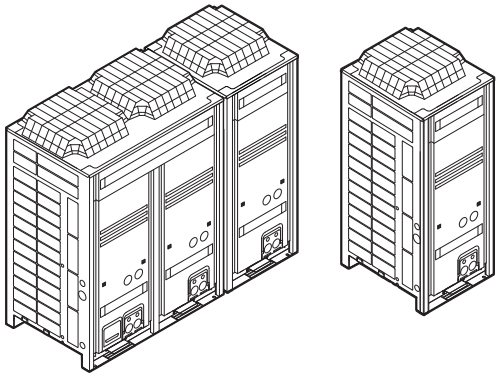
Installer and user reference guide

CO_2 Conveni-Pack outdoor unit and capacity up unit



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1 About the documentation

1.1 About this document

In this documentation the term "indoor units" is used for both refrigeration units and air conditioning units, unless otherwise mentioned.

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 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)
- **Installation and operation manual of the outdoor unit:**
  - Installation and operation instructions
  - Format: Paper (in the box of the outdoor unit)
- **Installer and user reference guide of the outdoor unit:**
  - 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.

Technical engineering 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).

2 General safety precautions

2.1 About the documentation

- The original instructions are written in English. All other languages are translations of the original instructions.
- The precautions described in this document cover very important topics, follow them carefully.
- The installation of the system, and all activities described in the installation manual and in the installer reference guide MUST be performed by an authorised installer.

2.1.1 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".

2.2 For the installer

2.2.1 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.

2.2.2 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.

Instructions for equipment using R744 refrigerant

WARNING

- Do NOT pierce or burn refrigerant cycle parts.
- Be aware that the refrigerant inside the system is odourless.

WARNING

The appliance shall be stored so as to prevent mechanical damage and in a well-ventilated room without continuously operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater) and have a room size as specified below.

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.

NOTICE

- 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.
- 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.

Installation space requirements

NOTICE

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

2.2.3 Refrigerant — in case of R744

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

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:

- Carbon dioxide poisoning
- Asphyxiation

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.

CAUTION

A vacuumed system will be under triple point. To avoid solid ice, ALWAYS start charging with R744 in vapour state. When the triple point is reached (5.2 bar absolute pressure or 4.2 bar gauge pressure), you may continue charging with R744 in liquid state.

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.

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.

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.

- 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 R744 (CO_2) as refrigerant. Other substances may cause explosions and accidents.
- Do NOT charge liquid refrigerant directly to a gas line. Liquid compression could cause compressor operation failure.

- 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.
- Open refrigerant cylinders slowly.

2.2.4 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.

General installation requirements

WARNING

- Make sure to install all necessary countermeasures in case of refrigerant leakage according to standard EN378 (see "14.1.3 Additional installation site requirements for CO_2 refrigerant" [▸ 62]).
- Make sure to install a CO_2 leak detector (field supply) in every room with refrigerant piping, air conditioning units, showcases or blower coils, and enable the function for refrigerant leak detection (see the installation manual of the indoor units).

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.

CAUTION

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

About the box (see "12 About the box" [▸ 42])

WARNING

A CO_2 detector is ALWAYS recommended during storage and transport.

WARNING

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

CAUTION

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

WARNING

Do NOT use the middle opening of the outdoor unit to attach the belts.

ALWAYS use the outer openings.

WARNING

Do NOT use the outer left opening of the outdoor unit for lifting the unit with a forklift.

About the unit and options (see "13 About the units and options" [▸ 47])

WARNING

ONLY the refrigeration parts that are also designed to work with R744 (CO_2) shall be connected to the system.

Unit installation (see "14 Unit installation" [▸ 57])

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.

WARNING

Follow the service space dimensions in this manual to install the unit correctly. See "14.1.1 Installation site requirements of the outdoor unit" [▸ 58].

WARNING

Fix the unit correctly. For instructions, see "14 Unit installation" [▸ 57].

WARNING

Fixing method of the outdoor unit MUST be in accordance with the instructions from this manual. See "14.3 Mounting the outdoor unit" [▸ 69].

WARNING

- Make sure to install all necessary countermeasures in case of refrigerant leakage according to standard EN378 (see "14.1.3 Additional installation site requirements for CO_2 refrigerant" [▸ 62]).
- Make sure to install a CO_2 leak detector (field supply) in every room with refrigerant piping, air conditioning units, showcases or blower coils, and enable the function for refrigerant leak detection (see the installation manual of the indoor units).

WARNING

In case of mechanical ventilation, take care the ventilated air is exhausted to the outdoor space and NOT into another closed area.

WARNING

When using safety shut-off valves, make sure to install measures such as a bypassing piping with a pressure relief valve (from liquid pipe to gas pipe). When the safety shut-off valves close and no measures are installed, increased pressure may damage the liquid piping.

WARNING

Install the unit ONLY in locations where the doors of the occupied space are NOT tight fitting.

CAUTION

Appliance NOT accessible to the general public, install it in a secured area, protected from easy access.

The equipment meets the requirements for commercial and light-industrial locations when professionally installed and maintained.

CAUTION

This equipment is NOT intended for use in residential locations and will NOT guarantee to provide adequate protection to radio reception in such locations.

CAUTION

Excessive concentrations of refrigerant R744 (CO_2) in a closed room can lead to unconsciousness and oxygen deficiency. Take appropriate measures.

See "To determine the minimum number of appropriate measures" [▸ 64].

CAUTION

If the safety valve operates inside the unit, CO_2 gas may concentrate inside the casing of the outdoor unit. Therefore, you should ALWAYS take a distance for your own safety. You can close the outdoor unit if your portable CO_2 detector confirmed that the concentration of CO_2 is at an acceptable level. For example, if 7 kg CO_2 is released inside the casing, it takes around 5 minutes until the concentration of CO_2 is low enough.

Piping installation (see "15 Piping installation" [▸ 72])

DANGER: RISK OF BURNING/SCALDING

WARNING

Field piping MUST be in accordance with the instructions from this manual. See "15 Piping installation" [▸ 72].

WARNING

The unit is partially factory charged with refrigerant R744.

WARNING

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

If these instructions are NOT followed correctly it may result in property damage or personal injury, which may be serious depending on the circumstances.

WARNING

NEVER remove the spun piping by brazing.

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

WARNING

When stop valves are closed during service, the pressure of the closed circuit will increase due to high ambient temperature. Make sure the pressure is kept below the design pressure.

WARNING

ONLY connect the outdoor unit to showcases or blower coils with a design pressure:

- At the high pressure side (liquid side) of 90 bar gauge.
- At the low pressure side (gas side) of 60 bar gauge (is possible with safety valve at field gas piping).

WARNING

- ONLY use R744 (CO_2) as refrigerant. Other substances may cause explosions and accidents.
- When installing, charging refrigerant, maintaining or performing service, ALWAYS use personal protective equipment, such as safety shoes, safety gloves and safety glasses.
- If the unit is installed indoors (for example, in a machine room), ALWAYS use a portable CO_2 detector.
- If the front panel is open, ALWAYS beware of the rotating fan. The fan will continue rotating for a while, even after the power switch has been turned off.

WARNING

- Use K65 or equivalent piping for high-pressure applications with a working pressure of 90 bar gauge.
- Use K65 or equivalent unions and fittings approved for a working pressure of 90 bar gauge.
- ONLY brazing is allowed to connect pipes. No other types of connections are allowed.
- Expanding pipes is NOT allowed.

WARNING

Serious injury and/or damage can result from the blow-off of the liquid receiver safety valve (see "25.2 Piping diagram: Outdoor unit" [▶ 152]):

- NEVER service the unit when the pressure at the liquid receiver is higher than 86 bar gauge. If the safety valve releases refrigerant, it can cause serious injury and/or damage. The safety valve is installed to protect the liquid receiver. The set pressure of the liquid receiver safety valve can be 90 bar gauge ±3% or 86 bar gauge ±3%, depending on the safety valve present in your unit. Confirm the set pressure by checking the safety valve body.
- If the pressure > set pressure, ALWAYS discharge from pressure relief devices before servicing.
- It is recommended to install and secure blow-off piping to the safety valve.
- ONLY alter the safety valve if the refrigerant has been removed.

WARNING

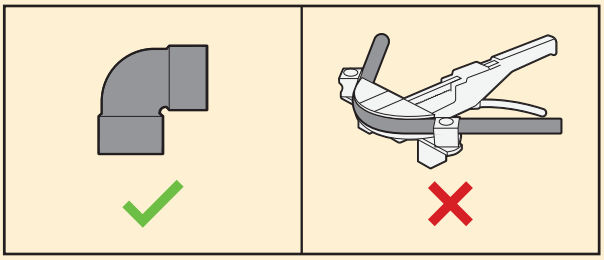
All installed safety valves MUST ventilate to the outdoor space and NOT into a closed area.

WARNING

Before putting the system into service, check if all field supplied components or indoor units comply with pressure test specifications of EN378-2. If you are not sure, it is recommended to perform the test below.

CAUTION

NEVER bend high pressure piping! Bending can reduce the pipe thickness and thus weaken the piping. ALWAYS use K65 fittings.



CAUTION

When installing a safety valve, ALWAYS add enough support to the valve. An activated safety valve is under high pressure. If not installed securely, the safety valve may cause damage to the piping or the unit.

CAUTION

Do NOT open the stop valve until you have measured the insulation resistance of the main power supply circuit.

CAUTION

ALWAYS use nitrogen gas for leak tests.

CAUTION

ALWAYS use K65 T-joints for refrigerant branching.

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.

Electrical installation (see "16 Electrical installation" [▸ 103])

DANGER: RISK OF ELECTROCUTION

WARNING

Electrical wiring MUST be in accordance with the instructions from:

- This manual. See "16 Electrical installation" [▸ 103].
- The wiring diagram of the outdoor unit, which is delivered with the unit, located on the inside of the top plate. For a translation of its legend, see "25.4 Wiring diagram: Outdoor unit" [▸ 156].

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.

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 applicable 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.

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

This equipment is NOT intended for use in residential locations and will NOT guarantee to provide adequate protection to radio reception in such locations.

INFORMATION

For details on the fuse ratings, the fuse types and the circuit breaker ratings, see "16 Electrical installation" [▸ 103].

Charging refrigerant (see "17 Charging refrigerant" [▸ 119])

WARNING

Charging of refrigerant MUST be in accordance with the instructions from this manual. See "17 Charging refrigerant" [▸ 119].

WARNING

- ONLY use R744 (CO_2) as refrigerant. Other substances may cause explosions and accidents.
- When installing, charging refrigerant, maintaining or performing service, ALWAYS use personal protective equipment, such as safety shoes, safety gloves and safety glasses.
- If the unit is installed indoors (for example, in a machine room), ALWAYS use a portable CO_2 detector.
- If the front panel is open, ALWAYS beware of the rotating fan. The fan will continue rotating for a while, even after the power switch has been turned off.

WARNING

The unit is already filled with a certain amount of R744. Do NOT open liquid and gas stop valves until all checks from the "20.3 Checklist before commissioning" [▸ 133] are completed.

WARNING

- Do NOT pierce or burn refrigerant cycle parts.
- Be aware that the refrigerant inside the system is odourless.

WARNING

After charging refrigerant, keep the power supply and operation switch of the outdoor unit ON to avoid a pressure increase on the low pressure (suction piping) side and to avoid pressure increase on the pressure side of the liquid receiver.

CAUTION

A vacuumed system will be under triple point. To avoid solid ice, ALWAYS start charging with R744 in vapour state. When the triple point is reached (5.2 bar absolute pressure or 4.2 bar gauge pressure), you may continue charging with R744 in liquid state.

CAUTION

Do NOT charge liquid refrigerant directly to a gas line. Liquid compression could cause compressor operation failure.

Configuration (see "19 Configuration" [▸ 127])

DANGER: RISK OF ELECTROCUTION

WARNING

If any part of system is already (accidentally) powered on, setting [2-21] on the outdoor unit can be set to value 1 to open the valves (Y1E, Y2E, Y7E, Y8E, Y13E, Y16E, Y17E, Y11S~Y16S, Y21S~Y26S, Y31S~Y34S, Y44S).

Commisioning (see "20 Commissioning" [▸ 132])

DANGER: RISK OF ELECTROCUTION

DANGER: RISK OF BURNING/SCALDING

WARNING

Commissioning MUST be in accordance with the instructions from this manual. See "20 Commissioning" [▸ 132].

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

ALWAYS turn off the operation switch BEFORE turning off the power supply.

CAUTION

After the refrigerant is fully charged, do NOT turn off the operation switch and power supply of the outdoor unit. This prevents the safety valve actuation due to an increase in internal pressure under high ambient temperature conditions.

When internal pressure rises, the outdoor unit can operate by itself to reduce the internal pressure, even if no indoor unit is operating.

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.

Maintenance and service (see "22 Maintenance and service" [▸ 140])

DANGER: RISK OF ELECTROCUTION

DANGER: RISK OF BURNING/SCALDING

DANGER: RISK OF EXPLOSION

Pump down – Refrigerant leakage

NEVER pump down the system. **Possible consequence:** If more than 5.2 kg is trapped in the unit this can cause a release of refrigerant via the safety valve. Also, when pumping down during a leakage self-combustion and explosion of the compressor can happen because of air going into the operating compressor.

CAUTION

The set pressure of the liquid receiver safety valve can be 90 bar gauge ±3% or 86 bar gauge ±3%, depending on the safety valve present in your unit. Confirm the set pressure by checking the safety valve body. If the refrigerant temperature is ≥31°C, the safety valve might be activated. When you close the stop valves, ALWAYS and REGULARLY check the pressure in the circuit and avoid that the safety valve is activated.

CAUTION

It is mandatory to open expansion valve Y1E while releasing refrigerant. If not open, refrigerant will remain inside the unit.

Troubleshooting (see "23 Troubleshooting" [▶ 143])

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.

For the user

4 User safety instructions

Always observe the following safety instructions and regulations.

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

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

WARNING

This unit contains electrical and hot parts.

WARNING

Do NOT keep flammable materials inside the unit. They may cause an explosion or a fire.

WARNING: FLAMMABLE MATERIAL

Do NOT place a flammable spray bottle near the unit and do NOT use sprays near the unit. **Possible consequence:** fire.

WARNING

NEVER use a flammable spray such as hair spray, lacquer or paint near the unit. It may cause a fire.

CAUTION

If this unit is installed indoors, it must ALWAYS be equipped with an electrically powered safety measure such as a CO_2 refrigerant leak detector (field supply). In order to be effective, the unit must ALWAYS be electrically powered after installation.

If for any reason the CO_2 refrigerant leak detector is powered OFF, ALWAYS use a portable CO_2 detector.

CAUTION

To avoid oxygen deficiency, ventilate the room sufficiently if equipment with burner is used together with the system.

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

- 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 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

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

CAUTION

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

About the system (see "5 About the system" [▸ 29])

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.

Maintenance and service (see "8 Maintenance and service" [▸ 33])

DANGER: RISK OF ELECTROCUTION

To clean showcases or blower coils, stop operation and turn OFF all power supplies. **Possible consequence:** electrical shock and injury.

DANGER: RISK OF ELECTROCUTION

To clean the air conditioner or air filter, be sure to stop operation and turn all power supplies OFF. Otherwise, an electrical shock and injury may result.

WARNING: System contains refrigerant under very high pressure.

The system MUST be serviced by qualified persons ONLY.

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

Be careful with ladders when working in high places.

WARNING

Do NOT let the indoor unit get wet. **Possible consequence:** Electrical shock or fire.

WARNING

When turning the power OFF for a long stop period, ALWAYS remove the refrigerant from the units. If you cannot remove the refrigerant for any reason, ALWAYS keep the power turned ON.

WARNING

- Do NOT pierce or burn refrigerant cycle parts.
- Be aware that the refrigerant inside the system is odourless.

WARNING

The R744 refrigerant (CO_2) inside the unit is odourless, non-flammable and normally does NOT leak.

If the unit is installed indoors, ALWAYS install a CO_2 detector according to the specifications of standard EN378.

If the refrigerant leaks in high concentrations in the room, it may have negative effects on its occupants such as asphyxiation and carbon dioxide poisoning. 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

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.

CAUTION

Do NOT insert fingers, rods or other objects into the air inlet or outlet. 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.

CAUTION

Before accessing terminal devices, make sure to interrupt all power supply.

Troubleshooting (see "9 Troubleshooting" [▸ 36])

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.

5 About the system

The indoor units can be used for heating/cooling and refrigerating applications. The type of indoor units which can be used depends on the outdoor units series.

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.

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 or works of art.

NOTICE

Do NOT use the system for cooling water. It may freeze.

NOTICE

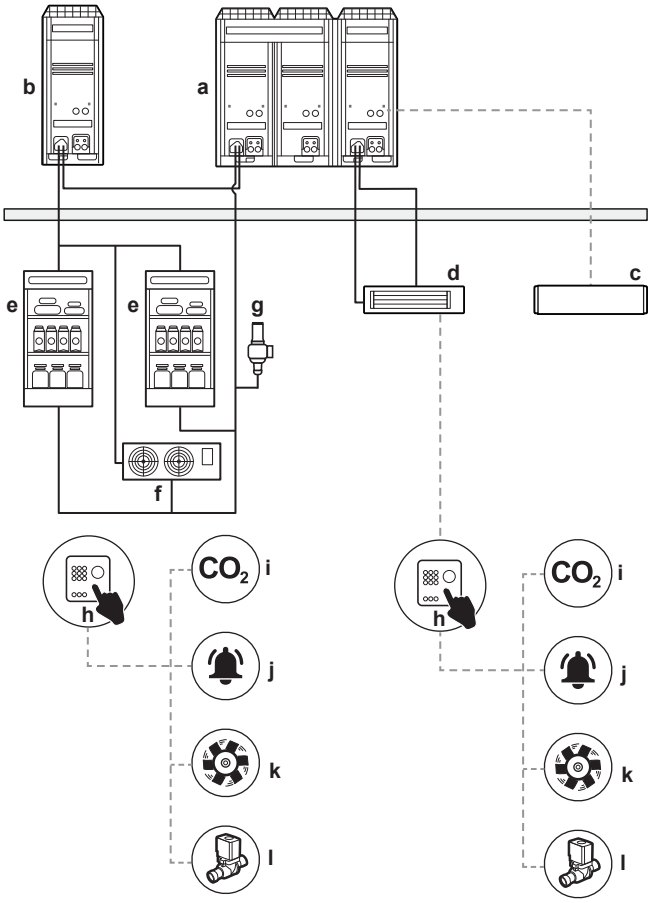
For future modifications or expansions of your system:

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 Main outdoor unit (LRYEN10*)
b Capacity up unit (LRNUN5*)
c Communication box (BRR9B1V1)
d Indoor unit for air conditioning (field supply)
e Indoor unit for refrigeration (showcase) (field supply)
f Indoor unit for refrigeration (blower coil) (field supply)
g Safety valve (field supply)
h CO_2 control panel (field supply)
i CO_2 detector (field supply)
j CO_2 alarm (field supply)
k CO_2 ventilator (field supply)
l Shut off valve (field supply)

6 Operation

6.1 Operation modes

The following operation modes are possible:

- Refrigeration only
- Cooling only
- Cooling and refrigeration
- Heating and refrigeration:
  - With fully heat recovery
  - With outdoor heat exchanger as gas cooler
  - With outdoor heat exchanger as evaporator
- Heating only

6.2 Operation range

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

	Refrigeration	Air conditioning cooling	Air conditioning heating
Outdoor temperature	–20~43°C DB[(a)]	–5~43°C DB	–20~16°C WB
Indoor temperature	—	14~24°C WB	15~27°C DB

[(a)] For low load restrictions, see "13.5.2 Constraints for refrigeration" [▶ 55].

6.3 Field piping pressure

Always keep the following field piping pressures in mind:

Side	Piping	Field piping pressure
Refrigeration	Gas	90 bar gauge
	Liquid	90 bar gauge
Air conditioning	Gas	120 bar gauge
	Liquid	90 bar gauge

7 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.
- Adjust the room temperature properly for a comfortable environment. Avoid excessive heating or cooling. Notice that it may take some time for the room temperature to reach the set temperature. Consider using the timer setting options.
- Adjust the evaporating temperature for refrigeration properly in the settings of the outdoor unit.
- 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.
- Turn off the main power supply switch to the unit when the unit is not used for longer periods of time. If the switch is on, it consumes electricity. Before restarting the unit, turn on the main power supply switch 6 hours before operation to ensure smooth running. (Refer to "Maintenance" in the indoor unit manual.)
- 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.)

8 Maintenance and service

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.

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

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

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

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.

8.1 Maintenance before a long stop period

E.g., at the end of the season.

- Let the indoor units run in fan only operation for about half a day in order to dry the interior of the units. See the **operation manual** of the indoor unit.
- Turn off the power. The user interface display disappears.

WARNING

When turning the power OFF for a long stop period, ALWAYS remove the refrigerant from the units. If you cannot remove the refrigerant for any reason, ALWAYS keep the power turned ON.

- Clean air filters and casings of indoor units. Contact your installer or maintenance person to clean air filters and casings of the indoor unit. Maintenance tips and procedures for cleaning are provided in the installation/operation manuals of dedicated indoor units. Make sure to install cleaned air filters back in the same position.

8.2 Maintenance after a long stop period

E.g., at the beginning of the season.

- Check and remove everything that might be blocking inlet and outlet vents of indoor units and outdoor units.
- Clean air filters and casings of indoor units. Contact your installer or maintenance person to clean air filters and casings of the indoor unit. Maintenance tips and procedures for cleaning are provided in the installation/operation manuals of dedicated indoor units. Make sure to install cleaned air filters back in the same position.
- Clean showcase and unit cooler. Maintenance tips and procedures for cleaning are provided in the installation/operation manuals of dedicated indoor units.
- Turn on the power at least 6 hours before operating the system in order to ensure smoother operation. As soon as the power is turned on, the user interface display appears.

8.3 About the refrigerant

This product contains refrigerant gases.

Refrigerant type: R744 (CO_2)

WARNING

- Do NOT pierce or burn refrigerant cycle parts.
- Be aware that the refrigerant inside the system is odourless.

WARNING

The R744 refrigerant (CO_2) inside the unit is odourless, non-flammable and normally does NOT leak.

If the unit is installed indoors, ALWAYS install a CO_2 detector according to the specifications of standard EN378.

If the refrigerant leaks in high concentrations in the room, it may have negative effects on its occupants such as asphyxiation and carbon dioxide poisoning. 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.

8.4 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.

9 Troubleshooting

If system malfunctions are likely to degrade the articles in the room/showcase, you can ask your installer to install an alarm (example: lamp). For more information, contact your installer.

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
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.	Contact your dealer or installer.
Water (other than defrost water) leaks from the unit.	Stop the operation.
The operation switch does NOT work well.	Turn OFF the power supply.
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.
The safety valve has opened.	1 Stop the operation. 2 Turn OFF the power supply. 3 Inform your installer.

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 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 the power is restored. ▪ Check if no fuse has blown or breaker is activated. Change the fuse or reset the breaker if necessary.
The system stops immediately after starting operation.	▪ 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  (time to clean the air filter). (Refer to "8 Maintenance and service" [▶ 33] and "Maintenance" in the indoor unit manual.)

Malfunction	Measure
The system operates but cooling or heating is insufficient. (for air conditioner indoor units)	▪ 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.
The system operates but cooling is insufficient. (for refrigerator and freezer indoor units)	▪ 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 indoor unit is not frosted up. Defrost the unit manually, or shorten the defrost operation cycle. ▪ Check if there are not too many articles inside the room/showcase. Remove a couple of articles. ▪ Check if there is smooth air circulation inside the room/showcase. Reorganise the articles inside the room/showcase. ▪ Check if there is not too much dust on the outdoor unit heat exchanger. Remove the dust with a brush or vacuum cleaner, without using water. If necessary, consult your dealer. ▪ Check if there is cold air leaking outside of the room/showcase. Stop the air from leaking outside. ▪ Check if you did not set the indoor unit setpoint temperature too high. Set the setpoint appropriately. ▪ Check if there are no high-temperature articles stored in the room/showcase. Always store articles after they have cooled down. ▪ Check if the door is not opened too long. Reduce the opening time of the door.

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.

9.1 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.

Code	Cause	Solution
E2	Electric leakage	Restart the unit. If the problem reoccurs, contact your dealer.
E3	The stop valve of an outdoor unit is left closed.	Open the stop valve on both the gas and liquid side.
E4	The stop valve of an outdoor unit is left closed.	Open the stop valve on both the gas and liquid side.
L4	The air passage is blocked.	Remove obstacles that block the passage of air to the outdoor unit.
U1	Lost phase in power supply.	Check the connection of the power supply cable.
U2	Insufficient supply voltage	Check if the supply voltage is supplied properly.
U4	Wrong transmission wiring between units	Check the connection of transmission wiring between the outdoor unit and the air conditioner.
UA	Wrong combination of indoor units	▪ Check the number of connected indoor units. ▪ Check if an indoor unit is installed that is not a possible combination.
UF	Wrong transmission wiring between units	Check the connection of transmission wiring between the outdoor unit and the air conditioner.

Refer to the service manual for other malfunction codes.

If no malfunction code is displayed, check if:

- power of indoor unit is turned on,
- user interface wiring is broken or incorrectly wired,
- fuse on PCB has melted.

10 Relocation

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

11 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.

For the installer

12 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.

- A forklift can be used for transport as long as the unit remains on its pallet.

In this chapter

12.1 Outdoor unit

WARNING

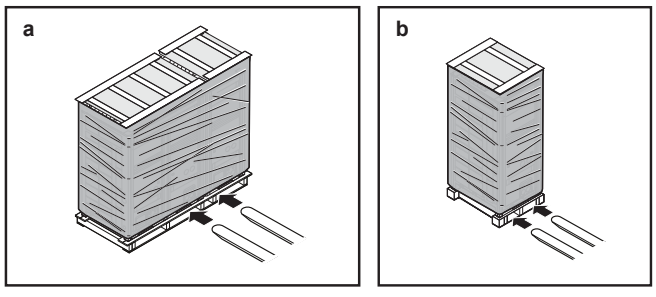
A CO_2 detector is ALWAYS recommended during storage and transport.

Also see "Label about maximum storage temperature" [▸ 50].

12.1.1 To transport the pallet

- A forklift can be used for transport as long as the unit remains on its pallet.

1 Transport the outdoor unit and the capacity up unit as shown in the figure below.



a Outdoor unit
b Capacity up unit

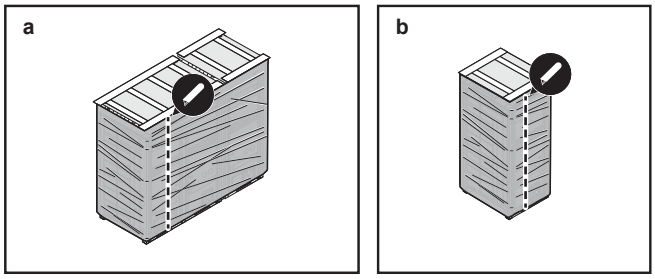
NOTICE

Use filler cloth on the forklift arms to prevent damage to the unit. Damage to the painting of the unit decreases the anti-corrosion protection.

12.1.2 To unpack the outdoor unit

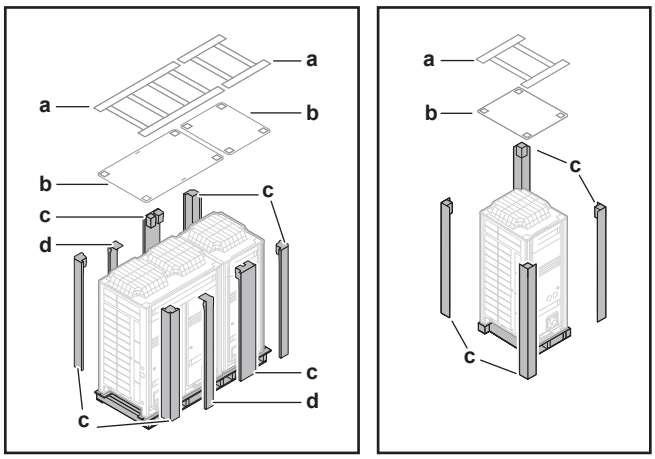
1 Remove the packaging material from the unit.

- Remove the shrink foil. Take care not to damage the unit when removing the shrink foil with a cutter.



a Outdoor unit
b Capacity up unit

- Remove the top pallets, top trays and all corner supports. For the outdoor unit also remove the 2 middle supports.

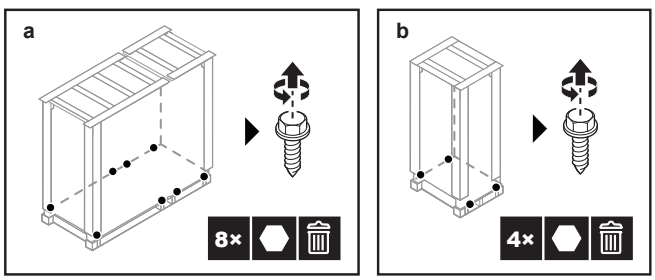


a Top pallet
b Top tray
c Corner support
d Middle support (for outdoor unit)

WARNING

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

2 The unit is fixed to the pallet with bolts. Remove these bolts.



a Outdoor unit
b Capacity up unit

12.1.3 To handle the outdoor unit

CAUTION

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

1 Unpack the outdoor unit and capacity up unit. See also "12.1.2 To unpack the outdoor unit" [▸ 43].

2 Make sure to read the label about handling the unit, located on the front packaging corner support.

3 There are 2 ways to lift the outdoor unit.

- with a crane and 2 belts of at least 8 m long as shown in the figure below. Always use protectors to prevent belt damage and pay attention to the centre of gravity of the unit.

WARNING

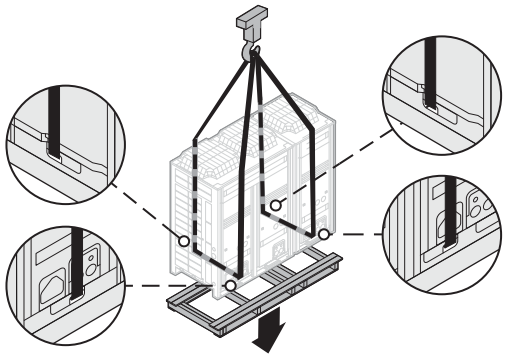
Do NOT use the middle opening of the outdoor unit to attach the belts.

ALWAYS use the outer openings.

NOTICE

- Use a belt sling that adequately bears the weight of the unit.
- Use protection between the casing and the belts.
- The width of the holes for belts in the outdoor unit is 70 mm.

Outdoor unit



- If a forklift is used, pass the forklift arms through the middle and outer right opening on the bottom of the unit as shown in the figure below.

WARNING

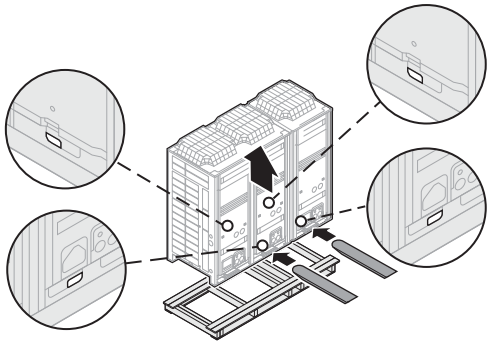
Do NOT use the outer left opening of the outdoor unit for lifting the unit with a forklift.

NOTICE

Precautions when lifting the outdoor unit with a forklift

- Use filler cloth on the forklift arms to prevent damage to the unit. Damage to the painting of the unit decreases the anti-corrosion protection.
- In case of damage, remove burrs and paint the edges and areas around the holes using anti-corrosion treatment/repair paint to prevent rusting after handling the unit.

Outdoor unit

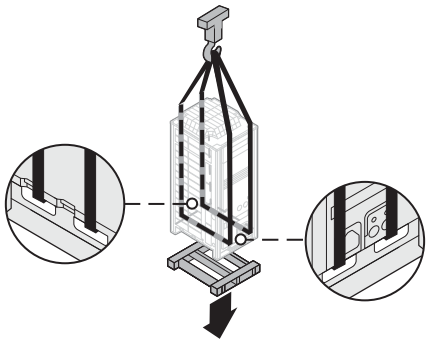


4 Lift the capacity up unit with a crane and 2 belts of at least 8 m long as shown in the figure below. Always use protectors to prevent belt damage and pay attention to the centre of gravity of the unit.

NOTICE

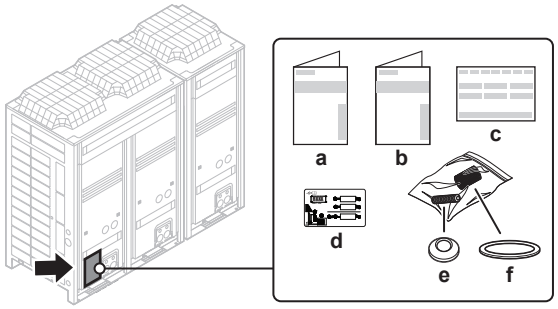
- Use a belt sling that adequately bears the weight of the unit.
- Use protection between the casing and the belts.
- The width of the holes for belts in the outdoor unit is 70 mm.

Capacity up unit



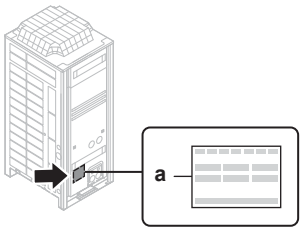
12.1.4 To remove the accessories from the outdoor unit

Outdoor unit



a General safety precautions
b Operation and installation manual
c Declaration of conformity
d Refrigerant charge label
e Copper packings for stop valve caps (15×)
f Copper packings for service port caps (15×)

Capacity up unit



a Declaration of conformity

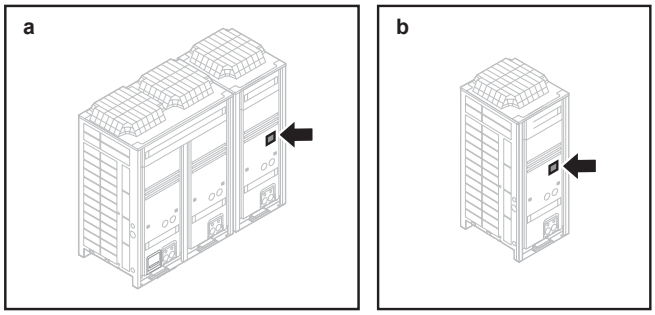
13 About the units and options

In this chapter

13.1 Identification

13.1.1 Identification label: Outdoor unit

Location



a Outdoor unit
b Capacity up unit

Model identification

Outdoor unit: LR YE N 10 A7 Y1

Code	Explanation
Outdoor unit: LR YE N 10 A7 Y1:	
LR	Product category: ▪ L: Low temperature air conditioner ▪ R: Outdoor unit
YE	Heatpump + economizer
N	Refrigerant: R744 (CO_2)
10	Capacity indication in HP
A7	Model series
Y1	Power supply (3~ / 50 Hz / 380~415 V)

Capacity up unit: LR NU N 5 A7 Y1:	
LR	Product category: ▪ L: Low temperature air conditioner ▪ R: Outdoor unit

Capacity up unit: LR NU N 5 A7 Y1:	
NU	Subcooler unit
N	Refrigerant: R744 (CO_2)
5	Capacity indication in HP
A7	Model series
Y1	Power supply (3~ / 50 Hz / 380~415 V)

13.2 About the outdoor unit

This installation manual concerns the outdoor unit and the optional capacity up unit.

These units are intended for outdoor installation and aimed for air to air heating, cooling and refrigeration applications.

NOTICE

These units (LRYEN10* and LRNUN5*) are only parts of an air conditioner system, complying with partial unit requirements of the International Standard IEC 60335-2-40:2018. As such, they must ONLY be connected to other units that have been confirmed as complying to corresponding partial unit requirements of this International Standard.

General name and product name

In this manual, we use the following names:

General name	Product name
Outdoor unit	LRYEN10A▲Y1▼
Capacity up unit	LRNUN5A▲Y1▼

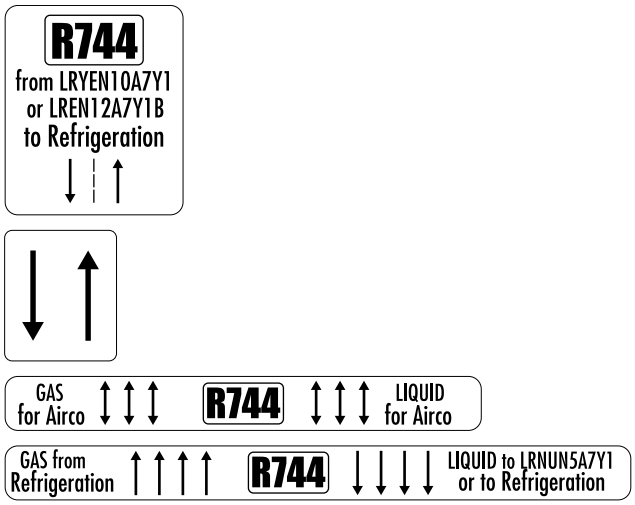
Temperature range

	Refrigeration	Air conditioning cooling	Air conditioning heating
Outdoor temperature	–20~43°C DB[(a)]	–5~43°C DB	–20~16°C WB
Indoor temperature	—	14~24°C WB	15~27°C DB

[(a)] For low load restrictions, see "13.5.2 Constraints for refrigeration" [▸ 55].

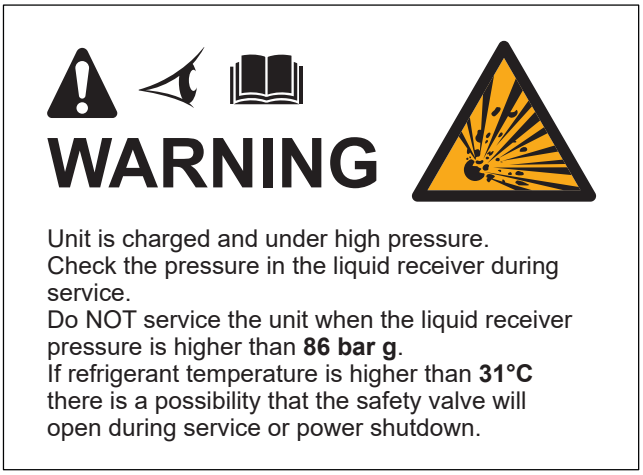
13.2.1 Labels on outdoor unit

Label about flow directions



Text on caution label	Translation
from LRYEN10A7Y1 or LREN12A7Y1B to Refrigeration	From LRYEN10A7Y1 or LREN12A7Y1B to Refrigeration
Gas for Airco	Gas for Airco
Liquid for Airco	Liquid for Airco
Gas from Refrigeration	Gas from Refrigeration
Liquid to LRNUN5A7Y1 or to Refrigeration	Liquid to LRNUN5A7Y1 or to Refrigeration

Label about safety valve



Text on warning label	Translation
Unit is charged and under high pressure.	Unit is charged and under high pressure.
Check the pressure in the liquid receiver during service.	Check the pressure in the liquid receiver during service.
Do NOT service the unit when the liquid receiver pressure is higher than 86 bar g.	Do NOT service the unit when the liquid receiver pressure is higher than **86 bar g**.

Text on warning label	Translation
If refrigerant temperature is higher than 31°C there is a possibility that the safety valve will open during service or power shutdown.	If refrigerant temperature is higher than **31°C** there is a possibility that the safety valve will open during service or power shutdown.

Check the set pressure of the safety valve at the low pressure side of the refrigeration cabinet to verify a safe service temperature.

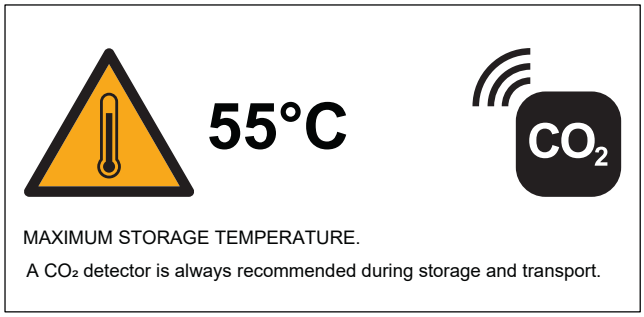
Also see "15.3.9 Guidelines to install safety valves" [▶ 96].

Card about stop valves and service ports

Text on warning card	Translation
Unit is charged and under high pressure.	Unit is charged and under high pressure.

Also see "15.2 Using stop valves and service ports" [▶ 79].

Label about maximum storage temperature



Text on warning label	Translation
MAXIMUM STORAGE TEMPERATURE: 55°C	MAXIMUM STORAGE TEMPERATURE: 55°C
A CO_2 detector is always recommended during storage and transport.	A CO_2 detector is always recommended during storage and transport.

The unit it factory charged with refrigerant. To avoid the safety relief valve being opened, the unit must not be exposed to temperatures above 55°C.

Label about servicing switch box

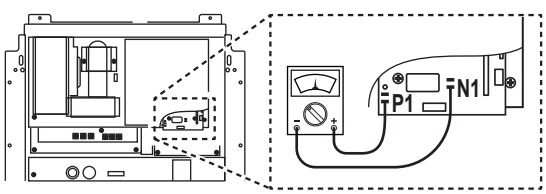
- Label on outdoor unit:

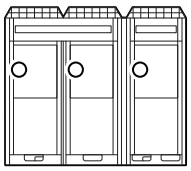
CAUTION

WARNING | ELECTRIC SHOCK CAUTION

Caution when servicing the switch box

1. Before obtaining access to terminal devices, all supply circuits must be interrupted because units at standstill may be in a pre-heating mode and start automatically.
2. Be aware that temperature of switch boxes can be extremely high.
3. Do not touch the switch box for another 10 minutes after turning off the circuit breaker. Even after 10 minutes, always measure the voltage at the terminals of main circuit capacitor or electrical parts and make sure that those voltages are 50 V DC or less. (Always touch the earth terminal first before pulling out or plugging in connectors in order to discharge static electricity. This to prevent the PCB from being damaged.)





○ Fanmotor connectors: X1A,X2A / X3A,X4A / X5A,X6A

4. After confirming the main circuit capacitor voltage drop, pull out the outdoor unit fan connector. Make sure not to touch any live parts during this action. (Strong adverse winds which let the outdoor unit fan rotate, induce a risk of electrical shock because the fan rotation makes the capacitor store electricity.)

Caution when performing other servicing

Do never connect power supply cables to compressors (U,V,W) directly. The compressor may burn out.

4P623521-1B

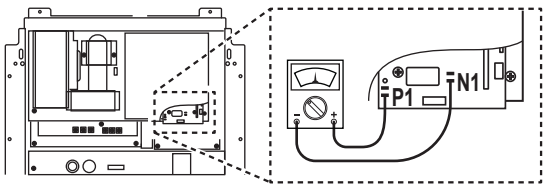
- Label on capacity up unit:

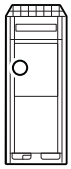
CAUTION

WARNING | ELECTRIC SHOCK CAUTION

Caution when servicing the switch box

1. Before obtaining access to terminal devices, all supply circuits must be interrupted because units at standstill may be in a pre-heating mode and start automatically.
2. Be aware that temperature of switch boxes can be extremely high.
3. Do not touch the switch box for another 10 minutes after turning off the circuit breaker. Even after 10 minutes, always measure the voltage at the terminals of main circuit capacitor or electrical parts and make sure that those voltages are 50 V DC or less. (Always touch the earth terminal first before pulling out or plugging in connectors in order to discharge static electricity. This to prevent the PCB from being damaged.)





○ Fanmotor connectors: X1A,X2A

4. After confirming the main circuit capacitor voltage drop, pull out the outdoor unit fan connector. Make sure not to touch any live parts during this action. (Strong adverse winds which let the outdoor unit fan rotate, induce a risk of electrical shock because the fan rotation makes the capacitor store electricity.)

Caution when performing other servicing

Do never connect power supply cables to compressors (U,V,W) directly. The compressor may burn out.

4P623521-2B

Text on warning label	Translation
Warning	Warning
Electric shock caution	Electric shock caution
Caution when servicing the switch box	Caution when servicing the switch box

Text on warning label	Translation
1. Before obtaining access to terminal devices, all supply circuits must be interrupted because units at standstill may be in a pre-heating mode and start automatically.	1. Before obtaining access to terminal devices, all supply circuits must be interrupted because units at standstill may be in a pre-heating mode and start automatically.
2. Be aware that temperature of switch boxes can be extremely high.	2. Be aware that temperature of switch boxes can be extremely high.
3. Do not touch the switch box for another 10 minutes after turning off the circuit breaker.	3. Do not touch the switch box for another 10 minutes after turning off the circuit breaker.
Even after 10 minutes, always measure the voltage at the terminals of main circuit capacitor of electrical parts and make sure that those voltages are 50 V DC or less.	Even after 10 minutes, always measure the voltage at the terminals of main circuit capacitor of electrical parts and make sure that those voltages are 50 V DC or less.
(Always touch the earth terminal first before pulling out or plugging in connectors in order to discharge static electricity. This to prevent the PCB from being damaged.)	(Always touch the earth terminal first before pulling out or plugging in connectors in order to discharge static electricity. This to prevent the PCB from being damaged.)
4. After confirming the main circuit capacitor voltage drop, pull out the outdoor unit fan connector.	4. After confirming the main circuit capacitor voltage drop, pull out the outdoor unit fan connector.
Make sure not to touch any live parts during this action. (Strong adverse winds which let the outdoor fan rotate, induce a risk of electrical shock because the fan rotation makes the capacitor store electricity.)	Make sure not to touch any live parts during this action. (Strong adverse winds which let the outdoor fan rotate, induce a risk of electrical shock because the fan rotation makes the capacitor store electricity.)
Caution when performing other servicing	Caution when performing other servicing
Do never connect power supply cable to compressors (U, V, W) directly. The compressor may burn out.	Do never connect power supply cable to compressors (U, V, W) directly. The compressor may burn out.

Also see "22.2 To prevent electrical hazards" [▶ 140].

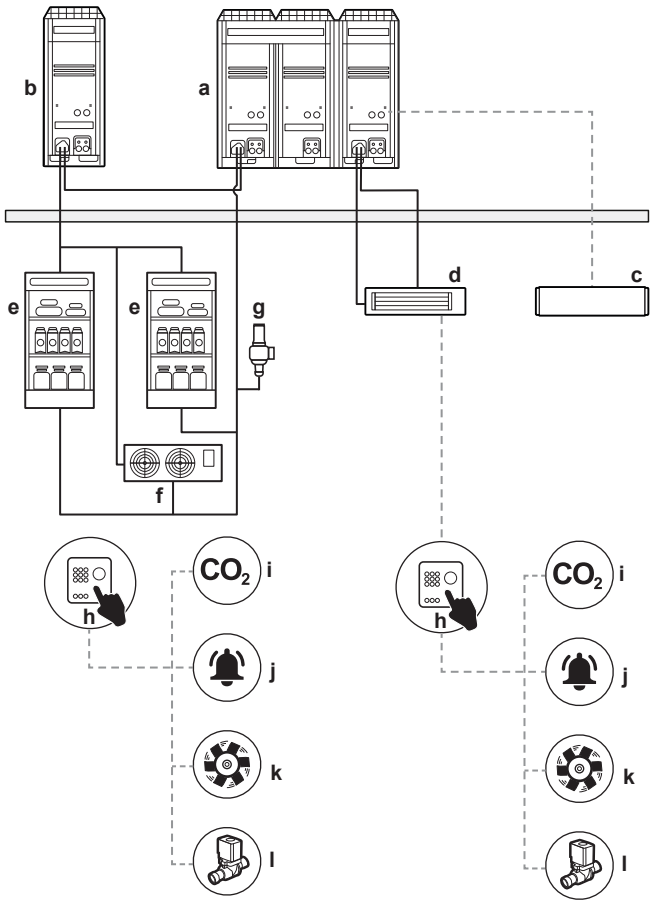
13.3 System layout

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 "13.4.1 Possible combinations of indoor units" [▶ 53].



a Main outdoor unit (LRYEN10*)
b Capacity up unit (LRNUN5*)
c Communication box (BRR9B1V1)
d Indoor unit for air conditioning (field supply)
e Indoor unit for refrigeration (showcase) (field supply)
f Indoor unit for refrigeration (blower coil) (field supply)
g Safety valve (field supply)
h CO_2 control panel (field supply)
i CO_2 detector (field supply)
j CO_2 alarm (field supply)
k CO_2 ventilator (field supply)
l Shut off valve (field supply)

13.4 Combining units and options

INFORMATION

Certain options may NOT be available in your country.

13.4.1 Possible combinations of indoor units

The following indoor units can be combined with the outdoor unit.

Indoor unit	Outdoor unit
	LRYEN10*
FXSN*A	O
FXFN*A	O

13.4.2 Possible options for the outdoor unit

INFORMATION

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

Refrigerant T-joints

	Allowed	Not allowed
Refrigerant unit	T-joints[(a)]	Refnet joints and headers (branch kits)
Air conditioning unit	T-joints[(a)]	Refnet joints and headers (branch kits)

[(a)] Field supply

Communication box (BRR9B1V1)

Install the modbus communication box to fully integrate your system with building control automation networks and other monitoring systems.

13.5 Indoor unit constraints

WARNING

ONLY the refrigeration parts that are also designed to work with R744 (CO_2) shall be connected to the system.

NOTICE

The design pressure of high pressure side of the connected refrigeration parts MUST be 9 MPaG (90 bar gauge).

NOTICE

If the design pressure of the gas piping of refrigeration parts is different from 90 bar gauge (for example: 6 MPaG (60 bar gauge)), a safety valve MUST be installed on the field piping according to this design pressure. It is NOT possible to connect refrigeration parts with design pressure below 60 bar gauge.

NOTICE

The design pressure of the connected air conditioning parts MUST be 12 MPaG (120 bar gauge). If this is not the case, please contact your dealer for assistance.

13.5.1 Constraints for air conditioning

Individual control with a remote controller

In case of a system with several air conditioners that are controlled with the same remote controller in the same space:

Capacity class	Individual control with a remote controller
50	NOT allowed
71+112	Allowed

Restrictions

Keep the following restrictions in mind when you connect indoor units:

Restriction	Minimum/maximum
Minimum air conditioning total capacity class	162
Maximum air conditioning total capacity class	233
Maximum indoor units that can be connected	≤4

For more information about the possible combinations, see "13.4 Combining units and options" [▸ 53].

13.5.2 Constraints for refrigeration

Keep the following restrictions in mind when you connect showcases and blower coils:

- Indoor unit restrictions:

Temperature	Total internal volume of indoor units
Medium temperature	≤85 l

Temperature	Minimum deliverable stable capacity (compressor off hysterises included)
Medium temperature	4.3 kW

- Refrigeration total capacity:

Refrigeration total capacity	Minimum	Maximum
Outdoor unit	8.7 kW (60%)	14.5 kW (100%)
Outdoor unit + capacity up unit	12.6 kW (60%)	21.0 kW (100%)

Low load for refrigeration

For the outdoor unit, a lower connection ratio (5.8~8.7 kW (40~60%)) is allowed when the following restrictions are applied:

Restriction	Usage range or value
Target evaporating temperature (refrigeration)	–20°C~–10°C
Lower limit of outdoor temperature	–15°C
Main piping size for all piping from outdoor unit to first branch (refrigeration side)	Ø9.5 mm (liquid side) Ø12.7 mm (gas side)
Maximum piping length	50 m
Maximum height difference outdoor unit above indoor unit	5 m
Maximum height difference outdoor unit below indoor unit	10 m

Restriction	Usage range or value
Defrosting of refrigeration side	Simultaneous defrost
Field setting components	See "DIP switches" [▶ 128]

14 Unit installation

WARNING

- Make sure to install all necessary countermeasures in case of refrigerant leakage according to standard EN378 (see "14.1.3 Additional installation site requirements for CO_2 refrigerant" [▶ 62]).
- Make sure to install a CO_2 leak detector (field supply) in every room with refrigerant piping, air conditioning units, showcases or blower coils, and enable the function for refrigerant leak detection (see the installation manual of the indoor units).

WARNING

Fix the unit correctly. For instructions, see "14 Unit installation" [▶ 57].

NOTICE

Adverse effects shall be considered. For example, danger of water collecting and freezing in discharge pipes for pressure relief devices, accumulation of dirt and debris, or blockage of the discharge pipes by solid CO_2 (R744).

INFORMATION

The installer is responsible for supplying the field supply components.

NOTICE

When indoor installation of the outdoor unit is required, for example in a technical room, the following requirements MUST be met:

- Air ducts MUST be installed to guide the unit's exhaust air outside.
- Every exhaust air fan in the unit MUST have an individual airflow path. Make sure no mixture/recirculation of airflow occurs.
- The pressure loss on the air ducts may NOT exceed the maximum static pressure value ensured by the High External Static Pressure (ESP) setting (78.40 Pa):

  - If the ESP, over duct work, is lower than or equal to 30.00 Pa, no High ESP setting activation is required.

  - If the ESP, over duct work, is higher than 30.00 Pa, the High ESP setting MUST be activated (see the service manual).
- Ensure an adequate ventilation of the technical area where the units are going to be installed, with façade air openings to allow fresh air compensation.
- For more information about the indoor installation of the outdoor unit, contact your local dealer.

In this chapter

14.1 Preparing the installation site

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.

14.1.1 Installation site requirements of the outdoor unit

CAUTION

Appliance NOT accessible to the general public, install it in a secured area, protected from easy access.

The equipment meets the requirements for commercial and light-industrial locations when professionally installed and maintained.

CAUTION

This equipment is NOT intended for use in residential locations and will NOT guarantee to provide adequate protection to radio reception in such locations.

NOTICE

If the equipment is installed closer than 30 m to a residential location, the professional installer MUST evaluate the EMC situation before installation.

NOTICE

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

INFORMATION

The sound pressure level is less than 70 dBA.

INFORMATION

Also read the following requirements:

- General installation site requirements. See "2 General safety precautions" [▶ 6].
- Service space requirements. See "25 Technical data" [▶ 149].
- Refrigerant piping requirements (length, height difference). See "15.1.1 Refrigerant piping requirements" [▶ 72].

Choosing an appropriate site

- When installing, take strong winds, typhoons or earthquakes into account, improper installation may result in the unit turning over.
- Make sure the installation site withstands the weight and vibration of the unit.
- Make sure the unit is level.
- Provide sufficient space around the unit for servicing and air circulation. See "25.1 Service space: Outdoor unit" [▶ 149].

- 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).

Refrigerant and ventilation

CAUTION

Excessive concentrations of refrigerant R744 (CO_2) in a closed room can lead to unconsciousness and oxygen deficiency. Take appropriate measures.

See "To determine the minimum number of appropriate measures" [▸ 64].

- When installing the unit in a small room, take measures in order to keep the refrigerant concentration from exceeding allowable safety limits in the event of a refrigerant leak.

  See "14.1.3 Additional installation site requirements for CO_2 refrigerant" [▸ 62].

- Make sure the area is well ventilated. Do NOT block any ventilation openings.

Water

- 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.
- 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.

Wind

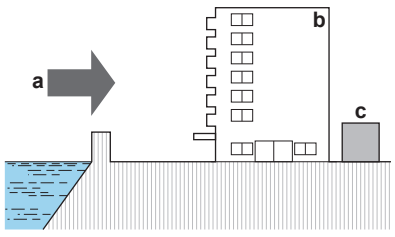
- Be sure that the air inlet of the unit is not positioned towards the main wind direction. Frontal wind will disturb the operation of the unit. If necessary, use a screen to block the wind.

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

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.

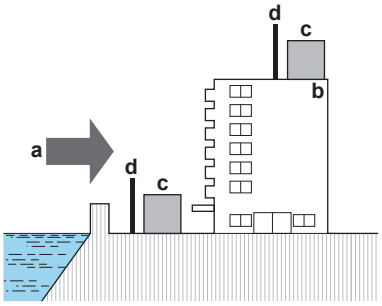
Example: Behind the building.



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

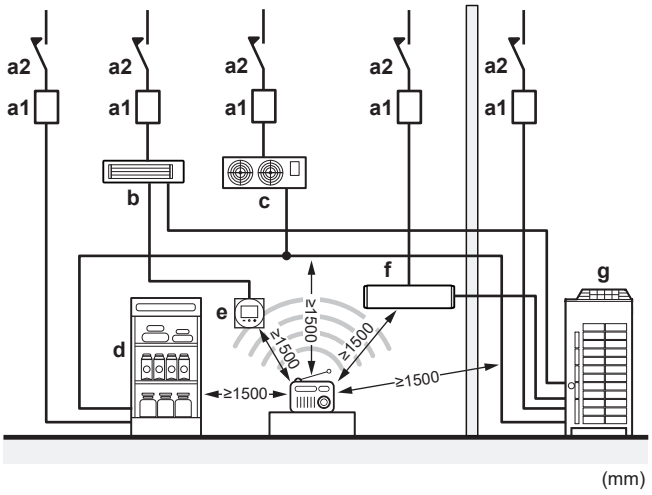
Sound, electronic noise and electromagnetic disturbance

- Select the location of the unit in such a way that the sound generated by the unit does not disturb anyone, and the location is selected according 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.



(mm)

a1 Overcurrent fuse
a2 Earth leakage circuit breaker
b AC fan
c Blower coil
d Showcase
e User interface
f Communication box
g Outdoor unit and capacity up 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.

Piping

- All piping lengths and distances have been taken into consideration (see "15.1.3 Refrigerant piping length and height difference" [▸ 74]).

To avoid

Do NOT install the unit in the following places:

- 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.

- 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.

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

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

NOTICE

When operating the unit in a low outdoor ambient temperature, be sure to follow the instructions described below.

To prevent exposure to wind and snow, install a baffle plate on the air side of the outdoor unit.

In heavy snowfall areas it is very important to select an installation site where the snow will NOT affect the unit. If lateral snowfall is possible, make sure that the heat exchanger coil is NOT affected by the snow. If necessary, install a snow cover or shed and a pedestal.

INFORMATION

For instructions on how to install the snow cover, contact your dealer.

NOTICE

When installing the snow cover, do NOT obstruct the air flow of the unit.

14.1.3 Additional installation site requirements for CO_2 refrigerant

NOTICE

Although it is recommended to install LRYEN10* and LRNUN5* outdoors, in some cases it might be needed to install them inside. In such cases, ALWAYS follow the indoor installation site requirements for CO_2 refrigerant.

WARNING

In case of mechanical ventilation, take care the ventilated air is exhausted to the outdoor space and NOT into another closed area.

Refrigerant basic characteristics	
Refrigerant	R744
RCL (refrigerant concentration limit)	0.072 kg/m^3
QLMV (quantity limit with minimum ventilation)	0.074 kg/m^3
QLAV (quantity limit with additional ventilation)	0.18 kg/m^3
Toxicity limit	0.1 kg/m^3
Safety class	A1

Allowable refrigerant charge

The calculation of the allowable refrigerant charge depends on the combination of the "access category" and the "location classification" as described in the following table.

INFORMATION

Where the possibility exists of more than one access category, the more stringent requirements apply. If occupied spaces are isolated, e.g. by sealed partitions, floors and ceilings, the requirements of the individual access category apply.

<table>
<tr><th colspan="2" rowspan="2">Access category</th><th colspan="4">Location classification</th></tr>
<tr><th>I</th><th>II</th><th>III</th><th>IV</th></tr>
<tr><td colspan="2">General</td><td colspan="2">Toxicity limit × Room volume
or
"Appropriate measures" [▸ 63]</td><td rowspan="7">No charge restriction</td><td rowspan="7">The charge shall be assessed according to location I, II or III, depending on the location of the ventilated enclosure</td></tr>
<tr><td rowspan="3">Supervised</td><td>Upper floors without emergency exits</td><td rowspan="2">Toxicity limit × Room volume
or
"Appropriate measures" [▸ 63]</td><td rowspan="6">No charge restriction</td></tr>
<tr><td>Below ground floor level</td></tr>
<tr><td>Other</td><td>No charge restriction</td></tr>
<tr><td rowspan="3">Authorized</td><td>Upper floors without emergency exits</td><td rowspan="2">Toxicity limit × Room volume
or
"Appropriate measures" [▸ 63]</td></tr>
<tr><td>Below ground floor level</td></tr>
<tr><td>Other</td><td>No charge restriction</td></tr>
</table>

14–1 Description of access categories

Access category	Description	Examples
General access	Rooms, parts of buildings, buildings where: ▪ sleeping facilities are provided; ▪ people are restricted in their movements; ▪ an uncontrolled number of people are present; ▪ any person has access without being personally acquainted with the necessary safety precautions.	Hospitals, courts or prisons, theatres, supermarkets, schools, lecture halls, public transport terminals, hotels, restaurants.
Supervised access	Rooms, parts of buildings, buildings where only a limited number of people may be assembled, some being necessarily acquainted with the general safety precautions of the location.	Business or professional offices, laboratories, places for general manufacturing and where people work.
Authorized access	Rooms, parts of buildings, buildings where only authorized persons have access, who are acquainted with general and special safety precautions of the location and where manufacturing, processing or storage of material or products take place.	Manufacturing facilities, e.g. for chemicals, food, beverage, ice, ice cream, refineries, cold stores, dairies, abattoirs, non-public areas in supermarkets.

14–2 Description of location classification

Location classification		Description
Class I	Mechanical equipment located within the occupied space	If the refrigerating system or refrigerant-containing parts are located in the occupied space, the system is considered to be of class I, unless the system complies with the requirements of class II.
Class II	Compressors in machinery room or open air	If all compressors and pressure vessels are either located in a machinery room or in the open air, the requirements for a class II location shall apply, unless the system complies with the requirements of class III. Coils and pipework including valves may be located in an occupied space.
Class III	Machinery room or open air	If all refrigerant-containing parts are located in a machinery room or in the open air, the requirements for a class III location shall apply. The machinery room shall fulfil the requirements of EN 378-3.
Class IV	Ventilated enclosure	If all refrigerant-containing parts are located in a ventilated enclosure, the requirements for a class IV location shall apply. The ventilated enclosure shall fulfil the requirements of EN 378-2 and EN 378-3.

Appropriate measures

INFORMATION

Appropriate measures are field supply. Choose and install all required appropriate measures in accordance with EN 378-3:2016.

- (natural or mechanical) ventilation

- safety shut-off valves
- safety alarm, in combination with a CO_2 refrigerant leak detector (a safety alarm alone is NOT considered an appropriate measure where occupants are restricted in their movements)
- CO_2 refrigerant leak detector

WARNING

Install the unit ONLY in locations where the doors of the occupied space are NOT tight fitting.

WARNING

When using safety shut-off valves, make sure to install measures such as a bypassing piping with a pressure relief valve (from liquid pipe to gas pipe). When the safety shut-off valves close and no measures are installed, increased pressure may damage the liquid piping.

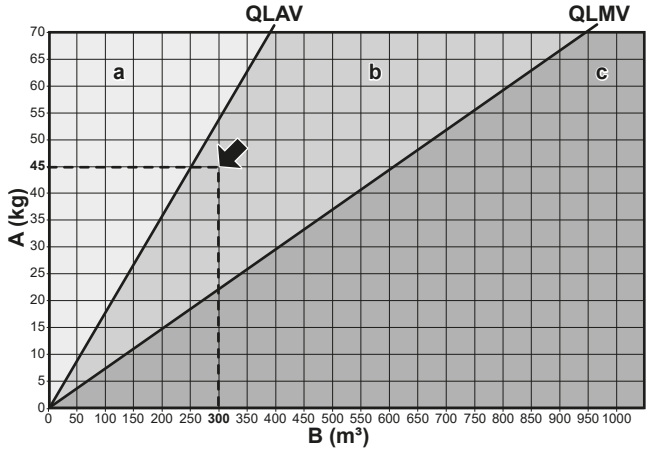
To determine the minimum number of appropriate measures

For occupancies other than on the lowest underground floor of the building

If the total refrigerant charge (kg) divided by the room volume[(a)] (m^3) is…	…the number of appropriate measures must be at least…
<QLMV	0
>QLMV and <QLAV	1
>QLAV	2

[(a)] For occupied spaces with a floor area exceeding 250 m^2, use 250 m^2 as the floor area for determination of the room volume (**Example:** even if the room area is 300 m^2 and the room height is 2.5 m, calculate the room volume as 250 m^2×2.5 m=625 m^3)

Example: Total refrigerant charge in the system is 45 kg and room volume is 300 m^3. 45/300=0.15, which is >QLMV (0.074) and <QLAV (0.18), therefore install at least 1 appropriate measure in the room.



14–1 Example graph for calculation

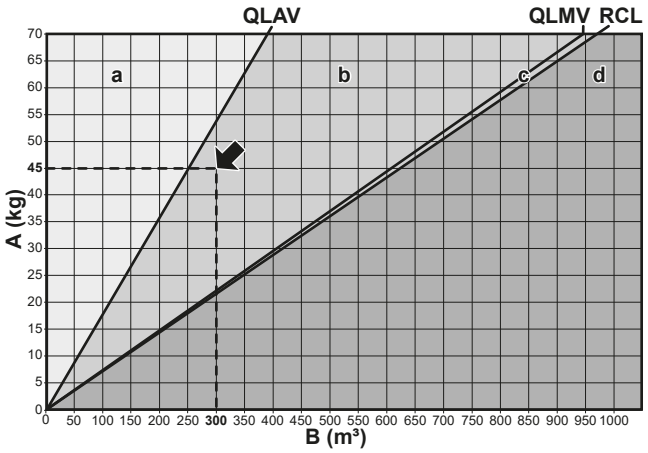
A Refrigerant charge
B Room volume
a 2 appropriate measures required
b 1 appropriate measure required
c No measure required

For occupancies on the lowest underground floor of the building

If the total refrigerant charge (kg) divided by the room volume[(a)] (m^3) is…	…the number of appropriate measures must be at least…
<RCL	0
>RCL and ≤QLMV	1
>QLMV and <QLAV	2
>QLAV	Value CANNOT be exceeded!

[(a)] For occupied spaces with a floor area exceeding 250 m^2, use 250 m^2 as the floor area for determination of the room volume (**Example:** even if the room area is 300 m^2 and the room height is 2.5 m, calculate the room volume as 250 m^2×2.5 m=625 m^3)

Example: Total refrigerant change in the system is 45 kg and room volume is 300 m^3. 45/300=0.15, which is >RCL (0.072) and <QLAV (0.18), therefore install at least 2 appropriate measures in the room.



14–2 Example graph for calculation

- **A** Refrigerant charge limit
- **B** Room volume
- **a** Installation is not allowed
- **b** 2 appropriate measures required
- **c** 1 appropriate measure required
- **d** No measure required

INFORMATION

Even if there is no refrigerating system on the lowest floor, where the largest system charge (kg) in the building divided by total volume of the lowest floor (m^3) exceed the value for QLMV, provide a mechanical ventilation in accordance with EN 378-3:2016.

Space volume calculation

Take into account following requirements for the space volume calculation:

- The space considered is any space that contains refrigerant-containing parts or into which refrigerant can be released.
- Use the room volume of the smallest, enclosed, occupied space to determine the refrigerant quantity limits.
- Multiple spaces that have appropriate openings (which cannot be closed) between the individual spaces or are connected with a common ventilation supply, return or exhaust system not containing the evaporator or the condenser shall be treated as a single space.
- Where the evaporator or condenser is located in an air supply duct system serving multiple spaces, the volume of the smallest single space shall be used.

- If the airflow to a space cannot be reduced to less than 10% of the maximum airflow using an airflow reducer, then that space shall be included in the volume of the smallest human occupied space.
- For refrigerants of safety class A1, the total volume of all the rooms cooled or heated by air from one system is used as the volume for calculation, if the air supply to each room cannot be restricted below 25% of its full supply.
- For refrigerants of safety class A1, the effect of the air changes may be considered in calculating the volume if the space has a mechanical ventilation system which will be operating during the occupation of the space.
- Where the evaporator or condenser is located in an air supply duct system and the system serves a non-partitioned multi-storey building, the occupied volume of the smallest occupied storey of the building shall be used.
- Include the space above a false ceiling or partition in the volume calculation unless the false ceiling is airtight.
- Where an indoor unit, or any related refrigerant-containing pipework, is located in a space where the total charge exceeds the allowable charge, make special provisions to ensure at least an equivalent level of safety.

14.2 Opening and closing the unit

14.2.1 About opening the units

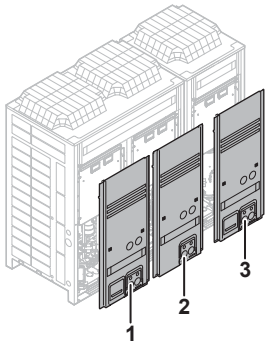
At certain times, you have to open the unit. **Example:**

- 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.

Overview front panels



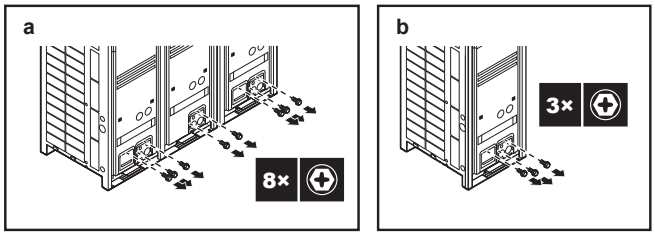
1 Front panel left
2 Front panel middle
3 Front panel right

14.2.2 To open the outdoor unit

DANGER: RISK OF ELECTROCUTION

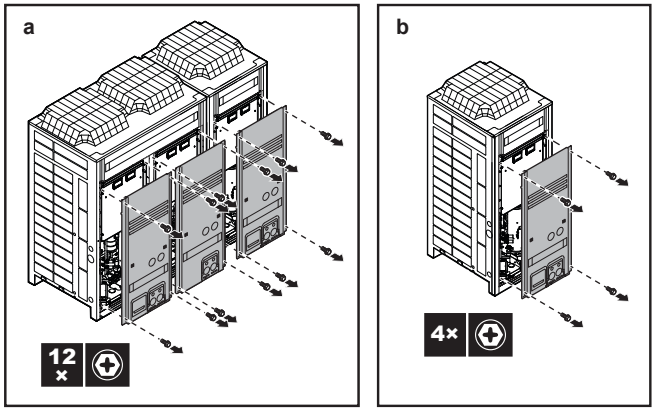
DANGER: RISK OF BURNING/SCALDING

1 Remove the screws of the small front plates.



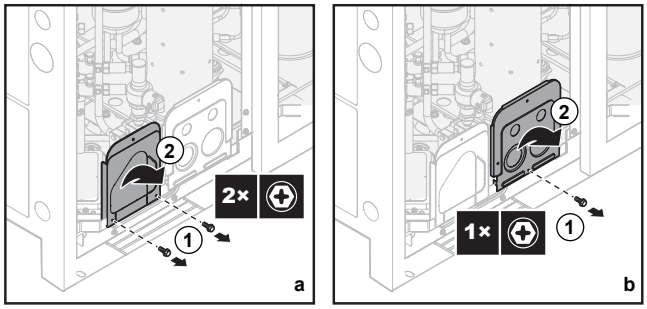
a Outdoor unit
b Capacity up unit

2 Remove the front panels.



a Outdoor unit
b Capacity up unit

3 Remove the small front plates of each removed front panel.



a (If applicable) Small front plate left
b Small front plate right

Once the front plates open, the switch box can be accessed. See "14.2.3 To open the switch box of the outdoor unit" [▸ 67].

For service purposes, the pushbuttons on the main PCB (located behind the middle front panel) need to be accessed. To access these pushbuttons, the switch box cover does not need to be opened. See "19.1.2 To access the field setting components" [▸ 127].

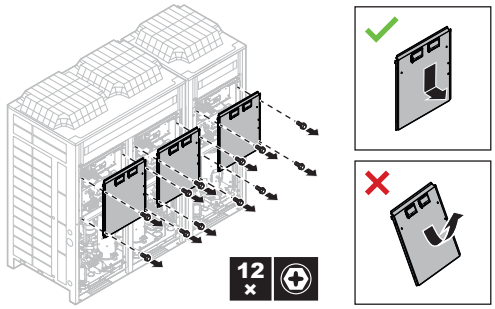
14.2.3 To open the switch box of the outdoor unit

NOTICE

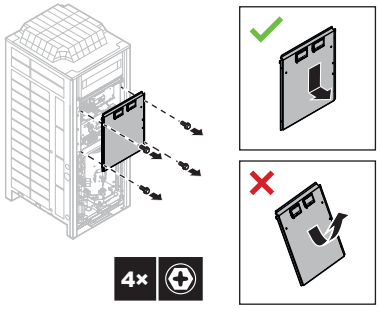
Do NOT apply excessive force when opening the switch box cover. Excessive force can deform the cover, resulting in entering of water to cause equipment failure.

Switch boxes of the outdoor unit

The switch boxes behind the left, middle and right front panel are all opened in the same way. The main switchbox is installed behind the middle panel.



Switch box of the capacity up unit

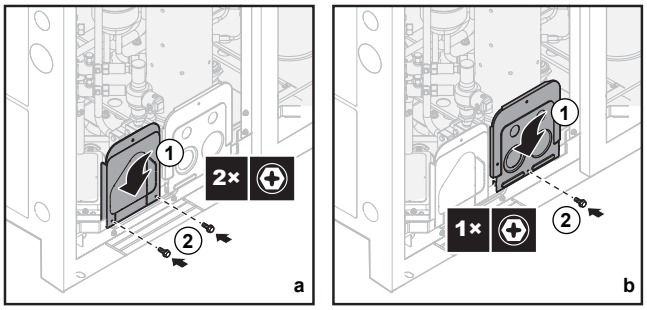


14.2.4 To close the outdoor unit

NOTICE

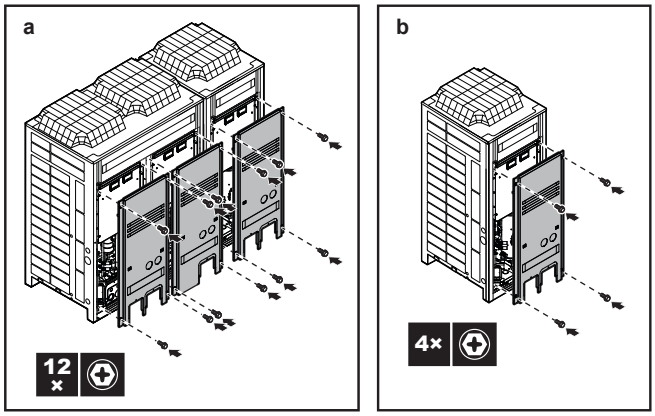
When closing the outdoor unit cover, make sure that the tightening torque does NOT exceed 3.98 N•m.

1 Reinstall the small front plates of each removed front panel.



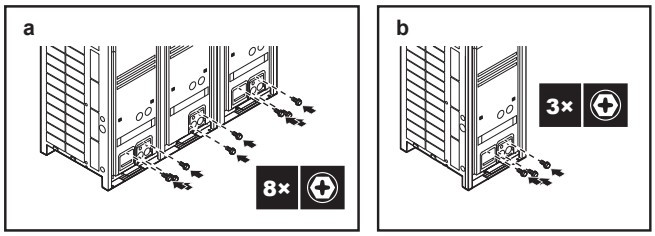
a (If applicable) Small front plate left
b Small front plate right

2 Reinstall the front panels.



a Outdoor unit
b Capacity up unit

3 Attach the small front plates to the front panels.



a Outdoor unit
b Capacity up unit

14.3 Mounting the outdoor unit

14.3.1 About mounting the outdoor unit

Typical workflow

Mounting the outdoor unit typically consists of the following stages:

1 Providing the installation structure.
2 Installing the outdoor unit.

14.3.2 Precautions when mounting the outdoor unit

INFORMATION

Also read the precautions and requirements in the following chapters:

- "2 General safety precautions" [▸ 6]
- "14.1 Preparing the installation site" [▸ 58]

14.3.3 To provide the installation structure

Make sure the unit is installed level on a sufficiently strong base to prevent vibration and noise.

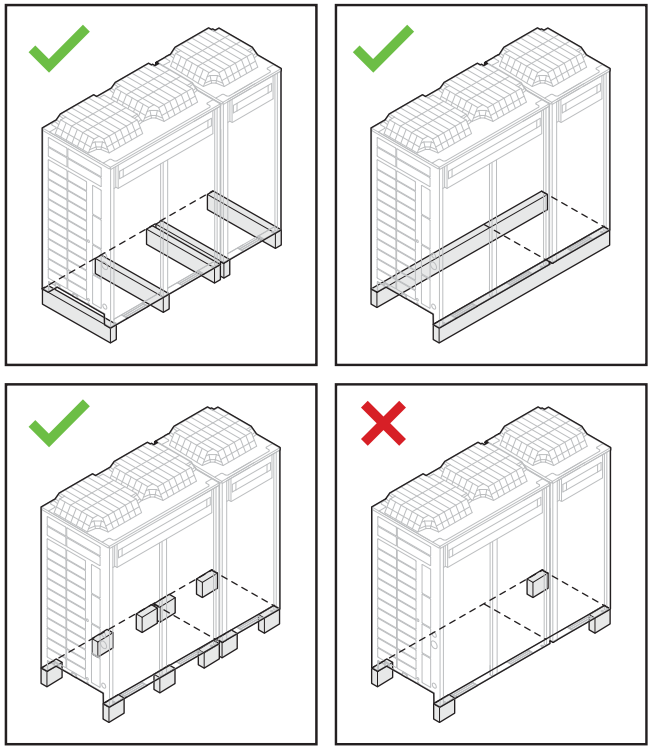
NOTICE

- When the installation height of the unit needs to be increased, do NOT use stands to only support the corners.
- Stands under the unit must be at least 100 mm wide.

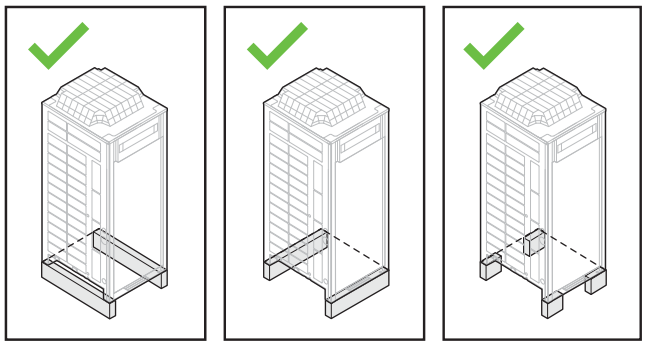
NOTICE

The height of the foundation must at least be 150 mm from the floor. In heavy snowfall areas, this height should be increased up to the average expected snow level, depending on the installation place and condition.

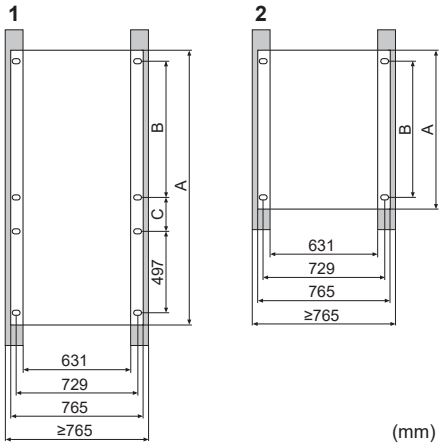
Outdoor unit



Capacity up unit



- The preferred installation is on a solid longitudinal foundation (steel beam frame or concrete). The foundation must be larger than the grey marked area.



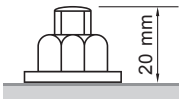
Minimum foundation
1 LRYEN10*
2 LRNUN5*

Unit	A	B	C
LRYEN10*	1940	1102	193
LRNUN5*	635	497	—

14.3.4 To install the outdoor unit

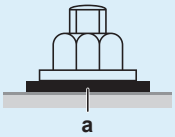
1 Position the unit onto the installation structure. See also: "12.1.3 To handle the outdoor unit" [▸ 44].

2 Fix the unit onto the installation structure. See also "14.3.3 To provide the installation structure" [▸ 69]. Fasten the unit in place using four foundation bolts M12. It is best to screw in the foundation bolts until their length remains 20 mm above the foundation surface.



NOTICE

When installed in a corrosive environment, use a nut with plastic washer (a) to protect the nut tightening part from rust.



3 Remove the slings.

4 Remove the cardboard protection.

14.3.5 To provide drainage

Make sure that condensation water can be evacuated properly.

NOTICE

Prepare a water drainage channel around the foundation to drain waste water from around the unit. When the outdoor temperatures are negative, the drained water from the outdoor unit will freeze up. If the water drainage is not taken care of, the area around the unit might be very slippery.

15 Piping installation

In this chapter

15.1 Preparing refrigerant piping

15.1.1 Refrigerant piping requirements

WARNING

The unit is partially factory charged with refrigerant R744.

NOTICE

Do NOT reuse piping from previous installations.

NOTICE

The refrigerant R744 requires strict cautions for keeping the system clean, dry and tight.

- Clean and dry: foreign materials (including mineral oils or moisture) should be prevented from getting mixed into the system.
- Tight: R744 does not contain any chlorine, does not destroy the ozone layer, and does not reduce earth's protection against harmful ultraviolet radiation. R744 can contribute to the greenhouse effect if it is released. Therefore pay special attention to check the tightness of the installation.

NOTICE

The piping and other pressure-containing parts shall be suitable for refrigerant and oil. Use K65 (or equivalent) copper-iron alloy tube system for high-pressure applications with a working pressure of 120 bar gauge at the air conditioner side and 90 bar gauge at the refrigeration side.

NOTICE

NEVER use standard hoses and manometers. Use ONLY equipment that is designed to use with R744.

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

NOTICE

If the ability to close the stop valves for field piping is wanted, the installer MUST install a pressure relief valve on the following piping:

- Outdoor unit to refrigeration indoor units: on liquid piping
- Outdoor unit to air conditioning indoor units: on liquid piping AND gas piping

INFORMATION

Also read the precautions and requirements in the "2 General safety precautions" [▸ 6].

15.1.2 Refrigerant piping material

Piping material

K65 and equivalent piping. For the maximum system operation pressure in field piping, refer to "6.3 Field piping pressure" [▸ 31].

Piping temper grade and thickness

Piping refrigeration unit

	Outer diameter (Ø)	Temper grade	Thickness (t) [a]	Design pressure	
Liquid piping	12.7 mm (1/2")	R300	0.85 mm	120 bar gauge	
Gas piping	15.9 mm (5/8")	R300	1.05 mm	120 bar gauge	

[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.

Piping air conditioning unit

	Outer diameter (Ø)	Temper grade	Thickness (t)[a]	Design pressure	
Liquid piping	15.9 mm (5/8")	R300	1.05 mm	120 bar gauge	
Gas piping	19.1 mm (3/4")	R300	1.30 mm	120 bar gauge	

[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.

15.1.3 Refrigerant piping length and height difference

Requirements and limits

The piping lengths and height differences must comply with the following requirements. For an example, see "15.1.4 To select the piping size" [▸ 76].

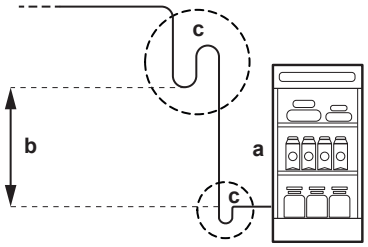
Requirement		Limit	
		LRYEN10*	LRYEN10* + LRNUN5*
Maximum piping length ▪ Example refrigeration side: - A+B+C+D+(E or F)[a]≤Limit - a+c+d+(e or f)[a]≤Limit ▪ Example air conditioner side: - A2+B2+(C2 or D2)[a]≤Limit - a2+b2+(c2 or d2)[a]≤Limit		Refrigeration side: 130 m[b] Air conditioning side: 130 m	
Piping length between LRYEN10* **and** LRNUN5*		Not specified, but piping must be horizontal	
Maximum branch piping length ▪ Example refrigeration side: - C+D+(E or F)[a] - c+d+(e or f)[a] - C+G - c+g - J - j ▪ Example air conditioner side: - B2+(C2 or D2)[a] - b2+(c2 or d2)[a] - E2 - e2		Refrigeration side: 50 m Air conditioning side: 30 m	
Maximum total equivalent piping length Example refrigeration side: A+B+C+D+E+F+G+J≤Limit		Refrigeration side: 180 m	
Maximum height difference between outdoor unit and indoor unit[b]	Outdoor higher than indoor Example: H2, H4≤Limit	35 m[c]	
	Outdoor unit lower than indoor unit Example: H2, H4≤Limit	10 m	

Requirement	Limit	
	LRYEN10*	LRYEN10* + LRNUN5*
Maximum height difference between blower coil and showcase ▪ Example: H3≤Limit	5 m	
Maximum height difference between air conditioners ▪ Example: H1≤Limit	0.5 m	

[a] Whichever is longer
[b] For low load restrictions, see "13.5.2 Constraints for refrigeration" [▶ 55].
[c] You may have to install an oil trap. See "To install an oil trap" [▶ 75].

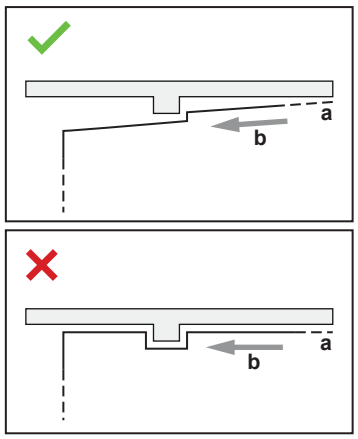
To install an oil trap

If the outdoor unit is installed higher than the refrigeration indoor unit, install an oil trap in the gas piping every 5 meter. Oil traps will make the oil return more easily.



a Showcase
b Height difference=5 m
c Trap

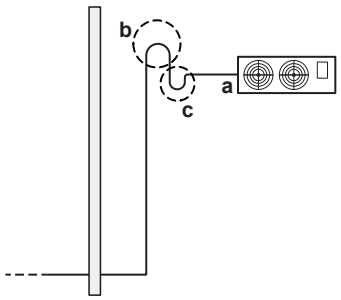
The refrigerant suction piping must always run down:



a Refrigeration indoor unit
b Flow direction in refrigerant suction piping

To install riser piping

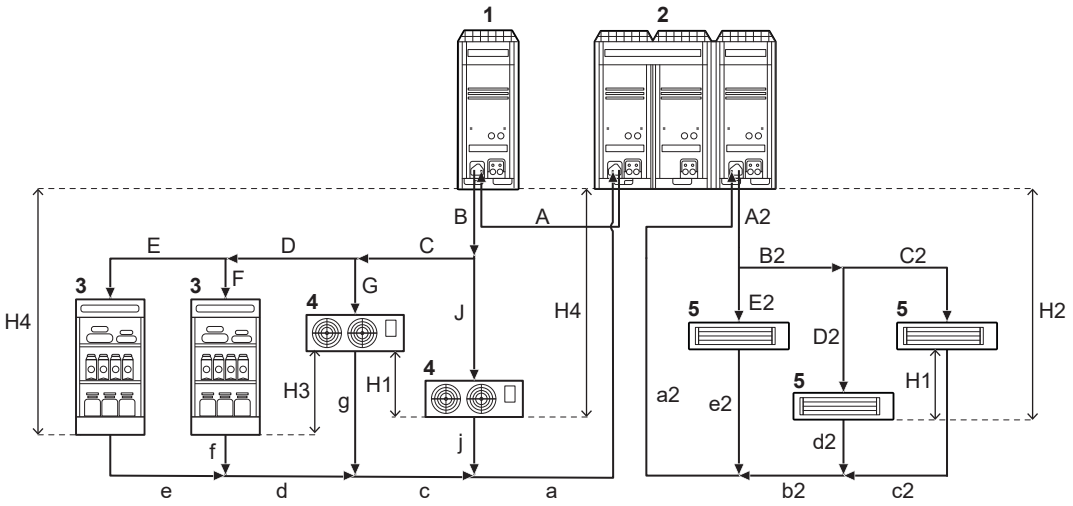
If the outdoor unit is installed lower than the refrigeration indoor unit, install riser piping close to the indoor unit. When the compressor of the outdoor unit starts, correctly installed riser piping will prevent liquid from flowing back to the outdoor unit.



a Refrigeration indoor unit
b Riser piping close to the indoor unit (gas pipe)
c Oil trap

15.1.4 To select the piping size

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



1 Capacity up unit (LRNUN5*)
2 Outdoor unit (LRYEN10*)
3 Indoor unit (showcase)
4 Indoor unit (blower coil)
5 Indoor unit (air conditioning)
A~J Liquid piping (side showcases and blower coils)
A2~E2 Liquid piping (side air conditioning)
a~g Gas piping (side showcases and blower coils)
a2~e2 Gas piping (side air conditioning)
H1~H4 Height difference

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 the following chapters:
  - For outdoor unit without capacity up unit: "17.4 To determine additional refrigerant amount" [▸ 122].
  - For outdoor unit with capacity up unit: see "17.4 To determine additional refrigerant amount" [▸ 122] but additional refrigerant is not needed because the capacity up unit is already precharged.

Piping size between outdoor unit and first branch

System side	Piping outer diameter size (mm)[a] K65	
	Liquid side	Gas side
Refrigeration	Ø12.7×t0.85[b]	Ø15.9×t1.05[b]
Air conditioner	Ø15.9×t1.05	Ø19.1×t1.30

[a] For refrigeration piping (A, B, a) and for air conditioner piping (A2, a2)
[b] For low load restrictions, see "13.5.2 Constraints for refrigeration" [▶ 55].

Piping size between branching areas or between first and second branch

Indoor unit capacity index (kW)	Piping outer diameter size (mm)	Piping material
Refrigeration side: liquid pipe[a]		
x≤10.0	Ø9.5×t0.65	K65 and equivalent piping
10.0<x	Ø12.7×t0.85	K65 and equivalent piping
Refrigeration side: gas pipe[a]		
x≤6.5	Ø9.5×t0.65	K65 and equivalent piping
6.5<x≤14.0	Ø12.7×t0.85	K65 and equivalent piping
14.0<x	Ø15.9×t1.03	K65 and equivalent piping
Air conditioner side: liquid pipe[b]		
—	Ø12.7×t0.85	K65 and equivalent piping
Air conditioner side: gas pipe[b]		
—	Ø15.9×t1.05	K65 and equivalent piping

[a] Piping between branching areas (C, D, c, d)
[b] Piping from first branch to second branch (B2, b2)

Piping size from branch to indoor unit

Piping outer diameter size (mm)	
Gas pipe	Liquid pipe
Refrigeration side[a]	
Same size as C, D, c, d. If piping sizes of the indoor units are different, connect a reducer close to the indoor unit to align piping sizes.	
Air conditioner side[b]	
Ø12.7×t0.85 (K65 and equivalent)	Ø9.5×t0.65 (K65 and equivalent)

[a] Piping from branch to indoor unit (E, F, G, J, e, f, g, j)
[b] Piping from branch to indoor unit (C2, D2, E2; c2; d2; e2)

Piping size of spun pipes with stop valves

	Liquid side	Gas side
Refrigeration side[a]	Ø15.9	Ø19.1
Air conditioner side[a]	Ø15.9	Ø15.9

[a] Reducers (field supply) may be required to connect the piping.

15.1.5 To select refrigerant branch kits

Always use K65 T-joints with a suitable design pressure for refrigerant branching.

15.1.6 To select expansion valves for refrigeration

The system controls liquid temperature and liquid pressure. Select the expansion valves as indicated according to nominal conditions and design pressure.

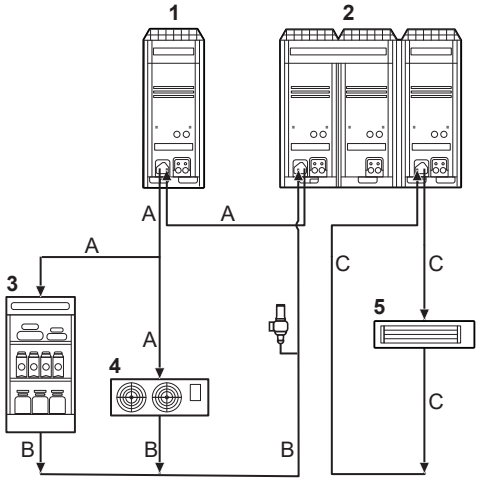
Nominal conditions

The following nominal conditions are valid for the liquid piping at the outlet of the outdoor unit. They are based on an ambient temperature of 32°C and an evaporate temperature of –10°C.

If showcases or blower coils are connected directly	
Liquid temperature	23°C
Liquid pressure	6.8 MPaG
Refrigerant condition	Subcooled liquid
If capacity up unit is connected between outdoor unit and showcases or blower coils	
Liquid temperature (at outlet of capacity up unit)	3°C
Liquid pressure (at outlet of capacity up unit)	6.8 MPaG
Refrigerant condition (at outlet of capacity up unit)	Subcooled liquid

Design pressure

Make sure all parts comply to the following design pressure:



A Liquid piping (refrigeration side): 90 bar gauge
B Gas piping (refrigeration side): depends on design pressure of showcase and blower coil. For example, 60 bar gauge
C Gas and liquid piping (air conditioning side): 120 bar gauge
1 Capacity up unit (LRNUN5*)
2 Outdoor unit (LRYEN10*)
3 Indoor unit (showcase)
4 Indoor unit (blower coil)
5 Indoor unit (air conditioning)

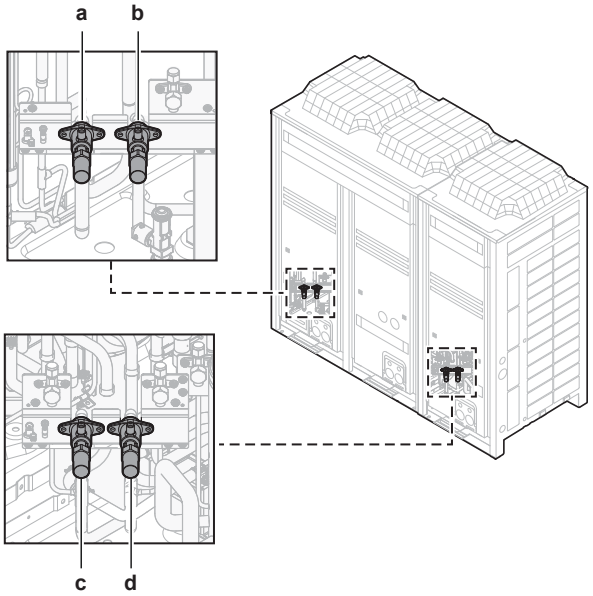
15.2 Using stop valves and service ports

For more information about the card on the unit, see "Card about stop valves and service ports" [▸ 50].

WARNING

When stop valves are closed during service, the pressure of the closed circuit will increase due to high ambient temperature. Make sure the pressure is kept below the design pressure.

15.2.1 Overview stop valves for refrigeration and air-conditioner



a Gas side stop valve for refrigeration
b Liquid side stop valve for refrigeration
c Gas side stop valve for air conditioner
d Liquid side stop valve for air conditioner

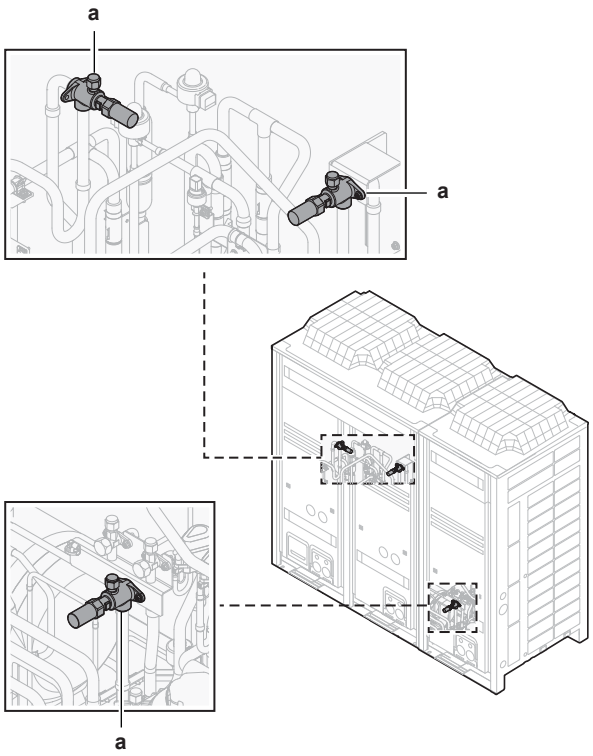
15.2.2 Overview stop valves for maintenance

NOTICE

Operate these stop valves ONLY during maintenance. During normal operation they are open. Be aware that if you close these stop valves during maintenance, you close the circuit of the liquid receiver and pressure might increase. The set pressure of the liquid receiver safety valve is set to 90 bar gauge ±3% or 86 bar gauge ±3%, depending on the safety valve present in your unit. Closing these maintenance stop valves might activate the safety valve. Note that you can check the set pressure of the liquid receiver safety valve on the safety valve body.

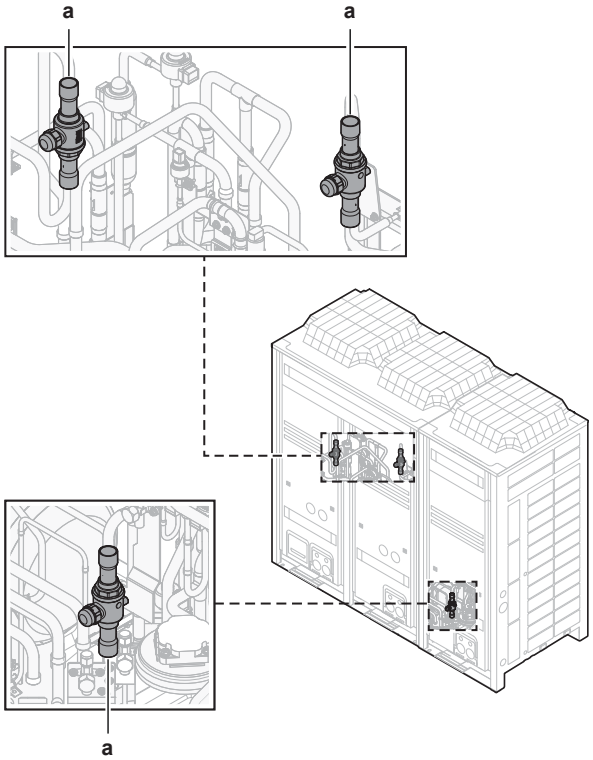
ALWAYS and REGULARLY check the pressure in the circuit and prevent that the safety valve is activated.

Units till serial number 3999999



a Stop valve for maintenance

Units from serial number 4000000



a Stop valve for maintenance

INFORMATION

Serial number, see MFG.NO on the nameplate of the unit.

15.2.3 To handle the stop valve

Take the following guidelines into account:

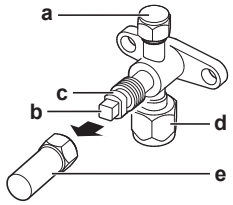
- The gas and liquid stop valves are factory closed.
- Make sure to keep all stop valves open during operation.
- Do NOT apply excessive force to the stop valve. Doing so may break the valve body.

Parts of the stop valve

The unit is delivered with one of the following types of stop valves:

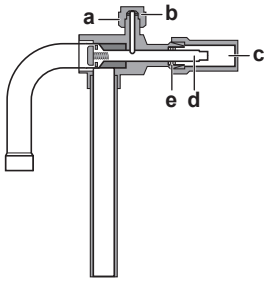
- Screw stop valve
- Ball stop valve

Screw stop valve



15–1 Screw stop valve: overview parts

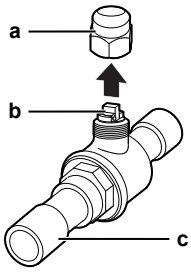
a Service port and service port cover
b Stop valve
c Stop valve lock
d Field piping connection
e Stop valve cover



15–2 Screw stop valve: intersection

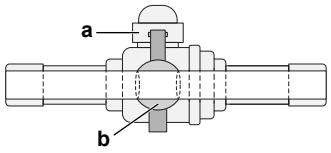
a Service port
b Flare gasket of service port
c Stop valve cover
d Stop valve shaft
e Valve seat

Ball stop valve



15–3 Ball stop valve: overview parts

a Stop valve cap
b Stop valve
c Field piping connection



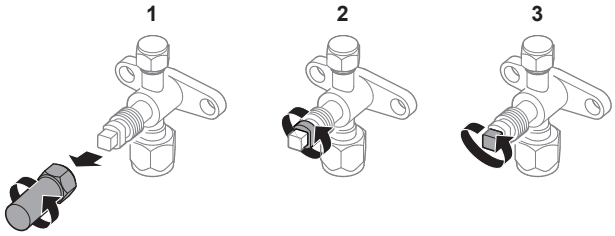
15–4 Ball stop valve: intersection

a Stop valve cap
b Ball + stem and handle

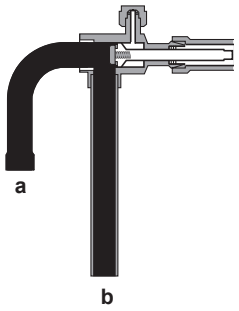
To open the stop valve

Screw stop valve

1. Remove the valve cap with 2 spanners.
2. Loosen the packing holder by rotating counterclockwise from 1/8 to 1/2 turn.
3. Turn the valve stem counterclockwise until it stops.



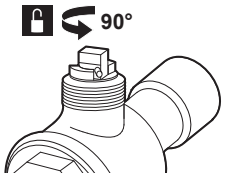
Result: The valve is fully open (connected between outdoor unit and indoor unit):



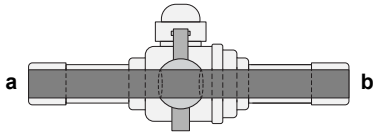
a To outdoor unit
b To indoor unit

Ball stop valve

1. Remove the valve cap.
2. Turn counterclockwise to open the valve.



Result: The valve is fully open:



a To outdoor unit
b To indoor unit

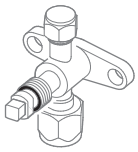
To close the stop valve

Screw stop valve

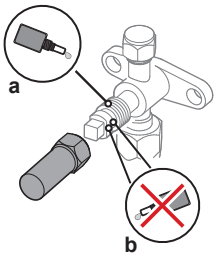
1 Turn the valve stem clockwise until it stops. Tighten with the appropriate tightening torque.

2 Tighten the packing holder.

3 Before mounting the valve cap, insert a new copper packing.



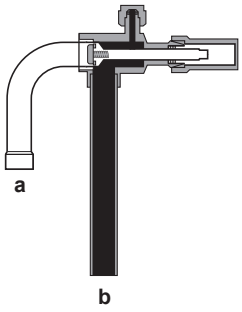
4 Apply screw lock agent or silicon sealant to the screw thread when mounting the valve cap. If not, moisture and condensing water may penetrate and freeze between the screw thread. As a result, refrigerant may leak and the valve cap may break.



a Apply screw lock agent
b Do NOT apply screw lock agent

5 Tighten the valve cap.

Result: The valve is fully closed (connected between charge port and indoor unit side):



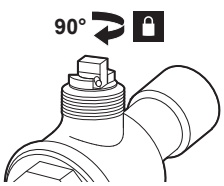
a To outdoor unit
b To indoor unit

Also see "15.2.4 Tightening torques" [▸ 84].

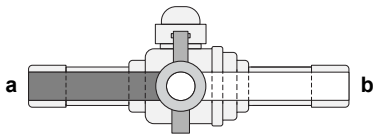
Ball stop valve

1 Turn clockwise to close the valve.

2 Screw the valve cap onto the valve.



Result: The valve is fully closed:



a To outdoor unit
b To indoor unit

15.2.4 Tightening torques

Screw stop valve

Stop valve size (mm)	Tightening torque (N•m) (turn clockwise to close)			
	Shaft			
	Valve cap	Packing pressure	Valve stem	Valve core cap
Ø15.9	38.2~46.6	7.4~9.0	13.2~16.0	14.2~17.2
Ø19.1				

Ball stop valve

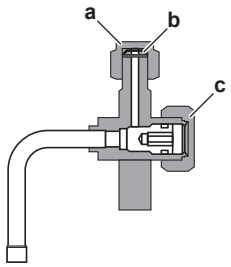
Stop valve size (mm)	Tightening torque (N•m) (turn clockwise to close)
	Shaft – valve cap
Ø22.2	50~55

15.2.5 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.
- All service ports are of the backseat type and do not have a valve core.
- After handling the service port, make sure to tighten the service port cap and the valve cap securely.
- Check for refrigerant leaks after tightening the service port cap and the valve cap.

Parts of the service port

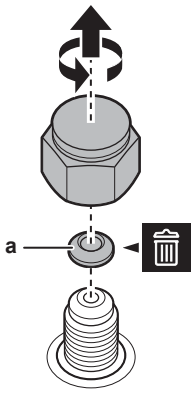
The figure below shows the name of each part required in handling service ports.



a Service port cap
b Copper packing
c Valve cap

To open the service port

1 Remove the service port cap with 2 spanners and remove the copper packing.



a Copper packing

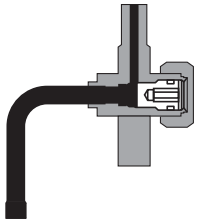
2 Connect the charge port to the service port.

3 Remove the valve cap with 2 spanners.

4 Insert a hexagonal wrench (4 mm).

5 Rotate the hexagonal wrench counterclockwise until the end.

Result: The service port is fully open.



To close the service port

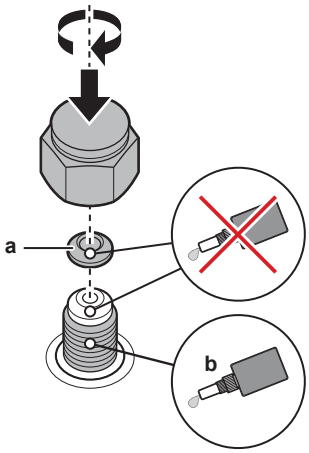
1 Insert a hexagonal wrench (4 mm).

2 Rotate the hexagonal wrench clockwise until the end.

3 Tighten the valve cap with 2 spanners. Apply screw lock agent or silicon sealant when tightening.

4 Add a new copper packing.

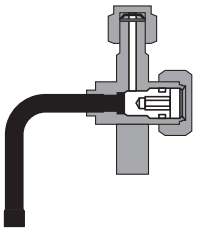
5 Apply screw lock agent or silicon sealant to the screw thread when mounting the service port cap. Without it, moisture and condensing water may penetrate and freeze between the screw thread. As a result, refrigerant may leak and the service port cap may break.



a New copper packing
b Screw lock agent or silicon sealant only on screw thread

6 Tighten the service port cap with 2 spanners.

Result: The service port is fully closed.



15.3 Connecting the refrigerant piping

15.3.1 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 refrigerant T-joints
- 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 connections
  - Flaring pipe ends
  - Brazing
  - Using the stop valves

15.3.2 Precautions when connecting the refrigerant piping

INFORMATION

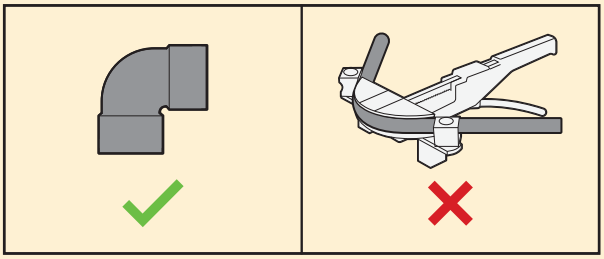
Also read the precautions and requirements in the following chapters:

- "2 General safety precautions" [▶ 6]
- "15.1 Preparing refrigerant piping" [▶ 72]

DANGER: RISK OF BURNING/SCALDING

CAUTION

NEVER bend high pressure piping! Bending can reduce the pipe thickness and thus weaken the piping. ALWAYS use K65 fittings.



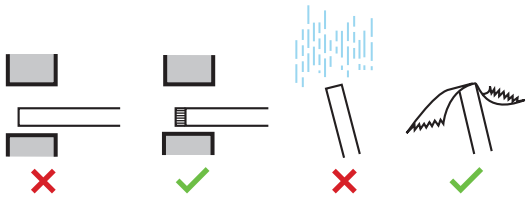
NOTICE

Take adequate measures to prevent misuse of the piping. Some examples of misuse of the piping: climbing on the piping, using the piping as storage, hanging tools on the piping.

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 R744 (CO_2) when adding refrigerant.
- Only use installation tools (e.g. manifold gauge set) that are exclusively used for R744 (CO_2) installations to withstand the pressure and to prevent foreign materials (e.g. mineral oils and moisture) from entering the system.
- Do NOT leave pipes unattended at the site. If you will finish the work in less than 1 month, tape the pipe ends or pinch the pipe (see figure below). Pipes that are installed outdoors must be pinched, regardless of the duration of the works.
- Use caution when passing copper tubes through walls (see figure below).



NOTICE

Enclose or protect refrigerant piping to avoid damage.

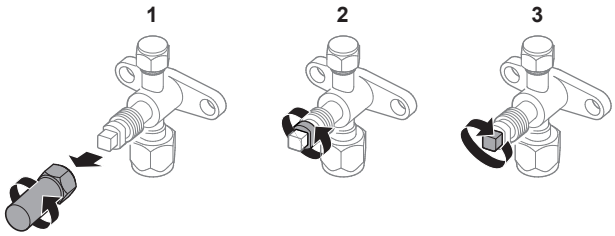
15.3.3 To cut off the spun pipes

WARNING

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

If these instructions are NOT followed correctly it may result in property damage or personal injury, which may be serious depending on the circumstances.

1 Open the stop valve cap, unlock the valve and check if the valve is closed.

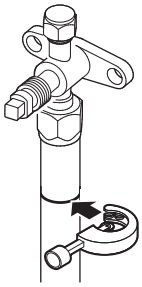


1 Remove the valve cap with 2 spanners (counterclockwise).
2 Loosen the packing holder by rotating counterclockwise from 1/8 to 1/2 turn.
3 Close the valve (clockwise).

2 Open the service port cap slowly and check that there is no pressure left.

3 Incrementally loosen the valve core to ensure that there is no pressure left.

4 Cut off the lower part of the gas and liquid stop valve pipes along the black line. Use only appropriate tools, such as a pipe cutter or pair of nippers.



WARNING

NEVER remove the spun piping by brazing.

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

INFORMATION

If the stop valve was initially open, a small amount of refrigerant or oil may leak out.

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

You can now connect the ingoing and outgoing refrigerant piping.

15.3.4 To connect the refrigerant piping to the outdoor unit

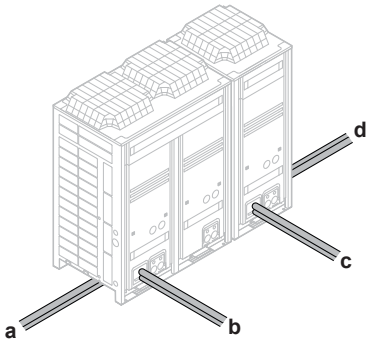
WARNING

ONLY connect the outdoor unit to showcases or blower coils with a design pressure:

- At the high pressure side (liquid side) of 90 bar gauge.
- At the low pressure side (gas side) of 60 bar gauge (is possible with safety valve at field gas piping).

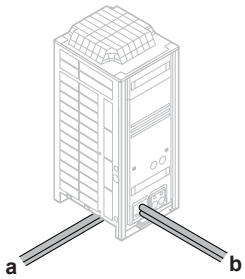
You can route refrigerant piping to the front or side of the unit.

For the outdoor unit



a Left side connection
b Front connection (refrigeration)
c Front connection (air conditioner)
d Right side connection

For the capacity up unit



a Left side connection
b Front connection (refrigeration)

NOTICE

Precautions when making knockout holes:

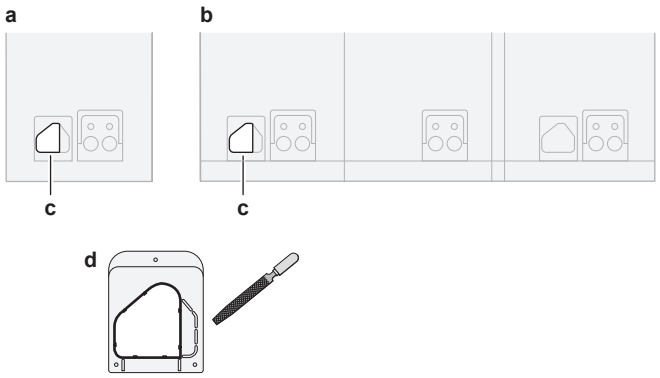
- Avoid damaging the casing.
- After making the knockout holes, we recommend you remove the burrs and paint the edges and areas around the edges using repair paint to prevent rusting.
- When passing electrical wiring through the knockout holes, wrap the wiring with protective tape to prevent damage.

Front connection (refrigeration)

NOTICE

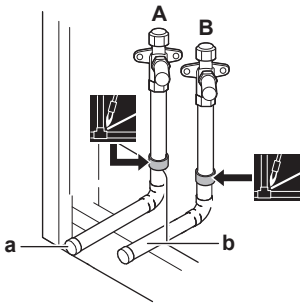
Protect the unit from damage during brazing.

1. Remove the left front panel of the outdoor unit and, if applicable, the one of the capacity up unit. See "14.2.2 To open the outdoor unit" [▸ 66].
2. Remove the knockout in the small front plate of the outdoor unit and, if applicable, the one of the capacity up unit. For more information, see "16.1.3 Guidelines for making knockout holes" [▸ 106].



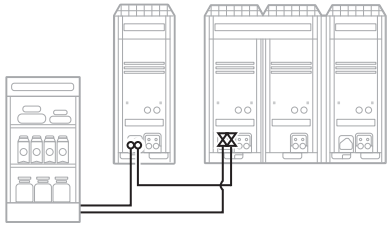
3 Cut off the spun pipes. See "15.3.3 To cut off the spun pipes" [▸ 87].

4 Connect the gas and liquid piping to the outdoor unit.



A Stop valve (gas – refrigeration)
B Stop valve (liquid – refrigeration)
a Gas piping
b Liquid piping

5 If applicable, connect the piping to the capacity up unit.



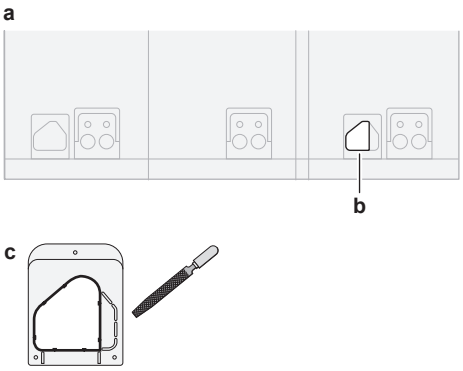
Front connection (air conditioner)

NOTICE

Protect the unit from damage during brazing.

1 Remove the right front panel of the outdoor unit. See "14.2.2 To open the outdoor unit" [▸ 66].

2 Remove the knockout in the small front plate of the outdoor unit. For more information, see "16.1.3 Guidelines for making knockout holes" [▸ 106].



3 Cut off the spun pipes. See "15.3.3 To cut off the spun pipes" [▸ 87].

4 Connect the gas and liquid piping of the air conditioning to the outdoor unit.

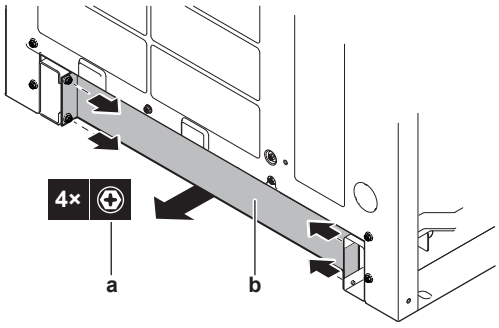
Side connection (refrigeration)

NOTICE

Protect the unit from damage during brazing.

1 Remove the left front panel of the outdoor unit and, if applicable, the one of the capacity up unit. See "14.2.2 To open the outdoor unit" [▸ 66].

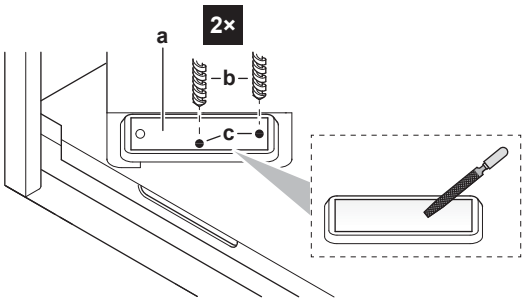
2 Unscrew the 4 screws to remove the side plate of the outdoor unit.



a Screw
b Side plate

3 Dispose of the plate and its screws.

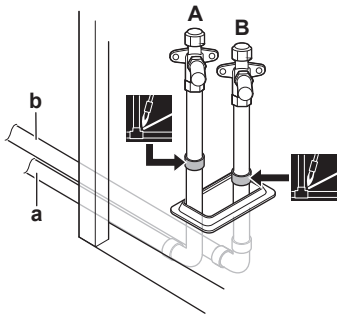
4 Remove the knockout in the bottom plate of the outdoor unit and, if applicable, the one of the capacity up unit. For more information, see "16.1.3 Guidelines for making knockout holes" [▸ 106].



a Knockout plate
b Drill (Ø6 mm)
c Drill here

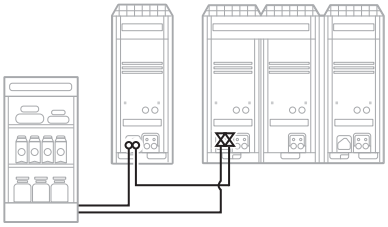
5 Cut off the spun pipes. See "15.3.3 To cut off the spun pipes" [▸ 87].

6 Connect the gas and liquid piping to the outdoor unit.



A Stop valve (gas – refrigeration)
B Stop valve (liquid – refrigeration)
a Gas piping
b Liquid piping

7 If applicable, connect the piping to the capacity up unit.



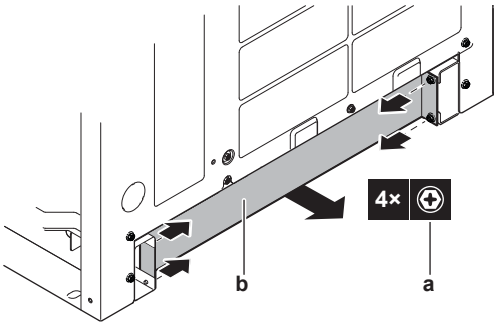
Side connection (air conditioner)

NOTICE

Protect the unit from damage during brazing.

1 Remove the right front panel of the outdoor unit. See "14.2.2 To open the outdoor unit" [▸ 66].

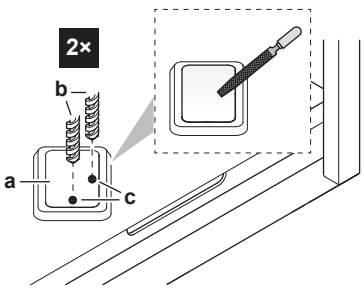
2 Unscrew the 4 screws to remove the side plate of the outdoor unit.



a Screw
b Side plate

3 Dispose of the plate and its screws.

4 Remove the knockout in the bottom plate of the outdoor unit. For more information, see "16.1.3 Guidelines for making knockout holes" [▸ 106].



a Knockout plate

b Drill (Ø6 mm)
c Drill here

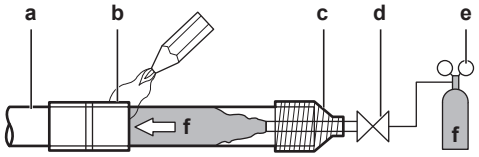
5 Cut off the spun pipes. See "15.3.3 To cut off the spun pipes" [▶ 87].

6 Connect the gas and liquid piping of the air conditioning to the outdoor unit.

15.3.5 To braze the pipe end

General guidelines

- When brazing, blow through with nitrogen to prevent creation of large quantities of oxidized 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 gauge pressure to 20 kPa (0.2 bar) (just enough so it can be felt on the skin) with a pressure-reducing valve.

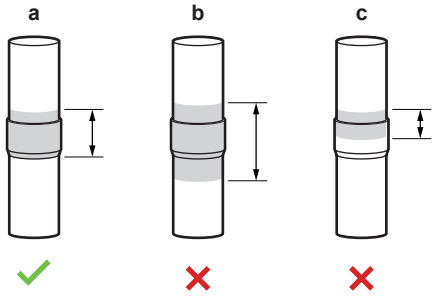


a Refrigerant piping
b Part to be brazed
c Taping
d Manual valve
e Pressure-reducing valve
f Nitrogen

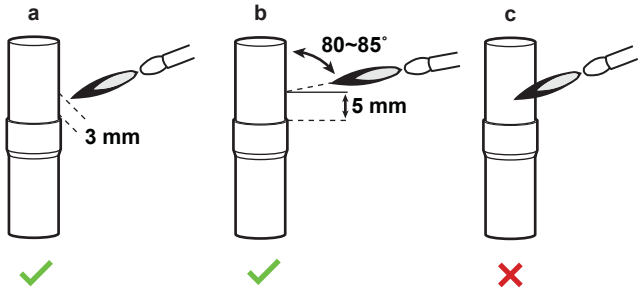
- Do NOT use anti-oxidants when brazing pipe joints. Residue can clog pipes and break equipment.
- Do NOT use flux when brazing copper-to-copper refrigerant piping. Use phosphor copper brazing filler alloy (CuP279, CuP281, or CuP284:DIN EN ISO 17672), which does not require flux.

  Flux has an extremely harmful influence on refrigerant piping systems. E.g., if a 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. using insulation foam) against heat when brazing.

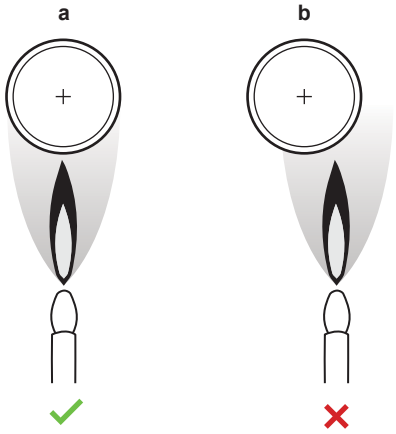
Preheating the piping



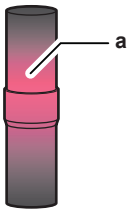
a Correct heating zone
b Heating zone is too large. Brazing material can cause obstructions inside the piping. A running test might detect these obstructions.
c Heating zone is too small. The brazed connection will not be strong and might rip.



a Correct distance and direction of flame during preheating.
b Correct distance and direction of flame during brazing.
c Incorrect distance and direction of flame. Beware of burning holes in the piping or not heating the piping enough.

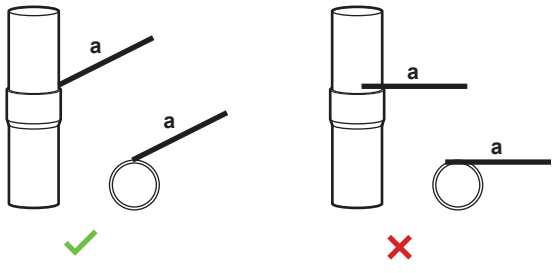


a Direct the flame to the center of the piping to heat the piping equally.
b If you do not direct the flame to the center of the piping, the piping will not be heated equally.

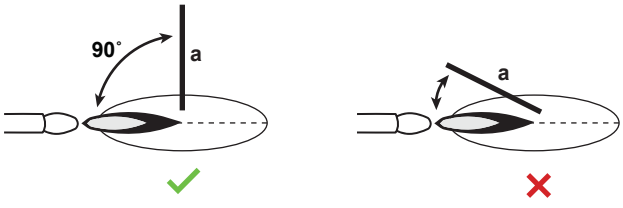


a Correct brazing can be done when the piping is heated until its color turns red-black/pink.

Adding brazing material



a Brazing rod



a Brazing rod

15.3.6 Guidelines to connect T-joints

INFORMATION

Piping joints and fittings shall comply with the requirements of EN 14276-2.

CAUTION

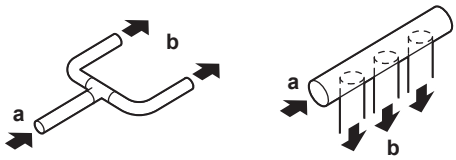
ALWAYS use K65 T-joints for refrigerant branching.

K65 T-joints are field supplied.

Liquid piping

Always branch horizontally when connecting the branch piping.

To prevent uneven refrigerant flow, always branch downwards when using a header.

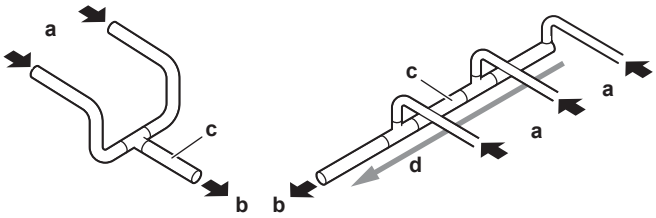


a Coming from the outdoor units
b Going to the indoor units

Gas piping

Always branch horizontally when connecting the branch piping.

To prevent refrigerant oil flowing into the indoor units, always set the branch piping above the main piping.



a Coming from the indoor units
b Going to the outdoor units
c Main refrigerant pipe
d Slanting downwards

NOTICE

Where joints are used on piping, avoid damage caused by freezing or vibration.

15.3.7 Guidelines to install a dryer

NOTICE

Do NOT operate the unit without a dryer installed on the liquid pipe of the refrigeration side. **Possible consequence:** Without dryer, operating the unit may cause a choked expansion valve, hydrolysis of the refrigerant oil and copper plating of the compressor.

Install a dryer on the liquid piping of the refrigeration side:

Dryer type	Drops of R744 water capacity at 60°C: 200 Recommended dryer for use with transcritical CO_2: For LRYEN10*: GMC Refrigerazione type CSR485CO2
Where/how	Install the dryer as near as possible to the outdoor unit.[a] Install the dryer on the liquid pipe of the refrigeration side. Install the dryer horizontally.
When brazing	Follow the brazing instructions in the dryer manual. Remove the dryer cap immediately before brazing (to prevent absorption of moisture). If dryer paint burnt during brazing, repair it. For repair paint details, contact the manufacturer.
Flow direction	If the dryer specifies a flow direction, install accordingly.

[a] Follow the instructions in the installation manual of the dryer.

15.3.8 Guidelines to install a filter

NOTICE

To avoid debris entering, do NOT operate the unit without a filter installed on the gas pipe of the refrigeration side.

Install a filter on the gas piping of the refrigeration side:

Filter type	Minimum Kv value: 4 Minimum Mesh: 70[a] Recommended filter: 4727E (Brand: Castel)
Where/how	Install the filter as near as possible to the outdoor unit.[b] Install the filter on the gas pipe. Install the filter horizontally.
When brazing	Follow the brazing instructions in the filter manual. If necessary, please use an adapter to adjust the connection size. Remove the filter cap immediately before brazing (to prevent absorption of moisture). If filter paint burnt during brazing, repair it. For repair paint details, contact the manufacturer.
Flow direction	If the filter specifies a flow direction, install accordingly.

[a] Smaller grid size (e.g. Mesh 100) is also allowed.
[b] Follow the instructions in the installation manual of the filter.

15.3.9 Guidelines to install safety valves

When installing a safety valve, always keep the design pressure of the circuit in mind. See "6.3 Field piping pressure" [▸ 31].

WARNING

Serious injury and/or damage can result from the blow-off of the liquid receiver safety valve (see "25.2 Piping diagram: Outdoor unit" [▶ 152]):

- NEVER service the unit when the pressure at the liquid receiver is higher than 86 bar gauge. If the safety valve releases refrigerant, it can cause serious injury and/or damage. The safety valve is installed to protect the liquid receiver. The set pressure of the liquid receiver safety valve can be 90 bar gauge ±3% or 86 bar gauge ±3%, depending on the safety valve present in your unit. Confirm the set pressure by checking the safety valve body.
- If the pressure > set pressure, ALWAYS discharge from pressure relief devices before servicing.
- It is recommended to install and secure blow-off piping to the safety valve.
- ONLY alter the safety valve if the refrigerant has been removed.

WARNING

All installed safety valves MUST ventilate to the outdoor space and NOT into a closed area.

CAUTION

When installing a safety valve, ALWAYS add enough support to the valve. An activated safety valve is under high pressure. If not installed securely, the safety valve may cause damage to the piping or the unit.

NOTICE

The design pressure of high pressure side of the connected refrigeration parts MUST be 9 MPaG (90 bar gauge).

NOTICE

The design pressure of the connected air conditioning parts MUST be 12 MPaG (120 bar gauge). If this is not the case, please contact your dealer for assistance.

NOTICE

If the design pressure of the gas piping of refrigeration parts is different from 90 bar gauge (for example: 6 MPaG (60 bar gauge)), a safety valve MUST be installed on the field piping according to this design pressure. It is NOT possible to connect refrigeration parts with design pressure below 60 bar gauge.

NOTICE

ALWAYS choose and install a safety valve according to the design pressure of the gas piping of refrigeration parts and that complies with the latest EN standards and applicable national legislation.

Based on the latest applicable standard (EN 13136:2013+A1:2018), it is recommended to use the following safety valve and installation technique if the design pressure of the gas piping of refrigeration parts is 60 bar gauge:

Safety valve type	$25.2<A^{(a)}\times Kd^{(b)}<39.49$ Recommended safety valve: ▪ 3030E/46C (Brand: Castel) ▪ 3061/4C (Brand: Castel)

Where/how	Low pressure side of the refrigeration circuit piping. Use a straight pipe ≤1 m and Ø15.9 mm for the piping connection between the field piping and the safety valve.

[a] A (mm^2): orifice section
[b] Kd: discharge coefficient

NOTICE

When installing the safety valve in the outdoor unit, apply 20 PTFE tape windings and tighten the safety valve in its correct position with a torque between 35 and 60 N•m. Make sure that blow off piping can be installed easily.

NOTICE

If the ability to close the stop valves for field piping is wanted, the installer MUST install a pressure relief valve on the following piping:

- Outdoor unit to refrigeration indoor units: on liquid piping
- Outdoor unit to air conditioning indoor units: on liquid piping AND gas piping

15.3.10 Guidelines to install blow-off piping

The installer has to install the blow-off piping.

- Install the outlet of the blow-off piping horizontally (for example, to prevent rain dripping in). Never point the piping outlet downwards.
- Direct the outlet of the blow-off pipe to a location where blown off residue cannot hurt or harm people or items.
- Calculate the maximum piping length according to standard EN 13136.
- Thread type must be G1 according to standard ISO 228.

15.4 Checking the refrigerant piping

Keep the following in mind:

- Refrigerant R744 is precharged into the unit.
- Always keep both liquid and gas stop valves closed during leak test and vacuum drying of the field piping.
- Only use R744 dedicated tools (such as gauge manifold and charge hose) that are designed to withstand high pressures and which will prevent water, dirt or dust entering the unit.

CAUTION

Do NOT open the stop valve until you have measured the insulation resistance of the main power supply circuit.

CAUTION

ALWAYS use nitrogen gas for leak tests.

15.4.1 About checking the refrigerant piping

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 "15.4.3 Checking refrigerant piping: Setup" [▸ 99].

15.4.2 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 "15.4.3 Checking refrigerant piping: Setup" [▸ 99]).

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).

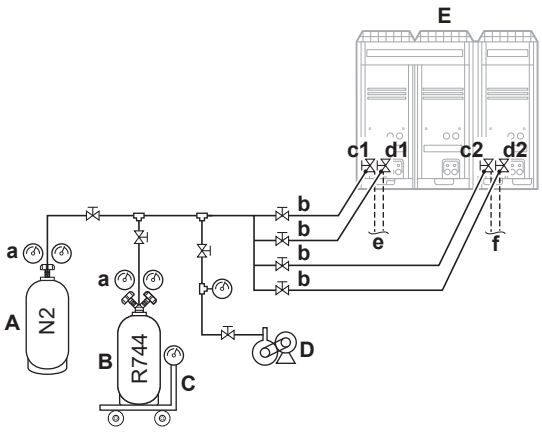
NOTICE

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.

15.4.3 Checking refrigerant piping: Setup



A Nitrogen (N_2)
B R744 refrigerant tank
C Weighing scales
D Vacuum pump

E Outdoor unit
a Pressure regulator
b Charge hose
c1, c2 Gas side
d1, d2 Liquid side
e To refrigeration indoor unit
f To air conditioning indoor unit
Stop valve
Service port
----- Field piping

NOTICE

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

Also see the indoor unit installation manual for more details. Leak test and vacuum drying should be done before the power supply is set to the unit.

15.4.4 To perform a strength pressure test

WARNING

Before putting the system into service, check if all field supplied components or indoor units comply with pressure test specifications of EN378-2. If you are not sure, it is recommended to perform the test below.

Perform this test for field piping.

The test must satisfy the specifications of EN378-2.

Prerequisite: To prevent the safety valve (field supplied) from opening during the test, if present, do the following:

- Remove the safety valve(s) (field supplied) and, if present, the changeover valve.
- Install a cap (field supplied) onto the treaded piece.

1 Close all stop valves

2 Connect to the gas side (c) and liquid side (d) of the circuit you want to test. See "15.4.3 Checking refrigerant piping: Setup" [▸ 99].

3 Pressurize both liquid side and gas side of the refrigeration circuit from the charge port of the stop valve. Always test the pressure according to EN378-2 and mind the set pressure of the pressure relief valve (if installed).

- For the liquid side we recommend a test pressure of 1.1 Ps (99 bar gauge).
- For the gas side we recommend a test pressure of 1.1 Ps (low pressure side of the refrigeration circuit).

NOTICE

If the design pressure of the gas piping of refrigeration parts is different from 90 bar gauge (for example: 6 MPaG (60 bar gauge)), a safety valve MUST be installed on the field piping according to this design pressure. It is NOT possible to connect refrigeration parts with design pressure below 60 bar gauge.

4 Pressurize both liquid side and gas side of the air conditioner circuit from the charge port of the stop valve. Always test the pressure according to EN378-2. We recommend a test pressure of 1.1 Ps (132 bar gauge).

5 Make sure there is no pressure drop.

6 If there is a pressure drop, after pressure is released, locate the leak and repair.

If the test was successful, replace the cap on the threaded piece with the changeover valve (if applicable) and safety valve(s) (field supplied).

15.4.5 To perform a leak test

Perform this test for field piping.

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

1 Close all stop valves.

2 Connect to the gas side (c) and liquid side (d) of the circuit you want to test. See "15.4.3 Checking refrigerant piping: Setup" [▶ 99].

3 Pressurize both liquid side and gas side of the refrigeration circuit up to 3.0 MPaG (30 bar gauge) from the charge port of the stop valve.

4 Pressurize both liquid side and gas side of the air conditioner circuit up to 3.0 MPaG (30 bar gauge) from the charge port of the stop valve.

5 Apply a bubble test solution to all piping connections.

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 parts.

6 If there is a pressure drop, locate the leak, repair it and repeat the strength pressure test (see "15.4.4 To perform a strength pressure test" [▶ 100]) and the leak test (see "15.4.5 To perform a leak test" [▶ 101]).

15.4.6 To perform vacuum drying

1 Connect a vacuum pump to the charge ports of the gas stop valves (c) and liquid stop valves (d). See "15.4.3 Checking refrigerant piping: Setup" [▶ 99].

2 Vacuum the unit for at least 2 hours and to –0.1 MPa or below.

3 Leave the unit for more than 1 hour with a vacuum pressure of –0.1 MPa or less. On the vacuum gauge, check if the pressure does not increase. If the pressure rises, the system has a leak or moisture remained into the piping.

In case of a leak

1 Find and repair the leak.

2 When done, vacuum again according to the procedure above.

In case of remaining moisture

When the unit is installed on rainy days, moisture may still remain in the piping after a first vacuum drying is performed. If so, conduct the following procedure:

1 Pressurize the nitrogen gas up to 0.05 MPa (for vacuum destruction) and vacuum for at least 2 hours.

2 Afterwards, vacuum dry the unit to –0.1 MPa or less for at least 1 hour.

3 Repeat vacuum destruction and vacuum drying if the pressure does not reach –0.1 MPa or less.

4 Leave the unit for more than 1 hour with a vacuum pressure of –0.1 MPa or less. On the vacuum gauge, check if the pressure does not increase.

15.5 Insulating the refrigerant piping

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

- 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:
  - all liquid piping at both the air conditioner and the refrigeration side.
  - gas piping at the refrigeration side.
- Use heat resistant polyethylene foam which can withstand a temperature of 120°C for gas piping at the air conditioner side.

Insulation thickness

Take the following into account when determining the insulation thickness:

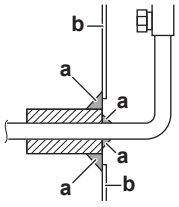
Piping	Mode	Minimum temperature during operation
Liquid piping	Refrigeration	0°C
	Air conditioner	20°C
Gas piping	Refrigeration	–20°C
	Air conditioner	0°C

Depending on your local weather conditions, you may need to increase the thickness of the insulation. If the ambient temperature exceeds 30°C and the humidity exceeds 80%.

- Increase the thickness of the liquid piping with ≥5 mm.
- Increase the thickness of the gas piping with ≥20 mm.

Insulation sealing

To prevent rain and condensed water entering the unit, add a sealing between the insulation and the front panel of the unit.



a Sealing material
b Front panel

16 Electrical installation

CAUTION

This equipment is NOT intended for use in residential locations and will NOT guarantee to provide adequate protection to radio reception in such locations.

NOTICE

If the equipment is installed closer than 30 m to a residential location, the professional installer MUST evaluate the EMC situation before installation.

In this chapter

16.1 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 (low voltage wiring and high voltage wiring).
3. Connecting the electrical wiring to the capacity up unit (low voltage wiring and high voltage wiring).

16.1.1 Precautions when connecting the electrical wiring

DANGER: RISK OF ELECTROCUTION

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.

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.

NOTICE

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

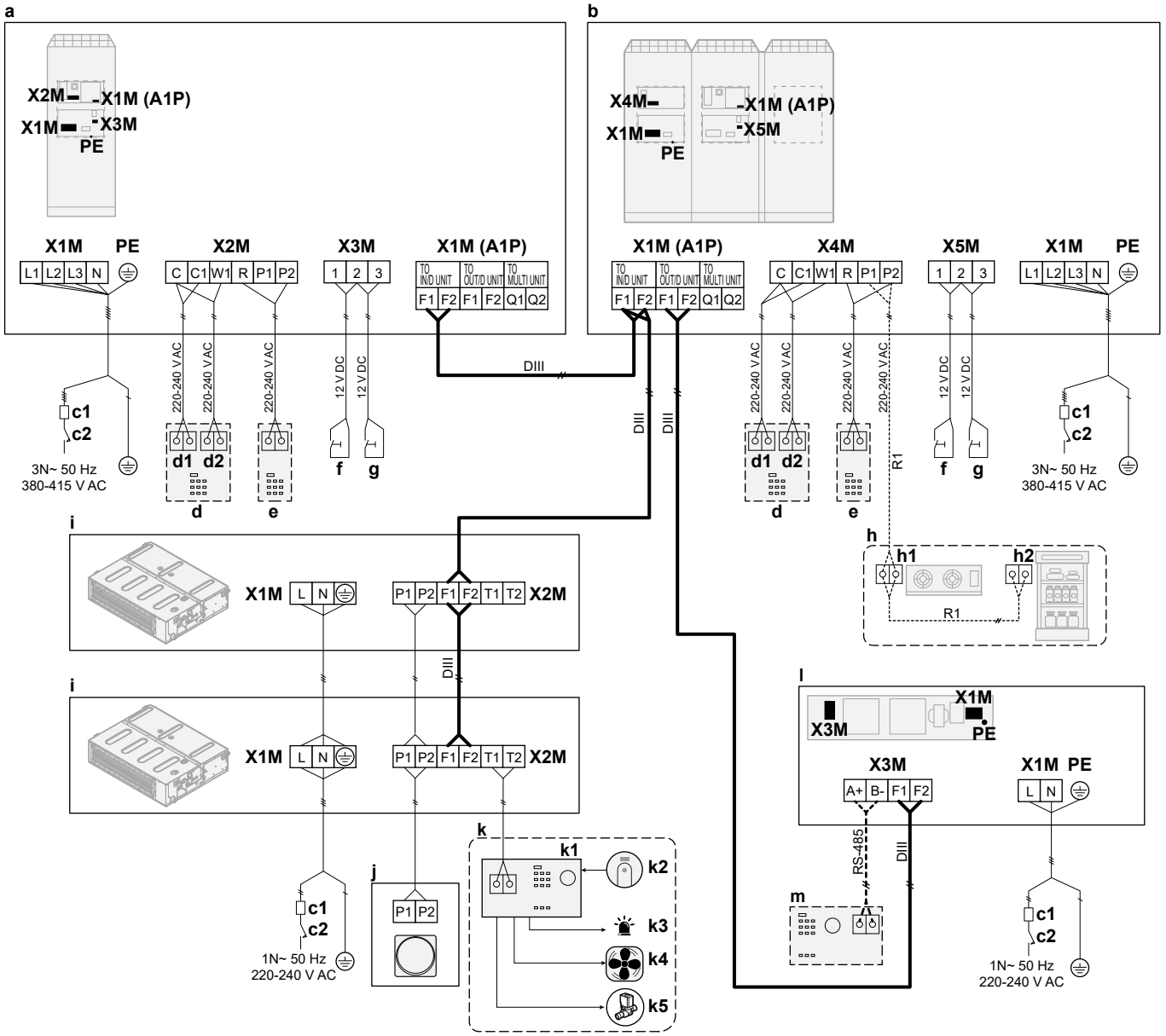
WARNING

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.

16.1.2 Field wiring: Overview

INFORMATION

Indoor units (air conditioning). This field wiring overview shows only one possible wiring for the indoor units (air conditioning). For more possibilities, see the indoor unit manual.



a Capacity up unit (LRNUN5*)
b Outdoor unit (LRYEN10*)
c1 Overcurrent fuse (field supply)
c2 Earth leakage circuit breaker (field supply)
d Alarm panel (field supply) for:
d1: Caution output signal
d2: Warning output signal
e Control panel (field supply) for operation output signal
f Remote operation switch (field supply)
g Remote low noise switch (field supply)
OFF: normal mode
ON: low noise mode
h Operation output signal to expansion valves of all:
h1: Blower coils (field supply)
h2: Showcases (field supply)

i Indoor unit (air conditioning)
j User interface for indoor units (air conditioning)
k Safety system (field supply). **Example:**
k1: Control panel
k2: CO_2 refrigerant leak detector
k3: Safety alarm (lamp)
k4: Ventilation (natural or mechanical)
k5: Shut off valve

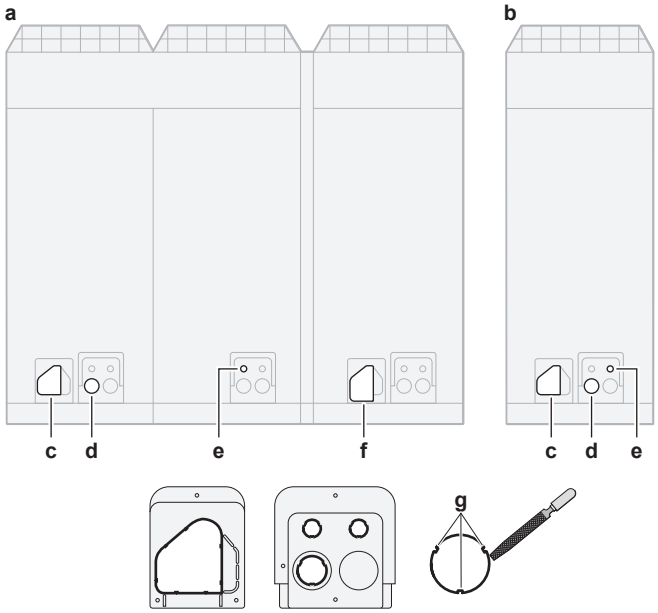
l Communication box (BRR9B1V1)
m Monitoring system (field supply)
Wiring:

RS-485 RS-485 transmission wiring (mind polarity)
DIII DIII transmission wiring (no polarity)
R1 Operation output

16.1.3 Guidelines for making knockout holes

- To punch a knockout hole in a front panel, hit on it with a hammer.
- To punch a knockout hole in the bottom panel, drill holes where indicated.
- After knocking out the holes, we recommend removing any burrs and paint the edges and areas around the holes using repair paint to prevent rusting.
- When passing electrical wiring through the knockout holes, prevent damage to the wires by wrapping the wiring with protective tape, putting the wires through field supplied protective wire conduits at that location, or install suitable field supplied wire nipples or rubber bushings into the knockout holes.

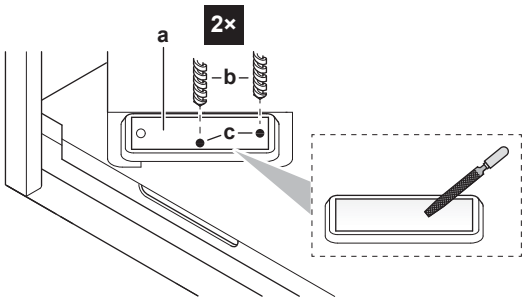
Front connection



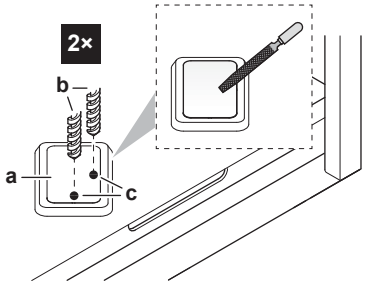
a Outdoor unit
b Capacity up unit
Knockout holes for:
c Piping (refrigeration)
d High voltage wiring
e Low voltage wiring
f Piping (air conditioning)
g Remove burrs

Side connection

- Left side connection (piping refrigeration)



- Right side connection (piping air conditioning)



a Knockout plate
b Drill (Ø6 mm)
c Drill here

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.

16.1.4 Guidelines when connecting the electrical wiring

NOTICE

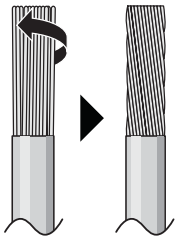
We recommend using solid (single-core) wires. If stranded wires are used, slightly twist the strands to consolidate the end of the conductor for either direct use in the terminal clamp or insertion in a round crimp-style terminal.

To prepare stranded conductor wire for installation

Method 1: Twisting conductor

1 Strip insulation (20 mm) from the wires.

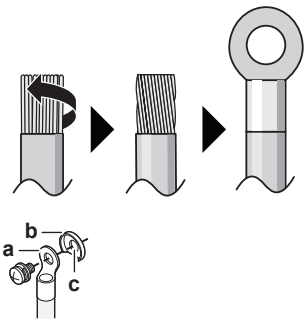
2 Slightly twist the end of the conductor to create a "solid-like" connection.



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

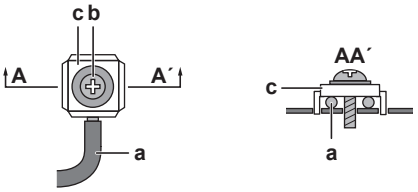
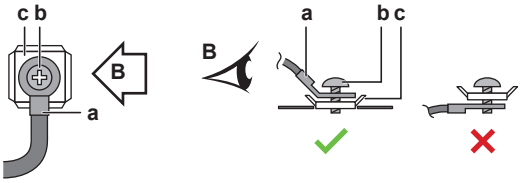
1 Strip insulation from wires and slightly twist the end of each wire.

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.

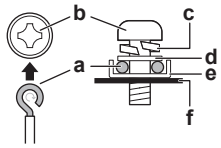


a Round crimp-style terminal
b Cut-out section
c Cup washer

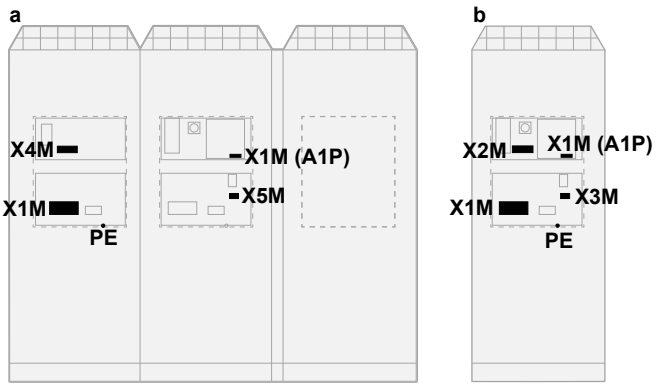
Use the following methods for installing wires:

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



a Terminals on outdoor unit
b Terminals on capacity up unit

Terminal	Screw size	Tightening torque (N•m)
X1M: Power supply	M8	5.5~7.3
PE: Protective earth (screw)	M8	
X2M, X4M: Output signals	M4	1.18~1.44
X3M, X5M: Remote switches	M3.5	0.79~0.97
X1M (A1P): DIII transmission wiring	M3.5	0.80~0.96

16.1.5 About electrical compliance

This equipment (LRYEN10* and LRNUN5*) complies with:

- **EN/IEC 61000-3-11** provided that the system impedance Z_{sys} is less than or equal to Z_{max} at the interface point between the user's supply and the public system.
  - EN/IEC 61000-3-11 = European/International Technical Standard setting the limits for voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current ≤75 A.
  - 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 system impedance Z_{sys} less than or equal to Z_{max}.
- **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	Z_{max}	Minimum S_{sc} value
LRYEN10*	—	4337
LRNUN5*	—	2294

16.1.6 Specifications of standard wiring components

Power supply

NOTICE

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

The power supply must be protected with the required safety devices, i.e. a main switch, a slow blow fuse on each phase and an earth leakage protector in accordance with the applicable legislation.

Selection and sizing of the wiring should be done in accordance with the applicable legislation based on the information mentioned in the table below.

Make sure that a separate power supply circuit is provided for this unit and that all electrical work is carried out by qualified personnel according to local laws and regulations and this manual. An insufficient power supply capacity or improper electrical construction may lead to electric shocks or fire.

Model	Minimum circuit ampacity	Recommended fuses	Power supply
LRYEN10*	33 A	40 A	3N~ 50 Hz 380-415 V
LRNUN5*	16 A	25 A	3N~ 50 Hz 380-415 V

DIII transmission wiring

Transmission wiring specification and limits[a]
Only use harmonised wire providing double insulation and suitable for the applicable voltage. 2-cord cable. 0.75~1.25 mm².

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

Remote switches

See details in:

- "16.2.1 Low voltage wiring – Outdoor unit" [▸ 111]
- "16.3.1 Low voltage wiring – Capacity up unit" [▸ 115]

Output signals

See details in:

- "16.2.2 High voltage wiring – Outdoor unit" [▸ 113]
- "16.3.2 High voltage wiring – Capacity up unit" [▸ 117]

16.2 Connections to the outdoor unit

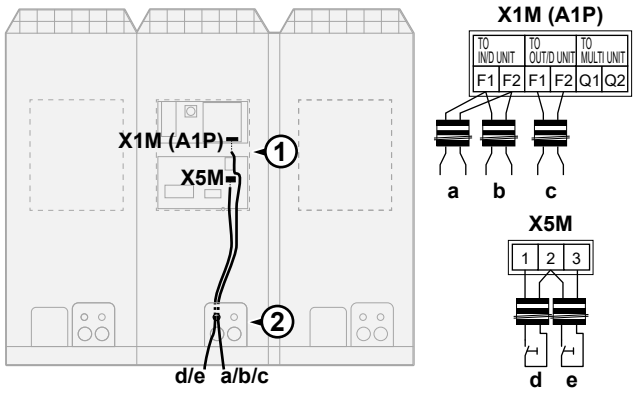
NOTICE

- Be sure to keep the power line and transmission line apart from each other (≥50 mm). Transmission wiring and power supply wiring may cross, but may not run parallel.
- Transmission wiring and power supply wiring may NOT touch internal piping 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.

Low voltage wiring	▪ DIII transmission wiring ▪ Remote switches (operation, low noise)
High voltage wiring	▪ Output signals (caution, warning, run, operation) ▪ Power supply (including earth)

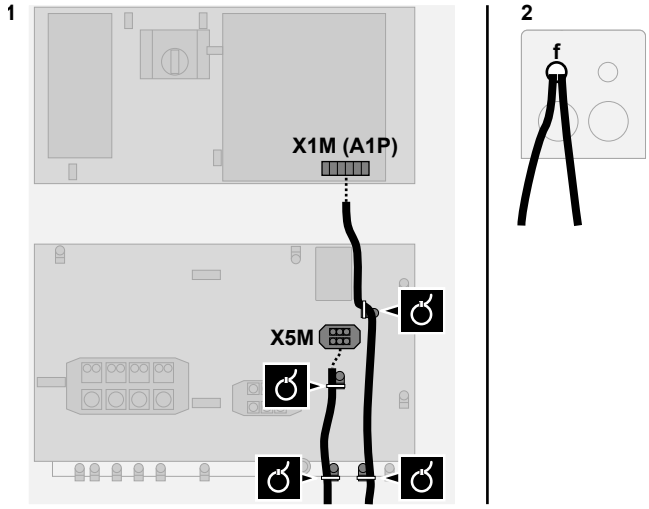
16.2.1 Low voltage wiring – Outdoor unit

Connections/routing/fixing



X1M (A1P) DIII transmission wiring:
a: To capacity up unit
b: To indoor units (air conditioning)
c: To communication box

X5M Remote switches:
d: Remote operation switch
e: Remote low noise switch



f Wiring intake (knockout hole) for low voltage. See "16.1.3 Guidelines for making knockout holes" [▸ 106].

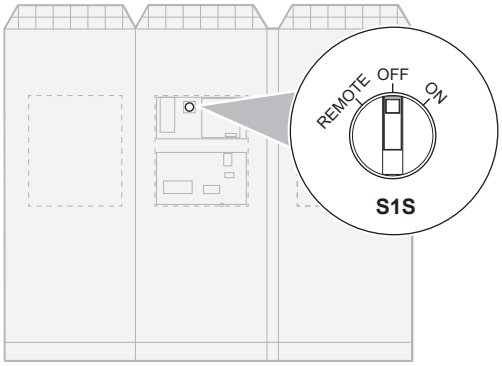
Details – DIII transmission wiring

See "16.1.6 Specifications of standard wiring components" [▸ 110].

Details – Remote operation switch

NOTICE

Remote operation switch. The unit is factory-equipped with an operation switch with which you can turn unit operation ON/OFF. If you want to remotely turn ON/OFF operation of the outdoor unit, a remote operation switch is required. Use a voltage-free contact for microcurrent (≤1 mA, 12 V DC). Connect to X5M/1+2 class II construction, and set to "Remote".



S1S Factory-equipped operation switch:
OFF: Unit operation turned OFF
ON: Unit operation turned ON
Remote: Unit controlled (ON/OFF) with remote operation switch

Wiring remote operation switch:

Wiring	Only use harmonised wire providing double insulation and suitable for the applicable voltage. 2-cord cable 0.75~1.25 mm²
Maximum wiring length	130 m

Details – Remote low noise switch

NOTICE

Low noise switch. If you want to remotely turn ON/OFF low noise operation, you must install a low noise switch. Use a voltage-free contact for microcurrent (≤1 mA, 12 V DC).

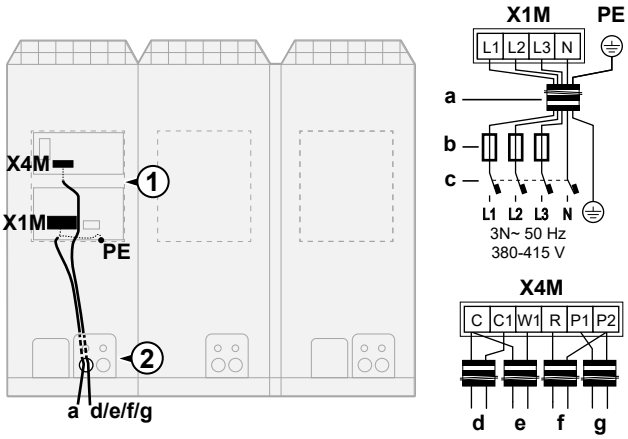
Low noise switch	Mode
OFF	Normal mode
ON	Low noise mode

Wiring low noise switch:

Wiring	Only use harmonised wire providing double insulation and suitable for the applicable voltage. 2-cord cable 0.75~1.25 mm²
Maximum wiring length	130 m

16.2.2 High voltage wiring – Outdoor unit

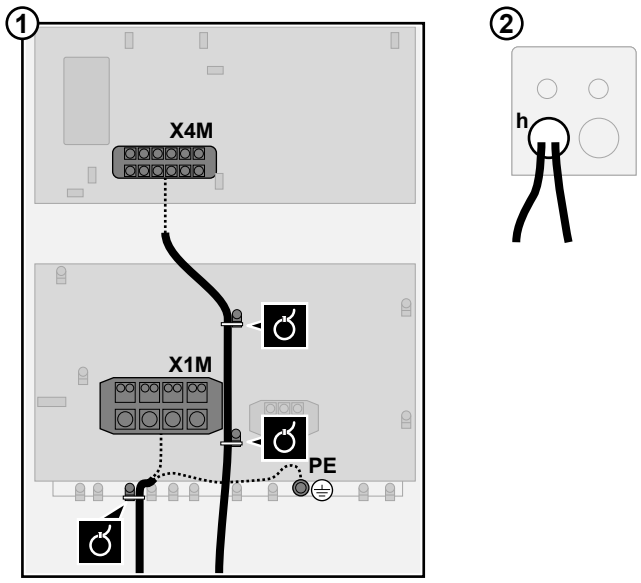
Connections/routing/fixing



X1M Power supply:
- a: Power supply cable
- b: Overcurrent fuse
- c: Earth leakage circuit breaker

PE Protective earth (screw)

X4M Output signals:
- d: Caution
- e: Warning
- f: Run
- g: Operation



h Wiring intake (knockout hole) for high voltage. See "16.1.3 Guidelines for making knockout holes" [▸ 106].

Details – Output signals

NOTICE

Output signals. The outdoor unit is provided with a terminal (X4M class II construction) that can output 4 different signals. The signal is 220~240 V AC. The maximum load for all signals is 0.5 A. The unit outputs a signal in the following situations:

- C/C1: **caution** signal – connection recommended – when an error occurs that does not stop unit operation.
- C/W1: **warning** signal – connection recommended – when an error occurs that causes unit operation to stop.
- R/P2: **run** signal – connection optional – when the compressor is running.
- P1/P2: **operation** signal – connection mandatory – when the expansion valves of the connected showcases and blower coils are being controlled.

NOTICE

The operation output P1/P2 of the outdoor unit MUST be connected to all expansion valves of the connected showcases and blower coils. This connection is required because the outdoor unit must be able to control the expansion valves during startup (to prevent liquid refrigerant from entering the compressor and to prevent opening of the safety valve at the low pressure side of the refrigeration cabinet).

Check on site that the expansion valve of the showcase or blower coil can ONLY open when P1/P2 signal is ON.

Wiring output signals:

Wiring	Only use harmonised wire providing double insulation and suitable for the applicable voltage. 2-cord cable 0.75~1.25 mm²
Maximum wiring length	130 m

Details – Power supply

See "16.1.6 Specifications of standard wiring components" [▸ 110].

16.3 Connections to the capacity up unit

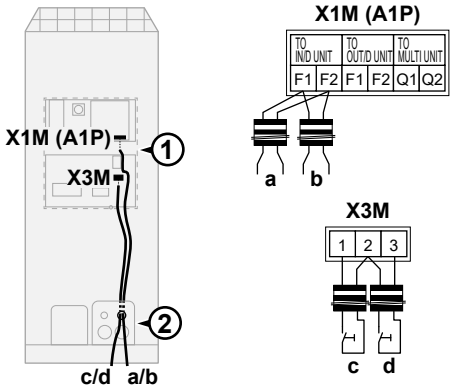
NOTICE

- Be sure to keep the power line and transmission line apart from each other (≥50 mm). Transmission wiring and power supply wiring may cross, but may not run parallel.
- Transmission wiring and power supply wiring may NOT touch internal piping 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.

Low voltage wiring	▪ DIII transmission wiring ▪ Remote switches (operation, low noise)
High voltage wiring	▪ Output signals (caution, warning, run) ▪ Power supply (including earth)

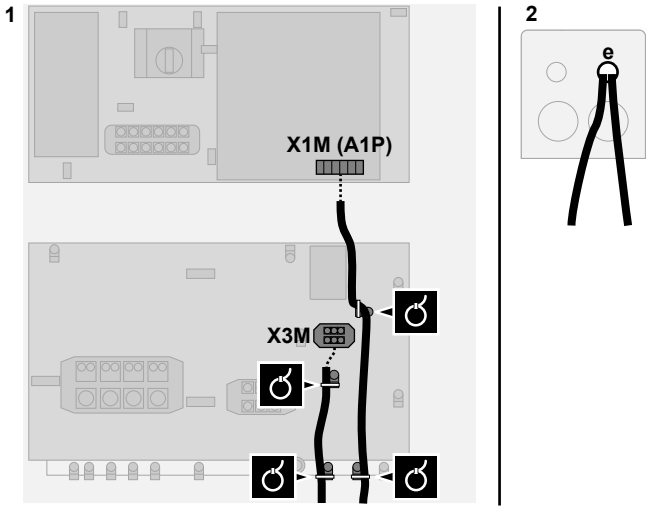
16.3.1 Low voltage wiring – Capacity up unit

Connections/routing/fixing



X1M (A1P) DIII transmission wiring:
a: To outdoor unit
b: To indoor units (air conditioning)

X3M Remote switches:
c: Remote operation switch
d: Remote low noise switch



e Wiring intake (knockout hole) for low voltage. See "16.1.3 Guidelines for making knockout holes" [▸ 106].

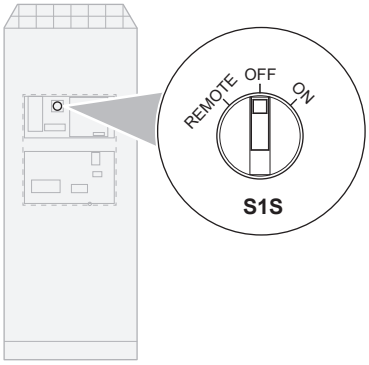
Details – DIII transmission wiring

See "16.1.6 Specifications of standard wiring components" [▸ 110].

Details – Remote operation switch

NOTICE

Remote operation switch. The unit is factory-equipped with an operation switch with which you can turn unit operation ON/OFF. If you want to remotely turn ON/OFF operation of the capacity up unit, a remote operation switch is required. Use a voltage-free contact for microcurrent (≤1 mA, 12 V DC). Connect to X3M/1+2 class II construction, and set to "Remote".



S1S Factory-equipped operation switch:
OFF: Unit operation turned OFF
ON: Unit operation turned ON
Remote: Unit controlled (ON/OFF) with remote operation switch

Wiring remote operation switch:

Wiring	Only use harmonised wire providing double insulation and suitable for the applicable voltage. 2-cord cable 0.75~1.25 mm²
Maximum wiring length	130 m

Details – Remote low noise switch:

NOTICE

Low noise switch. If you want to remotely turn ON/OFF low noise operation, you must install a low noise switch. Use a voltage-free contact for microcurrent (≤1 mA, 12 V DC).

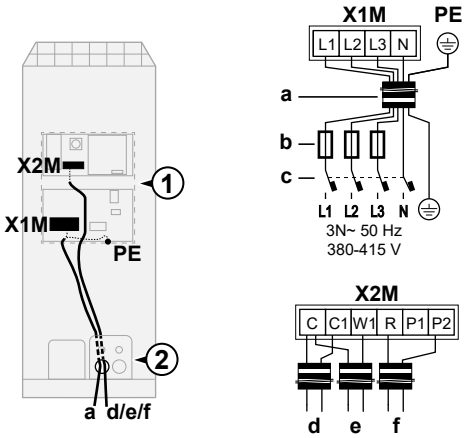
Low noise switch	Mode
OFF	Normal mode
ON	Low noise mode

Wiring low noise switch:

Wiring	Only use harmonised wire providing double insulation and suitable for the applicable voltage. 2-cord cable 0.75~1.25 mm²
Maximum wiring length	130 m

16.3.2 High voltage wiring – Capacity up unit

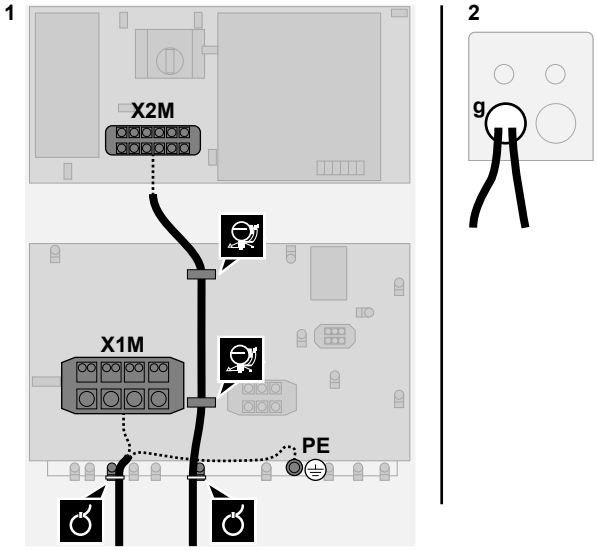
Connections/routing/fixing



X1M Power supply:
- a: Power supply cable
- b: Overcurrent fuse
- c: Earth leakage circuit breaker

PE Protective earth (screw)

X2M Output signals:
- d: Caution
- e: Warning
- f: Run



g Wiring intake (knockout hole) for high voltage. See "16.1.3 Guidelines for making knockout holes" [▶ 106].

Details – Output signals

NOTICE

Output signals. The outdoor unit is provided with a terminal (X2M class II construction) that can output 3 different signals. The signal is 220~240 V AC. The maximum load for all signals is 0.5 A. The unit outputs a signal in the following situations:

- C/C1: **caution** signal – connection recommended – when an error occurs that does not stop unit operation.
- C/W1: **warning** signal – connection recommended – when an error occurs that causes unit operation to stop.
- R/P2: **run** signal – connection optional – when the compressor is running.

Wiring output signals:

Wiring	Only use harmonised wire providing double insulation and suitable for the applicable voltage. 2-cord cable 0.75~1.25 mm²
Maximum wiring length	130 m

Details – Power supply:

See "16.1.6 Specifications of standard wiring components" [▸ 110].

17 Charging refrigerant

In this chapter

17.1 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 **external** refrigerant piping of the outdoor unit 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 refrigerant charge label.

The cylinder's internal pressure will drop when there is little refrigerant remaining, making it impossible to further charge the unit, even if the liquid stop valve opening is adjusted. Replace the cylinder with one with more refrigerant.

If the piping is long, replenishing with the liquid stop valve fully closed can have the protection system activated, causing the unit to stop operating.

NOTICE

ALWAYS store and use R744 cylinders in upright position.

NEVER store R744 cylinders near any source of heat or direct sunlight.

17.2 Precautions when charging refrigerant

WARNING

- ONLY use R744 (CO_2) as refrigerant. Other substances may cause explosions and accidents.
- When installing, charging refrigerant, maintaining or performing service, ALWAYS use personal protective equipment, such as safety shoes, safety gloves and safety glasses.
- If the unit is installed indoors (for example, in a machine room), ALWAYS use a portable CO_2 detector.
- If the front panel is open, ALWAYS beware of the rotating fan. The fan will continue rotating for a while, even after the power switch has been turned off.

CAUTION

A vacuumed system will be under triple point. To avoid solid ice, ALWAYS start charging with R744 in vapour state. When the triple point is reached (5.2 bar absolute pressure or 4.2 bar gauge pressure), you may continue charging with R744 in liquid state.

WARNING

The unit is already filled with a certain amount of R744. Do NOT open liquid and gas stop valves until all checks from the "20.3 Checklist before commissioning" [▸ 133] are completed.

CAUTION

Do NOT charge liquid refrigerant directly to a gas line. Liquid compression could cause compressor operation failure.

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

Before starting charging procedures, check if the 7-LEDs display is as normal (see "19.1.4 To access mode 1 or 2" [▸ 129]). If a malfunction code is present, see "23.3 Solving problems based on error codes" [▸ 143].

NOTICE

Close the front panel before any refrigerant charge operation is executed. Without the front panel attached the unit cannot judge correctly whether it is operating properly or not.

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

Do NOT fully close the stop valve for field piping after the refrigerant has been charged into the unit.

NOTICE

Do NOT fully close the liquid stop valve while the unit is stopping. The field liquid piping might burst because of liquid seal. Furthermore, continuously keep a connection between the safety valve and the field liquid piping to avoid bursting of the piping (if pressure increases too much).

INFORMATION

Also read the precautions and requirements in the following chapters:

- General safety precautions
- Preparation

INFORMATION

For the operation method of the stop valves, refer to "15.2 Using stop valves and service ports" [▶ 79].

17.3 About the refrigerant

This product contains refrigerant gases.

Refrigerant type: R744 (CO_2)

WARNING

- Do NOT pierce or burn refrigerant cycle parts.
- Be aware that the refrigerant inside the system is odourless.

WARNING

The R744 refrigerant (CO_2) inside the unit is odourless, non-flammable and normally does NOT leak.

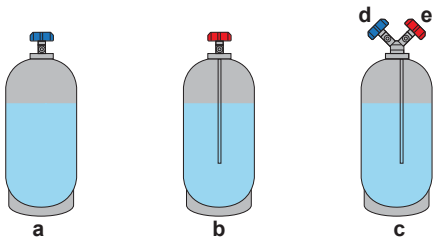
If the unit is installed indoors, ALWAYS install a CO_2 detector according to the specifications of standard EN378.

If the refrigerant leaks in high concentrations in the room, it may have negative effects on its occupants such as asphyxiation and carbon dioxide poisoning. 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.

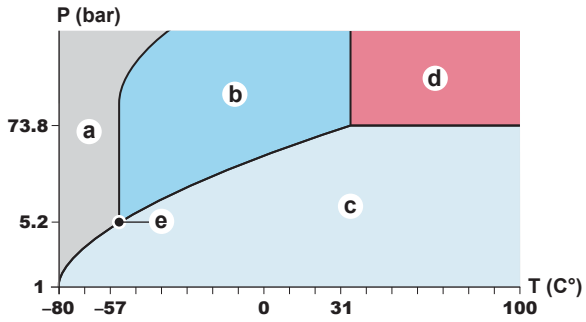
Cylinder types

The following cylinder types are used to charge additional R744 refrigerant:



a Cylinder with a vapour take-off valve
b Cylinder with a liquid take-off valve
c Cylinder with 2 ports for take-off (vapour and liquid)
d Vapour port
e Liquid port

Phase diagram of R744



P Pressure (in bar)
T Temperature (in °C)
a Solid phase
b Liquid phase
c Vapour phase
d Supercritical fluid
e Triple point (–57°C, 5.2 bar)

17.4 To determine additional refrigerant amount

1. Check the factory charged amount of refrigerant **[1]** on the nameplate of the unit.
2. Calculate each amount of refrigerant for the liquid piping using the **Calculation table** in this chapter, based on the piping size and length: **(a)** **(b)** and **(c)**. You may round off to the nearest 0.1 kg.
3. Total the amounts of refrigerant for the liquid piping: **(a)+(b)+(c)=[2]**
4. Calculate the amount of refrigerant for the indoor units using the **Conversion ratio for indoor units: refrigeration** table in this chapter, based on the type of indoor units and the cooling capacity:
   - Calculate the amount of refrigerant for blower coils: **(d)**
   - Calculate the amount of refrigerant for showcases: **(e)**
5. Calculate the amount of refrigerant for air conditioner indoor units using the **Conversion ratio for indoor units: air conditioners** table in this chapter, based on the model of indoor units and the number of units connected: **(f)**.
6. Total the amounts of refrigerant for indoor units: **(d)+(e)+(f)=[3]**
7. Total the calculated amounts of refrigerant and add the required amount of refrigerant for outdoor unit: **[2]+[3]+[4]=[5]**
8. Charge the total amount of refrigerant **[5]**.
9. If a test runs indicates that additional refrigerant is needed, charge the additional refrigerant and note down its amount: **[6]**.
10. Total the calculated amount of refrigerant **[5]**, the additional amount of refrigerant during test run **[6]**, and the factory charged amount of refrigerant **[1]**. The total amount of refrigerant in the system is thus: **[1]+[5]+[6]=[7]**
11. Note down the calculation results in the calculation table.

INFORMATION

After charging, add the total amount of refrigerant to the refrigerant charge label. See "17.6 To fix the refrigerant charge label" [▶ 124].

Calculation table: outdoor unit with or without capacity up unit

Factory charged amount of refrigerant into outdoor unit (kg): see nameplate (Factory charged amounts available: 5.2 kg and 6.3 kg)				[1]
Amount of refrigerant for liquid piping (refrigeration / air conditioner)				
	Liquid piping size (mm)	**Conversion ratio per meter of liquid piping (kg/m)**	**Piping length (m)**	**Total amount of refrigerant (kg)**
	Ø9.5	0.0463		(a)
	Ø12.7	0.0815		(b)
	Ø15.9	0.1266		(c)
	Subtotal (a)+(b)+(c):			[2]
Amount of refrigerant for indoor units				
	Type of indoor unit			**Total amount of refrigerant (kg)**
	Blower coils			(d)
	Showcases			(e)
	Air conditioner units			(f)
	Subtotal (d)+(e)+(f):			[3]
Required amount of refrigerant for outdoor unit (kg): substraction of 22.3 kg–[1]				[4][(a)]
Subtotal [2]+[3]+[4] (kg)				[5]
Additional amount of refrigerant charged when test run if required (kg)				[6][(b)]
Total amount of refrigerant [1]+[5]+[6] (kg)				[7]

(a) Either: 17.1 kg or 16.0 kg

(b) The maximum amount of additional refrigerant that can be charged at the time of the test run is 10% of the amount of refrigerant as calculated from the capacity of connected indoor units. Use [6]≤[3]×0.1 to calculate this maximum amount.

Conversion ratio for indoor units: refrigeration

Type	Conversion ratio
Blower coil	0.101 kg/dm^3
Showcase	

Conversion ratio for indoor units: air conditioners

Model	Conversion ratio
FXSN50	0.13 kg/unit
FXSN71	0.21 kg/unit
FXSN112	0.32 kg/unit

Model	Conversion ratio
FXFN50	0.13 kg/unit
FXFN71	0.21 kg/unit
FXFN112	0.32 kg/unit

INFORMATION

The capacity up unit is a pre-charged, closed circuit. There is no need to add additional refrigerant charging.

17.5 To charge refrigerant

1. Turn OFF the operation switch of the outdoor unit.
2. Turn ON the power supply of the outdoor unit and all indoor units (air conditioners, blower coils, showcases).
3. Charge refrigerant from the charge port of the stop valve (d1) on the refrigeration liquid side. Keep the stop valve closed. See "15.4.3 Checking refrigerant piping: Setup" [▸ 99].
4. When charging is finished, open all stop valves.
5. Attach the valve caps to the stop valves and service ports.

Pressure difference too low

If the pressure difference between the charging cylinder and refrigerant piping is too low, you cannot charge anymore. Continue as follows to decrease the pressure in the piping and to be able to continue charging:

1. Open the gas stop valves on refrigeration and air conditioner side (c1, c2) and the liquid stop valve on air conditioner side (d2).
2. Adjust the opening of the liquid stop valve on refrigeration side (d1). In case of long field piping length, the outdoor unit will automatically stop when charging refrigerant with the liquid stop valve fully closed.
3. Turn ON the operation switch of the outdoor unit. The pressure in the refrigerant piping will drop, and charging can be continued.
4. When the refrigerant is charged, fully open all gas and liquid stop valves.

WARNING

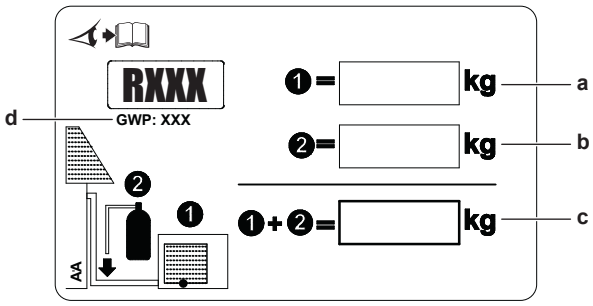
After charging refrigerant, keep the power supply and operation switch of the outdoor unit ON to avoid a pressure increase on the low pressure (suction piping) side and to avoid pressure increase on the pressure side of the liquid receiver.

INFORMATION

After charging, add the total amount of refrigerant to the refrigerant charge label. See "17.6 To fix the refrigerant charge label" [▸ 124].

17.6 To fix the refrigerant charge label

1. Fill in the label as follows:



a Factory refrigerant charge
b Additional refrigerant amount charged
c Total refrigerant charge
d GWP value of the refrigerant
GWP = Global Warming Potential

2 Fix the label on the outdoor unit near the nameplate.

18 Finishing the outdoor unit installation

18.1 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.

19 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

19.1 Making field settings

19.1.1 About making field settings

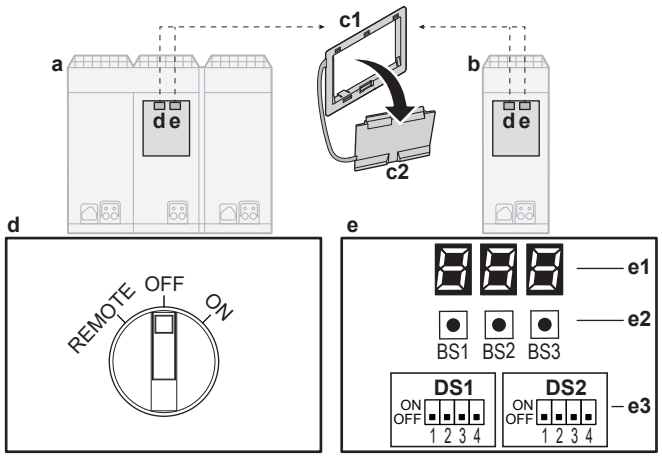
To configure the outdoor unit and capacity up unit, you must give input to the main PCB (A1P) of the outdoor unit and capacity up unit. This involves the following field setting components:

- Push buttons to give input to the PCB
- A 7-segment display to read feedback from the PCB
- DIP switches to set the target evaporating temperature for the refrigeration side

19.1.2 To access the field setting components

You do not have to open the complete switch box to access the field setting components.

1. Open the front panel (middle front panel in case of outdoor unit). See "14.2.2 To open the outdoor unit" [▸ 66].
2. Open the inspection hole cover (left), and turn OFF the operation switch.
3. Open the inspection hole cover (right), and make the field settings.



a Outdoor unit
b Capacity up unit

c1 Inspection hole
c2 Inspection hole cover
d Operation switch (S1S)
e Field setting components
e1 7-segment displays: ON (▣) OFF (■) Flashing (☼)
e2 Push buttons:
BS1: MODE: For changing the set mode
BS2: SET: For field setting
BS3: RETURN: For field setting
e3 DIP switches

4 After making the field settings, reattach the inspection hole covers and the front plate.

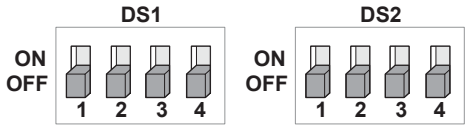
NOTICE

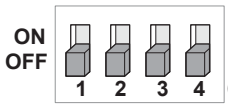
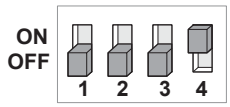
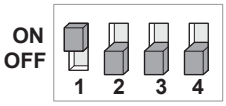
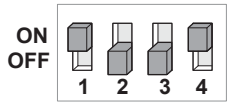
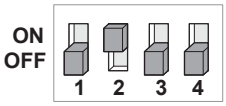
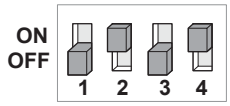
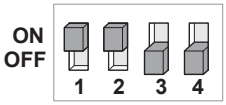
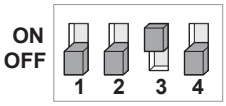
Close the cover of the switch box before turning ON the power.

19.1.3 Field setting components

DIP switches

Use DS1 to set the target evaporating temperature for the refrigeration side. Do NOT change DS2.

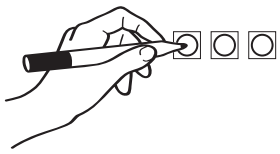


DS1		Target evaporating temperature
Normal load	Low load[a]	
 (b)		–10°C
		–20°C
		–15°C
	—	–5°C
	—	0°C

[a] For low load restrictions, see "13.5.2 Constraints for refrigeration" [▸ 55].
(b) Factory setting

Push buttons

Use the push buttons to make the field settings. Operate the push buttons with an insulated stick (such as a closed ball-point pen) to avoid touching live parts.



7-segment display

The display gives feedback about the field settings, which are defined as [Mode-Setting]=Value.

Example:

	Description
	Default situation
	Mode 1
	Mode 2
	Setting 8 (in mode 2)
	Value 4 (in mode 2)

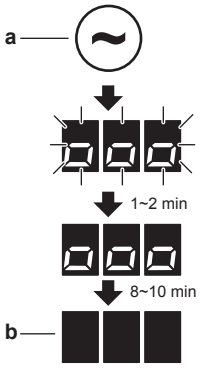
19.1.4 To access mode 1 or 2

After the units are turned ON, the display goes to its default situation. From there, you can access mode 1 and mode 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.

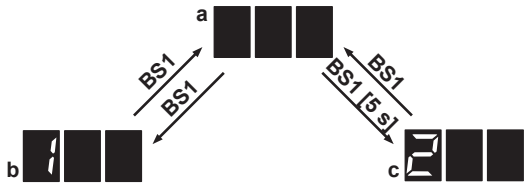
Turn on the power supply of the outdoor unit, capacity up unit, and all indoor units. When the communication between the units is established and normal, the display indication state will be as below (default situation when shipped from factory).



a Power ON
b Default situation

Switching between modes

Use BS1 to switch between the default situation, mode 1 and mode 2.



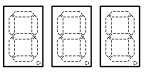
a Default situation (H1P OFF)
b Mode 1 (H1P flashing)
c Mode 2 (H1P ON)
BS1 Press BS1.
BS1 [5 s] Press BS1 for at least 5 s.

INFORMATION

If you get confused in the middle of the process, press BS1 to return to the default situation.

19.1.5 To set field settings

Prerequisite: Start from the default setting in the 7-segment display. See also "19.1.3 Field setting components" [▸ 128]. If anything but the default setting is visible, push BS1 once.



1 To select the desired mode, push BS1. See also "19.1.4 To access mode 1 or 2" [▸ 129].

- For mode 1: push BS1 and release it at once.
- For mode 2: push BS1 and keep it depressed for more than 5 seconds.

Result: The selected mode appears on the 7-segment display.

2 To select the desired setting, push BS2 the same amount of times as the number of the setting you need. For example: push 2 times for setting 2.

Result: The setting appears on the 7-segment display, [Mode Setting] is addressed.

3 Push BS3 1 time to access the selected setting's value.

Result: The display shows the status of the setting (depending on the actual field situation).

4 To change the value of the setting, push BS2 the same amount of times as the number of the value you need. For example: push 2 times for value 2.

Result: The value appears on the 7-segment display.

5 Push BS3 1 time to validate the value change.

6 Push BS3 again to start operation with the chosen value.

7 Push BS1 to quit and return to the initial status.

WARNING

If any part of system is already (accidentally) powered on, setting [2-21] on the outdoor unit can be set to value 1 to open the valves (Y1E, Y2E, Y7E, Y8E, Y13E, Y16E, Y17E, Y11S~Y16S, Y21S~Y26S, Y31S~Y34S, Y44S).

20 Commissioning

In this chapter

20.1 Overview: Commissioning

Typical workflow

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.

20.2 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.

CAUTION

After the refrigerant is fully charged, do NOT turn off the operation switch and power supply of the outdoor unit. This prevents the safety valve actuation due to an increase in internal pressure under high ambient temperature conditions.

When internal pressure rises, the outdoor unit can operate by itself to reduce the internal pressure, even if no indoor unit is operating.

INFORMATION

During the first running period of the unit, the required power may be higher than stated in the technical engineering data 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.

20.3 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.
☐	**Field wiring** Check that the field wiring has been carried out according to the instructions described in the chapter "16 Electrical installation" [▸ 103], 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 transmission 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 "16 Electrical installation" [▸ 103]. Be sure that no fuse or protection device is bypassed.
☐	**Internal wiring** Visually check the switch box and the inside of the unit for loose connections or damaged electrical components.
☐	**Safety valve (field supply)** Check that the safety valve (field supply) has been installed correctly according to standards EN378-2 and EN13136.

☐	**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 (4 in total) are open on the liquid and gas side for refrigeration and air conditioning.
☐	**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.
☐	**Refrigerant charge** The amount of refrigerant to be added to the unit shall be written in the logbook. Add the total amount of refrigerant to the refrigerant charge label.
☐	**Installation of indoor units** Check that the units are properly installed.
☐	**Installation of capacity up unit** Check that the unit is properly installed, if applicable.
☐	**Installation date and field setting** Be sure to keep record of the installation date in the logbook.

20.4 About the system test run

Make sure to carry out the system test operation after the first installation.

The procedure below describes the test operation of the complete system.

NOTICE

If a capacity up unit is installed, conduct its test run AFTER the test run of the outdoor unit.

20.5 To perform a test run (7-segment display)

To perform a test run of the outdoor unit

Applicable for LRYEN10*.

1. Check that all the stop valves of the outdoor unit are fully open: gas and liquid stop valves on both refrigeration and air conditioner side.
2. Check that all electrical components and refrigerant piping is installed correctly, for the indoor units, outdoor unit, and (if applicable) capacity up unit.

3 Turn ON the power supply of all units: the indoor units, outdoor unit and (if applicable) the capacity up unit.

4 Wait for about 10 minutes until the communication between the outdoor unit and indoor units is confirmed. The 7-segment display is blinking during the communication test:

- If communication is confirmed, the display will be OFF.
- If communication is not confirmed, an error code will be displayed on the remote controller of the indoor units. See "23.3.1 Error codes: Overview" [▸ 144].

5 Turn ON the operation switch of the outdoor unit. The compressors and fan motors start to operate.

6 Turn ON the remote controller of the air conditioner. See the operation manual of the indoor unit for more information about the temperature settings.

7 Check that the unit functions without error codes. See "20.5.1 Test run checks" [▸ 135].

8 Check that the showcases and blower coils cool correctly.

To perform a test run of the capacity up unit

Applicable for LRNUN5*.

Prerequisite: The refrigeration circuit of the outdoor unit is operating in a stable condition.

1 Turn ON the operation switch of the capacity up unit.

2 Wait for about 10 minutes (after power supply ON) until the communication between the outdoor unit and the capacity up unit is confirmed. The 7-segment display is blinking during the communication test:

- If communication is confirmed, the display will be OFF and the compressors and fans start operating.
- If communication is not confirmed, an error code will be displayed on the remote controller of the indoor units. See "23.3.1 Error codes: Overview" [▸ 144].

3 Check that the unit functions without error codes. See "20.5.1 Test run checks" [▸ 135].

4 Check that the showcases and blower coils cool correctly.

20.5.1 Test run checks

Check visually

Check the following:

- Showcases and blower coils are blowing cold air.
- Air conditioners are blowing hot or cold air.
- The temperature of the refrigerated room is dropping.
- There is no short circuit in the refrigeration room.
- The compressor does not switch on and off in less than 10 minutes.

Check error code

Check the remote controller of the indoor units.

The remote controller displays ...	Description
Room temperature	The remote controller operates correctly.
Error code	See "23.3.1 Error codes: Overview" [▶ 144].
Nothing	Check that: ▪ Power supply of indoor unit is turned ON. ▪ The cable of the power supply cable is not broken and connected correctly. ▪ The cable of the remote controller (indoor unit) is not broken and connected correctly. ▪ Fuses and circuit breakers on the indoor unit PCB did not trip.

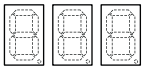
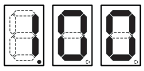
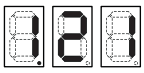
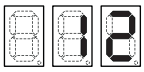
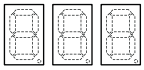
Operation parameters

For a stable operation of the unit, each of the following parameters should be in its range.

Parameter	Range	Root cause when out of range	Countermeasure
Suction superheat (refrigeration)	≥10 K	Incorrect selection of expansion valve at refrigeration side.	Set the correct target super heat (SH) value of showcase or blower coil.
Suction temperature (refrigeration)	≤18°C	Lack of amount of refrigerant.	Charge additional refrigerant[(a)].
		Incorrect selection of expansion valve at refrigeration side.	Set the correct target super heat (SH) value of showcase or blower coil.
Subcool	≥2 K	Lack of amount of refrigerant in outdoor unit (in case of high suction temperature, ≥18°C).	Charge additional refrigerant[(a)].
(if applicable) Liquid temperature of the capacity up unit	≤5°C	Lack of amount of refrigerant in outdoor unit (in case of high suction temperature, ≥18°C).	Charge additional refrigerant[(a)].

[(a)] Charge additional refrigerant until all parameters are within their range. See "17 Charging refrigerant" [▶ 119].

Check operation parameters

Action	Push button	7-segment display
Check that the 7-segment display is OFF. This is the initial condition after the communication has been confirmed. To return to the initial state of the 7-segment display, push BS1 once, or leave the unit as is for at least 2 hours.	—	
Push BS1 once and shift to the parameter indication mode.	 BS1 BS2 BS3	The indication will change: 
Push BS2 a number of times, depending on the indication you want to confirm: ▪ Suction superheat (refrigeration): 21 times ▪ Suction temperature (refrigeration): 9 times ▪ Subcool: 27 times To return to the initial state, for example if you pushed a wrong number of times, push BS1 once.	 BS1 BS2 BS3	The last 2 digits indicate the number of times you pushed. For example, you want to confirm suction superheat: 
Push BS3 once, and indicate each of the selected parameters.	 BS1 BS2 BS3	For example, 7-segment displays 12 if suction superheat is 12. 
Push BS1 once to return to the initial state.	 BS1 BS2 BS3	

Check defrosting

Check if the indoor unit starts defrosting if the defrosting setting is applied.

CAUTION

ALWAYS turn off the operation switch BEFORE turning off the power supply.

20.5.2 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.

20.6 Operating the unit

Once the unit is installed and test operation of outdoor unit and indoor units 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.

20.7 Logbook

In accordance with the applicable legislation, the installer must provide a logbook upon installation of the system. The logbook shall be updated following any maintenance or repair of the system. In Europe, EN378 provides the necessary guidance for this logbook.

Content of the logbook

The following information must be provided:

- Details of the maintenance and repair works
- Quantities and kind of (new, reused, recycled, reclaimed) refrigerant which have been charged on each occasion
- Quantities of refrigerant which have been transferred from the system on each occasion
- Results of any analysis of a reused refrigerant
- Source of reused refrigerant
- Changes and replacements of components of the system
- Results of all periodic routine tests
- Significant periods of non-use

Furthermore, you can add:

- 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

Location of the logbook

The logbook shall either be kept in the machinery room, or the data shall be stored digitally by the operator with a printout in the machinery room, in which case the information shall be accessible to the competent person when servicing or testing.

21 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.

22 Maintenance and service

In this chapter

22.1 Maintenance safety precautions

DANGER: RISK OF ELECTROCUTION

DANGER: RISK OF BURNING/SCALDING

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.

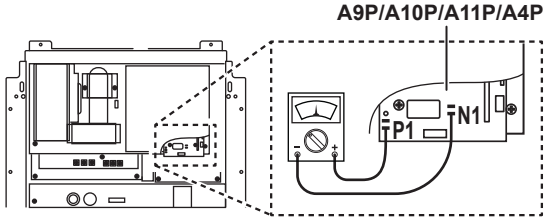
NOTICE: Risk of electrostatic discharge

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.

22.2 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.



A9P Outdoor unit, switchbox left
A10P Outdoor unit, switchbox middle
A11P Outdoor unit, switchbox right
A4P Capacity up unit, switchbox

3 To prevent damaging the PCB, touch a non-coated metal part to eliminate static electricity before pulling out or plugging in connectors.

4 Pull out junction connectors 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.)

Model	Junction connectors for fan motors
Outdoor unit	X1A, X2A, X3A, X4A, X5A, X6A
Capacity up unit	X1A, X2A

5 After the service is finished, plug the junction connector back in. Otherwise the malfunction code E7 will be displayed and normal operation will NOT be performed.

For details, see the wiring diagram labelled on the back of the service cover.

Also see "Label about servicing switch box" [▸ 50].

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.

22.3 To release refrigerant

Refrigerant R744 can be released into the atmosphere. You do not have to recover it.

DANGER: RISK OF EXPLOSION

Pump down – Refrigerant leakage

NEVER pump down the system. **Possible consequence:** If more than 5.2 kg is trapped in the unit this can cause a release of refrigerant via the safety valve. Also, when pumping down during a leakage self-combustion and explosion of the compressor can happen because of air going into the operating compressor.

CAUTION

The set pressure of the liquid receiver safety valve can be 90 bar gauge ±3% or 86 bar gauge ±3%, depending on the safety valve present in your unit. Confirm the set pressure by checking the safety valve body. If the refrigerant temperature is ≥31°C, the safety valve might be activated. When you close the stop valves, ALWAYS and REGULARLY check the pressure in the circuit and avoid that the safety valve is activated.

22.3.1 To release refrigerant using the service ports

For LRYEN*

1 Turn OFF the operation switch of LRYEN*.

2 Turn OFF the power supply of LRYEN*.

3 Make sure the service ports are closed. Install a pressure hose to service ports SP1, SP2, SP3 and SP5. Check that the hoses are properly fixed and that they lead outside.

4 Use a magnet to manually open expansion valve Y1E.

CAUTION

It is mandatory to open expansion valve Y1E while releasing refrigerant. If not open, refrigerant will remain inside the unit.

INFORMATION

ONLY in case the MFG.DATE is 2023 or later.

You can also use field setting [2-21] to open Y1E, instead of opening Y1E manually using a magnet. For more information about how to set field setting [2-21] of the outdoor unit, see "19.1.5 To set field settings" [▸ 130].

5 Make sure all stop valves are fully open. See "15.2.3 To handle the stop valve" [▸ 81].

6 Fully open SP2 to release the liquid refrigerant. See "15.2.5 To handle the service port" [▸ 84].

7 After ALL liquid refrigerant is released via SP2, fully open SP1, SP3 and SP5 to release the remaining refrigerant from the unit. See "15.2.5 To handle the service port" [▸ 84].

NOTICE

All refrigerant MUST be released before you continue maintenance and service activities.

For LRNUN5*

1 Turn OFF the operation switch of LRNUN5*.

2 Turn OFF the power supply of LRNUN5*.

3 Make sure the service ports are closed. Install a pressure hose to service ports SP1 and SP2. Check that the hoses are properly fixed and that they lead outside.

4 Fully open SP2 to release the liquid refrigerant. See "15.2.5 To handle the service port" [▸ 84].

5 After ALL liquid refrigerant is released via SP2, fully open SP1 to release the remaining refrigerant from the unit. See "15.2.5 To handle the service port" [▸ 84].

NOTICE

All refrigerant MUST be released before you continue maintenance and service activities.

23 Troubleshooting

In this chapter

23.1 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.

23.2 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.

23.3 Solving problems based on error codes

If the unit runs into a problem, the user interface displays an error code. It is important to understand the problem and to take measures before resetting an error code. This should be done by a licensed installer or by your local dealer.

This chapter gives you an overview of all possible error codes and their descriptions as they appear on the user interface.

INFORMATION

See the service manual for:

- The complete list of error codes
- A more detailed troubleshooting guideline for each error

23.3.1 Error codes: Overview

In case other error codes appear, contact your dealer.

Main code	LRYEN10*	LRNUN5*	Cause	Solution
E2	O	O	Electrical leakage	Correct the field wiring and connect ground wiring.
E3 E4	O	—	Stop valves are closed.	Open the stop valve on both the gas and liquid side.
E7	O	O	Malfunction of fan motor For LRYEN10*: ▪ (M1F) - A9P (X1A) ▪ (M2F) - A10P (X1A) ▪ (M3F) - A11P (X1A) For LRNUN5*: ▪ (M1F) - A4P (X1A)	Check connection on PCB or actuator.
E9	O	O	Malfunction of electronic expansion valve coil For LRYEN10*: ▪ (Y7E) - A12P (X8A) ▪ (Y4E) - A12P (X9A) ▪ (Y14E) - A12P (X10A) ▪ (Y3E) - A1P (X21A) ▪ (Y8E) - A1P (X22A) ▪ (Y2E) - A1P (X23A) ▪ (Y1E) - A1P (X25A) ▪ (Y13E) - A1P (X26A) ▪ (Y5E) - A2P (X21A) ▪ (Y16E) - A2P (X22A) ▪ (Y17E) - A2P (X23A) For LRNUN5*: ▪ (Y3E) - A1P (X21A) ▪ (Y1E) - A1P (X22A) ▪ (Y4E) - A1P (X23A) ▪ (Y2E) - A1P (X24A)	Check connection on PCB or actuator.
F4	O	—	Wrong selection of cooling load (including the expansion valves)	Reselect the cooling load, including the expansion valve.

Main code	LRYEN10*	LRNUN5*	Cause	Solution
H9	O	O	Malfunction of ambient temperature sensor For LRYEN10* and LRNUN5*: ▪ (R1T) - A1P (X18A)	Check connection on PCB or actuator.
J3	O	O	Malfunction of discharge/ compressor body temperature sensor For LRYEN10*: ▪ (R31T) - A1P (X19A) ▪ (R32T) - A1P (X33A) ▪ (R33T) - A2P (X19A) ▪ (R91T) - A1P (X19A) ▪ (R92T) - A1P (X33A) ▪ (R93T) - A2P (X19A) For LRNUN5*: ▪ (R3T) - A1P (X19A) ▪ (R9T) - A1P (X19A)	Check connection on PCB or actuator.
J5	O	O	Malfunction of suction temperature sensor For LRYEN10*: ▪ (R21T) - A1P (X29A) ▪ (R22T) - A1P (X23A) ▪ (R23T) - A2P (X29A) For LRNUN5*: ▪ (R2T) - A1P (X29A)	Check connection on PCB or actuator.
J6	O	O	Malfunction of the gas cooler outlet temperature thermistor For LRYEN10* and LRNUN5*: ▪ (R4T) – A1P (X35A)	Check connection on PCB or actuator.
J7	O	O	Malfunction of the economizer outlet temperature thermistor For LRYEN10*: ▪ (R8T) – A1P (X30A) For LRNUN5*: ▪ (R6T) – A1P (X35A)	Check connection on PCB or actuator
J8	O	O	Malfunction of the liquid (after sub-cool) temperature thermistor For LRYEN10*: ▪ (R7T) – A1P (X30A) For LRNUN5*: ▪ (R7T) – A1P (X35A) ▪ (R5T) – A1P (X35A)	Check connection on PCB or actuator.

Main code	LRYEN10*	LRNUN5*	Cause	Solution
JA	O	O	Malfunction of high pressure sensor For LRYEN10*: ▪ (S1NPH) – A2P (X31A) For LRNUN5*: ▪ (S1NPH) – A1P (X31A)	Check connection on PCB or actuator.
JC	O	O	Malfunction of low pressure sensor For LRYEN10*: ▪ (S1NPL) – A1P (X31A) ▪ (S2NPL) – A1P (X32A) ▪ (S1NPM) – A12P (X31A) ▪ (S2NPM) – A2P (X32A) For LRNUN5*: ▪ (S1NPL) – A1P (X32A) ▪ (S2NPM) – A6P (X31A)	Check connection on PCB or actuator.
L4	O	O	▪ Heat exchanger of outdoor unit is blocked. ▪ The outdoor temperature is above the maximum operating temperature.	▪ Check if any obstacles block the heat exchanger and remove them. ▪ Operate the unit only within the temperature operation range.
L8	O	O	Supply voltage dropped.	▪ Check the power supply. ▪ Check the wiring size and length of the power supply. They must be according to the specifications.
LC	O	O	Transmission outdoor unit – inverter: INV1/FAN1 transmission trouble	Check connection.
P1	O	O	Unbalanced power supply voltage	Check the power supply.
U1	O	O	Lost phase in power supply	Check the connection of the power supply cable.
U2	O	O	Insufficient supply voltage	Check the power supply.
U4	—	O	Communication error to outdoor unit or indoor unit	Check the connection of the communication cables upstream of indoor units (error displayed on remote controller) or outdoor unit.
U9	O	—	Communication error to indoor unit or capacity up unit	Check the connection of the communication cables downstream of indoor units (error displayed on remote controller).
UA	O	—	Wrong combination of outdoor unit with indoor units	▪ Check the number of connected indoor units. ▪ Check if an indoor unit is installed that is not a possible combination.

Main code	LRYEN10*	LRNUN5*	Cause	Solution
UF	O	—	Replaced all air conditioner indoor units after confirmed communication	Check the communication cable and conduct operation after all communication cables are corrected.
UH	O	—	Added any air conditioner indoor units after confirmed communication	If an air conditioner indoor unit is installed: - If you have changed the power supply cable or communication cable: turn the outdoor unit operation switch OFF but keep power supply ON. - Then push BS3 on the A1P PCB for more than 5 seconds.

NOTICE

After turning ON the operation switch, wait at least 1 minute before turning OFF the power supply. Electrical leakage detection is performed shortly after the compressor starts. Turning off the power supply during this check will result in an incorrect detection.

24 Disposal

Before disposal, remove all refrigerant. For more information, see "22.3.1 To release refrigerant using the service ports" [▸ 141].

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.

25 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).

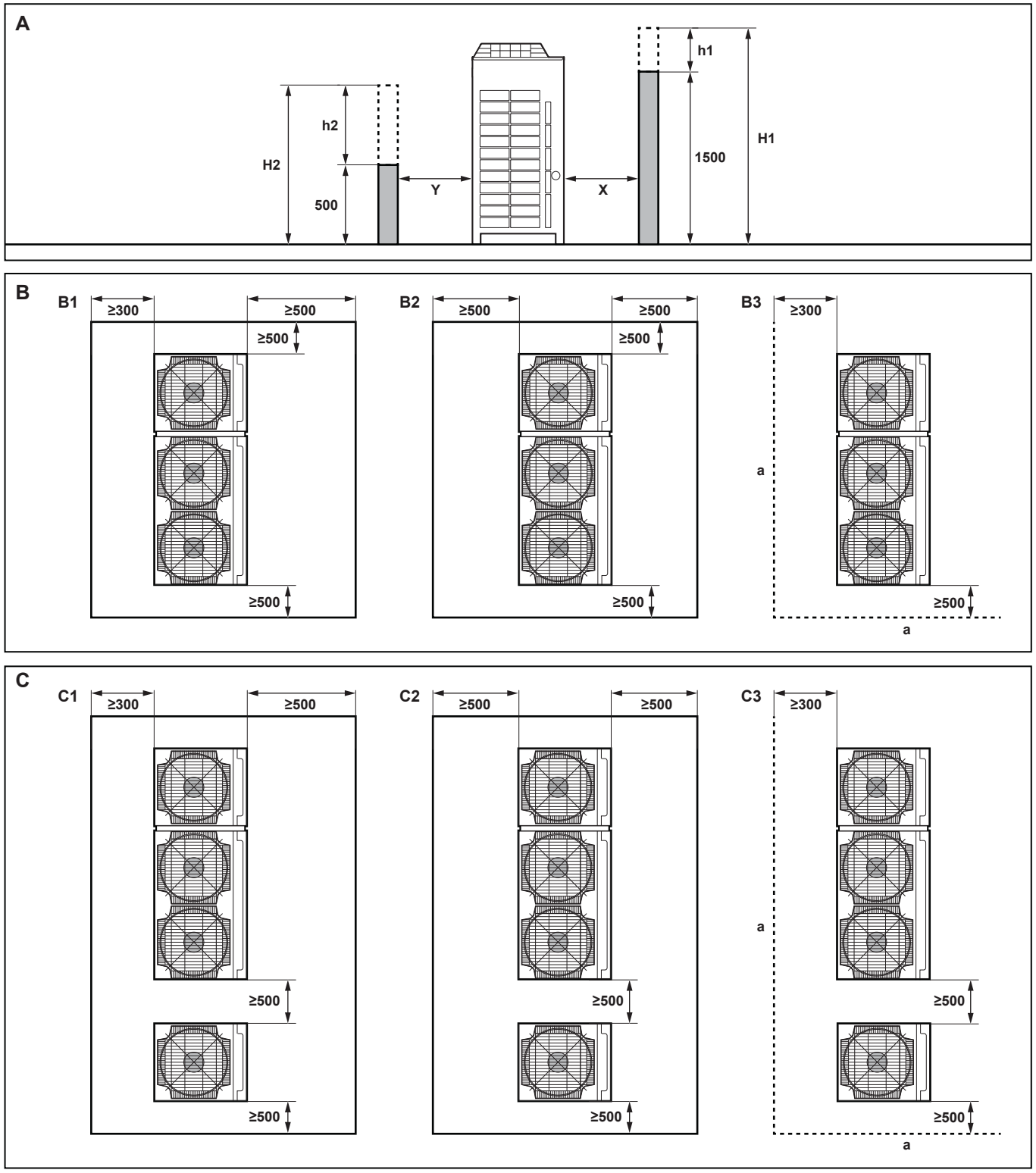
In this chapter

25.1 Service space: Outdoor unit

Make sure the space around the unit is adequate for servicing and the minimum space for air inlet and air outlet is available (refer to the figure below and choose one of the possibilities).

- If there are more units to be installed than shown in the figure below, make sure there are no short circuits.
- Make sure there is enough space around the unit(s) for the refrigerant piping.
- If the conditions for installation do not comply with the following figure, contact your dealer.

(mm)



Item	Description
A	Maintenance space
B	Possible patterns with installation spaces in case of a single outdoor unit[(a)(b)(c)(d)(e)(f)]
C	Possible patterns with installation spaces in case of an outdoor unit connected to a capacity up unit[(a)(b)(c)(d)(e)(f)]
h1	H1 (actual height)–1500 mm

Item	Description
h2	H2 (actual height)–500 mm
X	Front side = 500 mm+≥h1/2
Y (for patterns B)	Air inlet side = 300 mm+≥h2/2
Y (for patterns C)	Air inlet side = 100 mm+≥h2/2

[a] Wall height front side: ≤1500 mm.
[b] Wall height air inlet side: ≤500 mm.
[c] Wall height other sides: no limit.
[d] Calculate h1 and h2 as shown in the figure. Add h1/2 for maintenance space to the front side. Add h2/2 for maintenance space to the back side (if wall height exceeds above values).
[e] B1: pattern for regions without heavy snowfall.

B2: pattern for regions with heavy snowfall.

B3: no limit to wall height.
[f] C1: pattern for regions without heavy snowfall.

C2: pattern for regions with heavy snowfall.

C3: no limit to wall height.

INFORMATION

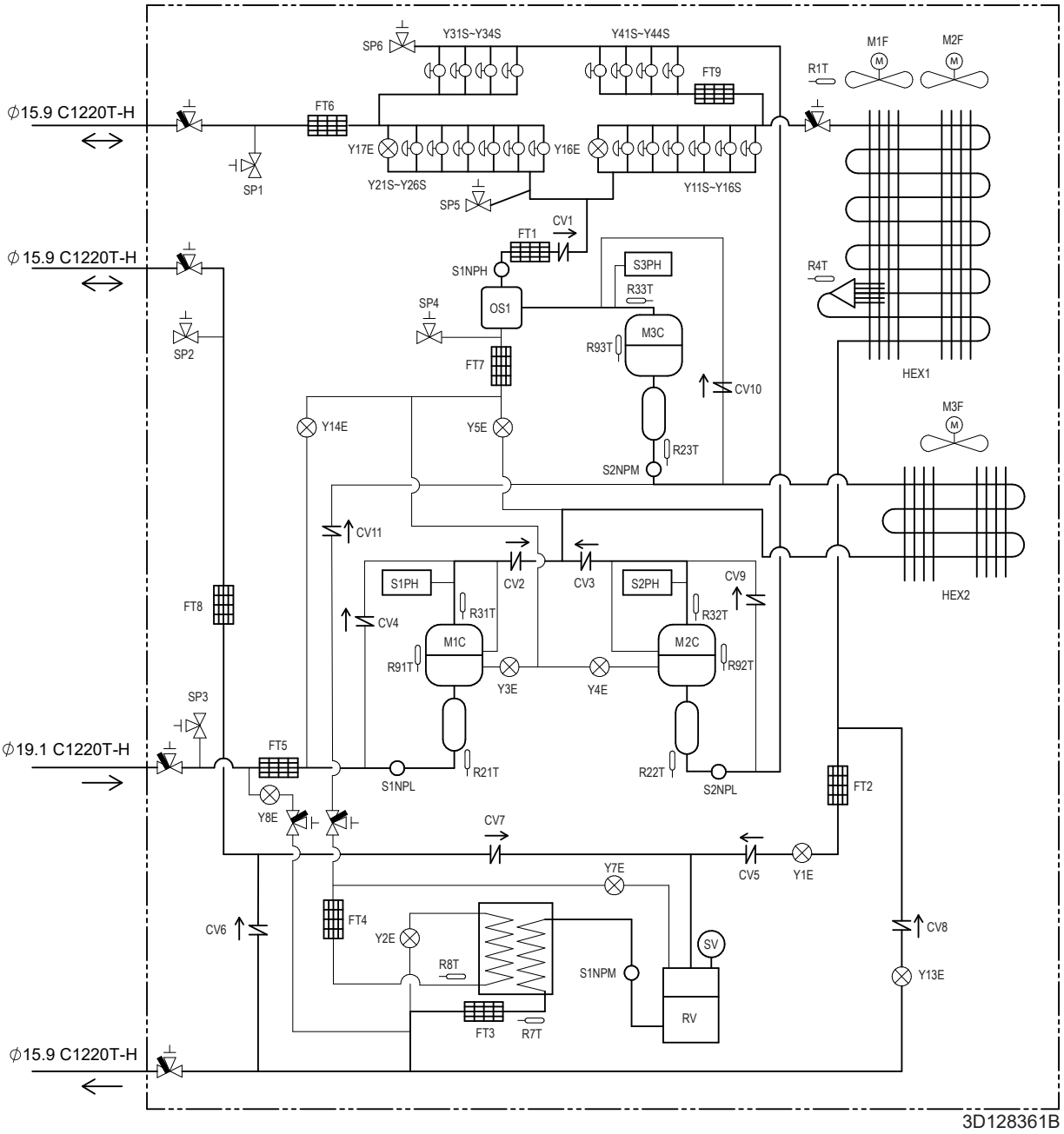
The service space dimensions in above figure are based on cooling operation at 32°C ambient temperature (standard conditions).

INFORMATION

Further specifications can be found in the technical engineering data.

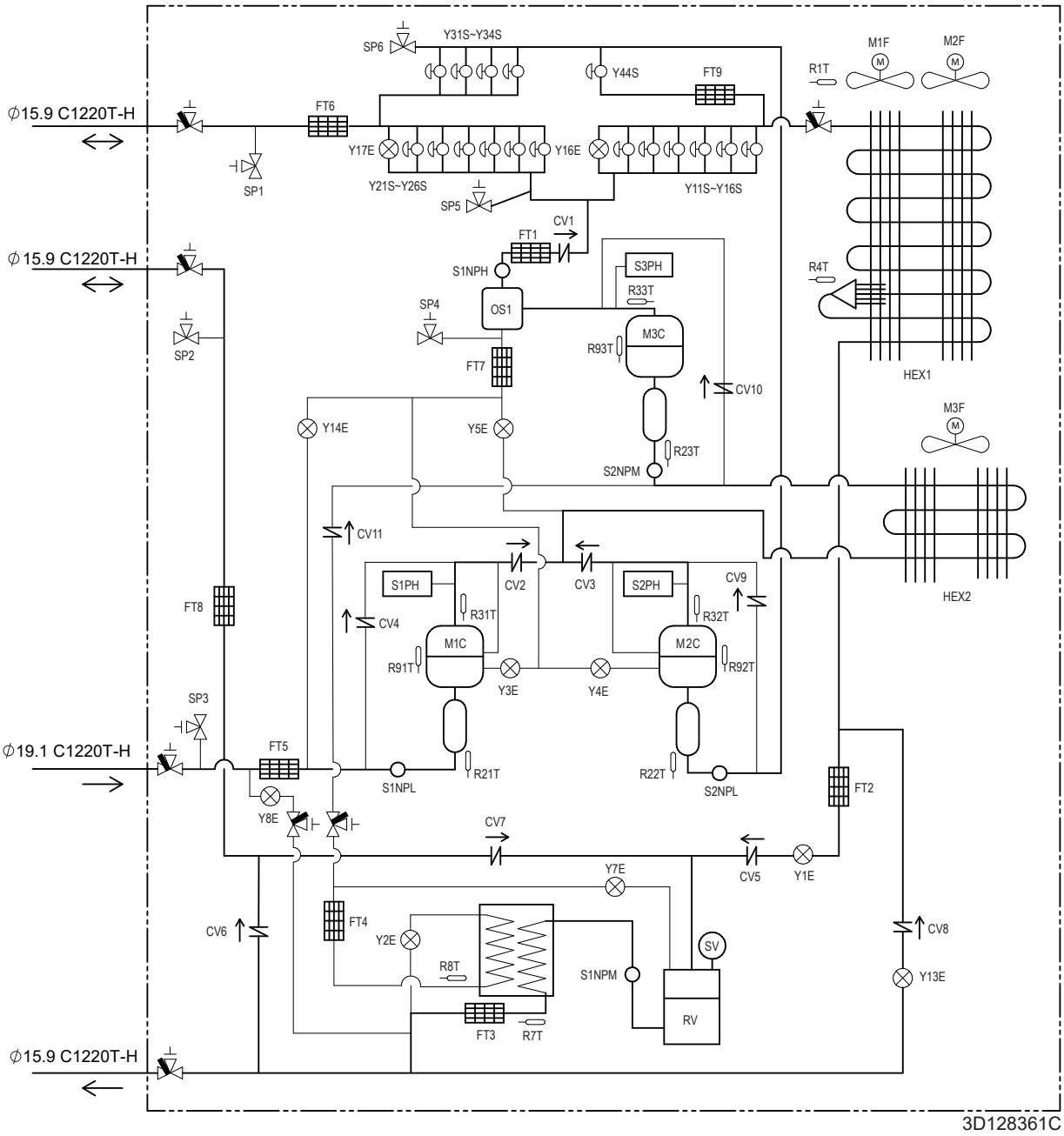
25.2 Piping diagram: Outdoor unit

Units till serial number 2999999



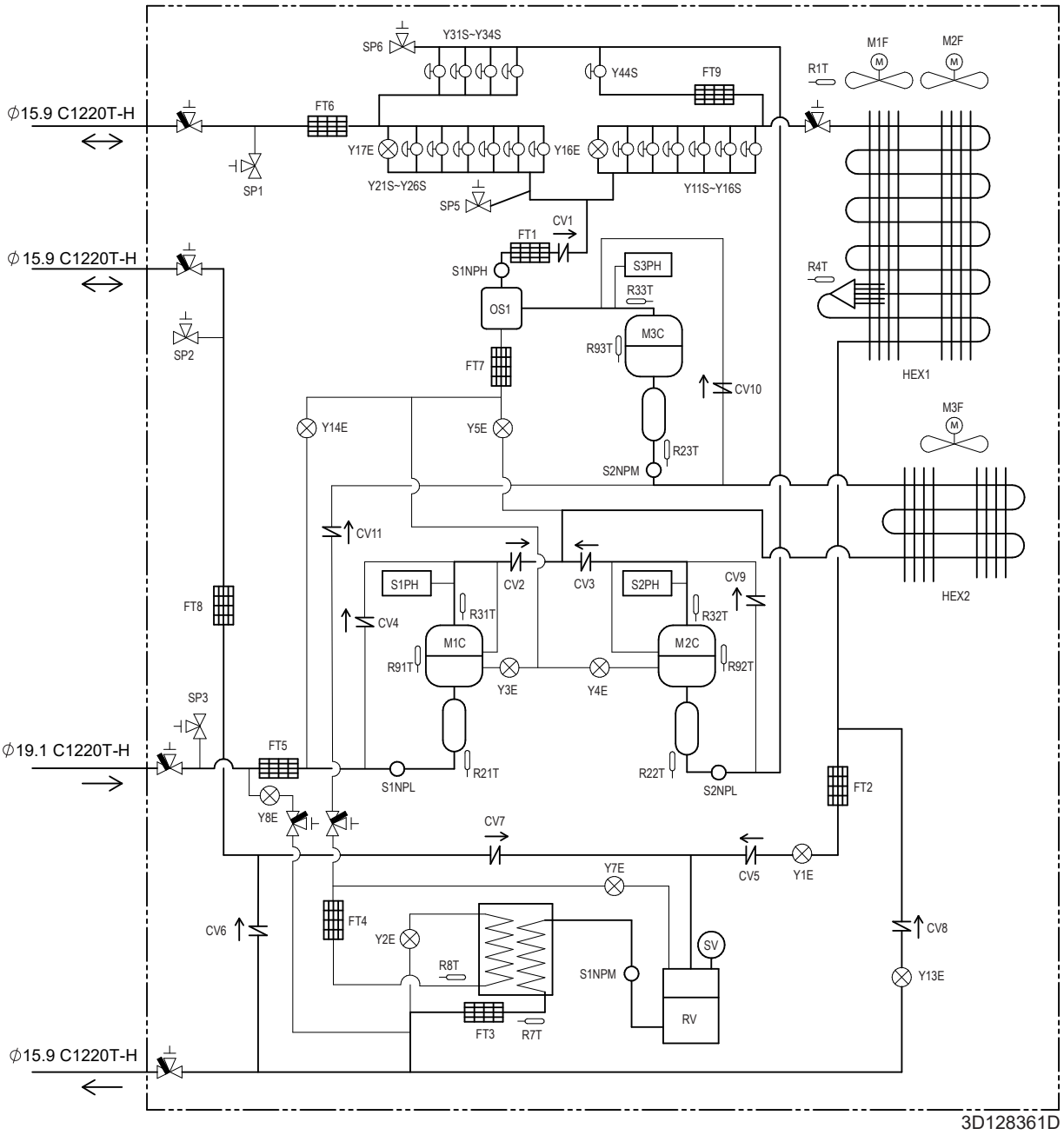
- Pressure sensor
- High pressure switch
- Check valve
- Stop valve
- Service port
- Safety valve
- Electronic expansion valve
- Solenoid valve
- Filter
- Thermistor
- Compressor with accumulator
- Heat exchanger
- Oil separator
- Liquid receiver
- Plate heat exchanger
- Distributor
- Oil and injection pipe
- Refrigerant pipe
- Propeller fan

Units from serial number 3000000 till 3999999



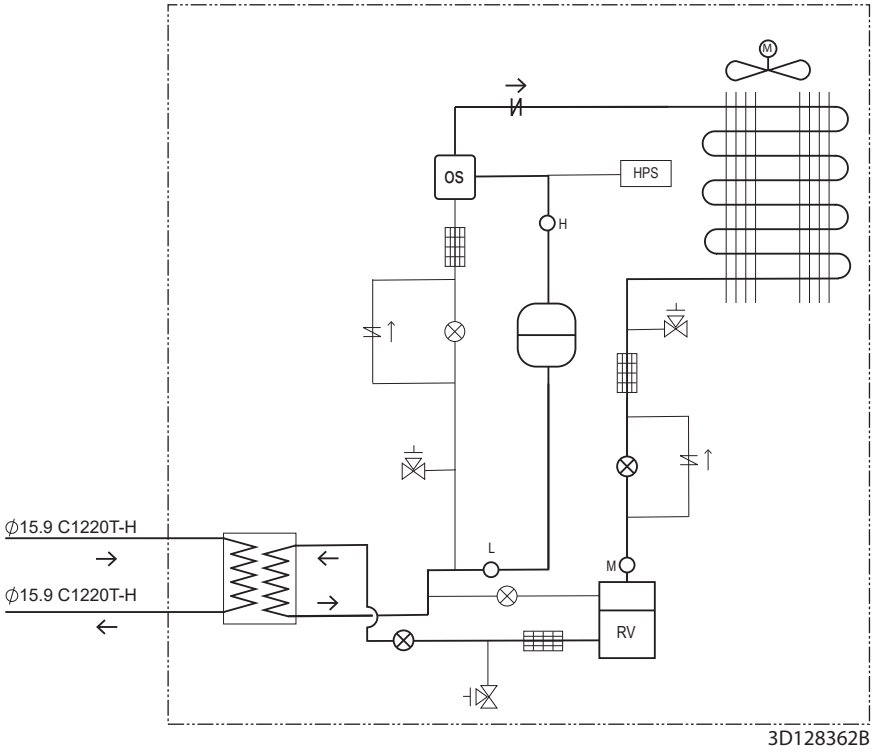
- Pressure sensor
- High pressure switch
- Check valve
- Stop valve
- Service port
- Safety valve
- Electronic expansion valve
- Solenoid valve
- Filter
- Thermistor
- Compressor with accumulator
- Heat exchanger
- Oil separator
- Liquid receiver
- Plate heat exchanger
- Distributor
- Oil and injection pipe
- Refrigerant pipe
- Propeller fan

Units from serial number 4000000



- Pressure sensor
- High pressure switch
- Check valve
- Stop valve
- Service port
- Safety valve
- Electronic expansion valve
- Solenoid valve
- Filter
- Thermistor
- Compressor with accumulator
- Heat exchanger
- Oil separator
- Liquid receiver
- Plate heat exchanger
- Distributor
- Oil and injection pipe
- Refrigerant pipe
- Propeller fan

25.3 Piping diagram: Capacity up unit



○	Pressure sensor		Compressor with accumulator
HPS	Pressure switch		Plate heat exchanger
↑≤	Check valve		Heat exchanger
	Service port	OS	Oil separator
⊗	Electronic expansion valve	RV	Liquid receiver
	Filter		Refrigerant pipe
	Propeller fan		Oil and injection pipe

25.4 Wiring diagram: Outdoor unit

The wiring diagram is delivered with the unit:

- For the outdoor unit: At the inside of the **left** switch box cover.
- For the capacity up unit: At the inside of the switch box cover.

Outdoor unit

Notes:

1	This wiring diagram applies only to the outdoor unit.	
2	⊏■■■⊐	Field wiring
3	□□□□	Terminal block
	⊠	Connector
	-o-	Terminal
	⏚	Protective earth (screw)
4	S1S is factory set to OFF. Set to ON or REMOTE to operate.	
5	Use a voltage-free contact for microcurrent (≤1 mA, 12 V DC). For more information about the remote switches, see details in "16.2.1 Low voltage wiring – Outdoor unit" [▸ 111].	
6	Output (caution, warning, run, operation) is 220-240 V AC, with a maximum load of 0.5 A.	
7	For more information about the BS1~BS3 push buttons and the DS1+DS2 DIP switches, see "19.1 Making field settings" [▸ 127].	
8	Do not operate the unit by short-circuiting protection devices (S1PH, S2PH and S3PH).	
9	Colours:	
	BLK	Black
	RED	Red
	BLU	Blue
	WHT	White
	GRN	Green
	YLW	Yellow
	PNK	Pink

Legend:

A1P	Printed circuit board (main 1)
A2P	Printed circuit board (main 2)
A3P	Printed circuit board (M1C)
A4P	Printed circuit board (M2C)
A5P	Printed circuit board (M3C)
A6P	Printed circuit board (noise filter) (M1C)
A7P	Printed circuit board (noise filter) (M2C)
A8P	Printed circuit board (noise filter) (M3C)

A9P	Printed circuit board (M1F)
A10P	Printed circuit board (M2F)
A11P	Printed circuit board (M3F)
A12P	Printed circuit board (sub)
A13P	Printed circuit board (ABC I/P 1)
A14P	Printed circuit board (earth leakage detector)
E1HC	Crankcase heater (M1C)
E2HC	Crankcase heater (M2C)
E3HC	Crankcase heater (M3C)
L1R	Reactor (A3P)
L2R	Reactor (A4P)
L3R	Reactor (A5P)
M1C	Motor (compressor) (INV1)
M2C	Motor (compressor) (INV2)
M3C	Motor (compressor) (INV3)
M1F	Motor (fan) (FAN1)
M2F	Motor (fan) (FAN2)
M3F	Motor (fan) (FAN3)
R1T	Thermistor (air) (A1P)
R21T	Thermistor (M1C suction)
R22T	Thermistor (M2C suction)
R23T	Thermistor (M3C suction)
R31T	Thermistor (M1C discharge)
R32T	Thermistor (M2C discharge)
R33T	Thermistor (M3C discharge)
R4T	Thermistor (de-icer)
R7T	Thermistor (liquid)
R8T	Thermistor (sub-cool heat exchanger outlet)
R91T	Thermistor (M1C body)
R92T	Thermistor (M2C body)
R93T	Thermistor (M3C body)
S1NPH	High pressure sensor
S1NPM	Medium pressure sensor (liquid)
S2NPM	Medium pressure sensor (M3C suction)
S1NPL	Low pressure sensor (refrigeration)
S2NPL	Low pressure sensor (air conditioner)
S1PH	Pressure switch (high pressure protection) (M1C)
S2PH	Pressure switch (high pressure protection) (M2C)

S3PH	Pressure switch (high pressure protection) (M3C)
S1S	Operation switch (REMOTE/OFF/ON)
Y11S~Y16S	Solenoid valve (discharge, cooling or defrost)
Y21S~Y26S	Solenoid valve (discharge, heating)
Y31S~Y34S	Solenoid valve (suction, cooling)
Y41S~Y44S **Note**: units till serial number 2999999	Solenoid valve (outdoor unit (heat exchanger coil) evaporation)
Y44S **Note**: units from serial number 3000000	Solenoid valve (outdoor unit (heat exchanger coil) evaporation)
Y1E	Electronic expansion valve (transcritical)
Y2E	Electronic expansion valve (economiser)
Y3E	Electronic expansion valve (oil return) (M1C)
Y4E	Electronic expansion valve (oil return) (M2C)
Y5E	Electronic expansion valve (oil return) (M3C)
Y7E	Electronic expansion valve (gas relief)
Y8E	Electronic expansion valve (liquid injection)
Y13E	Electronic expansion valve (outdoor evaporation)
Y14E	Electronic expansion valve (suction oil return) (M1C)
Y16E	Electronic expansion valve (discharge, cooling or defrost)
Y17E	Electronic expansion valve (discharge, heating)

Capacity up unit

Notes:

1	This wiring diagram applies only to the capacity up unit.	
2		Field wiring
3		Terminal block
		Connector
		Terminal
		Protective earth (screw)
4	S1S is factory set to OFF. Set to ON or REMOTE to operate.	
5	Use a voltage-free contact for microcurrent (≤1 mA, 12 V DC). For more information about the remote switches, see details in "16.3.1 Low voltage wiring – Capacity up unit" [▸ 115].	
6	Output (caution, warning, run, operation) is 220-240 V AC, with a maximum load of 0.5 A.	
7	For more information about the BS1~BS3 push buttons and the DS1+DS2 DIP switches, see "19.1 Making field settings" [▸ 127].	

8	Colours:	
	BLK	Black
	RED	Red
	BLU	Blue
	WHT	White
	GRN	Green
	YLW	Yellow

Legend:

A1P	Printed circuit board (main)
A2P	Printed circuit board (M1C)
A3P	Printed circuit board (noise filter) (M1C)
A4P	Printed circuit board (M1F)
A5P	Printed circuit board (ABC I/P 1)
A6P	Printed circuit board (sub)
BS1~BS3	Push buttons (mode, set, return)
C503, C506	Capacitor (A2P)
C507	Film capacitor (A2P)
DS1, DS2	DIP switch (A1P)
E1HC	Crankcase heater (M1C)
F1U, F2U	Fuse (T 6.3 A 250 V) (A1P)
F1U	Fuse (A6P)
F101U	Fuse (A4P)
F3U, F4U	Fuse (B 1 A 250 V)
F401U, F403U	Fuse (A3P)
F601U	Fuse (A2P)
HAP	Light-emitting diode (service monitor is green) (A1P, A2P, A4P, A6P)
K1R, K2R, K9R~K12R	Magnetic relay (A1P)
K3R	Magnetic relay (A2P)
L1R	Reactor (A2P)
M1C	Motor (compressor) (INV1)
M1F	Motor (fan) (FAN1)
PS	Switching power supply (A1P, A2P, A6P)
Q1LD	Earth leakage detector (A1P)
R300	Resistor (A2P)
R10	Resistor (current sensor) (A4P)
R1T	Thermistor (air) (A1P)
R2T	Thermistor (M1C suction)

R3T	Thermistor (M1C discharge)
R4T	Thermistor (de-icer)
R5T	Thermistor (liquid separator outlet)
R6T	Thermistor (plate heat exchanger outlet)
R7T	Thermistor (liquid pipe)
R9T	Thermistor (M1C body)
S1NPH	High pressure sensor
S1NPL	Low pressure sensor (air conditioner)
S1NPM	Medium pressure sensor
S1PH	Pressure switch (high pressure protection) (M1C)
S1S	Operation switch (REMOTE/OFF/ON)
T1A	Current sensor (A1P)
V1R	Power module (A2P, A4P)
V1D	Diode (A2P)
X1A, X2A	Connector (M1F)
X3A	Connector (A1P: X31A)
X4A	Connector (A1P: X32A)
X5A	Connector (A6P: X31A)
X1M	Terminal block (power supply)
X2M	Terminal block
X3M	Terminal block (remote switch)
X4M	Terminal block (compressor)
Y1E	Electronic expansion valve
Y2E	Electronic expansion valve
Y3E	Electronic expansion valve
Y4E	Electronic expansion valve
Z1C~Z11C	Ferrite core
ZF	Noise filter (with surge absorber) (A3P)

26 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.

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