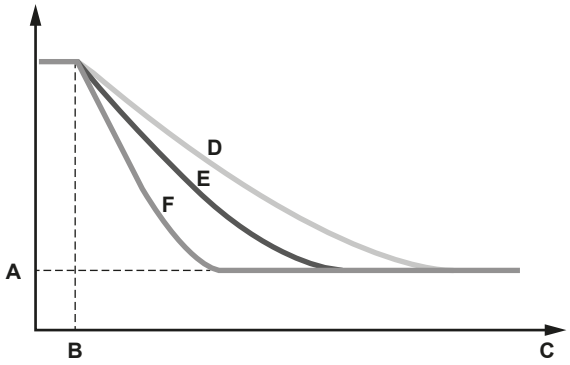
To activate this in…	Change…
Cooling operation	[2-81]=0 This setting is used in conjunction with setting [2-8].
Heating operation	[2-82]=0 This setting is used in conjunction with setting [2-9].

21.2.3 Example: Automatic mode during cooling



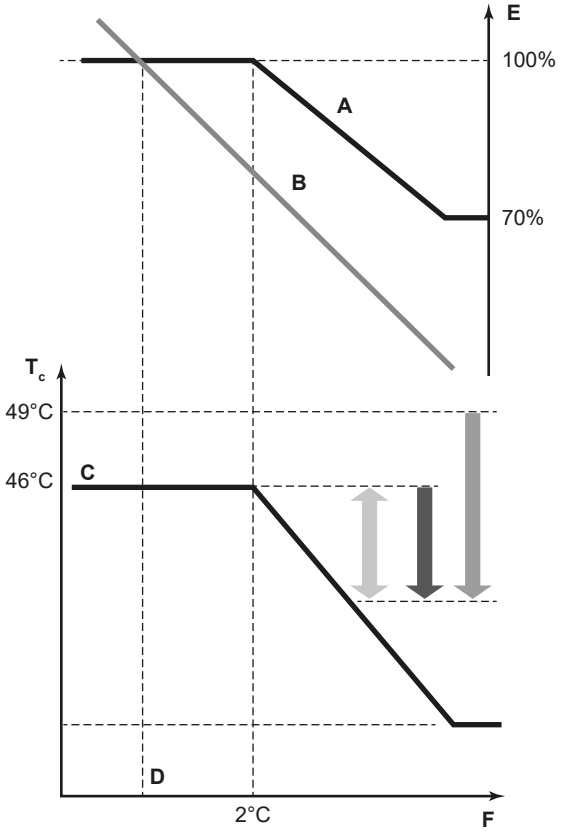
A Actual load curve
B Virtual load curve (initial capacity automatic mode)
C Virtual target value (initial evaporation temperature value automatic mode)
D Required evaporation temperature value
E Load factor
F Outside air temperature
T_e Evaporating temperature
Quick
Powerful
Mild

Room temperature evolution:



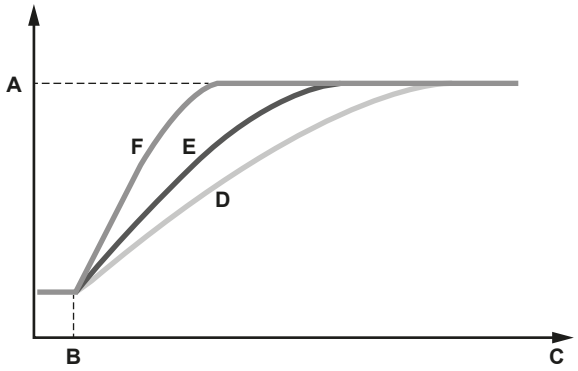
A Indoor unit set temperature
B Operation start
C Operating time
D Mild
E Quick
F Powerful

21.2.4 Example: Automatic mode during heating



A Virtual load curve (default automatic mode peak capacity)
B Load curve
C Virtual target value (initial condensation temperature value automatic mode)
D Design temperature
E Load factor
F Outside air temperature
T_c Condensing temperature
Quick
Powerful
Mild

Room temperature evolution:



A Indoor unit set temperature
B Operation start
C Operating time
D Mild
E Quick
F Powerful

22 Commissioning

CAUTION

See "3 Specific installer safety instructions" [▶ 13] to make sure commissioning complies with all safety regulations.

NOTICE

General commissioning checklist. Next to the commissioning instructions in this chapter, a general commissioning checklist is also available on the Daikin Business Portal (authentication required).

The general commissioning checklist is complementary to the instructions in this chapter and can be used as a guideline and reporting template during commissioning and hand-over to the user.

In this chapter

22.1 Overview: Commissioning

After installation and once the field settings are defined, the installer is obliged to verify correct operation. Therefore a test run MUST be performed according to the procedures described below.

This chapter describes what you have to do and know to commission the system after it is configured.

Commissioning typically consists of the following stages:

1 Checking the "Checklist before commissioning".
2 Performing a test run.
3 If necessary, correcting errors after abnormal completion of the test run.
4 Operating the system.

22.2 Precautions when commissioning

DANGER: RISK OF ELECTROCUTION

DANGER: RISK OF BURNING/SCALDING

CAUTION

Do NOT perform the test operation while working on the indoor unit(s).

When performing the test operation, NOT ONLY the outdoor unit, but the connected indoor unit will operate as well. Working on an indoor unit while performing a test operation is dangerous.

CAUTION

Do NOT insert fingers, rods or other objects into the air inlet or outlet. Do NOT remove the fan guard. When the fan is rotating at high speed, it will cause injury.

NOTICE

Test run is possible for ambient temperatures between –10°C and 50°C.

INFORMATION

During the first running period of the unit, the required power may be higher than stated on the nameplate of the unit. This phenomenon is caused by the compressor, that needs a continuous run time of 50 hours before reaching smooth operation and stable power consumption.

NOTICE

Turn ON the power 6 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

During test operation, the outdoor unit and the indoor units will start up. Make sure that the preparations of all indoor units are finished (field piping, electrical wiring, air purge, ...). See installation manual of the indoor units for details.

22.3 Checklist before commissioning

1. After the installation of the unit, check the items listed below.
2. Close the unit.
3. Power up the unit.

☐	You have read the complete installation and operation instructions described in the **installer and user reference guide**.
☐	**Installation** Check that the unit is properly installed, to avoid abnormal noises and vibrations when starting up the unit.
☐	**Transportation stay** Check that the outdoor unit's transportation stay is removed.
☐	**Field wiring** Check that the field wiring has been carried out according to the instructions described in the chapter "20 Electrical installation" [▸ 115], according to the wiring diagrams and according to the applicable national wiring regulation.
☐	**Power supply voltage** Check the power supply voltage on the local supply panel. The voltage MUST correspond to the voltage on the nameplate of the unit.
☐	**Earth wiring** Be sure that the earth wires have been connected properly and that the earth terminals are tightened.

☐	**Insulation test of the main power circuit** Using a megatester for 500 V, check that the insulation resistance of 2 MΩ or more is attained by applying a voltage of 500 V DC between power terminals and earth. NEVER use the megatester for the interconnection wiring.
☐	**Fuses, circuit breakers, or protection devices** Check that the fuses, circuit breakers, or the locally installed protection devices are of the size and type specified in the chapter "20.1.6 Specifications of standard wiring components" [▸ 122]. Be sure that neither a fuse nor a protection device has been bypassed.
☐	**Internal wiring** Visually check the switch box and the inside of the unit for loose connections or damaged electrical components.
☐	**Pipe size and pipe insulation** Be sure that correct pipe sizes are installed and that the insulation work is properly executed.
☐	**Stop valves** Be sure that the stop valves are open on both liquid and gas side.
☐	**Damaged equipment** Check the inside of the unit for damaged components or squeezed pipes.
☐	**Refrigerant leak** Check the inside of the unit on refrigerant leakage. If there is a refrigerant leak, try to repair the leak. If the repair is unsuccessful, call your local dealer. Do not touch any refrigerant which has leaked out from refrigerant piping connections. This may result in frostbite.
☐	**Oil leak** Check the compressor for oil leakage. If there is an oil leak, try to repair the leak. If the repairing is unsuccessful, call your local dealer.
☐	**Air inlet/outlet** Check that the air inlet and outlet of the unit is NOT obstructed by paper sheets, cardboard, or any other material.
☐	**Additional refrigerant charge** The amount of refrigerant to be added to the unit shall be written on the included "Added refrigerant" plate and attached to the rear side of the front cover.
☐	**Requirements for R32 equipment** Make sure the system meets all requirements that are described in the following chapter: "3.1 Instructions for equipment using R32 refrigerant" [▸ 17].
☐	**Field settings** Make sure all field settings you want are set. See "21.1 Making field settings" [▸ 128].
☐	**Field setting [2-54]** (direct connection from outdoor to indoor unit) In case of a system with at least one indoor unit that has a direct connection to the outdoor unit, make sure to change field setting [2-54] from 0 to 1. See "[2-54]" [▸ 138].
☐	**Installation date and field setting** Be sure to keep record of the installation date on the sticker on the rear of the upper front panel according to EN60335-2-40 and keep record of the contents of the field setting(s).

22.4 Checklist during commissioning

☐	To perform a **SV unit test run**. See the SV unit installation manual for more information.
☐	To perform a **test run**.

☐	To perform a **SV/indoor unit connection check (optional)**.

22.5 About the SV unit test run

The SV unit test run has to be performed on all SV units in the system, before the test run of the outdoor unit. The SV unit test run has to confirm that the required safety measures are properly installed. Even when no safety measures are required, it is necessary to perform this SV unit test run and confirm the result, because the test run of the outdoor unit checks this confirmation for all SV units in the system. See the SV unit installation and operation manual for more information.

NOTICE

It is very important that all refrigerant piping work is done before the units (outdoor, SV or indoor) are powered. When the units are powered, the expansion valves initialise. This means that the valves close.

If any part of the system had already been powered before, FIRST activate setting [2-21] on the outdoor unit to open the expansion valves again THEN power off the unit to conduct the SV unit test run.

22.6 About the system test run

NOTICE

Make sure to carry out the test run after the first installation. Otherwise, the malfunction code U3 will be displayed on the user interface and normal operation or individual indoor unit test run cannot be carried out.

The procedure below describes the test operation of the complete system. This operation checks and judges following items:

- Check for incorrect wiring (communication check with indoor unit(s)).
- Check of the stop valves opening.
- Judgement of piping length.
- Abnormalities on indoor units cannot be checked for each unit separately. After the test operation is finished, check the indoor units one by one by performing a normal operation using the user interface. Refer to the indoor unit installation manual for more details concerning the individual test run.

INFORMATION

- It may take 10 minutes to achieve a uniform refrigerant state before the compressor starts.
- During the test operation, the refrigerant running sound or the magnetic sound of a solenoid valve may become loud and the display indication may change. These are not malfunctions.

22.6.1 To perform a test run

1. Close all front panels to prevent misjudgement.
2. Make sure all field settings you want are set; see "21.1 Making field settings" [▸ 128].
3. Turn ON the power to the outdoor unit and the connected indoor unit(s).

NOTICE

Turn ON the power 6 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

4 Make sure the default (idle) situation is existing; see "21.1.3 To access mode 1 or 2" [▸ 129]. Push BS2 for 5 seconds or more. The unit will start test operation.

Result: The test operation is automatically carried out, the outdoor unit display will indicate "t01" and the indication "Test operation" and "Under centralised control" will display on the user interface of the indoor unit(s).

Steps during the automatic system test run procedure:

Step	Description
t01	Control before start up (pressure equalisation)
t02	Cooling start up control
t03	Cooling stable condition
t04	Communication check and stop valve check
t06	Pipe length check
t09	Pump down operation
t10	Unit stop

INFORMATION

During the test operation, it is not possible to stop the unit operation from a user interface. To abort the operation, press BS3. The unit will stop after ±30 seconds.

5 Check the test operation results on the outdoor unit 7-segment display.

Completion	Description
Normal completion	No indication on the 7-segment display (idle).
Abnormal completion	Indication of malfunction code on the 7-segment display. Refer to "22.6.2 Correcting after abnormal completion of the test run" [▸ 149] to take actions for correcting the abnormality. When the test operation is fully completed, normal operation will be possible after 5 minutes.

22.6.2 Correcting after abnormal completion of the test run

The test operation is only completed if there is no malfunction code displayed on the user interface or outdoor unit 7-segment display. In case of a displayed malfunction code, perform correcting actions as explained in the malfunction code table. Carry out the test operation again and confirm that the abnormality is properly corrected.

INFORMATION

Refer to the installation manual of the indoor unit for detailed malfunction codes related to indoor units.

22.7 To perform a SV/indoor unit connection check

This test run can be performed to confirm if wiring and piping connections between indoor units and SV units are matching.

For the safe operation of the system, it is mandatory to confirm the wiring and piping connections between the indoor units and SV units. This can be done either via a thorough manual check or via the built-in automatic check.

Below instruction is only related to the built-in check.

SV/indoor automatic connection test run

Operation range for the indoor units is 20~27°C and for the outdoor units this is 0~43°C.

1. Close all front panels to prevent misjudgement.
2. Make sure the test run is fully completed without malfunction code (see "22.6.1 To perform a test run" [▸ 148]).
3. To start the SV/indoor unit connection check, make field setting [2-20]=2 (see "21.1.7 Mode 2: field settings" [▸ 134]). The unit will start the check operation.

Result: The check operation is automatically carried out, the outdoor unit display will indicate "tOO" and the indication "Centralised control" and "Test run" will display on the indoor unit user interface(s).

Steps during the automatic connection check procedure:

Step	Description
tOO	Check ON
tO1	Control before start-up (pressure equalisation)
tO2	Four-way valve initial control
tO3	Precooling/preheating start-up
tO4	Precooling/preheating operations
tO5	Misconnection assessment operation
tO6	Pumpdown
tO7	Restart standby
tO8	Stop

INFORMATION

During the check operation, it is not possible to stop the unit operation from a user interface. To abort the operation, press BS3. The unit will stop after ±30 seconds.

During the check, if the following codes are on 7-segment display, the check will not continue, take actions for correcting.

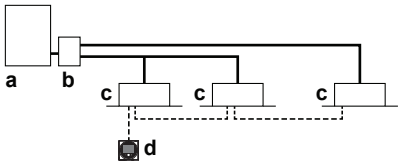
Code	Description
E-2	Indoor unit is out of temperature range 20~27°C for SV connection check.
E-3	Outdoor unit is out of temperature range 0~43°C for SV connection check.
E-4	Too low pressure was noticed during SV connection check. Restart SV/indoor unit connection check.

Code	Description
E-5	Indicates an indoor unit is not compatible with this function.
E-6	1 Only a single port SV unit (SV1A) is used in the setup. 2 Only a single port or a combined single port in the multi SV unit (SV4~8A) is used in the setup

4 Check the results on the outdoor unit 7-segment display.

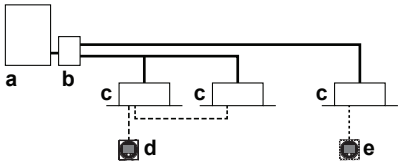
Completion	Description
Normal completion	"oH" on the 7-segment display.
Abnormal completion	Indication of malfunction code on the 7-segment display. Refer to "22.6.2 Correcting after abnormal completion of the test run" [▶ 149] to take actions for correcting the abnormality. When the check is fully completed, normal operation will be possible after 5 minutes.

In case group control is implemented over multiple branch ports of the same SV unit, it is not possible to directly use the built-in automatic check.



a Outdoor unit
b SV unit
c Indoor unit
d Remote controller
—— Refrigerant piping
----- User interface wiring

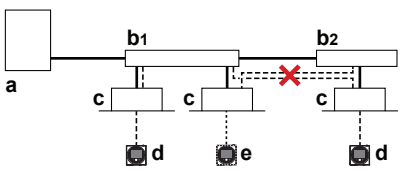
To be able to execute the built-in connection check it is required to connect a spare remote controller to the other branch ports. Each branch port needs a dedicated remote controller for the built-in automatic connection check to function.



a Outdoor unit
b SV unit
c Indoor unit
d Remote controller
e Spare remote controller
—— Refrigerant piping
----- User interface wiring

After successful completion of the check, the spare remote controller can be removed, and the group control can be restored as wanted. In case group control is limited to single branch ports no extra actions are needed.

In case of miswiring between two different SV units, it is not possible to detect a misconnection during the check.



a Outdoor unit
b SV unit
c Indoor unit
d Remote controller
e Spare remote controller
—— Refrigerant piping
----- User interface wiring

Note: Connection check is not possible in the following cases:

- connection with only air handling units (pair or multi-application).
- connection of air curtain (Biddle).
- connection of air handling unit in heating dedication mode (mix application).

22.8 Operating the unit

Once the unit is installed and test operation of outdoor unit and indoor unit(s) is finished, the operation of the system can start.

For operating the indoor unit, the user interface of the indoor unit should be switched ON. Refer to the indoor unit operation manual for more details.

23 Hand-over to the user

Once the test run is finished and the unit operates properly, make sure the following is clear for the user:

- Make sure that the user has the printed documentation and ask him/her to keep it for future reference. Inform the user that he/she can find the complete documentation at the URL mentioned earlier in this manual.
- Explain to the user how to properly operate the system and what to do in case of problems.
- Show the user what to do for the maintenance of the unit.

24 Maintenance and service

NOTICE

Maintenance MUST be done by an authorised installer or service agent.

We recommend performing maintenance at least once a year. However, applicable legislation might require shorter maintenance intervals.

NOTICE

Applicable legislation on **fluorinated greenhouse gases** requires that the refrigerant charge of the unit is indicated both in weight and CO_2 equivalent.

Formula to calculate the quantity in CO_2 equivalent tonnes: GWP value of the refrigerant × total refrigerant charge [in kg] / 1000

In this chapter

24.1 Maintenance safety precautions

DANGER: RISK OF ELECTROCUTION

DANGER: RISK OF BURNING/SCALDING

WARNING

Prior to start working on systems containing flammable refrigerant, safety checks are necessary to ensure that the risk of ignition is minimised. Therefore, some instructions should be followed.

Please refer to the service manual for more information.

NOTICE: Risk of electrostatic discharge

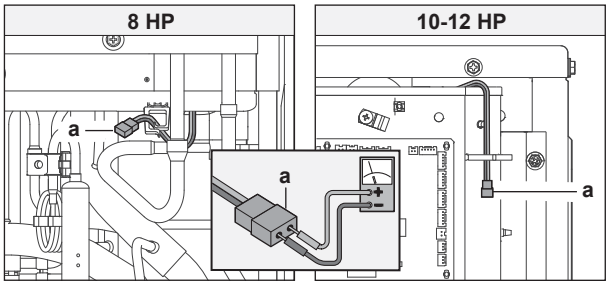
Before performing any maintenance or service work, touch a metal part of the unit in order to eliminate static electricity and to protect the PCB.

24.1.1 To prevent electrical hazards

When performing service to inverter equipment:

1. Do NOT perform electrical work for 10 minutes after turning off the power supply.
2. Measure the voltage between terminals on the terminal block for power supply with a tester and confirm that the power supply is shut off. In addition, measure points as shown in the figure, with a tester and confirm that the

voltage of the capacitor in the main circuit is less than 50 V DC. If the voltage measured is still higher than 50 V DC, discharge the capacitors in a safe manner by using a dedicated capacitor discharge pen to avoid possibility of sparking.



a Connector for capacitor voltage check

3 Pull out junction connectors X1A, X2A for the fan motors in the outdoor unit before starting service operation on the inverter equipment. Be careful NOT to touch the live parts. (If a fan rotates due to strong wind, it may store electricity in the capacitor or in the main circuit and cause electrical shock.)

4 After the service is finished, plug the junction connector back in. Otherwise the malfunction code E7 will be displayed on the user interface or on the outdoor unit 7-segment display and normal operation will NOT be performed.

For details refer to the wiring diagram labelled on the back of the switch box/ service cover.

Pay attention to the fan. It is dangerous to inspect the unit while the fan is running. Make sure to turn off the main switch and to remove the fuses from the control circuit located in the outdoor unit.

24.2 Checklist for yearly maintenance of the outdoor unit

Check the following at least once a year:

- Heat exchanger

  The heat exchanger of the outdoor unit can get blocked up due to dust, dirt, leaves, etc. It is recommended to clean the heat exchanger yearly. A blocked heat exchanger can lead to too low pressure or too high pressure leading to worse performance.

24.3 About service mode operation

Refrigerant recovery operation/vacuuming operation is possible by applying setting [2-21]. Refer to "21.1 Making field settings" [▶ 128] for details how to set mode 2.

When vacuuming/recovery mode is used, check very carefully what should be vacuumed/recovered before starting. See installation manual of the indoor unit for more information about vacuuming and recovery.

24.3.1 To use vacuum mode

1 When the unit is at standstill, set the unit in [2-21]=1.

Result: When confirmed, the indoor and outdoor unit expansion valves will fully open. At that moment the 7-segment display indication=E0 1 and the user interface of all indoor units indicate TEST (test operation) and (external control) and the operation will be prohibited.

2 Evacuate the system with a vacuum pump.

3 Press BS3 to stop vacuuming mode.

24.3.2 To recover refrigerant

This should be done with a refrigerant recovery unit. Follow the same procedure as for vacuuming method.

DANGER: RISK OF EXPLOSION

Pump down – Refrigerant leakage. If you want to pump down the system, and there is a leak in the refrigerant circuit:

- Do NOT use the unit's automatic pump down function, with which you can collect all refrigerant from the system into the outdoor unit. **Possible consequence:** Self-combustion and explosion of the compressor because of air going into the operating compressor.
- Use a separate recovery system so that the unit's compressor does NOT have to operate.

NOTICE

Make sure to NOT recover any oil while recovering refrigerant. **Example:** By using an oil separator.

24.3.3 Before the maintenance and service of a system with SV unit

Before starting the maintenance and service, field setting "[2-45]" [▶ 138] must be applied on the outdoor unit. For more information, see "21.1.7 Mode 2: field settings" [▶ 134].

If field setting "[2-45]" [▶ 138] is applied, the shut-off valves of the SV unit will close. The compressor, outdoor fan and indoor unit will stop operating and the 7-segment display will show code "E0 1".

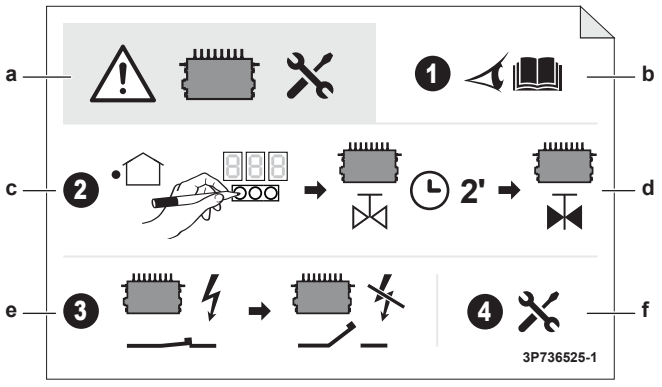
To confirm the full closure of the shut-off valves, "oH" will be shown on the 7-segment display of the outdoor unit .

The system power supply must be turned off for maintenance.

24.4 SV unit maintenance and service label

WARNING

Never power off the unit for maintenance and service before the shut-off valves are closed.



a Caution for maintenance and servicing of SV unit

b Consult the installation manual or service manual
c Apply the field setting on the outdoor unit
d Wait for two minutes to allow the system to close the valves
e Turn off the system power
f Perform maintenance and servicing on the SV unit

25 Troubleshooting

CAUTION

See "3 Specific installer safety instructions" [▸ 13] to make sure troubleshooting complies with all safety regulations.

In this chapter

25.1 Overview: Troubleshooting

Before troubleshooting

Carry out a thorough visual inspection of the unit and look for obvious defects such as loose connections or defective wiring.

25.2 Precautions when troubleshooting

DANGER: RISK OF ELECTROCUTION

DANGER: RISK OF BURNING/SCALDING

WARNING

- When carrying out an inspection on the switch box of the unit, ALWAYS make sure that the unit is disconnected from the mains. Turn off the respective circuit breaker.
- When a safety device was activated, stop the unit and find out why the safety device was activated before resetting it. NEVER shunt safety devices or change their values to a value other than the factory default setting. If you are unable to find the cause of the problem, call your dealer.

WARNING

Prevent hazards due to inadvertent resetting of the thermal cut-out: power to this appliance MUST NOT be supplied through an external switching device, such as a timer, or connected to a circuit that is regularly turned ON and OFF by the utility.

25.3 Solving problems based on error codes

In case of a displayed malfunction code, perform correcting actions as explained in the malfunction code table.

After correcting the abnormality, press BS3 to reset the malfunction code and retry operation.

The malfunction code which is displayed on the outdoor unit will indicate a main malfunction code and a sub code. The sub code indicates more detailed information about the malfunction code. The malfunction code will be displayed intermittent.

Example:

Code	Example
Main code	E3
Sub code	-01

With an interval of 1 second, the display will switch between main code and sub code.

INFORMATION

See the service manual for:

- The complete list of error codes
- A more detailed troubleshooting guideline for each error

25.3.1 Error codes: Overview

Main code	Sub code	Cause	Solution	SVEO[a]	SVS[b]
A0	-11	The R32 sensor in one of the indoor units has detected a refrigerant leak[c]	Possible R32 leak. The SV unit will close the shut-off valves of the branch pipe port to which the corresponding indoor unit is connected. Indoor units on this branch pipe port will be out of operation until the leak is repaired. In case the indoor unit is directly connected to the outdoor unit, the compressor will shut down and the unit will stop operating. Also all shut-off valves for all ports in all SV units in the system will be closed. Refer to service manual for more information.		✓
	-20	The R32 sensor in one of the SV unit has detected a refrigerant leak	Possible R32 leak. The SV unit will close all of its shut-off valves and triggers the ventilation system of the SV unit. The system goes in locked status. Service is needed to repair the leak and activate the system. Refer to the service manual for more information.		✓
	/CH	Safety system error (leak detection)[c]	An error related to the safety system occurred. Refer to the service manual for more information.		

Main code	Sub code	Cause	Solution	SVEO[a]	SVS[b]
CH	-01	R32 sensor malfunction in one of the indoor units[c]	Check connection on PCB or actuator. The system will continue operating, but the indoor unit in scope will stop operating. Refer to the service manual for more information.		✓
	-02	R32 sensor end of lifetime in one of the indoor units[c]	One of the sensors is at the end of lifetime and must be replaced. Refer to the service manual for more information.		
	-05	R32 sensor end of lifetime<6 months in one of the indoor units[c]	One of the sensors is almost at the end of lifetime and must be replaced. Refer to the service manual for more information.		
	-10	Waiting for indoor unit R32 sensor replacement input[c]	Refer to the service manual for more information.		
	-20	Waiting for SV unit replacement input	Refer to the service manual for more information.		
	-21	R32 sensor malfunction in one of the SV units	Check connection on PCB or actuator. The system will continue operation, but SV unit in scope will stop operating. Refer to the service manual for more information.		✓
	-22	R32 sensor end of lifetime less than 6 months in one of the SV units	One of the sensors is at the end of lifetime (for CH-22: almost) and must be replaced. Refer to the service manual for more information.		
	-23	R32 sensor end of lifetime in one of the SV units			
EA	-27	SV unit damper malfunction	Check damper motor of the SV unit(s). Possibly the damper cannot rotate or rotation is not detected. Refer to the service manual for more information.		✓
E2	-01	Earth leakage detector activated	Restart the unit. If the problem reoccurs, contact your dealer.		
	-06	Earth leakage detector malfunction (open circuit) - A1P (X101A)	Check connection on PCB or actuator.		

Main code	Sub code	Cause	Solution	SVEO[a]	SVS[b]
E3	-01	High pressure switch was activated (S1PH) – main PCB (X2A)	Check stop valve situation or abnormalities in (field) piping or airflow over air cooled coil.		
	-02	▪ Refrigerant overcharge ▪ Stop valve closed	▪ Check refrigerant amount+recharge unit. ▪ Open stop valves		
	-13	Stop valve closed (liquid)	Open liquid stop valve.		
	-18	▪ Refrigerant overcharge ▪ Stop valve closed	▪ Check refrigerant amount+recharge unit. ▪ Open stop valves.		
E4	-01	Low pressure malfunction: ▪ Stop valve closed ▪ Refrigerant shortage ▪ Indoor unit malfunction	▪ Open stop valves. ▪ Check refrigerant amount+recharge unit. ▪ Check the user interface's display or interconnection wiring between the outdoor unit and the indoor unit.		
E9	-01	Electronic expansion valve malfunction (heat exchanger) (Y1E) – main PCB (X21A)	Check connection on PCB or actuator.		
	-04	Electronic expansion valve malfunction (inverter cooling) (Y3E) – main PCB (X23A)	Check connection on PCB or actuator.		
	-26	Electronic expansion valve malfunction (liquid injection) (Y4E) – main PCB (X25A)	Check connection on PCB or actuator.		
	-29	Electronic expansion valve malfunction (subcool heat exchanger) (Y2E) – main PCB (X26A)	Check connection on PCB or actuator.		
F3	-01	Discharge temperature too high (R21T) – main PCB (X33A): ▪ Stop valve closed ▪ Refrigerant shortage	▪ Open stop valves. ▪ Check refrigerant amount+recharge unit.		
	-20	Compressor casing temperature too high (R8T) – main PCB (X33A): ▪ Stop valve closed ▪ Refrigerant shortage	▪ Open stop valves. ▪ Check refrigerant amount+recharge unit.		
H9	-01	Ambient temperature sensor malfunction (R1T) – main PCB (X18A)	Check connection on PCB or actuator.		

Main code	Sub code	Cause	Solution	SVEO[(a)]	SVS[(b)]
J3	- 16	Discharge temperature sensor malfunction (R21T): open circuit – main PCB (X33A)	Check connection on PCB or actuator.		
	- 17	Discharge temperature sensor malfunction (R21T): short circuit - main PCB (X33A)	Check connection on PCB or actuator.		
	-47	Compressor casing temperature sensor malfunction (R8T): open circuit - main PCB (X33A)	Check connection on PCB or actuator.		
	-48	Compressor casing temperature sensor malfunction (R8T): short circuit - main PCB (X33A)	Check connection on PCB or actuator.		
J5	- 18	Suction temperature sensor (R3T) – main PCB (X30A)	Check connections on PCB or actuator.		
J6	-01	Heat exchanger deicer temperature sensor (R7T) – main PCB (X30A)	Check connection on PCB or actuator		
J7	-06	Subcool heat exchanger – liquid - temperature sensor (R5T) - main PCB (X30A)	Check connection on PCB or actuator.		
J8	-01	Heat exchanger – liquid -temperature sensor (R4T) - main PCB (X30A)	Check connection on PCB or actuator.		
J9	-01	Subcool heat exchanger – gas - temperature sensor (R6T) – main PCB (X30A)	Check connection on PCB or actuator.		
JA	-06	High pressure sensor malfunction (S1NPH): open circuit - main PCB (X32A)	Check connection on PCB or actuator.		
	-07	High pressure sensor malfunction (S1NPH): short circuit - main PCB (X32A)	Check connection on PCB or actuator.		
JC	-06	Low pressure sensor malfunction (S1NPL): open circuit - main PCB (X31A)	Check connection on PCB or actuator.		
	-07	Low pressure sensor malfunction (S1NPL): short circuit - main PCB (X31A)	Check connection on PCB or actuator.		
LC	- 14	Transmission outdoor unit - inverter: INV1 transmission trouble - main PCB (X20A, X28A, X40A)	Check connection.		
	- 19	Transmission outdoor unit - inverter: FAN1 transmission trouble - main PCB (X20A, X28A, X40A)	Check connection.		
	-24	Transmission outdoor unit - inverter: FAN2 transmission trouble - main PCB (X20A, X28A, X40A)	Check connection.		

Main code	Sub code	Cause	Solution	SVEO[(a)]	SVS[(b)]
P1	-01	INV1 unbalanced power supply voltage	Check if power supply is within range.		
U1	-01	Reversed power supply phase malfunction	Correct phase order.		
	-04	Reversed power supply phase malfunction	Correct phase order.		
U2	-01	INV1 voltage power shortage	Check if power supply is within range.		
	-02	INV1 power phase loss	Check if power supply is within range.		
U3	-03	Malfunction code: system test run not yet executed (system operation not possible)	Execute system test run.		
	-04	An error occurred during the test run	Re-execute the test run.		
	-05, -06	Test run aborted	Re-execute the test run.		
	-07, -08	Test run aborted due to communication issues	Check the communication wires and re-execute the test run.		
	- 12	Commissioning of SV unit safety system is not completed	Complete commissioning of SV unit safety system. Refer to SV unit manual for more information.	✓	
U4	-03	Indoor unit communication error	Check user interface connection.		
U7	-03, -04	Malfunction code: faulty wiring to Q1/ Q2	Check Q1/Q2wiring.		
	- 11	Too many indoor units are connected to F1/F2 line	Check indoor unit amount and total capacity connected.		
U9	-01	Warning because there is an error on another unit (indoor/SV unit)	Check if other indoor units/SV units have a malfunction and confirm if indoor unit mix is allowed.		
UA	-03	Connection malfunction over indoor units or type mismatch	Check if other indoor units have a malfunction and confirm if indoor unit mix is allowed.		
	- 18	Connection malfunction over indoor units or type mismatch	Check if other indoor units have a malfunction and confirm if indoor unit mix is allowed.		
	-20	Wrong outdoor unit connected	Disconnect the outdoor unit.		
	-29	There is a direct indoor unit connection, but the field setting [2-54] is not set to '1'.	Set field setting [2-54]=1		
	-52	SV unit refrigerant type abnormality	Check SV unit refrigerant type		
	-53	SV unit DIP switch abnormality	Check the DIP switches of the SV unit.	✓	

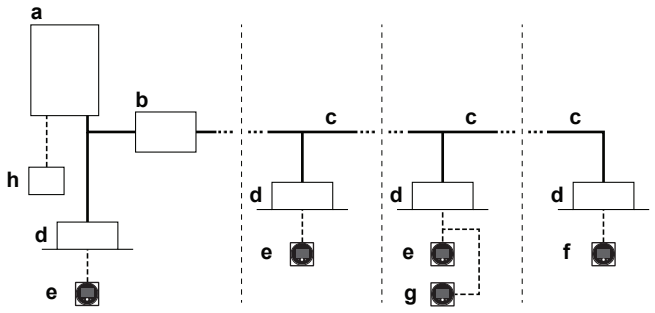
Main code	Sub code	Cause	Solution	SVEO[a]	SVS[b]
UF	-01 -18	Mismatch between wiring path and piping path during test run	Mistake detected during SV unit and indoor unit connection check (see "22.7 To perform a SV/indoor unit connection check" [▸ 150]). Confirm wiring between indoors and SV units. Refer to SV unit manual for correct way of wiring.	✓	
UH	-01	Auto address malfunction (inconsistency)	Check if interconnected unit amount matches with powered unit amount (by monitor mode) or wait until initialisation is finished.		
UJ	-40	Maintenance warning (ventilation fan)	SV unit ventilation needs maintenance check. Refer to the SV unit manual for more information.		
In case other error codes appear, contact your dealer.					

[a] The SVEO terminal provides an electrical contact that closes in case the indicated error occurs.
[b] The SVS terminal provides an electrical contact that closes in case the indicated error occurs.
[c] The error code is only shown on the user interface of the indoor unit where the error occurs.

25.4 Refrigerant leak detection system

Normal operation

During normal operation, the alarm only and supervisor remote controller have no functionality. The screen of the remote controller in alarm only and supervisor mode will be off. Operation of the remote controller can be checked by pushing the ○ button to open the installer menu.



a Heat pump outdoor unit
b SV unit
c Refrigerant piping
d VRV direct expansion (DX) indoor unit
e Remote controller in normal mode
f Remote controller in alarm only mode
g Remote controller in supervisor mode (mandatory in some situations)
h Centralised controller (optional)

Note: During start-up of the system, the mode of the remote control can be verified from the screen.

Leak detection operation

1 If the R32 sensor in the indoor unit detects a refrigerant leak:

- The user will be warned by both audible and visible signals of the remote controller of the leaking indoor unit (and the supervisor remote controller, if applicable).
- At the same time the SV unit will close the shut-off valves of the corresponding branch pipe in order to reduce the amount of refrigerant in the indoor system.
- After the operation, the indoor units of the port where the leak was detected will be out of operation and display an error. The rest of the system will continue operation.

2 If the R32 sensor in the indoor unit without a SV unit (directly connected to the outdoor unit) detects a refrigerant leak:

- All shut off valves in SV units connected to other indoor units will be closed, the compressor will be shut down and the system cannot operate anymore.

3 If the R32 sensor in the SV unit detects a refrigerant leak:

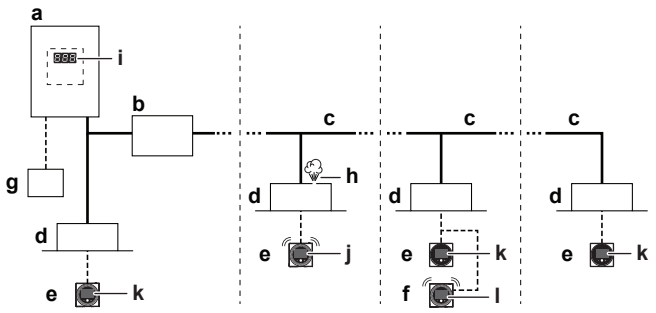
- The SV unit will close all of its shut-off valves and triggers the ventilation system (if equipped) of the SV unit to evacuate the leaking refrigerant.
- After the operation, the system will go in locked state and the remote controllers will display an error. Service is needed to repair the leak and activate the system. Refer to the service manual for more information.

Feedback of the remote controller after leak detection operation will depend on its mode.

WARNING

The unit is equipped with a refrigerant leak detection system for safety.

To be effective, the unit MUST be electrically powered at all times after installation, except for maintenance.



a Heat pump outdoor unit
b SV unit
c Refrigerant piping
d VRV direct expansion (DX) indoor unit
e Remote controller in normal mode and alarm only mode
f Remote controller in supervisor mode (mandatory in some situations)
g Centralised controller (optional)
h Refrigerant leak
i Outdoor unit error code on 7-segment display
j Error code 'A0–11' and audible alarm and red warning signal is generated from this remote controller.
k Error code 'U9–01' is displayed on this remote controller. No alarm or warning lights.
l Error code 'A0–11' and audible alarm and red warning signal is generated from this **supervisor** remote controller. The unit **address** is displayed on this remote controller.

Note: It is possible to stop the leak detection alarm from the remote controller and from the app. To stop the alarm from the remote controller, press ⊞ for 3 seconds.

Note: Leak detection will trigger SVS output. For more information, see "20.3 To connect the external outputs" [▸ 125].

Note: An optional output PCB for the indoor unit can be added to provide output for external device. The output PCB will trigger in case a leak is detected. For exact model name see option list of the indoor unit. For more information about this option, refer to the installation manual of the optional output PCB

Note: Some centralised controllers can also be used as supervisor remote controller. For further details on installation, please refer to the installation manual of the centralised controllers.

NOTICE

The R32 refrigerant leakage sensor is a semiconductor detector which may incorrectly detect substances other than R32 refrigerant. Avoid using chemical substances (e.g. organic solvents, hair spray, paint) in high concentrations, in the close proximity of the indoor unit because this may cause misdetection by the R32 refrigerant leakage sensor.

26 Disposal

NOTICE

Do NOT try to dismantle the system yourself: dismantling of the system, treatment of the refrigerant, oil and other parts MUST comply with applicable legislation. Units MUST be treated at a specialised treatment facility for reuse, recycling and recovery.

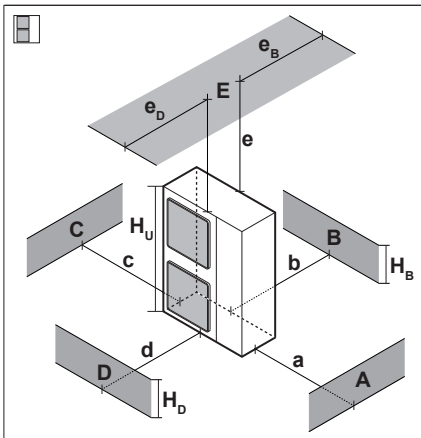
27 Technical data

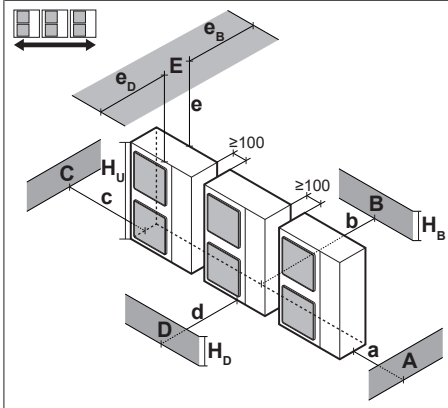
- A **subset** of the latest technical data is available on the regional Daikin website (publicly accessible).
- The **full set** of the latest technical data is available on the Daikin Business Portal (authentication required).

27.1 Service space: Outdoor unit

When mounting units side by side, the piping route must be to the front or downwards. In this case the piping route to the side is not possible.

Single unit ( ) | Single row of units ( )



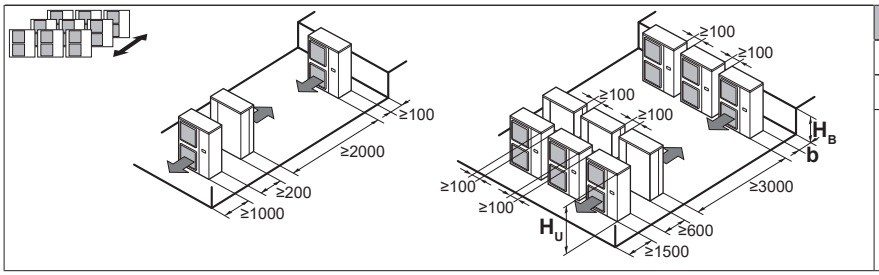


A~E	H_B H_D H_U		[mm] a	b	c	d	e	e_B	e_D	
B	—			≥100						
A, B, C	—		≥100	≥100	≥100					
B, E	—			≥100			≥1000		≤500	
A, B, C, E	—		≥150	≥150	≥150		≥1000		≤500	
D	—					≥500				
D, E	—					≥1000	≥1000	≤500		
B, D	—			≥100		≥1000				
B, D, E	H_B<H_D	H_B≤½H_U		≥250		≥1000	≥1000	≤500		1
		½H_U<H_B≤H_U		≥250		≥1250	≥1000	≤500		
		H_B>H_U	⊘							
	H_B>H_D	H_D≤½H_U		≥100		≥1000	≥1000		≤500	
		½H_U<H_D≤H_U		≥200		≥1000	≥1000		≤500	
		H_D>H_U		≥200		≥1700	≥1000		≤500	
A, B, C	—		≥200	≥300	≥1000					
A, B, C, E	—		≥200	≥300	≥1000		≥1000		≤500	
D	—					≥1000				
D, E	—					≥1000	≥1000	≤500		
B, D	H_D>H_U			≥300		≥1000				
	H_D≤½H_U			≥250		≥1500				
	½H_U<H_D≤H_U			≥300		≥1500				
B, D, E	H_B<H_D	H_B≤½H_U		≥300		≥1000	≥1000	≤500		1+2
		½H_U<H_B≤H_U		≥300		≥1250	≥1000	≤500		
		H_B>H_U	⊘							
	H_B>H_D	H_D≤½H_U		≥250		≥1500	≥1000		≤500	
		½H_U<H_D≤H_U		≥300		≥1500	≥1000		≤500	
		H_D>H_U		≥300		≥2200	≥1000		≤500	

A,B,C,D Obstacles (walls/baffle plates)
E Obstacle (roof)
a,b,c,d,e Minimum service space between the unit and obstacles A, B, C, D and E
e_B Maximum distance between the unit and the edge of obstacle E, in the direction of obstacle B
e_D Maximum distance between the unit and the edge of obstacle E, in the direction of obstacle D
H_U Height of the unit
H_B,H_D Height of obstacles B and D
1 Seal the bottom of the installation frame to prevent discharged air from flowing back to the suction side through the bottom of the unit.
2 Maximum two units can be installed.
⊘ Not allowed

Note: For better serviceability, use a distance ≥250 mm for all dimensions marked with '**a**'.

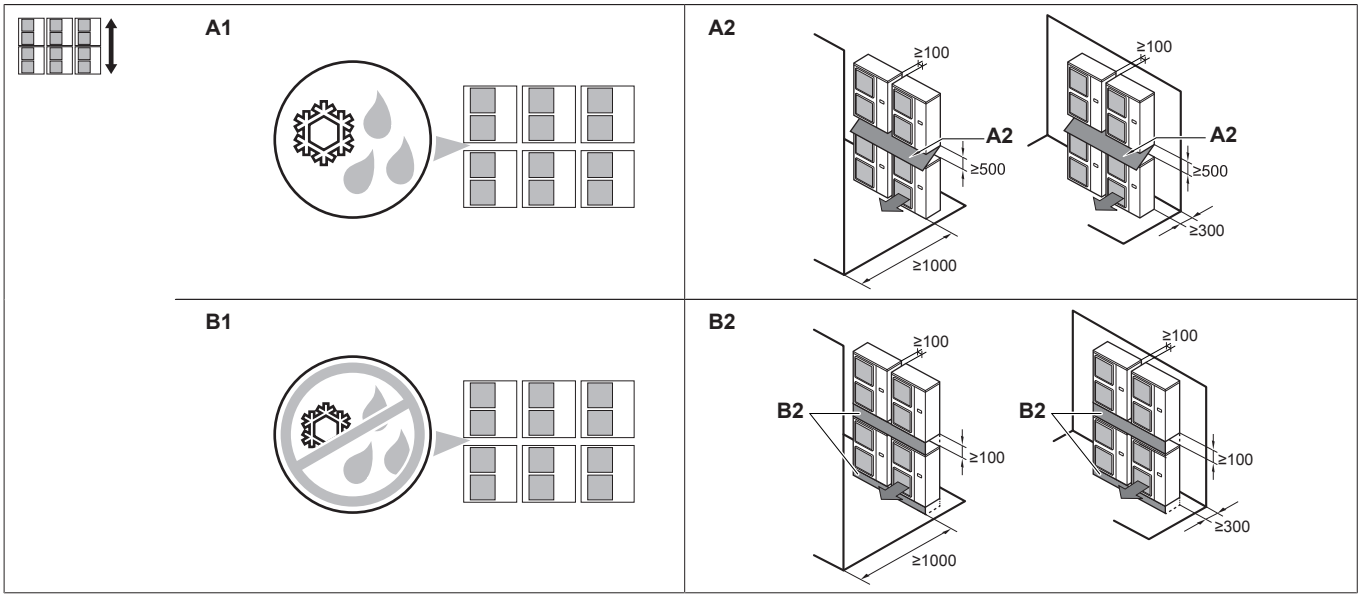
Multiple rows of units ()



H_B H_U	b [mm]
$H_B \leq ½H_U$	b≥250
$½H_U < H_B \leq H_U$	b≥300
$H_B > H_U$	⃠

Note: For better serviceability, use a side by side distance ≥250 mm (instead of ≥100 mm as shown on the figures above).

Stacked units (max. 2 levels) ()



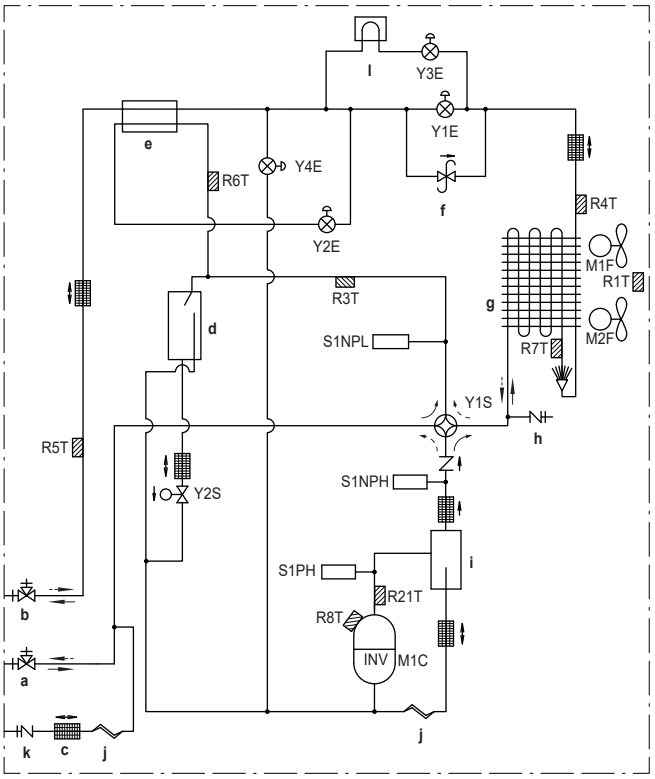
A1=>A2 (A1) If there is danger of drainage dripping and freezing between the upper and lower units...
(A2) Then install a **roof** between the upper and lower units. Install the upper unit high enough above the lower unit to prevent ice buildup at the upper unit's bottom plate.

B1=>B2 (B1) If there is no danger of drainage dripping and freezing between the upper and lower units...
(B2) Then it is not required to install a roof, but **seal the gap** between the upper and lower units to prevent discharged air from flowing back to the suction side through the bottom of the unit.

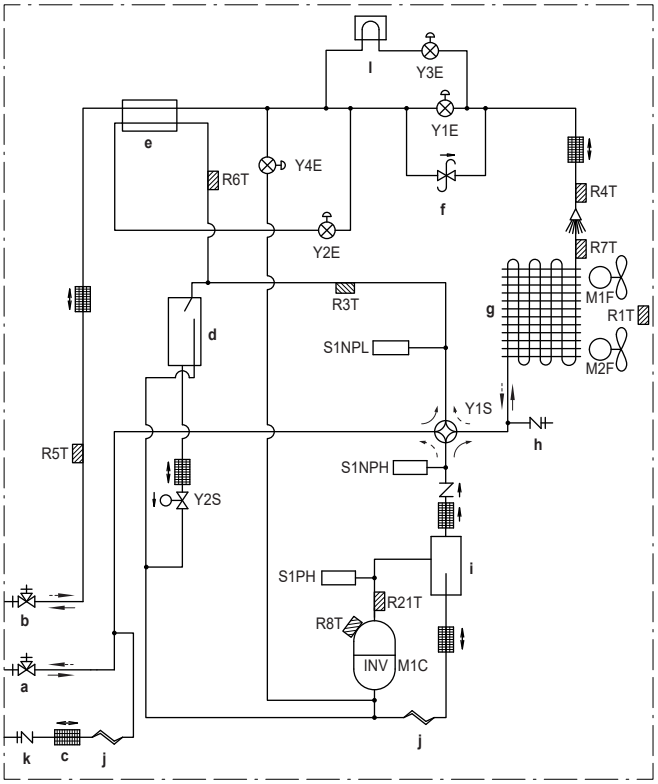
Note: For better serviceability, use a side by side distance ≥250 mm (instead of ≥100 mm as shown on the figures above).

27.2 Piping diagram: Outdoor unit

Piping diagram: 8 HP



Piping diagram: 10+12 HP



Legend:

- **a** Stop valve (gas)
- **b** Stop valve (liquid)
- **c** Filter (6×)
- **d** Accumulator
- **e** Subcool tube heat exchanger

f	Pressure regulating valve
g	Heat exchanger
h	Service port
i	Oil separator
j	Capillary tube (2×)
k	Charge port
l	Heat sink
M1C	Compressor
M1F-M2F	Fan motor
R1T	Thermistor (air)
R3T	Thermistor (suction accumulator)
R4T	Thermistor (heat exchanger, liquid)
R5T	Thermistor (liquid)
R6T	Thermistor (subcool heat exchanger, gas)
R7T	Thermistor (de-icer)
R8T	Thermistor (M1C body)
R21T	Thermistor (M1C discharge pipe)
S1NPH	High pressure sensor
S1NPL	Low pressure sensor
S1PH	High pressure switch
Y1E	Electronic expansion valve (main)
Y2E	Electronic expansion valve (subcool heat exchanger)
Y3E	Electronic expansion valve (inverter cooling)
Y4E	Electronic expansion valve (liquid injection)
Y1S	Solenoid valve (4-way valve)
Y2S	Solenoid valve (accumulator oil return)
—►	Cooling
--►	Heating

27.3 Wiring diagram: Outdoor unit

The wiring diagram is delivered with the unit, located at the inside of the service cover.

Notes:

1 Symbols (see below).

2 Refer to the installation or service manual on how to use the BS1~BS3 push buttons and DS1~DS2 switches.

3 Do not operate the unit by short-circuiting protection device S1PH.

4 Refer to the installation manual for indoor-outdoor transmission F1-F2 wiring.

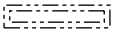
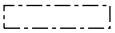
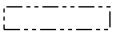
5 When using the central control system, connect outdoor-outdoor transmission F1-F2.

6 The capacity of the contact is 220~240 VAC – 0.5 A. (Rush current needs 3 A or less)

7 Use dry contact for micro-current (1 mA or less 12VDC).

Symbols:

X1M	Main terminal
—·—·—·—	Earth wiring
15	Wire number 15
- - - - - - -	Field wire
	Field cable
—> **/12.2	Connection ** continues on page 12 column 2

①	Several wiring possibilities
	Option
	Not mounted in switch box
	Wiring depending on model
	PCB

Colours:

BLK	Black
BLU	Blue
BRN	Brown
GRN	Green
ORG	Orange
RED	Red
WHT	White
YLW	Yellow

Legend for wiring diagram:

A1P	Printed circuit board (main)
A2P	Printed circuit board (noise filter)
A3P	Printed circuit board (inverter)
A4P	Printed circuit board (fan 1)
A5P	Printed circuit board (fan 2)
A6P	Printed circuit board (cool/heat selector)
BS* (A1P)	Push button switch
DS* (A1P)	DIP switch
E1HC	Crankcase heater
F1U (A1P)	Fuse (T 10 A / 250 V)
F1U, F2U	Fuse (T 1 A / 250 V)
F3U	Field fuse (field supply)
HAP (A1P)	Light-emitting diode (service monitor is green)
K*R (A*P)	Relay on PCB
L1R	Reactor
M1C	Motor (compressor)
M1F, M2F	Motor (upper and lower fan)
Q1DI	Earth leakage circuit breaker (field supply)
R1T	Thermistor (air)
R3T	Thermistor (suction accumulator)
R4T	Thermistor (heat exchanger liquid)
R5T	Thermistor (liquid)

R6T	Thermistor (subcool heat exchanger gas)
R7T	Thermistor (de-icer)
R8T	Thermistor (M1C body)
R21T	Thermistor (M1C discharge pipe)
S1NPH	High pressure sensor
S1NPL	Low pressure sensor
S1PH	High pressure switch
S1S	Air control switch (optional)
S2S	Cool/heat switch (optional)
SEG* (A1P)	7-segment display
SFB	Mechanical ventilation error input (field supply)
T1A	Current sensor
X*A	Connector
X*M	Terminal strip
Y1E	Electronic expansion valve (heat exchanger)
Y2E	Electronic expansion valve (subcool heat exchanger)
Y3E	Electronic expansion valve (inverter cooling)
Y4E	Electronic expansion valve (liquid injection)
Y1S	Solenoid valve (4-way valve)
Y2S	Solenoid valve (accumulator oil return)
Y3S	Error operation output (SVEO)(field supply)
Y4S	Leak sensor output (SVS)(field supply)
Z*C	Noise filter (ferrite core)

28 Glossary

Dealer
Sales distributor for the product.

Authorised installer
Technical skilled person who is qualified to install the product.

User
Person who is owner of the product and/or operates the product.

Applicable legislation
All international, European, national and local directives, laws, regulations and/or codes that are relevant and applicable for a certain product or domain.

Service company
Qualified company which can perform or coordinate the required service to the product.

Installation manual
Instruction manual specified for a certain product or application, explaining how to install, configure and maintain it.

Operation manual
Instruction manual specified for a certain product or application, explaining how to operate it.

Maintenance instructions
Instruction manual specified for a certain product or application, which explains (if relevant) how to install, configure, operate and/or maintain the product or application.

Accessories
Labels, manuals, information sheets and equipment that are delivered with the product and that need to be installed according to the instructions in the accompanying documentation.

Optional equipment
Equipment made or approved by Daikin that can be combined with the product according to the instructions in the accompanying documentation.

Field supply
Equipment NOT made by Daikin that can be combined with the product according to the instructions in the accompanying documentation.

DAIKIN EUROPE N.V.
Zandvoordestraat 300, B-8400 Oostende, Belgium

4P752782-1B 2024.10