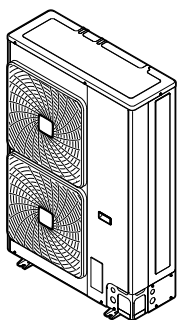




Installer and user reference guide

Air-cooled refrigeration condensing unit



LRMEQ3AY1
LRMEQ4AY1

Installer and user reference guide
Air-cooled refrigeration condensing unit

English

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1 General safety precautions

1.1 About the documentation


- The original documentation is written in English. All other languages are translations.
- 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 the installer reference guide must be performed by an authorized installer.


1.1.1 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**
Indicates a situation that could result in burning because of extreme hot or cold temperatures.

 **WARNING: FLAMMABLE MATERIAL**

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


 **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.

1.2 For the user

- If you are not sure how to operate the unit, contact your installer.
- 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 electric 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.

 **NOTICE**

- 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: the dismantling of the system, treatment of the refrigerant, of oil and of other parts must be done by an authorized installer and must comply with applicable legislation. Units must be treated at a specialized 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.

1 General safety precautions

- 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 specialized 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.

1.3 For the installer

1.3.1 General

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



NOTICE

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



WARNING

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



CAUTION

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



WARNING

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



DANGER: RISK OF BURNING

- 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

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

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



NOTICE

- 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.

1.3.2 Installation site

- Provide sufficient space around the unit for servicing and air circulation.
- Make sure the installation site withstands the unit's weight and vibration.
- 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.

1.3.3 Refrigerant

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



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.



WARNING

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



WARNING

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

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



WARNING

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



NOTICE

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



NOTICE

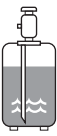

- To avoid compressor breakdown, do NOT charge more than the specified amount of refrigerant.
- When the refrigerant system is to be opened, refrigerant must be treated according to the applicable legislation.



WARNING

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

- In case re-charge is required, refer to the nameplate of the unit. It states the type of refrigerant and necessary amount.
- The unit is factory charged with refrigerant and depending on pipe sizes and pipe lengths some systems require additional charging of refrigerant.
- Only use tools exclusively for the refrigerant type used in the system, this to ensure pressure resistance and prevent foreign materials from entering into the system.
- Charge the liquid refrigerant as follows:

If	Then
A siphon tube is present (i.e., the cylinder is marked with "Liquid filling siphon attached")	Charge with the cylinder upright. 
A siphon tube is NOT present	Charge with the cylinder upside down. 

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



CAUTION

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

1.3.4 Brine

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



WARNING

The selection of the brine MUST be in accordance with the applicable legislation.



WARNING

Take sufficient precautions in case of brine leakage. If brine leaks, ventilate the area immediately and contact your local dealer.



WARNING

The ambient temperature inside the unit can get much higher than that of the room, e.g. 70°C. In case of a brine leak, hot parts inside the unit can create a hazardous situation.



WARNING

The use and installation of the application MUST comply with the safety and environmental precautions specified in the applicable legislation.

1.3.5 Water

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



NOTICE

Make sure water quality complies with EU directive 98/83 EC.

1.3.6 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 1 minute, 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, shall be installed in the fixed wiring.

2 About the documentation



WARNING

- ONLY use copper wires.
- Make sure the field wiring complies with the applicable legislation.
- 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 electric 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.



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 below.



- 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 metre away from televisions or radios to prevent interference. Depending on the radio waves, a distance of 1 metre may not be sufficient.



WARNING

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



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.

2 About the documentation

2.1 About this document

Target audience

Authorised installers + end users



INFORMATION

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

Documentation set

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

- **General safety precautions:**
 - Safety instructions that you must read before installing
 - Format: Paper (in the box of the outdoor unit)
- **Outdoor unit installation and operation manual:**
 - Installation and operation instructions
 - Format: Paper (in the box of the outdoor unit)
- **Installer and user reference guide:**
 - Preparation of the installation, technical specifications, reference data,...
 - Detailed step-by-step instructions and background information for basic and advanced usage
 - Format: Digital files on <http://www.daikineurope.com/support-and-manuals/product-information/>

Latest revisions of the supplied documentation may be available on the regional Daikin website or via your dealer.

The original documentation is written in English. All other languages are translations.

For the installer

3 About the box

3.1 Overview: About the box

This chapter describes what you have to do after the box with the outdoor unit is delivered on-site.

It contains information about:

- Unpacking and handling the units
- Removing the accessories from the units

Keep the following in mind:

- At delivery, the unit must be checked for damage. Any damage must be reported immediately to the carrier's claims agent.
- Bring the packed unit as close as possible to its final installation position to prevent damage during transport.
- When handling the unit, take into account the following:

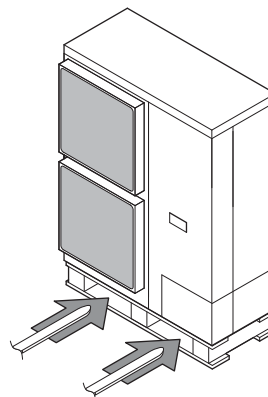


Fragile, handle the unit with care.



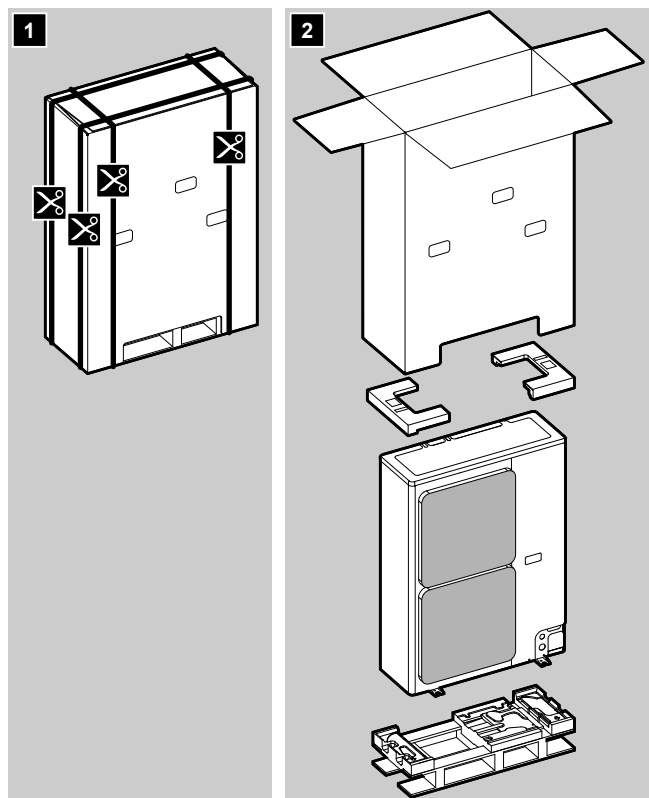
Keep the unit upright in order to avoid compressor damage.

- Choose on beforehand the path along which the unit is to be brought in.



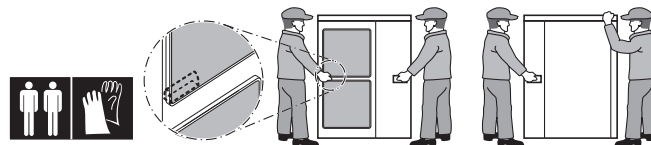
3.2 Outdoor unit

3.2.1 To unpack the outdoor unit



3.2.2 To handle the outdoor unit

Carry the unit slowly as shown:



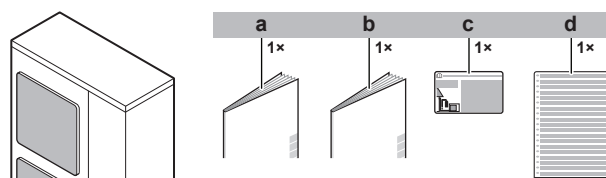
CAUTION

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

Forklift. As long as the unit remains on its pallet, you can also use a forklift.

3.2.3 To remove the accessories from the outdoor unit

- Remove the service cover. See "6.2.2 To open the outdoor unit" on page 13.
- Remove the accessories.



- a General safety precautions
- b Outdoor unit installation and operation manual
- c Fluorinated greenhouse gases label
- d Multilingual fluorinated greenhouse gases label

4 About the units

4.1 Overview: About the units

This chapter contains information about:

- Identification of the outdoor unit.
- Where the outdoor unit fits in the system layout.
- With which indoor units you can combine the outdoor units.

4.2 Identification



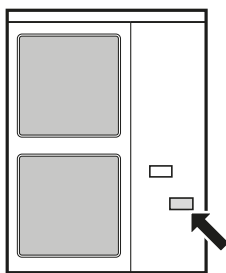
NOTICE

When installing or servicing several units at the same time, make sure NOT to switch the service panels between different models.

5 Preparation

4.2.1 Identification label: Outdoor unit

Location



Model identification

Example: LR ME Q 4 A Y1 [*]

Code	Explanation
LR	ZEAS condensing unit
ME	Medium temperature refrigeration
Q	Refrigerant R410A
3+4	Capacity class
A	Model series
Y1	Power supply
[*]	Minor model change indication

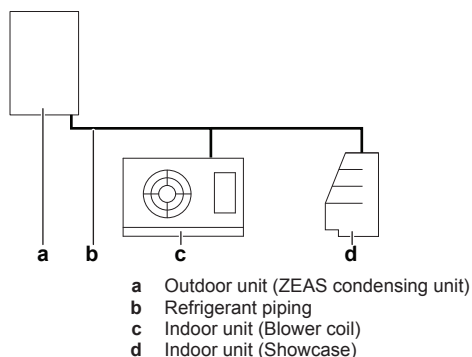
4.3 About the outdoor unit

This installation manual concerns the ZEAS condensing unit.

This unit is intended for outdoor installation and aimed for air to air cooling applications.

Specification	LRMEQ3+4
Capacity (cooling)	5.90~8.40 kW
Ambient design temperature (cooling)	-10~43°C DB

4.4 System layout



4.5 About the indoor units



NOTICE

To be sure your system setup (outdoor unit+indoor unit(s)) will work, you have to consult the latest technical engineering data for ZEAS condensing unit.

The ZEAS condensing unit can be combined with several types of third party indoor units and is intended for R410A use only.

When installing indoor units, mind the following:

- **Expansion valve.** Install an R410A mechanical thermostatic expansion valve on each indoor unit. Insulate the feeler block of the mechanical thermostatic expansion valve.

- **Solenoid valve.** Install an R410A solenoid valve (with an operating differential pressure of 3.5 MPa [35 bar] or more) on the primary side of the mechanical thermostatic expansion valve for each indoor unit.
- **Filter.** Install a filter on the primary side of the solenoid valve for each indoor unit. Determine the filter mesh count based on the size specified by the solenoid valve and the mechanical thermostatic expansion valve being used.
- **Refrigerant flow.** Route the path to the indoor unit heat exchanger so that the refrigerant flow is from top to bottom.
- **Multiple indoor units.** When installing multiple indoor units, install them at the same level. A combination of showcases and blower coils is allowed if they are installed on the same floor.
- **Defrosting type.** Use either off-cycle defrosting or electric heater defrosting models. Do NOT use hot-gas defrosting models.

4.5.1 About reusing existing indoor heat exchangers

In some cases you may reuse existing indoor heat exchangers, in other cases not.

Reuse not allowed

You may not reuse existing indoor heat exchangers in the following cases:

- When the design pressure is insufficient. (minimum design pressure = 2.5 MPa [25 bar])
- When the path to the heat exchanger has been routed so that the flow of refrigerant is from bottom to top.
- When the copper piping or fan is corroded.
- When the heat exchanger is contaminated. Foreign materials (including oils for fabrication) must be ≤30 mg/10 m.

Reuse allowed

In other cases than above, you may reuse existing indoor heat exchangers. However, if the old condensing unit did NOT use the same refrigerant (R410A) and the same oil (FVC68D) as the new one, you must clean the heat exchanger tubes to remove any residue.

If the old condensing unit did NOT use the same refrigerant (R410A) as the new one, make sure the mechanical thermostatic expansion valve is compatible with R410A.

5 Preparation

5.1 Overview: Preparation

This chapter describes what you have to do and know before going on-site.

It contains information about:

- Preparing the installation site
- Preparing the refrigerant piping
- Preparing the electrical wiring

5.2 Preparing installation 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.

Choose the installation location with sufficient place for carrying the unit in and out of the site.

5.2.1 Installation site requirements of the outdoor unit



INFORMATION

Also read the following requirements:

- General installation site requirements. See the "General safety precautions" chapter.
- Service space requirements. See the "Technical data" chapter.
- Refrigerant piping requirements (length, height difference). See further in this "Preparation" chapter.



CAUTION

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

This unit, both indoor and outdoor, is suitable for installation in a commercial and light industrial environment.



NOTICE

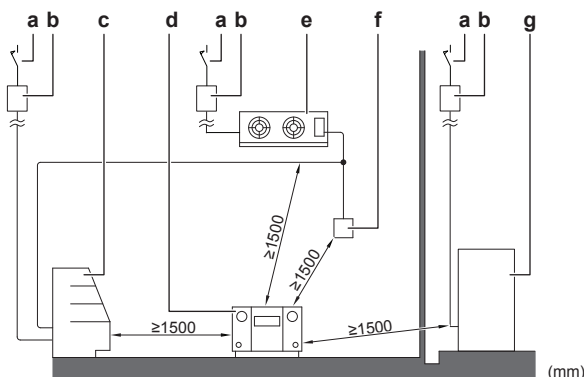
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.



NOTICE

The equipment described in this manual may cause electronic noise generated from radio-frequency energy. The equipment complies to 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 keeping proper distances away from stereo equipment, personal computers, etc.



- a Earth leakage protector
- b Fuse
- c Indoor unit (Showcase)
- d Personal computer or radio
- e Indoor unit (Blower coil)
- f User interface
- g Outdoor unit

In places with weak reception, keep distances of 3 m or more to avoid electromagnetic disturbance of other equipment and use conduit tubes for power and transmission lines.

- Select a place where rain can be avoided as much as possible.
- Take care that in the event of a water leak, water cannot cause any damage to the installation space and surroundings.
- Choose a location where the hot/cold air discharged from the unit or the operation noise, will NOT disturb anyone.
- Heat exchanger fins are sharp and injury is possible. Choose an installation location where there is no risk for injury (especially in areas where children play).

Do NOT install the unit in the following places:

- Sound sensitive areas (e.g. near a bedroom and the like), 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 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.

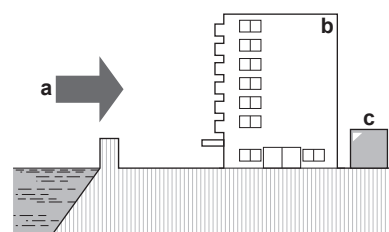
It is NOT recommended to install the unit in the following places because it may shorten the life of the unit:

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

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.

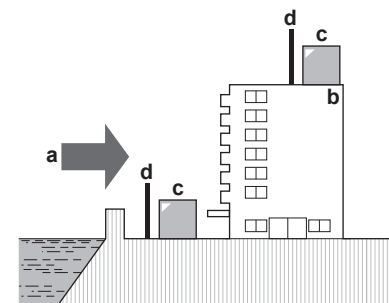
Install the outdoor unit away from direct sea winds.

Example: Behind the building.



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

- Height of windbreaker $\geq 1.5 \times$ height of outdoor unit
- Mind the service space requirements when installing the windbreaker.



- a Sea wind
- b Building
- c Outdoor unit
- d Windbreaker

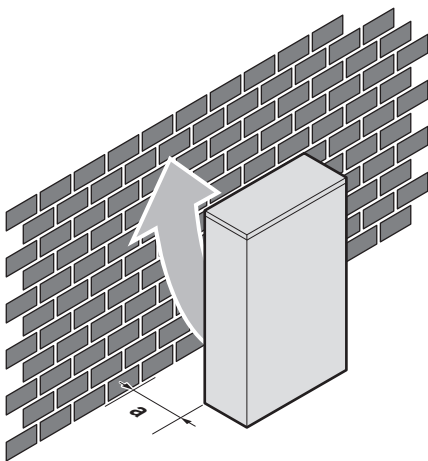
Strong winds (≥ 18 km/h) blowing against the outdoor unit's air outlet causes short circuit (suction of discharge air). This may result in:

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

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

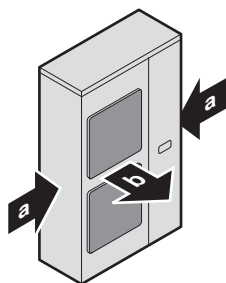
Turn the air outlet side towards the building's wall, fence or screen.

5 Preparation



a Make sure there is enough installation space

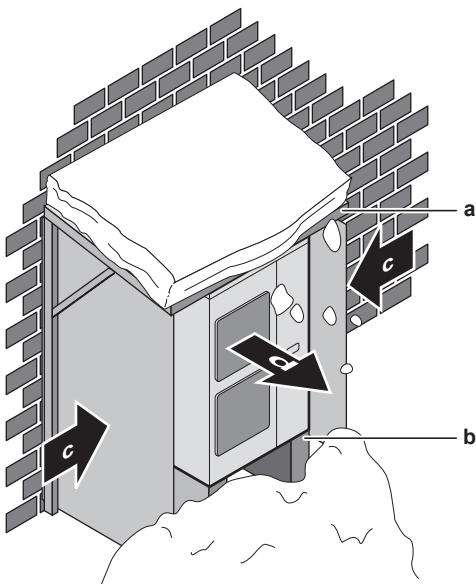
Set the air outlet side at a right angle to the direction of the wind.



a Prevailing wind direction
b Air outlet

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

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



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

5.2.3 Securing safety against refrigerant leaks

About safety against refrigerant leaks

The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are not available.

This system uses R410A as refrigerant. R410A itself is an entirely safe non-toxic, non-combustible refrigerant. Nevertheless care must be taken to ensure that the system is installed in a room which is sufficiently large. This assures that the maximum concentration level of refrigerant gas is not exceeded, in the unlikely event of major leak in the system and this in accordance to the local applicable regulations and standards.

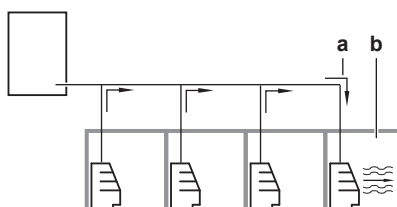
About the maximum concentration level

The maximum charge of refrigerant and the calculation of the maximum concentration of refrigerant is directly related to the humanly occupied space in to which it could leak.

The unit of measurement of the concentration is kg/m^3 (the weight in kg of the refrigerant gas in 1 m^3 volume of the occupied space).

Compliance to the local applicable regulations and standards for the maximum allowable concentration level is required.

According to the appropriate European Standard, the maximum allowed concentration level of refrigerant to a humanly space for R410A is limited to 0.44 kg/m^3 .



a Direction of the refrigerant flow
b Room where refrigerant leak has occurred (outflow of all the refrigerant from the system)

Pay special attention to places, such as basements etc., where refrigerant can stay, since refrigerant is heavier than air.

To check the maximum concentration level

Check the maximum concentration level in accordance with steps 1 to 4 below and take whatever action is necessary to comply.

- 1 Calculate the amount of refrigerant (kg) charged to each system separately.

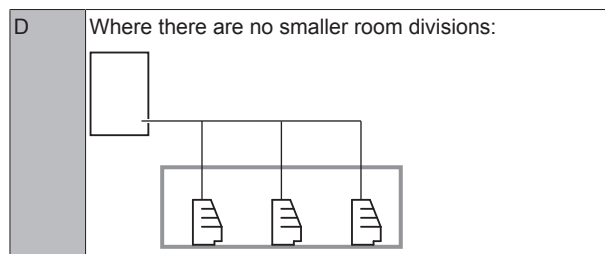
Formula	A+B=C
A	Amount of refrigerant in a single unit system (amount of refrigerant with which the system is charged before leaving the factory)
B	Additional charging amount (amount of refrigerant added locally)
C	Total amount of refrigerant (kg) in the system

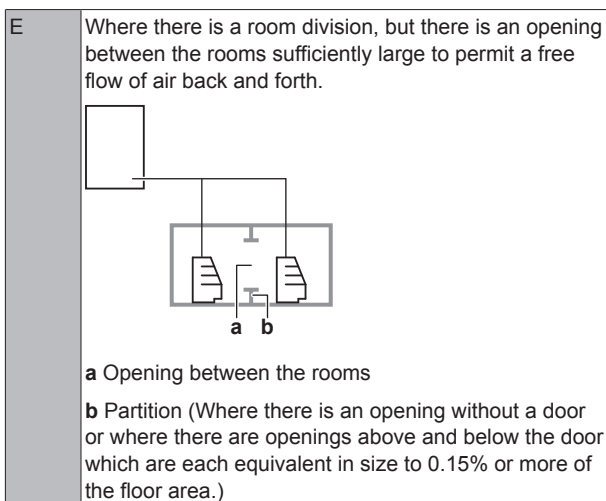


NOTICE

Where a single refrigerant facility is divided into 2 entirely independent refrigerant systems, use the amount of refrigerant with which each separate system is charged.

- 2 Calculate the volume of the room (m^3) where the indoor unit is installed. In a case such as the following, calculate the volume of (D), (E) as a single room or as the smallest room.





- 3 Calculate the refrigerant density using the results of the calculations in steps 1 and 2 above. If the result of the above calculation exceeds the maximum concentration level, a ventilation opening to the adjacent room shall be made.

Formula	F/G≤H
F	Total volume of refrigerant in the refrigerant system
G	Size (m ³) of smallest room in which there is an indoor unit installed
H	Maximum concentration level (kg/m ³)

- 4 Calculate the refrigerant density taking the volume of the room where the indoor unit is installed and the adjacent room. Install ventilation openings in the door of adjacent rooms until the refrigerant density is smaller than the maximum concentration level.

5.3 Preparing refrigerant piping

5.3.1 About reusing existing piping

In some cases you may reuse existing piping, in other cases not.

Reuse not allowed

You may not reuse existing piping in the following cases:

- When the compressor in the old installation had problems (example: breakdown). **Possible consequence:** oxidised coolant oil, scale residue and other adverse effects.
- When the indoor and outdoor units were disconnected from the piping for a long time. **Possible consequence:** water and dirt in the piping.
- When the copper piping is corroded.

Reuse allowed

In other cases than above, you may reuse existing piping but keep the following in mind:

Item	Description
Piping diameter	Must comply with requirements. See
Piping material	"5.3.2 Refrigerant piping requirements" on page 11.
Piping length and height difference	
Piping insulation	If deteriorated, must be replaced. Must comply with requirements. See "6.6 To insulate the refrigerant piping" on page 19.

Item	Description
Flare connections	May not be reused. Make new ones to prevent leaks. See "6.4.3 Guidelines when connecting the refrigerant piping" on page 14 and "6.4.5 To flare the pipe end" on page 15.
Welded connections	Must be checked for gas leaks.
Cleaning piping	If the old condensing unit did NOT use the same refrigerant (R410A) and the same oil (FVC68D) as the new one, you must clean the piping to remove any residue.

5.3.2 Refrigerant piping requirements



INFORMATION

Also read the precautions and requirements in the "General safety precautions" chapter.



NOTICE

The refrigerant R410A 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: R410A does not contain any chlorine, does not destroy the ozone layer, and does not reduce earth's protection against harmful ultraviolet radiation. R410A can contribute slightly to the greenhouse effect if it is released. Therefore we should take special attention to check the tightness of the installation.



NOTICE

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

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

5.3.3 Refrigerant piping material

- Piping material:** Phosphoric acid deoxidised seamless copper.
- Piping temper grade and thickness:**

Outer diameter (Ø)	Temper grade	Thickness (t) ^(a)	
6.4 mm (1/4")	Annealed (O)	≥0.80 mm	
9.5 mm (3/8")			
12.7 mm (1/2")			
15.9 mm (5/8")	Annealed (O)	≥0.99 mm	

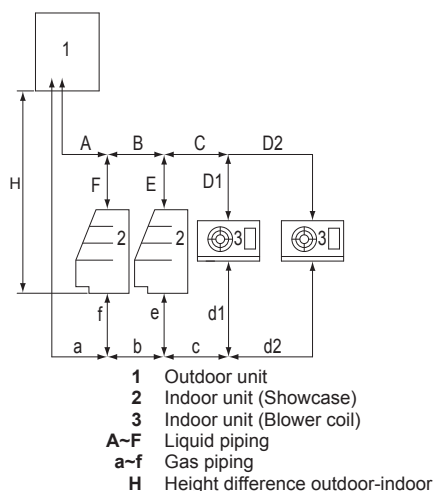
(a) Depending on the applicable legislation and the unit's maximum working pressure (see "PS High" on the unit name plate), larger piping thickness might be required.

- Flare connections:** Only use annealed material.

5.3.4 To select the piping size

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

5 Preparation



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 change-over from inch to mm pipes (field supply).
- The additional refrigerant calculation has to be adjusted as mentioned in "6.7.3 To determine the additional refrigerant amount" on page 20.

A/a: Piping between outdoor unit and piping branching

Use the same diameters as the connections on the outdoor units:

Liquid piping	Ø9.5 mm
Gas piping	Ø15.9 mm

B+C/b+c: Piping between piping branching

Use diameters depending on the total capacity of the indoor units connected downstream.

	Capacity	Piping outer diameter
Liquid piping	<4.0 kW	Ø6.4 mm
	4.0≤x<8.4 kW	Ø9.5 mm
Gas piping	<1.0 kW	Ø9.5 mm
	1.0≤x<6.0 kW	Ø12.7 mm
	6.0≤x<8.4 kW	Ø15.9 mm

D~F/d~f: Piping between piping branching and indoor unit

Use the same diameters as the connections (liquid, gas) on the indoor units.

NOTICE

If only 1 indoor unit is connected to the outdoor unit, and the connections on the outdoor unit are different from those on the indoor unit, then use the same piping diameter as the connections on the outdoor unit, and install suitable adapters as near to the indoor unit as possible.

5.3.5 Refrigerant piping length and height difference

The piping lengths and height differences must comply with the following requirements.

(see example in "5.3.4 To select the piping size" on page 11)

Requirement		Limit
Maximum actual piping length ▪ Example: $a+b+c+d2 \leq \text{Limit}$		30 m
Maximum total piping length ▪ Example: $a+b+c+d1+d2+e+f \leq \text{Limit}$		30 m
Maximum length first branch kit-indoor unit ▪ Example: $b+c+d2 \leq \text{Limit}$		10 m
Maximum height difference outdoor-indoor	Outdoor higher than indoor ▪ Example: $H \leq \text{Limit}$	5 m
	Outdoor lower than indoor	0 m
Maximum height difference indoor-indoor		0 m ^(a)

(a) A combination of showcases and blower coils is allowed if they are installed on the same floor.

5.4 Preparing electrical wiring

5.4.1 Safety device requirements

Power supply

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.

Model	Minimum circuit ampacity	Recommended fuses	Power supply
LRMEQ3+4	13.5 A	16 A	3N~ 50 Hz 380-415 V

Operation switch, low-noise switch and error output wiring



NOTICE

Operation switch. An operation switch is required to turn outdoor unit operation ON/OFF. The outdoor unit cannot operate without it. Use a voltage-free contact for microcurrent (≤ 1 mA, 12 V DC).



NOTICE

Low-noise switch. If you want to remotely turn ON/OFF low-noise operation (see setting [2-25]), you must install a low-noise switch. Use a voltage-free contact for microcurrent (≤ 1 mA, 12 V DC).



NOTICE

Error output. If system malfunctions are likely to degrade the articles in the room/showcase, you can install an alarm (example: lamp). If a malfunction occurs, a signal (220-240 V AC) is given to the error output (X2M/E1/E2). Use an alarm with a maximum load of 0.5 A.

Wiring	Sheathed + shielded cable (2 wires)
	Vinyl cords 0.75~1.25 mm ²
Maximum wiring length	130 m

6 Installation

6.1 Overview: Installation

This chapter describes what you have to do and know on-site to install the system.

Typical workflow

Installation typically consists of the following stages:

- Mounting the outdoor unit.
- Mounting the indoor units.
- Connecting the refrigerant piping.
- Checking the refrigerant piping.
- Charging refrigerant.
- Connecting the electrical wiring.
- Finishing the outdoor installation.
- Finishing the indoor installation.



INFORMATION

For installation of the indoor unit (mounting the indoor unit, connecting the refrigerant piping to the indoor unit, connecting the electrical wiring to the indoor unit ...), see the installation manual of the indoor unit.

6.2 Opening the units

6.2.1 About opening the units

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

- When connecting the refrigerant piping
- 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.

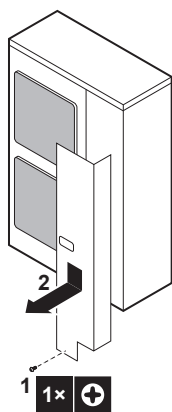
6.2.2 To open the outdoor unit



DANGER: RISK OF ELECTROCUTION



DANGER: RISK OF BURNING



6.3 Mounting the outdoor unit

6.3.1 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.
- 3 Preventing the outdoor unit from falling over.
- 4 Protecting the unit against snow and wind by installing a snow cover and baffle plates. See "Preparing installation site" in "5 Preparation" on page 8.

6.3.2 Precautions when mounting the outdoor unit



INFORMATION

Also read the precautions and requirements in the following chapters:

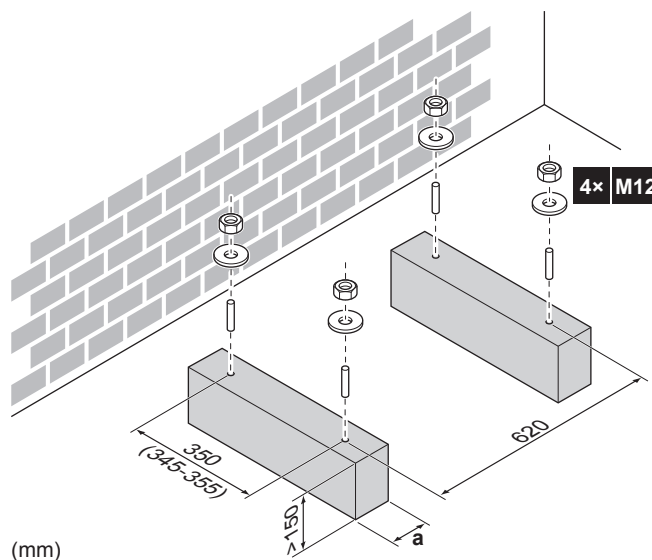
- General safety precautions
- Preparation

6.3.3 To provide the installation structure

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

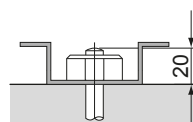
Fix the unit securely by means of foundation bolts in accordance with the foundation drawing.

Prepare 4 sets of anchor bolts, nuts and washers (field supply) as follows:



INFORMATION

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

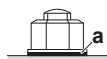


6 Installation

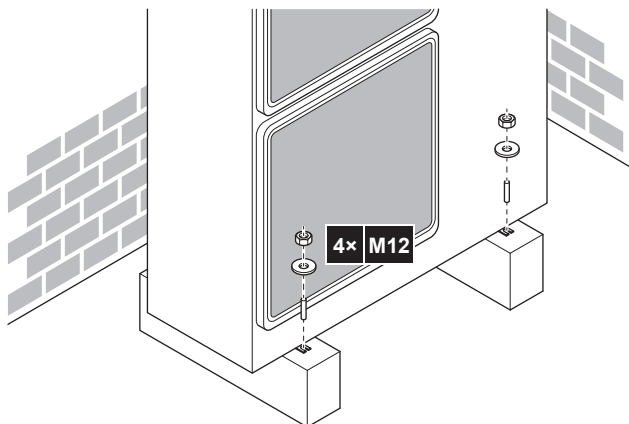


NOTICE

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



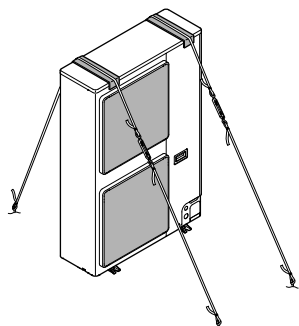
6.3.4 To install the outdoor unit



6.3.5 To prevent the outdoor unit from falling over

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

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



6.4 Connecting the refrigerant piping

6.4.1 About connecting the refrigerant piping

Before connecting the refrigerant piping

Make sure the outdoor and indoor units are mounted.

Typical workflow

Connecting the refrigerant piping involves:

- Connecting the refrigerant piping to the outdoor unit
- Connecting the dryer and sight glass
- Connecting refrigerant piping branching
- Connecting the refrigerant piping to the indoor units (see the installation manual of the indoor units)
- Insulating the refrigerant piping

- Keeping in mind the guidelines for:

- Pipe bending
- Flaring pipe ends
- Brazing
- Using the stop valves

6.4.2 Precautions when connecting the refrigerant piping



INFORMATION

Also read the precautions and requirements in the following chapters:

- General safety precautions
- Preparation



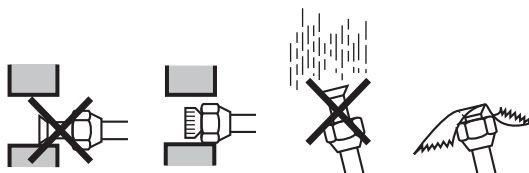
DANGER: RISK OF BURNING



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 R410A when adding refrigerant.
- Only use installation tools (e.g. manifold gauge set) that are exclusively used for R410A installations to withstand the pressure and to prevent foreign materials (e.g. mineral oils and moisture) from mixing into the system.
- Install the piping so that the flare is NOT subjected to mechanical stress
- Protect the piping as described in the following table to prevent dirt, liquid or dust from entering the piping.
- Use caution when passing copper tubes through walls (see figure below).



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



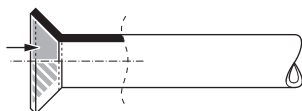
INFORMATION

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

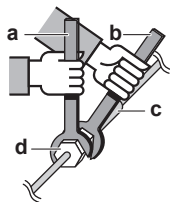
6.4.3 Guidelines when connecting the refrigerant piping

Take the following guidelines into account when connecting pipes:

- Coat the flare inner surface with ether oil or ester oil when connecting a flare nut. Tighten 3 or 4 turns by hand, before tightening firmly.



- Always use two wrenches together when loosening a flare nut.
- Always use a spanner and torque wrench together to tighten the flare nut when connecting the piping. This to prevent nut cracking and leaks.



- a Torque wrench
- b Spanner
- c Piping union
- d Flare nut

Piping size (mm)	Tightening torque (N·m)	Flare dimensions (A) (mm)	Flare shape (mm)
Ø6.4	15~17	8.7~9.1	
Ø9.5	33~39	12.8~13.2	
Ø12.7	50~60	16.2~16.6	
Ø15.9	63~75	19.3~19.7	

6.4.4 Pipe bending guidelines

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

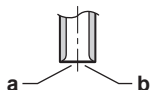
6.4.5 To flare the pipe end



CAUTION

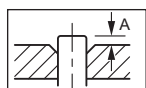
- Incomplete flaring may cause refrigerant gas leakage.
- Do NOT re-use flares. Use new flares to prevent refrigerant gas leakage.
- Use flare nuts that are included with the unit. Using different flare nuts may cause refrigerant gas leakage.

- Cut the pipe end with a pipe cutter.
- Remove burrs with the cut surface facing downward so that the chips do not enter the pipe.



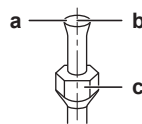
- a Cut exactly at right angles.
- b Remove burrs.

- Remove the flare nut from the stop valve and put the flare nut on the pipe.
- Flare the pipe. Set exactly at the position as shown in the following illustration.



	Flare tool for R410A (clutch type)	Conventional flare tool	
		Clutch type (Ridgid-type)	Wing nut type (Imperial-type)
A	0~0.5 mm	1.0~1.5 mm	1.5~2.0 mm

- Check that the flaring is properly made.



- a Flare's inner surface must be flawless.
- b The pipe end must be evenly flared in a perfect circle.
- c Make sure the flare nut is fitted.

6.4.6 To braise the pipe end



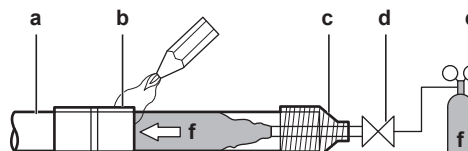
NOTICE

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

≤Ø25.4



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



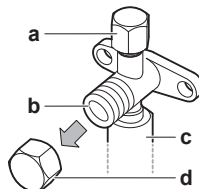
- a Refrigerant piping
- b Part to be brazed
- c Taping
- d Manual valve
- e Pressure-reducing valve
- f Nitrogen

- Do NOT use anti-oxidants when brazing pipe joints. Residue can clog pipes and break equipment.
- Do NOT use flux when brazing copper-to-copper refrigerant piping. Use phosphor copper brazing filler alloy (BCuP), which does not require flux. Flux has an extremely harmful influence on refrigerant piping systems. For instance, if chlorine based flux is used, it will cause pipe corrosion or, in particular, if the flux contains fluorine, it will deteriorate the refrigerant oil.

6.4.7 Using the stop valve and service port

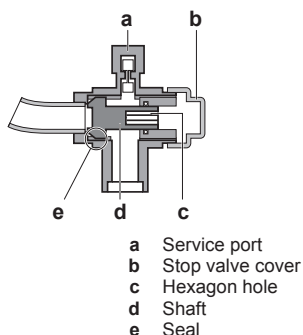
To handle the stop valve

- Make sure to keep all stop valves open during operation.
- The figure below shows the name of each part required in handling the stop valve.
- The stop valve is factory closed.



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

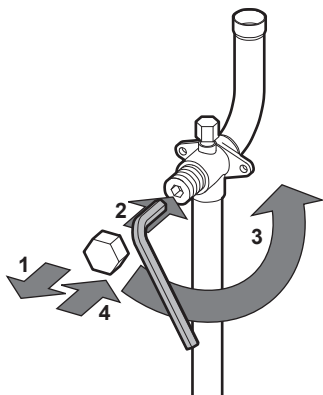
6 Installation



To open the stop valve

- 1 Remove the stop valve cover.
- 2 Insert a hexagon wrench into the stop valve and turn the stop valve counterclockwise.
- 3 When the stop valve cannot be turned any further, stop turning.

Result: The valve is now open.

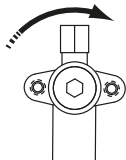


To close the stop valve

- 1 Remove the stop valve cover.
- 2 Insert a hexagon wrench into the stop valve and turn the stop valve clockwise.
- 3 When the stop valve cannot be turned any further, stop turning.

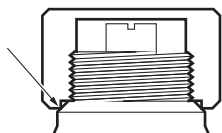
Result: The valve is now closed.

Closing direction:



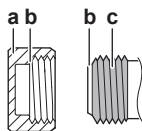
To handle the stop valve cover

- The stop valve cover is sealed where indicated by the arrow. Take care not to damage it.
- After handling the stop valve, make sure to tighten the stop valve cover securely. For the tightening torque, refer to the table below.
- Check for refrigerant leaks after tightening the stop valve cover.



NOTICE

Thread-locking fluid. Before reattaching the stop valve cover, apply thread-locking fluid to the screw thread (NOT to the cover or sealing part). Otherwise, condensation water might enter and freeze. **Possible consequence:** Deformation, refrigerant leakage and compressor malfunction.



- a Cover (do NOT apply thread-locking fluid)
b Sealing part (do NOT apply thread-locking fluid)
c Screw thread with thread-locking fluid

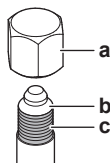
To handle the service port

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



NOTICE

Thread-locking fluid. Before reattaching the service port cover, apply thread-locking fluid to the screw thread (NOT to the cover or sealing part). Otherwise, condensation water might enter and freeze. **Possible consequence:** Deformation, refrigerant leakage and compressor malfunction.



- a Cover (do NOT apply thread-locking fluid)
b Sealing part (do NOT apply thread-locking fluid)
c Screw thread with thread-locking fluid

Tightening torques

Stop valve size (mm)	Tightening torque N·m (turn clockwise to close)			
	Shaft			
	Valve body	Hexagonal wrench	Cap (valve lid)	Service port
Ø9.5	5.4~6.6	4 mm	13.5~16.5	11.5~13.9
Ø15.9	13.5~16.5	6 mm	22.5~27.5	

6.4.8 Guidelines when installing a sight glass

Install a sight glass on the liquid piping:

Diameter	9.5 mm
Where/how	<p>Install the sight glass before the dryer, as near to the outdoor unit as possible. Install horizontally.</p> <p>a Sight glass b Dryer</p>

When brazing	Follow the brazing instructions in the sight glass manual.
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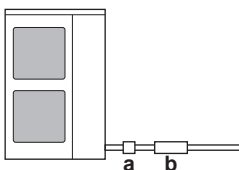
6.4.9 Guidelines when installing a dryer



NOTICE

Do NOT operate the unit without a dryer installed.
Possible consequence: Equipment malfunction.

Install a dryer on the liquid piping:

Dryer type	80 g (100% molecular sieve equivalent) (DML083/DML083S: Danfoss made)
Where/how	Install the dryer after the sight glass, as near to the outdoor unit as possible. Install horizontally.  a Sight glass b Dryer
When brazing	Follow the brazing instructions in the dryer manual. Remove the dryer cap immediately before brazing (to prevent absorption of airborne 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.

6.4.10 To connect the refrigerant piping to the outdoor unit

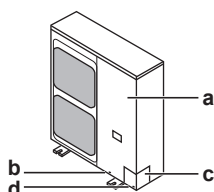


NOTICE

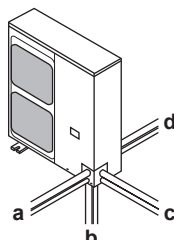
Be sure that the field installed piping does not touch other pipes, the bottom panel or side panel. Especially for the bottom and side connection, be sure to protect the piping with suitable insulation, to prevent it from coming into contact with the casing.

1 Do the following:

- Remove the service cover (a) with screw (b).
- Remove the piping intake plate (c) with screw (d).

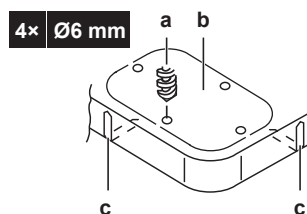


2 Choose a piping route (a, b, c or d).



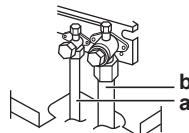
3 If you have chosen the downwards piping route:

- Drill (a, 4×) and remove the knockout hole (b).
- Cut out the slits (c) with a metal saw.



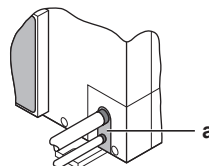
4 Do the following:

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



5 Reattach the service cover and the piping intake plate.

6 Seal all gaps (example: a) to prevent snow and small animals from entering the system.



WARNING

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



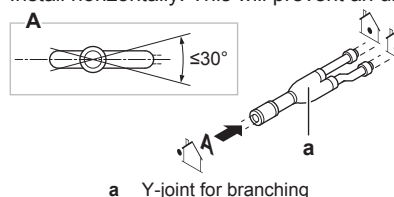
NOTICE

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

6.4.11 Guidelines when connecting piping branching

Liquid piping branching

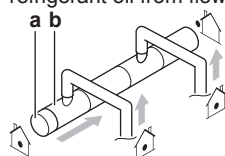
- Use Y-joints.
- Install horizontally. This will prevent an uneven refrigerant flow.



a Y-joint for branching

Gas piping branching

- Use T-joints.
- Install branched piping above main piping. This will prevent refrigerant oil from flowing back to non-operating indoor units.

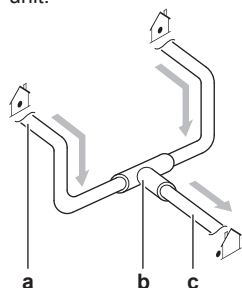


a Main piping

6 Installation

b T-joint for branching

- Make sure the "horizontal" gas piping slopes down to the outdoor unit.



- a Gas piping sloping down from indoor units to branching
b T-joint for branching
c Gas piping sloping down from branching to outdoor unit

6.5 Checking the refrigerant piping

6.5.1 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 "6.5.3 Checking refrigerant piping: Setup" on page 18.

6.5.2 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 "6.5.3 Checking refrigerant piping: Setup" on page 18).



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 (5 Torr absolute).



NOTICE

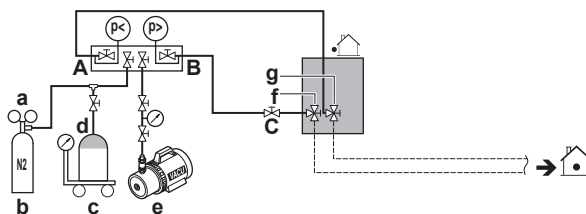
Make sure the pump oil does not flow oppositely into the system while the pump is not working.



NOTICE

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

6.5.3 Checking refrigerant piping: Setup



- a Pressure reducing valve
b Nitrogen
c Weighing scales
d Refrigerant R410A tank (siphon system)
e Vacuum pump
f Liquid line stop valve
g Gas line stop valve
A Valve A
B Valve B
C Valve C

Valve	State of valve
Valve A	Open
Valve B	Open
Valve C	Open
Liquid line stop valve	Close
Gas line stop valve	Close



NOTICE

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

6.5.4 To perform a leak test

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

To check for leaks: Vacuum leak test

- Evacuate the system from the liquid and gas piping to -100.7 kPa (-1.007 bar/5 Torr) for more than 2 hours.
- Once reached, turn off the vacuum pump and check that the pressure does not rise for at least 1 minute.
- Should the pressure rise, the system may either contain moisture (see vacuum drying below) or have leaks.

To check for leaks: Pressure leak test

- Break the vacuum by pressurising with nitrogen gas to a minimum gauge pressure of 0.2 MPa (2 bar).
 - Never set the gauge pressure of the **high pressure section** of the system higher than the maximum operation pressure of 4.0 MPa (40 bar).
 - Never set the gauge pressure of the **low pressure section** of the system higher than the design pressure of the indoor unit.
- Test for leaks by applying a bubble test solution to all piping connections.
- Discharge all nitrogen gas.



NOTICE

Make sure to use a recommended bubble test solution from your wholesaler. Do not use soap water, which may cause cracking of flare nuts (soap water may contain salt, which absorbs moisture that will freeze when the piping gets cold), and/or lead to corrosion of flared joints (soap water may contain ammonia which causes a corrosive effect between the brass flare nut and the copper flare).

6.5.5 To perform vacuum drying



NOTICE

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

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

- 1 Evacuate the system for at least 2 hours to a target vacuum of -100.7 kPa ($-1.007 \text{ bar/5 Torr}$).
- 2 Check that, with the vacuum pump turned off, the target vacuum is maintained for at least 1 hour.
- 3 Should you fail to reach the target vacuum within 2 hours or maintain the vacuum for 1 hour, the system may contain too much moisture. In that case, break the vacuum by pressurising with nitrogen gas to a gauge pressure of 0.05 MPa (0.5 bar) and repeat steps 1 to 3 until all moisture has been removed.
- 4 Depending on whether you want to immediately charge refrigerant through the refrigerant charge port or first pre-charge a portion of refrigerant through the liquid line, either open the outdoor unit stop valves, or keep them closed. See "6.7.4 To charge refrigerant" on page 20 for more information.



INFORMATION

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

6.6 To insulate the refrigerant piping

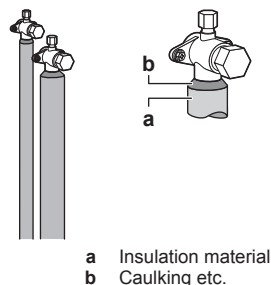
After finishing the leak test and vacuum drying, the piping must be insulated. Take into account the following points:

- Make sure to insulate the connection piping and refrigerant piping branching entirely.
- Be sure to insulate the liquid and gas piping (for all units).
- Use heat resistant polyethylene foam which can withstand a temperature of 70°C for liquid piping and polyethylene foam which can withstand a temperature of 120°C for gas piping.
- Take the following into account when determining the insulation thickness:

Liquid pipe minimum temperature	20°C
Gas pipe minimum temperature	-10°C

Condensation might form on the surface of the insulation.

- If there is a possibility that condensation on the stop valve might drip down into the indoor unit through gaps in the insulation and piping because the outdoor unit is located higher than the indoor unit, this must be prevented by sealing up the connections. See below figure.



6.7 Charging refrigerant

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

Typical workflow

Charging additional refrigerant typically consists of the following stages:

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

6.7.2 Precautions when charging refrigerant



INFORMATION

Also read the precautions and requirements in the following chapters:

- General safety precautions
- Preparation



WARNING

- Only use R410A as refrigerant. Other substances may cause explosions and accidents.
- R410A contains fluorinated greenhouse gases. Its global warming potential (GWP) value is 2087.5. Do NOT vent these gases into the atmosphere.
- When charging refrigerant, always use protective gloves and safety glasses.



NOTICE

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



NOTICE

Be sure to 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 "7.2.4 To access mode 1 or 2" on page 25). If a malfunction code is present, see "11.3 Solving problems based on error codes" on page 30.



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 units) 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.

6 Installation

6.7.3 To determine the additional refrigerant amount



INFORMATION

For final charge adjustment in a test laboratory, contact your dealer.

Additional refrigerant to be charged=R (kg). R should be rounded off in units of 0.1 kg.

$$R=[(X_1 \times 0.095) \times 0.059 + (X_2 \times 0.064) \times 0.022] + A1 + A2$$

$X_{1,2}$ =Total length (m) of liquid piping size at Øa

Parameter A1:

If the total capacity ^(a) of showcases is...	Then A1 is...
<5.0 kW	1.1 kg
5.0≤x<8.4 kW	2.3 kg

(a) Capacity at evaporating temperature of -10°C

Parameter A2:

If the total capacity ^(a) of blower coils is...	Then A2 is...
<5.0 kW	0.6 kg
5.0≤x<8.4 kW	1.2 kg

(a) Capacity at temperature difference (= evaporating temperature – room temperature) of 10°C

Metric piping. When using metric piping, please take into account following table concerning the weight factor to be allocated. It should be substituted in the formula for R.

Inch piping		Metric piping	
Size (Ø) (mm)	Weight factor	Size (Ø) (mm)	Weight factor
6.4	0.022	6	0.018
9.5	0.059	10	0.065

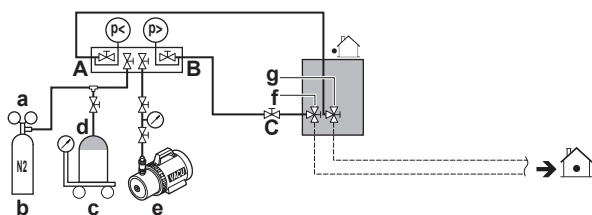
6.7.4 To charge refrigerant

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

Pre-charging refrigerant

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

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



- a Pressure reducing valve
- b Nitrogen
- c Weighing scales
- d Refrigerant R410A tank (siphon system)
- e Vacuum pump
- f Liquid line stop valve
- g Gas line stop valve
- A Valve A
- B Valve B
- C Valve C

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

- 4 Do one of the following:

If	Then
The determined additional refrigerant amount is reached	Disconnect the manifold from the liquid line. Continue with the " Checking the sight glass " instructions.
Too much refrigerant is charged	Recover refrigerant. Disconnect the manifold from the liquid line. Continue with the " Checking the sight glass " instructions.
The determined additional refrigerant amount is not reached yet	Disconnect the manifold from the liquid line. Continue with the " Charging refrigerant (via the refrigerant charging port) " instructions.

Checking the sight glass

If the determined additional refrigerant amount is **reached by the "Pre-charging refrigerant" instructions**, continue as follows:

- 5 Open all outdoor unit stop valves.
- 6 Take all the precautions mentioned in "[7 Configuration](#)" on [page 25](#) and "[8 Commissioning](#)" on [page 27](#) into account.
- 7 Turn on the power of the outdoor unit, but leave the external operation switch turned off (see "[6.8.5 To connect the electrical wiring on the outdoor unit](#)" on [page 23](#)).
- 8 Set the target evaporating temperature with setting [2-8] (see "[7.2.8 Mode 2: Field settings](#)" on [page 27](#)).
- 9 Turn on the power of the indoor units.
- 10 Turn on the external operation switch.

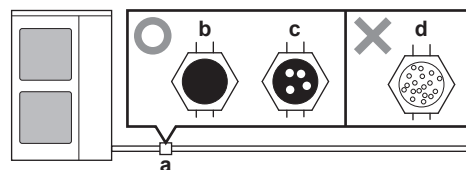
Result: The unit will start operation.



INFORMATION

- When a malfunction is detected during the procedure (e.g., in case of closed stop valve), a malfunction code will be displayed. In that case, refer to "[6.7.5 Error codes when charging refrigerant](#)" on [page 21](#) and solve the malfunction accordingly.
- Aborting the manual refrigerant charge is possible by turning OFF the external operation switch. The unit will stop and return to idle condition.

- 11 Check the sight glass of the outdoor unit. If the refrigerant is NOT in sealing state, charge extra refrigerant as described in the "**Charging refrigerant (via the refrigerant charging port)**" instructions, but do NOT exceed 10% of the determined additional refrigerant amount (see "[6.7.3 To determine the additional refrigerant amount](#)" on [page 20](#)).



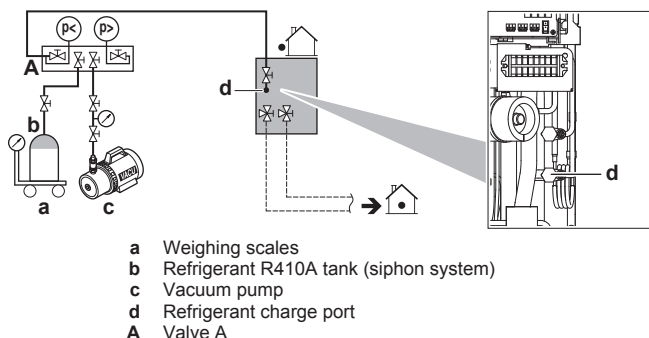
- O Sealing state (= sufficient refrigerant)
- X Insufficient refrigerant
- a Sight glass
- b Full of liquid
- c A little foam in the liquid
- d A lot of foam in the liquid

- 12 Turn off the external operation switch.

Charging refrigerant (via the refrigerant charging port)

The remaining additional refrigerant charge can be charged by operating the outdoor unit.

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

**NOTICE**

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

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

15 Take all the precautions mentioned in "7 Configuration" on page 25 and "8 Commissioning" on page 27 into account.

16 Turn on the power of the outdoor unit, but leave the external operation switch turned off (see "6.8.5 To connect the electrical wiring on the outdoor unit" on page 23).

17 Set the target evaporating temperature with setting [2-8] (see "7.2.8 Mode 2: Field settings" on page 27).

18 Turn on the power of the indoor units.

19 Turn on the external operation switch.

Result: The unit will start operation.

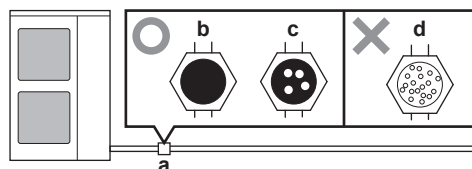
INFORMATION

- When a malfunction is detected during the procedure (e.g., in case of closed stop valve), a malfunction code will be displayed. In that case, refer to "6.7.5 Error codes when charging refrigerant" on page 21 and solve the malfunction accordingly.
- Aborting the manual refrigerant charge is possible by turning OFF the external operation switch. The unit will stop and return to idle condition.

20 Open valve A.

21 Charge refrigerant until the remaining determined additional refrigerant amount is added (see "6.7.3 To determine the additional refrigerant amount" on page 20), and then close valve A.

22 Check the sight glass of the outdoor unit. If the refrigerant is NOT in sealing state, charge extra refrigerant, but do NOT exceed 10% of the determined additional refrigerant amount (see "6.7.3 To determine the additional refrigerant amount" on page 20).



- O Sealing state (= sufficient refrigerant)
X Insufficient refrigerant
a Sight glass
b Full of liquid
c A little foam in the liquid

d A lot of foam in the liquid

23 Turn off the external operation switch.

**NOTICE**

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

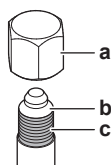
Operating with the stop valves closed will damage the compressor.

**NOTICE**

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

**NOTICE**

Thread-locking fluid. Before reattaching the service port cover, apply thread-locking fluid to the screw thread (NOT to the cover or sealing part). Otherwise, condensation water might enter and freeze. **Possible consequence:** Deformation, refrigerant leakage and compressor malfunction.

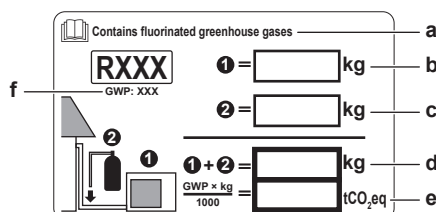
**6.7.5 Error codes when charging refrigerant****INFORMATION**

If a malfunction occurs, a signal (220-240 V AC) is given to the error output (X2M/E1/E2), and the H2P LED on the main PCB is lit.

If a malfunction occurs, close valve A immediately. Confirm the malfunction code and take corresponding action, "11.3 Solving problems based on error codes" on page 30.

6.7.6 To fix the fluorinated greenhouse gases label

1 Fill in the label as follows:



- a If a multilingual fluorinated greenhouse gases label is delivered with the unit (see accessories), peel off the applicable language and stick it on top of a.
b Factory refrigerant charge: see unit name plate
c Additional refrigerant amount charged
d Total refrigerant charge
e **Greenhouse gas emissions** of the total refrigerant charge expressed as tonnes CO₂-equivalent
f GWP = Global warming potential

6 Installation



NOTICE

In Europe, the **greenhouse gas emissions** of the total refrigerant charge in the system (expressed as tonnes CO₂-equivalent) is used to determine the maintenance intervals. Follow the applicable legislation.

Formula to calculate the greenhouse gas emissions:
GWP value of the refrigerant × Total refrigerant charge [in kg] / 1000

- 2 Fix the label on the inside of the outdoor unit near the gas and liquid stop valves.

6.8 Connecting the electrical wiring

6.8.1 About connecting the electrical wiring

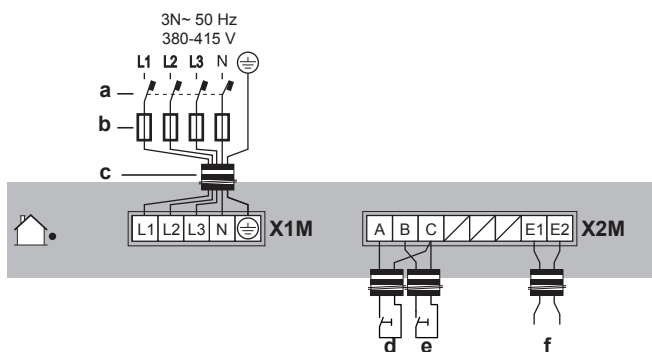
Typical workflow

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 (power supply, operation switch, low-noise switch and error output).
- 3 Connecting the main power supply.

Field wiring: Overview

Field wiring consists of the following:



- a Earth leakage circuit breaker
- b Fuse
- c Power supply (including earth) (sheathed cable)
- d Low-noise switch
- e Operation switch
- f Error output



NOTICE

Operation switch. An operation switch is required to turn outdoor unit operation ON/OFF. The outdoor unit cannot operate without it. Use a voltage-free contact for microcurrent (≤ 1 mA, 12 V DC).



NOTICE

Low-noise switch. If you want to remotely turn ON/OFF low-noise operation (see setting [2-25]), you must install a low-noise switch. Use a voltage-free contact for microcurrent (≤ 1 mA, 12 V DC).



NOTICE

Error output. If system malfunctions are likely to degrade the articles in the room/showcase, you can install an alarm (example: lamp). If a malfunction occurs, a signal (220-240 V AC) is given to the error output (X2M/E1/E2). Use an alarm with a maximum load of 0.5 A.



NOTICE

- Field 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.

6.8.2 Precautions when connecting electrical wiring



DANGER: RISK OF ELECTROCUTION



WARNING

All field wiring and components must be installed by a licensed electrician and must comply with the applicable legislation.



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, shall be installed in the fixed wiring.



WARNING

- ONLY use copper wires.
- Make sure the field wiring complies with the applicable legislation.
- 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 electric 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.

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



WARNING

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



NOTICE

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

**NOTICE**

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

**NOTICE**

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

**NOTICE**

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

**NOTICE**

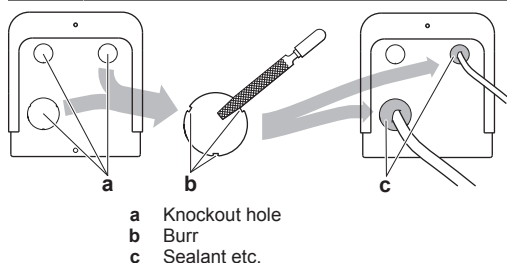
- The reversed phase protection detector of this product only functions when the product starts up. Consequently reversed phase detection is not performed during normal operation of the product.
- The reversed phase protection detector is designed to stop the product in the event of an abnormality when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

6.8.3 Guidelines when knocking out knockout holes

**NOTICE**

Precautions when making knockout holes:

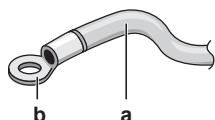
- Avoid damaging the casing.
- After making the knockout holes, we recommend you remove the burrs and paint the edges and areas around the edges using repair paint to prevent rusting.
- When passing electrical wiring through the knockout holes, wrap the wiring with protective tape to prevent damage.



6.8.4 Guidelines when connecting the electrical wiring

Keep the following in mind:

- If stranded conductor wires are being used, install a round crimp-style terminal on the tip. Place the round crimp-style terminal on the wire up to the covered part and fasten the terminal with the appropriate tool.



- Use the following methods for installing wires:

Wire type	Installation method
Single core wire	<p>a Curled single core wire b Screw c Flat washer</p>
Stranded conductor wire with round crimp-style terminal	<p>a Terminal b Screw c Flat washer</p>

Tightening torques

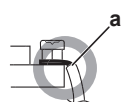
Wiring	Screw size	Tightening torque (N·m)
Power supply wiring (power supply + shielded ground)	M5	2.2~2.7
Operation switch, low-noise switch and error output	M3.5	0.8~0.97

6.8.5 To connect the electrical wiring on the outdoor unit

**NOTICE**

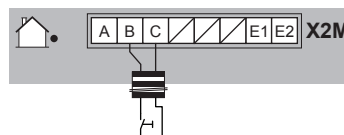
- Follow the wiring diagram (delivered with the unit, located at the inside of the service cover).
- Make sure the electrical wiring does NOT obstruct proper reattachment of the service cover.

- 1 Remove the service cover. See "6.2.2 To open the outdoor unit" on page 13.
- 2 Strip insulation (20 mm) from the wires.



- a Strip wire end to this point
b Excessive strip length may cause electrical shock or leakage.

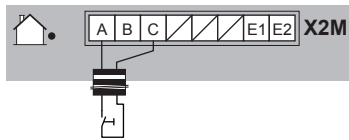
- 3 Connect the **operation switch** as follows:

**NOTICE**

Operation switch. An operation switch is required to turn outdoor unit operation ON/OFF. The outdoor unit cannot operate without it. Use a voltage-free contact for microcurrent (≤ 1 mA, 12 V DC).

- 4 Connect the **low-noise switch** as follows:

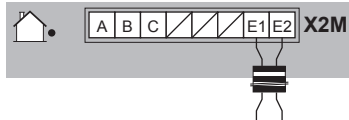
6 Installation



NOTICE

Low-noise switch. If you want to remotely turn ON/OFF low-noise operation (see setting [2-25]), you must install a low-noise switch. Use a voltage-free contact for microcurrent (≤ 1 mA, 12 V DC).

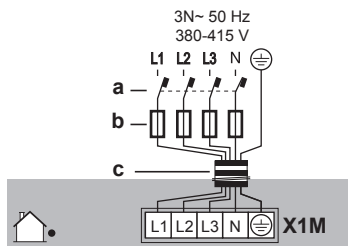
- 5 Connect the **error output** as follows:



NOTICE

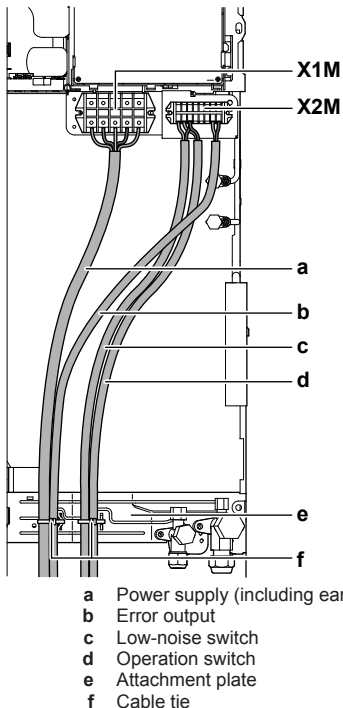
Error output. If system malfunctions are likely to degrade the articles in the room/showcase, you can install an alarm (example: lamp). If a malfunction occurs, a signal (220-240 V AC) is given to the error output (X2M/E1/E2). Use an alarm with a maximum load of 0.5 A.

- 6 Connect the **power supply** as follows:



- a Earth leakage circuit breaker
- b Fuse
- c Power supply cable

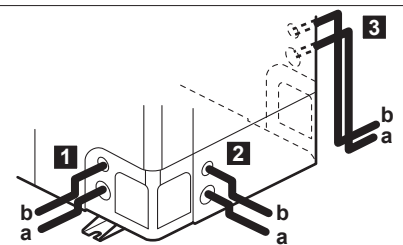
- 7 Fix the cables with cable ties.



- a Power supply (including earth)
- b Error output
- c Low-noise switch
- d Operation switch
- e Attachment plate
- f Cable tie

- 8 Route the wiring through the frame and connect it to it.

Routing through the frame



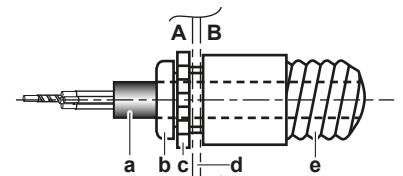
a Power supply cable and error output cable

b Operation switch cable and low-noise switch cable

Connecting to the frame

When cables are routed from the unit, a protection sleeve for the conduits (PG insertions) can be inserted at the knockout hole.

When you do not use a wire conduit, protect the wires with vinyl tubes to prevent the edge of the knockout hole from cutting the wires.



A Inside of the outdoor unit

B Outside of the outdoor unit

a Wire

b Bush

c Nut

d Frame

e Hose

- 9 Reattach the service cover. See "6.9.1 To close the outdoor unit" on page 24.

- 10 Connect an earth leakage circuit breaker and fuse to the power supply line.

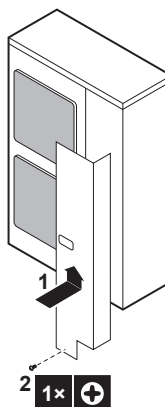
6.9 Finishing the outdoor unit installation

6.9.1 To close the outdoor unit



NOTICE

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



7 Configuration

7.1 Overview: Configuration

This chapter describes what you have to do and know to configure the system after it is installed.

It contains information about:

- Making field settings



INFORMATION

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



DANGER: RISK OF ELECTROCUTION

7.2 Making field settings

7.2.1 About making field settings

To configure the condensing unit, you must give input to the outdoor unit's main PCB (A1P). This involves the following field setting components:

- Push buttons to give input to the PCB
- A display to read feedback from the PCB

Field settings are defined by their mode, setting and value. Example: [2-8]=4.

Mode 1 and 2

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

7.2.2 To access the field setting components

See "6.2.2 To open the outdoor unit" on page 13.

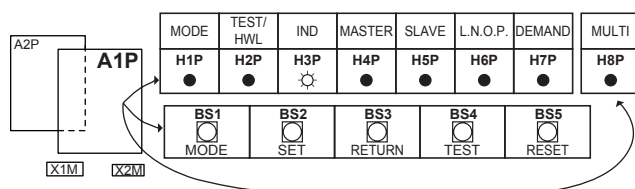
7.2.3 Field setting components



NOTICE

The DIP switch (DS1 on A1P) is not used. Do NOT change the factory setting.

The components to make field settings are as follows:



BS1~BS5 Push buttons
H1P~H7P 7-LEDs display
H8P LED for indication during initialisation
ON (☀) OFF (●) Flashing (⚡)

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 of live parts.



BS1 MODE: For changing the set mode
BS2 SET: For field setting
BS3 RETURN: For field setting
BS4 Not used
BS5 Not used

7-LEDs display

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

H1P Shows the mode
H2P~H7P Shows the settings and values, represented in binary code
H8P NOT used for field settings, but used during initialisation

Example:

[H1P- 32 + 16 + 8 + 4 + 2 + 1] H1P H2P H3P H4P H5P H6P H7P	Description
● ● ● ● ● ● ● (H1P OFF)	Default situation
⚡ ● ● ● ● ● ● ● (H1P flashing)	Mode 1
☀ ● ● ● ● ● ● ● (H1P ON)	Mode 2
☀ ● ● ● ● ● ● ● 0 + 0 + 8 + 0 + 0 + 0 (H2P~H7P = binary 8)	Setting 8 (in mode 2)
☀ ● ● ● ● ● ● ● 0 + 0 + 0 + 4 + 0 + 0 (H2P~H7P = binary 4)	Value 4 (in mode 2)

7.2.4 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.

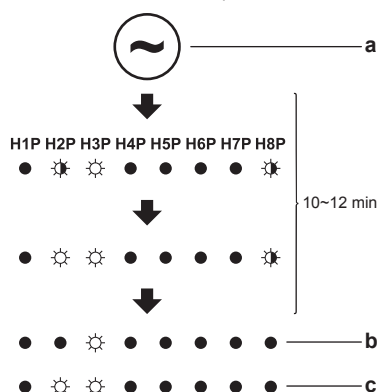
Initialisation: default situation



NOTICE

Be sure to turn on the power 6 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

Turn on the power supply of the outdoor unit, and turn on the external operation switch. After initialisation, the display indication state will be as below (default situation when shipped from factory).



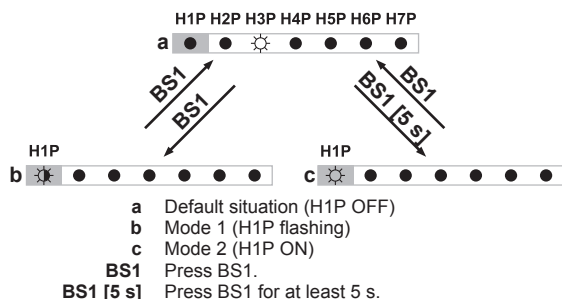
7 Configuration

- a Power ON
- b Default situation
- c LED indication when there is a malfunction

If the default situation is not displayed after 10~12 minutes, check the malfunction code. Solve the malfunction code accordingly.

Switching between modes

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



INFORMATION

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

7.2.5 To use mode 1

In mode 1 (and in default situation) you can read out some information.

Example: 7-LEDs display – Default situation (H1P OFF)

You can read out the status of low noise operation as follows:

#	Action	Button/display
1	Make sure the LEDs are showing the default situation.	H1P H2P H3P H4P H5P H6P H7P ● ● ● ● ● ● ● (H1P OFF)
2	Check the status of LED H6P.	● ● ● ● ● ● ● H6P OFF: Unit is currently not operating under low noise restrictions. ● ● ● ● ● ● ● H6P ON: Unit is currently operating under low noise restrictions.

Example: 7-LEDs display – Mode 1

See "11.3.1 To display the error codes of the latest malfunctions" on page 30.

7.2.6 To use mode 2

In mode 2 you can make field settings to configure the system.

Example: 7-LEDs display – Mode 2

You can change the value of setting [2-8] (= T_e target evaporating temperature) to 4 (= -4°C) as follows:

#	Action	Button/display
1	Start from the default situation.	H1P H2P H3P H4P H5P H6P H7P ● ● ● ● ● ● ●
2	Select mode 2.	BS1 [5 s] ● ● ● ● ● ● ●
3	Select setting 8. ("X" depends on the setting that you want to select.)	BS2 [X×] ● ● ● ● ● ● ● (= binary 8)

#	Action	Button/display
4	Select value 4 (= -4°C). a: Display the current value. b: Change to 4. ("X" depends on the current value, and the value that you want to select.) c: Enter the value in the system. d: Confirm. The system starts operating according to the setting.	a BS3 [1×] ● ● ● ● ● ● ● b BS2 [X×] ● ● ● ● ● ● ● c BS3 [1×] ● ● ● ● ● ● ● d BS3 [1×] ● ● ● ● ● ● ●
5	Quit mode 2.	BS1 [1×] ● ● ● ● ● ● ●

7.2.7 Mode 1 (and default situation): Monitoring settings

In mode 1 (and in default situation) you can read out some information.

7-LEDs display – Default situation (H1P OFF)

You can read out the following information:

	Value / Description
H6P	Shows the status of low noise operation.
OFF	● ● ● ● ● ● ● Unit is currently not operating under low noise restrictions.
ON	● ● ● ● ● ● ● Unit is currently operating under low noise restrictions.
	Low noise operation reduces the sound generated by the unit compared to nominal operating conditions. Low noise operation can be set in mode 2. There are two methods to activate low noise operation of the outdoor unit system.
	<ul style="list-style-type: none"> The first method is to enable an automatic low noise operation during night time by field setting. The unit will operate at the selected low noise level during the selected time frames. The second method is to enable low noise operation based on an external input. For this operation a low noise switch needs to be installed (see "6.8.5 To connect the electrical wiring on the outdoor unit" on page 23).

7-LEDs display – Mode 1 (H1P flashing)

You can read out the following information:

Setting (H1P H2P H3P H4P H5P H6P H7P)	Value / Description
[1-14] ● ● ● ● ● ● ●	Shows the latest malfunction code.
[1-15] ● ● ● ● ● ● ●	Shows the 2nd last malfunction code.
[1-16] ● ● ● ● ● ● ●	Shows the 3rd last malfunction code.

7.2.8 Mode 2: Field settings

In mode 2 you can make field settings to configure the system. The LEDs give a binary representation of the setting/value number.

Setting	Value						
	H1P H2P H3P H4P H5P H6P H7P	Description					
[2-8] ☀ ● ● ☀ ● ● ● T _e target evaporating temperature.	☀ ● ● ● ● ● ● ☀	−10°C					
	☀ ● ● ● ● ● ☀ ●	−8°C					
	☀ ● ● ● ● ● ☀ ☀	−6°C					
	☀ ● ● ● ☀ ● ● ●	−4°C					
	(default)						
	☀ ● ● ● ☀ ● ● ☀	−2°C					
	☀ ● ● ● ☀ ☀ ● ●	0°C					
[2-18] ☀ ● ☀ ● ● ☀ ● Fan high static pressure setting. In order to increase the static pressure the outdoor unit fan is delivering, this setting should be activated. For details about this setting, see technical specifications.	☀ ● ● ● ● ● ● ☀	Deactivated.					
	(default)						
	☀ ● ● ● ● ● ☀ ●	Activated.					
	[2-21] ☀ ● ☀ ● ☀ ● ☀ Refrigerant recovery/vacuumping mode. In order to achieve a free pathway to reclaim refrigerant out of the system or to remove residual substances or to vacuum the system it is necessary to apply a setting which will open required valves in the refrigerant circuit so the reclaim of refrigerant or vacuumping process can be done properly.	☀ ● ● ● ● ● ● ☀	Deactivated.				
		(default)					
		☀ ● ● ● ● ● ☀ ●	Activated. To stop the refrigerant recovery/vacuumping mode, push BS1. If BS1 is not pushed, the system will remain in refrigerant recovery/ vacuumping mode.				
	[2-22] ☀ ● ☀ ● ☀ ☀ ● Automatic low noise setting and level during night time. By changing this setting, you activate the automatic low noise operation function of the unit and define the level of operation. Depending on the chosen level, the noise level will be lowered. The start and stop moments for this function are defined under setting [2-26] and [2-27].	☀ ● ● ● ● ● ● ●	Deactivated				
(default)							
☀ ● ● ● ● ● ● ☀		Level 1	Level 3<Level 2<Level 1				
☀ ● ● ● ● ● ☀ ●		Level 2					
☀ ● ● ● ● ● ☀ ☀		Level 3					
[2-25] ☀ ● ☀ ☀ ● ● ☀ Low noise operation level via the low noise switch. If the system needs to be running under low noise operation conditions when an external signal is sent to the unit, this setting defines the level of low noise that will be applied.	☀ ● ● ● ● ● ● ☀	Level 1	Level 3<Level 2<Level 1				
	☀ ● ● ● ● ● ☀ ●	Level 2					
	(default)						
	☀ ● ● ● ● ☀ ● ● ●	Level 3					
[2-26] ☀ ● ☀ ☀ ● ☀ ● Low noise operation start time. This setting is used in conjunction with setting [2-22].	☀ ● ● ● ● ● ● ☀	20h00					
	☀ ● ● ● ● ● ☀ ●	22h00					
	(default)						
	☀ ● ● ● ● ☀ ● ● ●	24h00					
[2-27] ☀ ● ☀ ☀ ● ☀ ☀ Low noise operation stop time. This setting is used in conjunction with setting [2-22].	☀ ● ● ● ● ● ● ☀	6h00					
	☀ ● ● ● ● ● ☀ ●	7h00					
	☀ ● ● ● ● ☀ ● ● ●	8h00					
	(default)						

8 Commissioning

8.1 Overview: Commissioning

After installation and once the field settings are defined, the installer is obliged to verify correct operation. Therefore a test run must be performed according to the procedures described below.

This chapter describes what you have to do and know to commission the system after it is configured.

Commissioning typically consists of the following stages:

- 1 Checking the "Checklist before commissioning".
- 2 Performing a test run.
- 3 If necessary, correcting errors after abnormal completion of the test run.
- 4 Operating the system.

8.2 Precautions when commissioning



DANGER: RISK OF ELECTROCUTION

8 Commissioning



DANGER: RISK OF BURNING



CAUTION

Do not perform the test operation while working on the indoor units.

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.



INFORMATION

Note that during the first running period of the unit, required power input may be higher. This phenomenon originates from the compressor that requires a 50 hour run elapse before reaching smooth operation and stable power consumption. Reason is that the scroll is made out of iron and that it takes some time to smooth the surfaces that make contact.



NOTICE

Be sure to 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.

8.3 Checklist before commissioning

After the installation of the unit, first check the following items. Once all below checks are fulfilled, the unit must be closed, only then can the unit be powered up.

<input type="checkbox"/>	You read the complete installation and operation instructions, as described in the installer and user reference guide .
<input type="checkbox"/>	Installation Check that the unit is properly installed, to avoid abnormal noises and vibrations when starting up the unit.
<input type="checkbox"/>	Field wiring Be sure that the field wiring has been carried out according to the instructions described in the chapter "6.8 Connecting the electrical wiring" on page 22, according to the wiring diagrams and according to the applicable legislation.
<input type="checkbox"/>	Power supply voltage Check the power supply voltage on the local supply panel. The voltage must correspond to the voltage on the identification label of the unit.
<input type="checkbox"/>	Earth wiring Be sure that the earth wires have been connected properly and that the earth terminals are tightened.
<input type="checkbox"/>	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.

<input type="checkbox"/>	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 "5.4.1 Safety device requirements" on page 12. Be sure that neither a fuse nor a protection device has been bypassed.
<input type="checkbox"/>	Internal wiring Visually check the electrical component box and the inside of the unit on loose connections or damaged electrical components.
<input type="checkbox"/>	Pipe size and pipe insulation Be sure that correct pipe sizes are installed and that the insulation work is properly executed.
<input type="checkbox"/>	Stop valves Be sure that the stop valves are open on both liquid and gas side.
<input type="checkbox"/>	Damaged equipment Check the inside of the unit on damaged components or squeezed pipes.
<input type="checkbox"/>	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.
<input type="checkbox"/>	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.
<input type="checkbox"/>	Air inlet/outlet Check that the air inlet and outlet of the unit is not obstructed by paper sheets, cardboard, or any other material.
<input type="checkbox"/>	Additional refrigerant charge The amount of refrigerant to be added to the unit shall be written on the included "Added refrigerant" plate and attached to the rear side of the front cover.
<input type="checkbox"/>	Installation date and field setting Be sure to keep record of the installation date on the rear of the front panel according to EN60335-2-40 and keep record of the contents of the field setting(s).

8.4 Checklist during commissioning

<input type="checkbox"/>	To perform a test run .
--------------------------	--------------------------------

8.4.1 About 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.

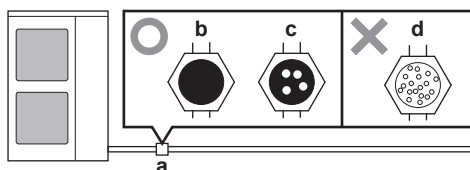
8.4.2 To perform a test run (7-LEDs display)

- 1 Make sure all field settings you want are set; see ["7.2 Making field settings"](#) on page 25.
- 2 Turn ON the power to the outdoor unit and the connected indoor units.

**NOTICE**

Be sure to turn on the power 6 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

- 3 Turn ON the operation switch of the outdoor unit.
- 4 Check the sight glass of the outdoor unit. If the refrigerant is NOT in sealing state, charge extra refrigerant, but do NOT exceed 10% of the determined additional refrigerant amount (see "6.7.3 To determine the additional refrigerant amount" on page 20).



- O Sealing state (= sufficient refrigerant)
- X Insufficient refrigerant
- a Sight glass
- b Full of liquid
- c A little foam in the liquid
- d A lot of foam in the liquid

- 5 Check if the indoor unit blows cold air, and the room/showcase temperature decreases.
- 6 Turn OFF the operation switch of the outdoor unit.

**CAUTION**

Do NOT turn OFF power by disconnecting the power supply directly. **Possible consequence:**

- The auto restart function of the unit might automatically resume operation after the power supply is reconnected.
- Compressor malfunction.

- 7 Check the test operation results on the outdoor unit 7-LEDs display.

Completion	Description
Normal completion	● ● ● ● ● ● ●
Abnormal completion	● ● ● ● ● ● ● Refer to "8.4.3 Correcting after abnormal completion of the test run" on page 29 to take actions for correcting the abnormality. When the test operation is fully completed, normal operation is possible.

8.4.3 Correcting after abnormal completion of the test run

The test operation is only completed if no malfunction occurs. In case of a malfunction, perform correcting actions as explained in the error code table (see "11.3.2 Error codes: Overview" on page 31). Carry out the test operation again and confirm that the abnormality is properly corrected.

**INFORMATION**

If a malfunction occurs, a signal (220-240 V AC) is given to the error output (X2M/E1/E2), and the H2P LED on the main PCB is lit.

**INFORMATION**

Refer to the installation manual of the indoor unit for detailed malfunction codes related to indoor units.

8.4.4 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.

9 Hand-over to the user

Once the test run is finished and the unit operates properly, please 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 can find the complete documentation on the url as earlier described in this manual.
- Explain the user how to properly operate the system and what to do in case of problems.
- Show the user what to do in relation to maintaining the unit.

10 Maintenance and service

**NOTICE**

Maintenance must be done by an authorised installer or service agent.

We recommend to do maintenance at least once a year. However, applicable legislation might require shorter maintenance intervals.

**NOTICE**

In Europe, the **greenhouse gas emissions** of the total refrigerant charge in the system (expressed as tonnes CO₂-equivalent) is used to determine the maintenance intervals. Follow the applicable legislation.

Formula to calculate the greenhouse gas emissions:

GWP value of the refrigerant × Total refrigerant charge [in kg] / 1000

10.1 Overview: Maintenance and service

This chapter contains information about:

- Preventing electrical hazards when maintaining and servicing the system
- The refrigerant recovery operation

10.2 Maintenance safety precautions



DANGER: RISK OF ELECTROCUTION



DANGER: RISK OF BURNING

**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.

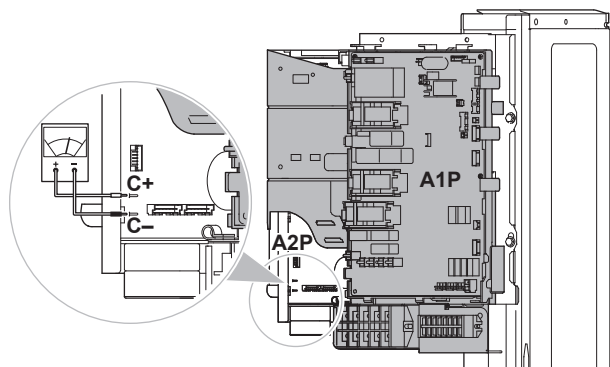
10.2.1 To prevent electrical hazards

When performing service to inverter equipment:

- 1 Do not open the electrical component box cover for 10 minutes after the power supply is turned off.

11 Troubleshooting

- 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 below, with a tester and confirm that the voltage of the capacitor in the main circuit is less than 50 V DC.



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

Junction connectors	X106A for M1F
	X107A for M2F

- 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 refer to the wiring diagram labelled on the back of the service cover.

Pay attention to the fan. It is dangerous to inspect the unit while the fan is running. Make sure to turn off the main switch and to remove the fuses from the control circuit located in the outdoor unit.

10.3 Checklist for yearly maintenance of the outdoor unit

Check the following at least once a year:

- Outdoor unit heat exchanger.

The heat exchanger of the outdoor unit can get blocked up due to dust, dirt, leaves, etc. It is recommended to clean the heat exchanger yearly. A blocked heat exchanger can lead to too low pressure or too high pressure leading to worse performance.

10.4 About service mode operation

Refrigerant recovery operation/vacuuming operation is possible by applying setting [2-21]. Refer to "7.2 Making field settings" on page 25 for details how to set mode 2.

When vacuuming/recovery mode is used, check very carefully what should be vacuumed/recovered before starting. See installation manual of the indoor unit for more information about vacuuming and recovery.

10.4.1 To use vacuum mode

- Turn OFF the external operation switch.
- Activate setting [2-21] to start vacuuming mode.

Result: When confirmed, the outdoor unit expansion valves will fully open. At that moment H1P is lit.

- Evacuate the system with a vacuum pump.

- Press BS1 to stop vacuuming mode.

10.4.2 To recover refrigerant

This should be done by a refrigerant reclaimer. Follow the same procedure as for vacuuming method.



NOTICE

Make sure to NOT recover any oil while recovering refrigerant. **Example:** By using an oil separator.

11 Troubleshooting

11.1 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.

11.2 Precautions when troubleshooting



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 bridge 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.



DANGER: RISK OF ELECTROCUTION



WARNING

Prevent hazard due to the inadvertent resetting of the thermal cut-out: 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.



DANGER: RISK OF BURNING

11.3 Solving problems based on error codes



INFORMATION

If a malfunction occurs, a signal (220-240 V AC) is given to the error output (X2M/E1/E2), and the H2P LED on the main PCB is lit.

You can display the error codes of the 3 latest malfunctions by using the push buttons and 7-LEDs display (see "7.2.3 Field setting components" on page 25). Error codes consist of 2 characters (example: E3).

After solving the problem, reset the malfunction by turning OFF and ON the external operation switch, and retry operation.

11.3.1 To display the error codes of the latest malfunctions

#	Action	Display
1	Start from the default situation.	H1P H2P H3P H4P H5P H6P H7P ● ● ● ● ● ● ●

#	Action	Display
2	Select mode 1.	BS1 [1×]
3	Select a malfunction. ("X×" depends on the setting that you want to select.)	BS2 [X×] Possible malfunctions: [1-14] Latest malfunction: [1-15] 2nd last malfunction: [1-16] 3rd last malfunction:
4	Display the first character of the error code.	BS3 [1×] Possible characters: E: H: F: J: L: P: U:
5	Display the second character of the error code.	BS2 [1×] Possible characters: 1: 2: 3: 4: 5: 6: 7: 8: 9: A: C:
6	Quit mode 1.	BS1 [1×]

11.3.2 Error codes: Overview

Code	Cause	Solution
E3	<ul style="list-style-type: none"> The stop valve of an outdoor unit is left closed. Refrigerant overcharge 	<ul style="list-style-type: none"> Open the stop valve on both the gas and liquid side. Recalculate the required amount of refrigerant and correct the refrigerant charge level by recovering any excessive refrigerant with a refrigerant recovery machine.
E4	<ul style="list-style-type: none"> The stop valve of an outdoor unit is left closed. Insufficient refrigerant 	<ul style="list-style-type: none"> Open the stop valve on both the gas and liquid side. Check if the additional refrigerant charge has been finished correctly. Recalculate the required amount of refrigerant and add an adequate amount of refrigerant.

Code	Cause	Solution
E7	Fan motor malfunction (M1F) – A2P (X106A) (M2F) – A2P (X107A)	Check connection on PCB or actuator.
E9	Electronic expansion valve malfunction (Y1E) - A1P (X21A) (Y3E) - A1P (X22A)	Check connection on PCB or actuator.
F3	<ul style="list-style-type: none"> The stop valve of an outdoor unit is left closed. Insufficient refrigerant 	<ul style="list-style-type: none"> Open the stop valve on both the gas and liquid side. Check if the additional refrigerant charge has been finished correctly. Recalculate the required amount of refrigerant and add an adequate amount of refrigerant.
F6	Refrigerant overcharge	Recalculate the required amount of refrigerant and correct the refrigerant charge level by recovering any excessive refrigerant with a refrigerant recovery machine.
H9	Ambient temperature sensor malfunction (R1T) - A1P (X11A)	Check connection on PCB or actuator.
J3	Discharge temperature sensor malfunction (R2T): open circuit / short circuit - A1P (X12A)	Check connection on PCB or actuator.
J5	Suction temperature sensor malfunction (R3T) - A1P (X12A) (R5T) - A1P (X12A)	Check connection on PCB or actuator.
J6	Liquid temperature sensor (coil) malfunction (R6T) - A1P (X13A)	Check connection on PCB or actuator.
J7	Liquid temperature sensor (after subcool HE) malfunction (R7T) - A1P (X13A)	Check connection on PCB or actuator.
J9	Gas temperature sensor (after subcool HE) malfunction (R4T) - A1P (X12A)	Check connection on PCB or actuator.
JA	High pressure sensor malfunction (S1NPH): open circuit / short circuit - A1P (X17A)	Check connection on PCB or actuator.
JC	Low pressure sensor malfunction (S1NPL): open circuit / short circuit - A1P (X18A)	Check connection on PCB or actuator.
L4	<ul style="list-style-type: none"> Fin temperature rise because of inverter malfunction. Fin temperature rise because of short circuit. Fin thermistor malfunction. 	<ul style="list-style-type: none"> Remove obstacles that block the passage of air to the outdoor unit. Check connection on PCB or actuator.

12 Disposal

Code	Cause	Solution
LC	Transmission outdoor unit - inverter: INV1 / FAN1 transmission trouble	Check connection.
P1	INV1 unbalanced power supply voltage	Check if power supply is within range.
U1	Reversed power supply phase malfunction	Correct phase order.
U2	Insufficient supply voltage	Check if the supply voltage is supplied properly.

12 Disposal

Dismantling of the unit, and treatment of the refrigerant, oil and other parts must comply with the applicable legislation.

13 Technical data

13.3 Service space: Outdoor unit

When mounting units side by side, the piping route must be to the front, to the back or downwards. In this case the piping route to the side is not possible.

When mounting the units side by side and routing the piping to the back, you must keep a distance of ≥ 250 mm between the units (instead of ≥ 100 mm as shown on the figures below).

Single unit () | Single row of units ()

Diagram illustrating the dimensions and clearances for a single unit. The unit is shown with obstacles A, B, C, D, and E. The dimensions are defined as follows:

- a : Clearance from the front of the unit to obstacle A.
- b : Clearance from the side of the unit to obstacle B.
- c : Clearance from the side of the unit to obstacle C.
- d : Clearance from the front of the unit to obstacle D.
- e : Clearance from the top of the unit to obstacle E.
- e_B : Clearance from the top of the unit to obstacle B.
- e_D : Clearance from the top of the unit to obstacle D.
- H_B : Height of obstacle B.
- H_D : Height of obstacle D.
- H_U : Height of the unit.

A~E	H_B H_D H_U	(mm)							
		a	b	c	d	e	e_B	e_D	
B	—		≥ 100						
A, B, C	—	≥ 100	≥ 100	≥ 100					
B, E	—		≥ 100			≥ 1000		≤ 500	
A, B, C, E	—	≥ 150	≥ 150	≥ 150		≥ 1000		≤ 500	
D	—				≥ 500				
D, E	—				≥ 1000	≥ 1000	≤ 500		
B, D	—		≥ 100		≥ 500				
B, D, E	$H_B < H_D$	$H_B \leq \frac{1}{2}H_U$	≥ 250		≥ 750	≥ 1000	≤ 500		
			≥ 250		≥ 1000	≥ 1000	≤ 500		
			\varnothing						
	$H_B > H_D$	$H_D \leq \frac{1}{2}H_U$	≥ 100		≥ 1000	≥ 1000		≤ 500	
			≥ 200		≥ 1000	≥ 1000		≤ 500	
			≥ 200		≥ 1700	≥ 1000		≤ 500	

1

Diagram illustrating the dimensions and clearances for a row of units. The dimensions are defined as follows:

- a : Clearance from the front of the unit to obstacle A.
- b : Clearance from the side of the unit to obstacle B.
- c : Clearance from the side of the unit to obstacle C.
- d : Clearance from the front of the unit to obstacle D.
- e : Clearance from the top of the unit to obstacle E.
- e_B : Clearance from the top of the unit to obstacle B.
- e_D : Clearance from the top of the unit to obstacle D.
- H_B : Height of obstacle B.
- H_D : Height of obstacle D.
- H_U : Height of the unit.

A, B, C	—	≥ 200	≥ 300	≥ 1000				
A, B, C, E	—	≥ 200	≥ 300	≥ 1000		≥ 1000		≤ 500
D	—				≥ 1000			
D, E	—				≥ 1000	≥ 1000	≤ 500	
B, D	$H_D > H_U$	≥ 300		≥ 1000				
	$H_D \leq \frac{1}{2}H_U$	≥ 250		≥ 1500				
	$\frac{1}{2}H_U < H_D \leq H_U$	≥ 300		≥ 1500				
B, D, E	$H_B < H_D$	$H_B \leq \frac{1}{2}H_U$	≥ 300		≥ 1000	≥ 1000	≤ 500	
			≥ 300		≥ 1250	≥ 1000	≤ 500	
			\varnothing					
	$H_B > H_D$	$H_D \leq \frac{1}{2}H_U$	≥ 250		≥ 1500	≥ 1000		≤ 500
			≥ 300		≥ 1500	≥ 1000		≤ 500
			≥ 300		≥ 2200	≥ 1000		≤ 500

1+2

A, B, C, D Obstacles (walls/baffle plates)

E Obstacle (roof)

a, b, c, d, e Minimum service space between the unit and obstacles A, B, C, D and E

e_B Maximum distance between the unit and the edge of obstacle E, in the direction of obstacle B

e_D Maximum distance between the unit and the edge of obstacle E, in the direction of obstacle D

H_U Height of the unit

H_B, H_D Height of obstacles B and D

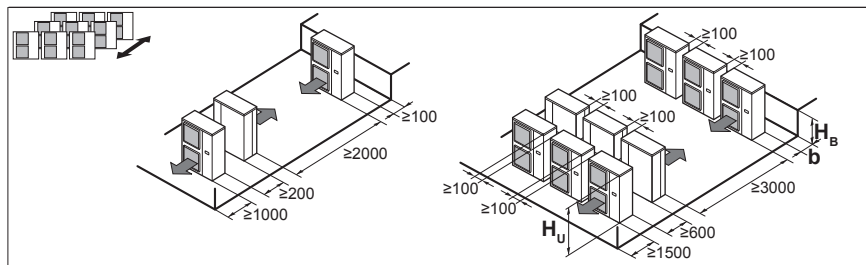
1 Seal the bottom of the installation frame to prevent discharged air from flowing back to the suction side through the bottom of the unit.

2 Maximum two units can be installed.

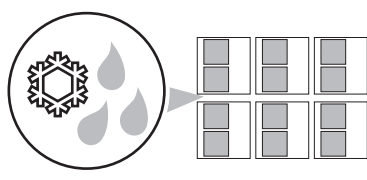
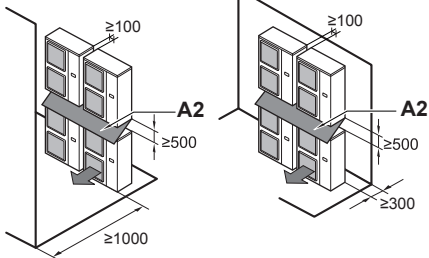
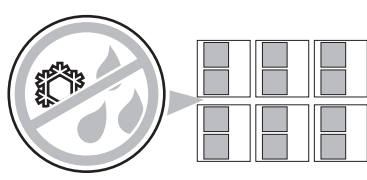
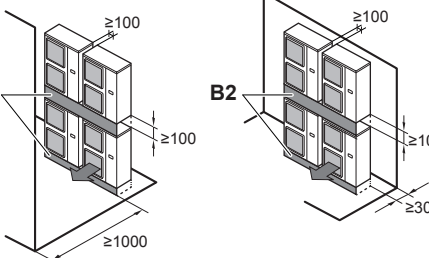


Not allowed

Multiple rows of units

	<table> <tr> <th>H_B H_U</th><th>b (mm)</th></tr> <tr> <td>$H_B \leq \frac{1}{2} H_U$</td><td>$b \geq 250$</td></tr> <tr> <td>$\frac{1}{2} H_U < H_B \leq H_U$</td><td>$b \geq 300$</td></tr> <tr> <td>$H_B > H_U$</td><td>⊘</td></tr> </table>	H_B H_U	b (mm)	$H_B \leq \frac{1}{2} H_U$	$b \geq 250$	$\frac{1}{2} H_U < H_B \leq H_U$	$b \geq 300$	$H_B > H_U$	⊘
H_B H_U	b (mm)								
$H_B \leq \frac{1}{2} H_U$	$b \geq 250$								
$\frac{1}{2} H_U < H_B \leq H_U$	$b \geq 300$								
$H_B > H_U$	⊘								

Stacked units (max. 2 levels)

<p>A1</p> 	<p>A2</p> 
<p>B1</p> 	<p>B2</p> 

A1=>A2 (A1) If there is danger of drainage dripping and freezing between the upper and lower units...

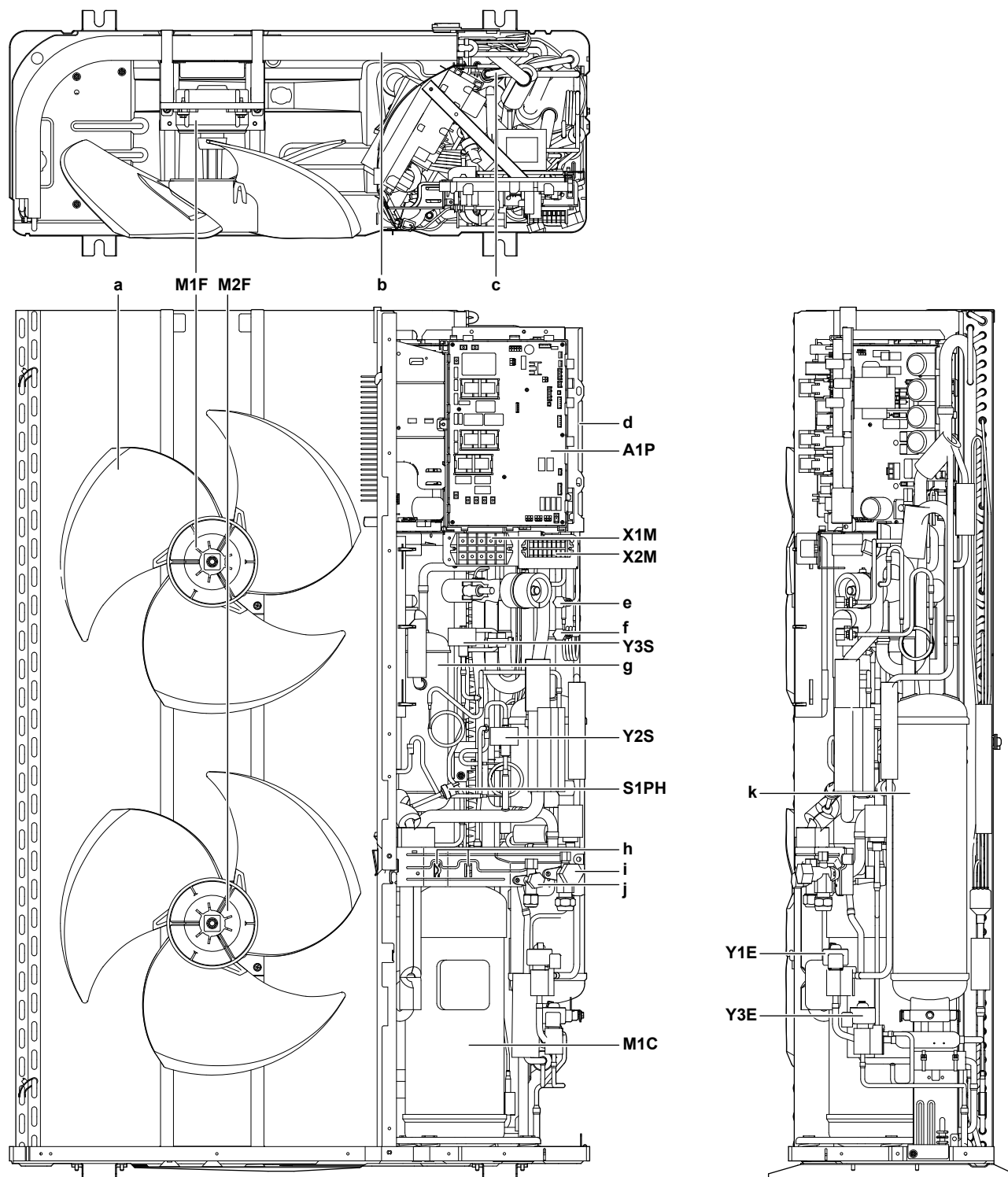
(A2) Then install a **roof** between the upper and lower units. Install the upper unit high enough above the lower unit to prevent ice buildup at the upper unit's bottom plate.

B1=>B2 (B1) If there is no danger of drainage dripping and freezing between the upper and lower units...

(B2) Then it is not required to install a roof, but **seal the gap** between the upper and lower units to prevent discharged air from flowing back to the suction side through the bottom of the unit.

13 Technical data

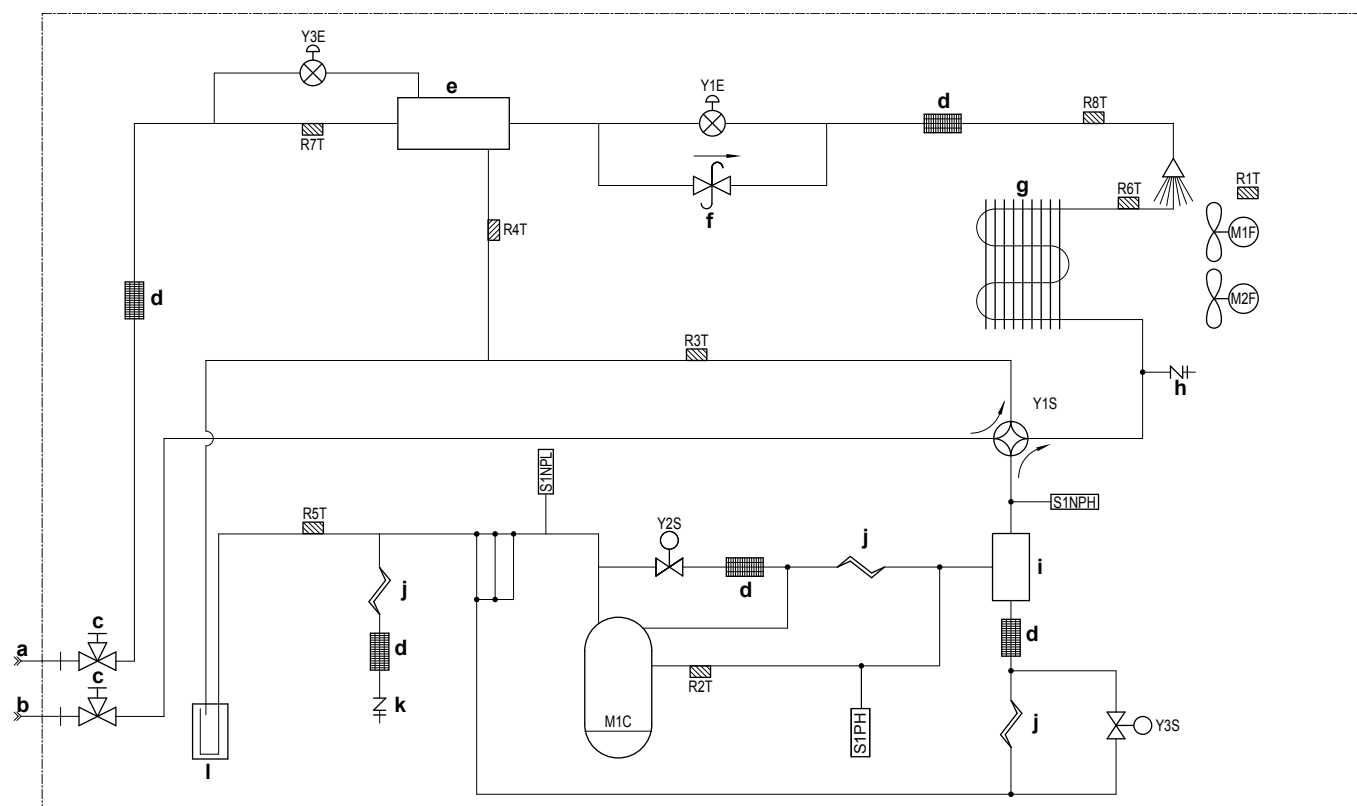
13.4 Components: Outdoor unit



- a Fan
- b Heat exchanger
- c Subcool heat exchanger
- d Switch box
- e Service port (high pressure)
- f Service port (refrigerant charge)
- g Oil separator
- h Cable tie mountings (to fix the field wiring with cable ties to ensure stress relief)
- i Stop valve (gas)
- j Stop valve (liquid)
- k Accumulator
- A1P Printed circuit board (main)
- M1C Motor (compressor)
- M1F-M2F Motor (upper and lower fan)
- S1PH High pressure switch

- X1M Terminal strip (power supply wiring)
- X2M Terminal strip (operation switch, low-noise switch and error output)
- Y1E Electronic expansion valve (main)
- Y3E Electronic expansion valve (subcool heat exchanger)
- Y2S Solenoid valve (unloader circuit)
- Y3S Solenoid valve (hot gas)

13.5 Piping diagram: Outdoor unit

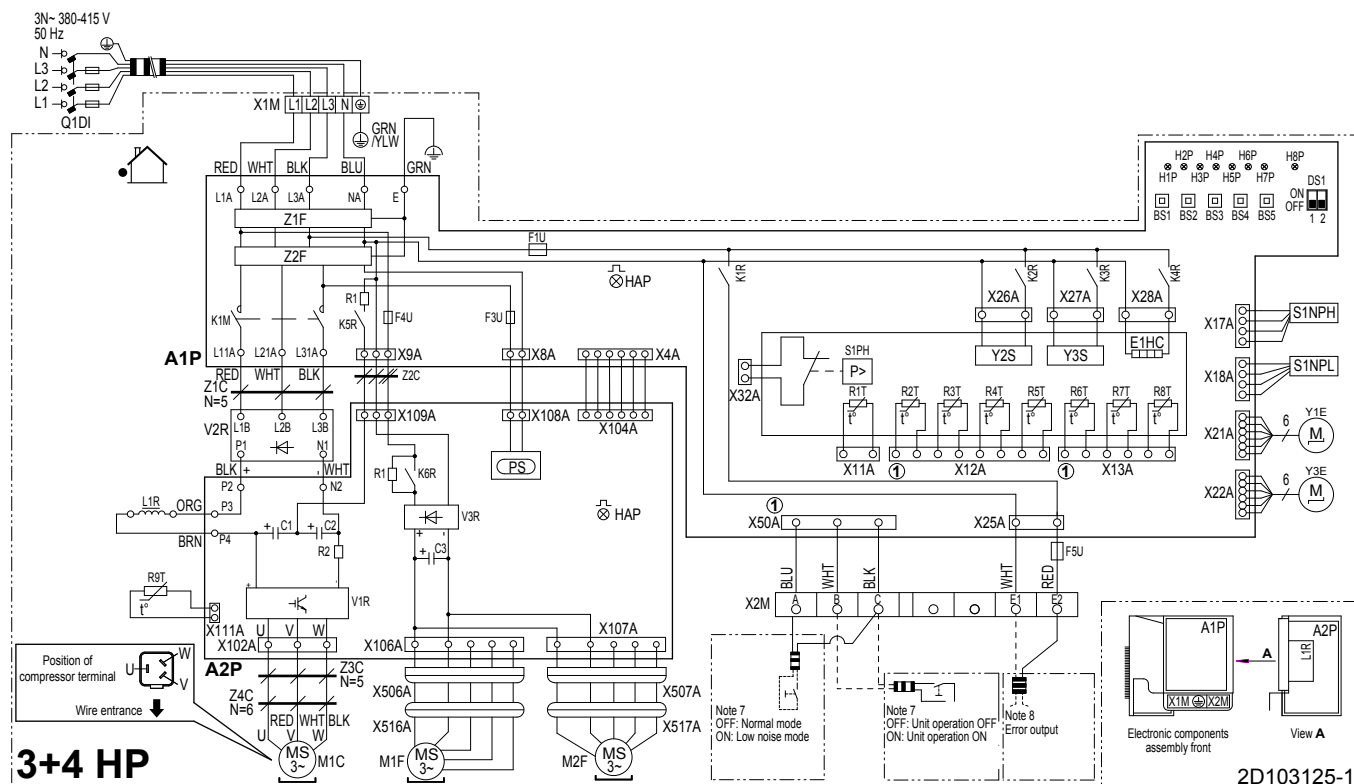


- a Field piping (liquid: Ø9.5 flare connection)
- b Field piping (gas: Ø15.9 flare connection)
- c Stop valve (with service port 5/16")
- d Filter (5×)
- e Subcool heat exchanger
- f Pressure regulating valve
- g Heat exchanger
- h Service port (high pressure)
- i Oil separator
- j Capillary tube (3×)
- k Service port (refrigerant charge)
- l Accumulator
- M1C Compressor
- M1F-M2F Fan motor
- R1T Thermistor (air)
- R2T Thermistor (discharge)
- R3T Thermistor (suction 1)
- R4T Thermistor (subcool heat exchanger)
- R5T Thermistor (suction 2)
- R6T Thermistor (heat exchanger)
- R7T Thermistor (liquid pipe 1)
- R8T Thermistor (liquid pipe 2)
- S1NPH High pressure sensor
- S1NPL Low pressure sensor
- S1PH High pressure switch
- Y1E Electronic expansion valve (main)
- Y3E Electronic expansion valve (subcool heat exchanger)
- Y1S 4-way valve
- Y2S Solenoid valve (hot gas)
- Y3S Solenoid valve (unloader circuit)
- Cooling

13 Technical data

13.6 Wiring diagram: Outdoor unit

The wiring diagram is delivered with the unit, located at the inside of the service cover.



Notes:

- This wiring diagram applies only to the outdoor unit.
- Symbols (see below).
- Symbols (see below).
- Refer to the installation manual or service manual on how to use BS1~BS5 push button switch and DS1-1, DS1-2 DIP switch.
- Do not operate the unit by short-circuiting protection device S1PH.
- Colours (see below).
- Use a voltage-free contact for microcurrent (≤ 1 mA, 12 V DC).
- Error output is 220-240 V AC, with a maximum load of 0.5 A.

Symbols:

L	Live
N	Neutral
---	Field wiring
□	Terminal strip
⊠	Connector
⊢	Fixed connector
⊣	Movable connector
⊤	Protective earth (screw)
⊥	Noiseless earth
○	Terminal

Colours:

BLK	Black
BLU	Blue
BRN	Brown
GRN	Green
ORG	Orange
RED	Red
WHT	White
YLW	Yellow

GRN	Green
ORG	Orange
RED	Red
WHT	White
YLW	Yellow

Legend for wiring diagram LRMEQ3+4:

A1P	Printed circuit board (main)
A2P	Printed circuit board (inverter)
BS1~BS5	Push button switch (MODE, SET, RETURN, TEST, RESET)
C1~C3	Capacitor
DS1	DIP switch
E1HC	Crankcase heater
F1U~F4U (A1P)	Fuse (T 6.3 A / 250 V)
F5U	Fuse (F 1.0 A / 250 V)
H1P~H8P	Light-emitting diode (service monitor is orange)
H2P:	<ul style="list-style-type: none"> Prepare, test: Flickering Malfunction detection: Light up
HAP (A1P)	Light-emitting diode (service monitor is green)
HAP (A2P)	Light-emitting diode (service monitor is green)
K1M (A1P)	Magnetic contactor
K1R	Magnetic relay (Y1S)
K2R	Magnetic relay (Y2S)
K3R	Magnetic relay (Y3S)
K4R	Magnetic relay (E1HC)

K5R, K6R	Magnetic relay
L1R	Reactor
M1C	Motor (compressor)
M1F	Motor (fan) (upper)
M2F	Motor (fan) (lower)
PS	Switching power supply
Q1DI	Earth leakage circuit breaker (300 mA)
R1 (A1P)	Resistor
R1 (A2P), R2 (A2P)	Resistor
R1T	Thermistor (air)
R2T	Thermistor (M1C discharge)
R3T	Thermistor (suction 1)
R4T	Thermistor (subcool)
R5T	Thermistor (suction 2)
R6T	Thermistor (heat exchanger)
R7T	Thermistor (liquid 1)
R8T	Thermistor (liquid 2)
R9T	Thermistor (power module)
S1NPH	Pressure sensor (high)
S1NPL	Pressure sensor (low)
S1PH	Pressure switch (high)
V1R	Power module
V2R, V3R	Diode module
X1M	Terminal strip (power supply)
X2M	Terminal strip
Y1E	Electronic expansion valve (main)
Y3E	Electronic expansion valve (subcool)
Y2S	Solenoid valve (hot gas)
Y3S	Solenoid valve (unloader circuit)
Z1C~Z4C	Noise filter (ferrite core)
Z1F	Noise filter (with surge absorber)
Z2F	Noise filter

13 Technical data

13.7 Technical specifications: Outdoor unit

Technical specifications

Specification	LRMEQ3	LRMEQ4
Casing material	Painted galvanised steel	
Dimensions h×w×d	1345×900×320 mm	
Weight	104 kg	
Operation range		
▪ Evaporating temperature	−10~2°C	
▪ Outdoor temperature	−10~43°C DB	
Capacity^(a)		
▪ Refrigerating capacity (medium temperature)	5.90 kW	8.40 kW
▪ COP		
▪ Power input		
PED		
▪ Category	1	
▪ Most critical part	Compressor	
▪ PS×V	167 bar×l	
Maximum number of indoor units connected	4	
Heat exchanger		
▪ Type	Cross fin	
▪ Treatment	Anti corrosion	
Fan		
▪ Type	Propeller	
▪ Quantity	2	
▪ Air flow rate ^(b)	106 m³/min	
▪ Motor	2	
▪ Model	Direct drive	
▪ Output/pcs	70 W	
Compressor		
▪ Quantity	1	
▪ Model	Inverter	
▪ Type	Hermetically sealed scroll compressor	
Sound level (nominal)^(c)		
▪ Sound power ^(d)	67 dBA	
▪ Sound pressure ^(e)	51 dBA	
Refrigerant		
▪ Type	R410A	
▪ Charge	4.0 kg	
Refrigerant oil	FVC68D	
Safety devices	High pressure switch Fan driver overload protector Inverter overload protector PCB fuse	

(a) Nominal capacities are based on evaporating temperature −10°C, outdoor temperature 32°C DB, and suction superheat 10°C.

(b) Nominal at 230 V.

(c) Sound values are measured in a semi-anechoic room.

(d) Sound power level is an absolute value that a sound generates.

(e) Sound pressure level is a relative value depending on the distance and acoustic environment. For more details, refer to sound level drawings in the technical data book.

Electrical specifications

Specification	LRMEQ3	LRMEQ4
Power supply		
▪ Name	Y1	
▪ Phase	3N~	
▪ Frequency	50 Hz	
▪ Voltage	380-415 V	
Current		
▪ Nominal running current (RLA) ^(a)		
▪ Starting current (MSC) ^(b)	≤MCA	≤MCA
▪ Minimum circuit amps (MCA) ^(c)	13.5 A	
▪ Maximum fuse amps (MFA) ^(d)	16 A	
▪ Full load amps (FLA) ^(e)	0.3+0.3 A	
Voltage range	380-415 V +/- 10%	
Wiring connections		
▪ For power supply	5G	

(a) RLA is based on evaporating temperature -10°C, outdoor temperature 32°C DB, and suction superheat 10°C.

(b) MSC=the maximum current during startup of the compressor. ZEAS uses only inverter compressors. MCA must be used to select the correct field wiring size. The MCA can be regarded as the maximum running current.

(c) MCA must be used to select the correct field wiring size. The MCA can be regarded as the maximum running current.

(d) MFA is used to select the circuit breaker and the ground fault circuit interrupter (earth leakage circuit breaker).

(e) FLA=nominal running current fan. Voltage range: units are suitable for use on electrical systems where voltage supplied to unit terminal is not below or above listed range limits. Maximum allowable voltage range variation between phases is 2%.

For the user

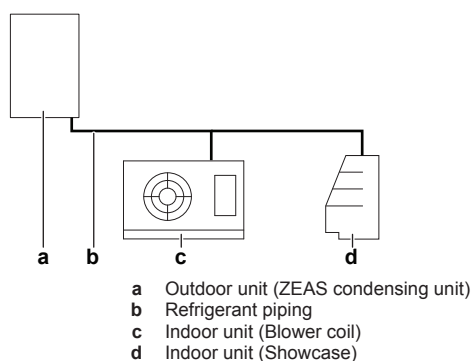
14 About the system

**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.

14.1 System layout



15 Before operation

**WARNING**

This unit contains electrical and hot parts.

**WARNING**

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

**CAUTION**

It is not good for your health to expose your body to the air flow for a long time.

**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. This could cause the chemicals to become deposited in the unit, which could endanger the health of those who are hypersensitive to chemicals.

16 Operation

16.1 Operation range

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

	Cooling
Outdoor temperature	-10~43°C DB
Evaporating temperature	-10~2°C

16.2 Operating the system

16.2.1 About operating the system

- To protect the unit, turn on the main power switch 6 hours before operation.

17 Energy saving and optimum operation

- To start and stop operation of the outdoor unit, use the external operation switch.
- If the main power supply is turned off during operation, operation will restart automatically after the power turns back on again.

17 Energy saving and optimum 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.

18 Maintenance and service



NOTICE

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



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

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



CAUTION

Pay attention to the fan.

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

Be 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.

18.1 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 the outdoor unit.
- Turn on the power at least 6 hours before operating the unit in order to ensure smoother operation.

18.2 About the refrigerant

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

Refrigerant type: R410A

Global warming potential (GWP) value: 2087.5



NOTICE

In Europe, the **greenhouse gas emissions** of the total refrigerant charge in the system (expressed as tonnes CO₂-equivalent) is used to determine the maintenance intervals. Follow the applicable legislation.

Formula to calculate the greenhouse gas emissions:
GWP value of the refrigerant × Total refrigerant charge [in kg] / 1000

Please contact your installer for more information.



WARNING

The refrigerant in the system is safe and normally does not leak. If the refrigerant leaks in the room, contact with a fire of a burner, a heater or a cooker may result in a harmful gas.

Turn off any combustible heating devices, ventilate the room and contact the dealer where you purchased the unit.

Do not use the system until a service person confirms that the portion where the refrigerant leaks is repaired.

18.3 After-sales service and warranty

18.3.1 Warranty period

- This product includes a warranty card that was filled in by the dealer at the time of installation. The completed card has to be checked by the customer and stored carefully.
- If repairs to the product are necessary within the warranty period, contact your dealer and keep the warranty card at hand.

18.3.2 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 electric shock or fire. Contact your dealer.
- In case of accidental refrigerant leaks, make sure there are no naked flames. The refrigerant itself is entirely safe, non-toxic and non-combustible, but it will generate toxic gas when it accidentally leaks into a room where combustible air from fan heaters, gas cookers, etc. is present. Always have qualified service personnel confirm that the point of leakage has been repaired or corrected before resuming operation.

19 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 occur, 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, electric shock or fire. Contact your dealer.

The system must be repaired by a qualified service person:

Malfunction	Measure
If a safety device such as a fuse, a breaker or an earth leakage breaker frequently actuates or the ON/OFF switch does not properly work.	Turn off the main power switch.
If water leaks from the unit.	Stop the operation.
The operation switch does not work well.	Turn off the power.

If the system does not properly operate except for the above mentioned cases and none of the above mentioned malfunctions is evident, investigate the system according to the following procedures.

Malfunction	Measure
If the system does not operate at all.	<ul style="list-style-type: none"> 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 supply is recovered. Check if no fuse has blown or breaker has worked. Change the fuse or reset the breaker if necessary.
The system stops immediately after starting operation.	<ul style="list-style-type: none"> Check if air inlet or outlet of outdoor or indoor unit is not blocked by obstacles. Remove any obstacle and make it well-ventilated.

Malfunction	Measure
The system operates but cooling is insufficient.	<ul style="list-style-type: none"> Check if air inlet or outlet of outdoor or indoor unit is not blocked by obstacles. Remove any obstacle and make it well-ventilated. 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.

If after checking all above items, 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 (possibly listed on the warranty card).

19.1 Symptoms that are NOT system malfunctions

The following symptoms are NOT system malfunctions:

19.1.1 Symptom: The system does not operate

- The system does not start immediately after it is turned ON again. If the operation lamp lights, the system is in normal condition. To prevent overloading of the compressor motor, the system starts 5 minutes after it is turned ON again in case it was turned OFF just before.
- The system does not start immediately after the power supply is turned on. Wait one minute until the micro computer is prepared for operation.

19.1.2 Symptom: The unit does not stop immediately when operation is stopped

This is to prevent components from being damaged. The unit will stop in a little while.

19.1.3 Symptom: Noise (Outdoor unit)

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

20 Relocation

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

19.1.4 Symptom: Dust comes out of the unit

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

19.1.5 Symptom: The outdoor unit fan does not spin

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

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

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

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.

20 Relocation

Contact your dealer for removing and reinstalling the total unit. Moving units requires technical expertise.

21 Disposal

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

22 Glossary

Dealer

Sales distributor for the product.

Authorized 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

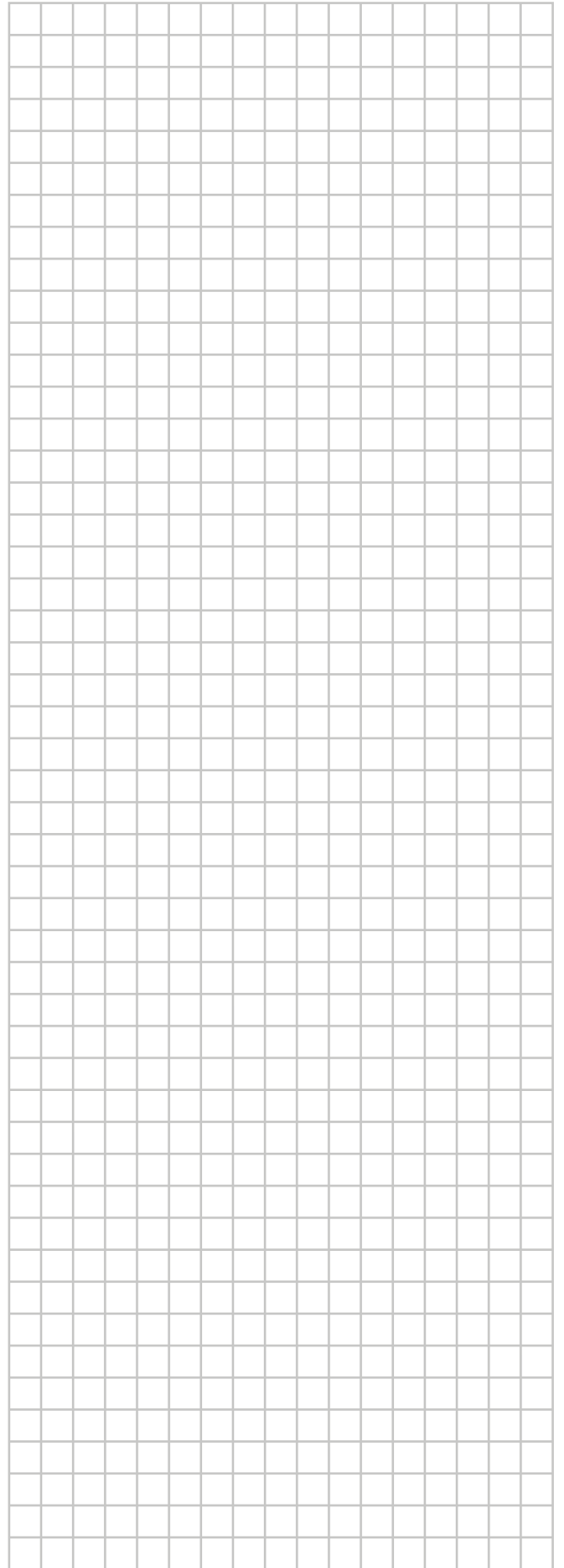
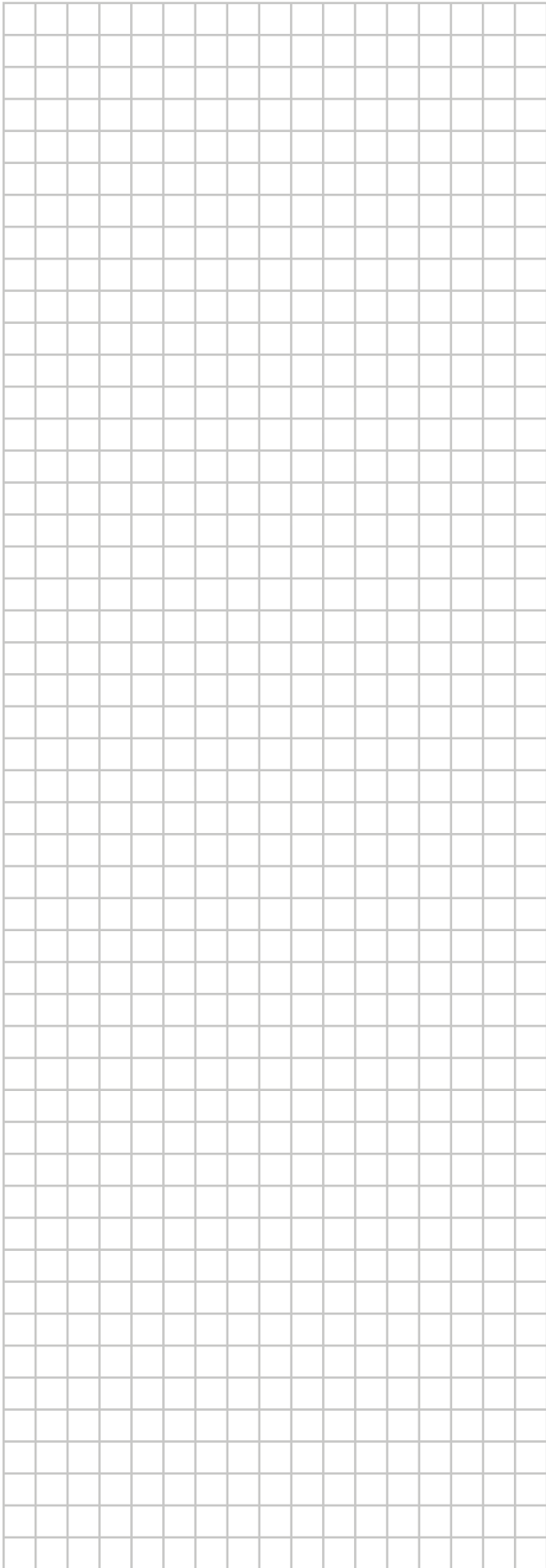
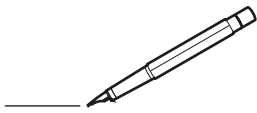
Instruction manual specified for a certain product or application, explaining how to install, configure and maintain it.

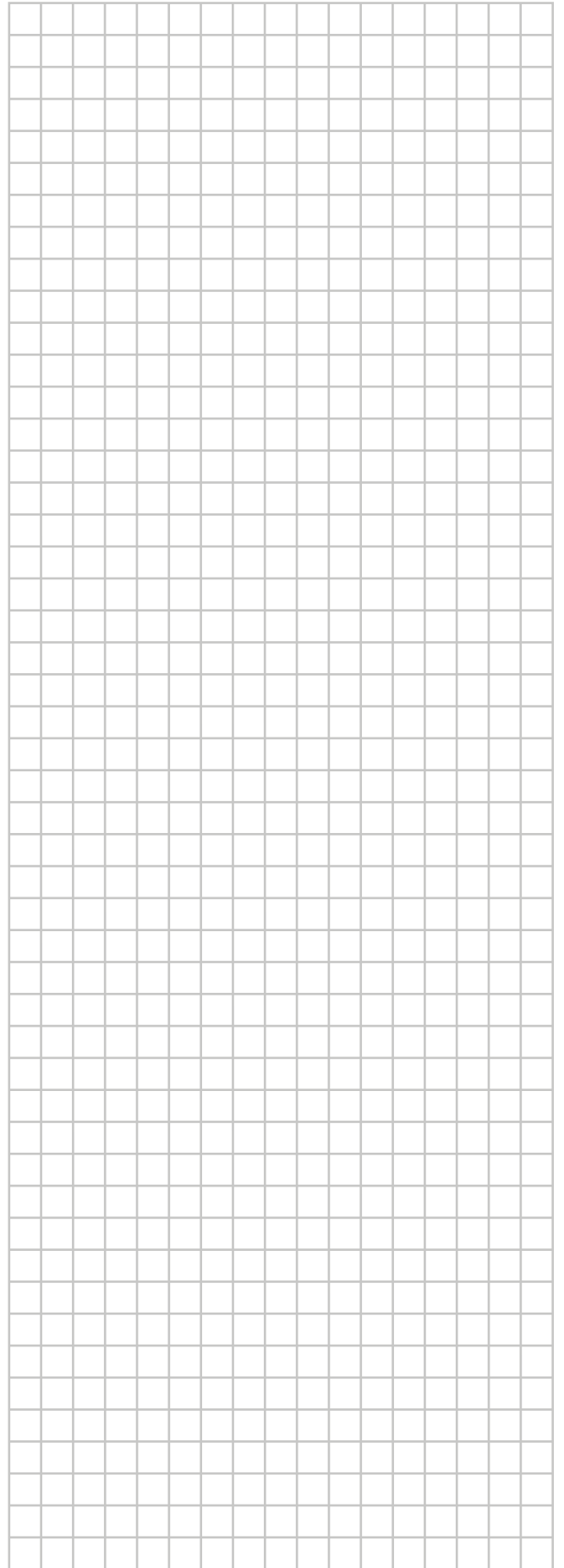
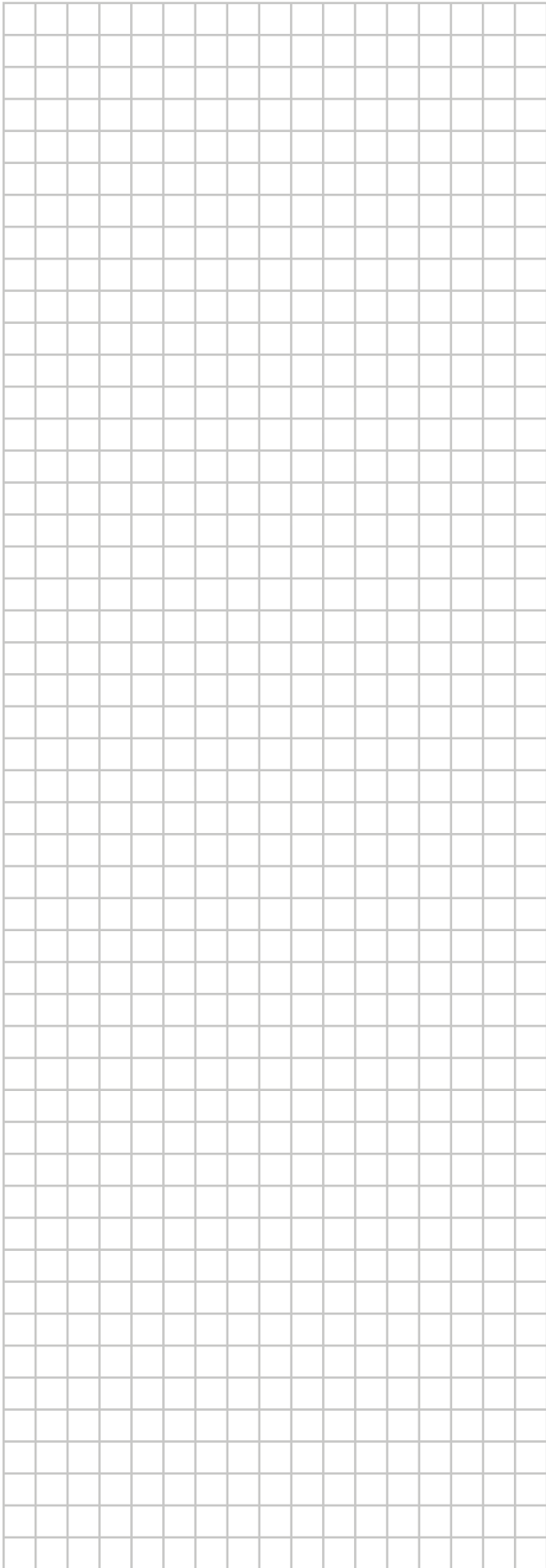
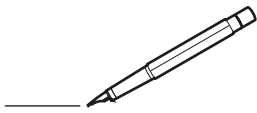
Operation manual

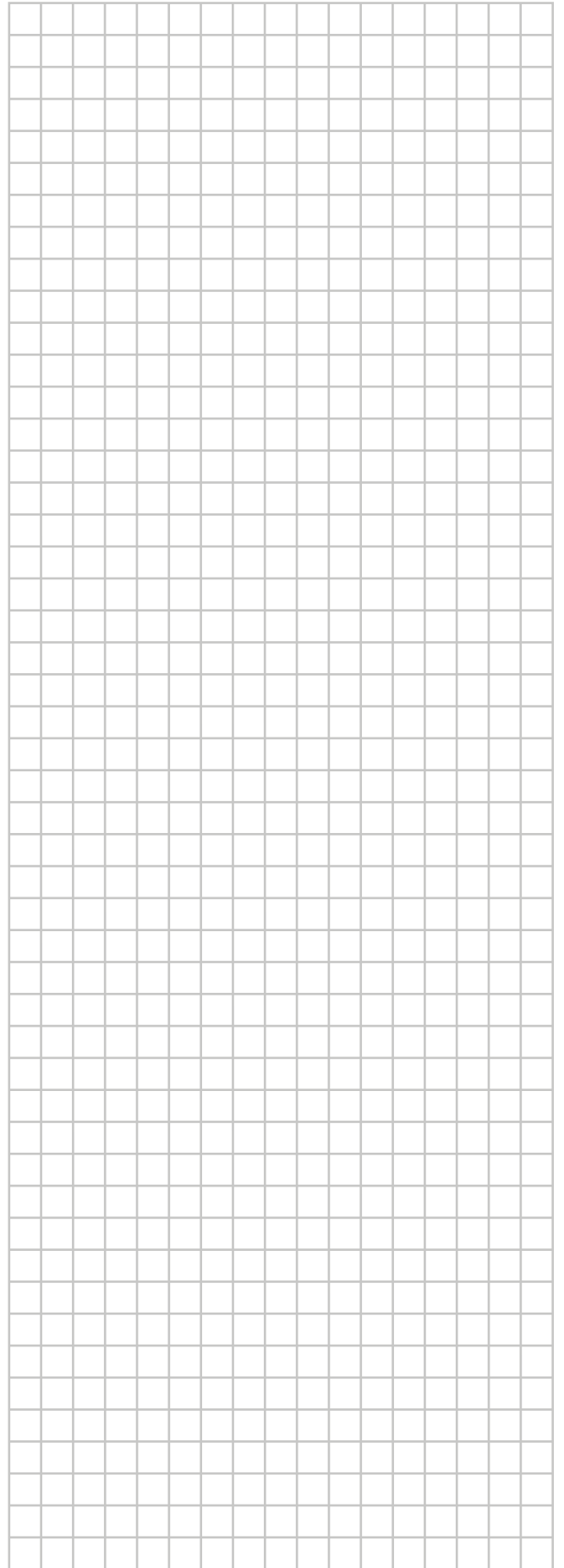
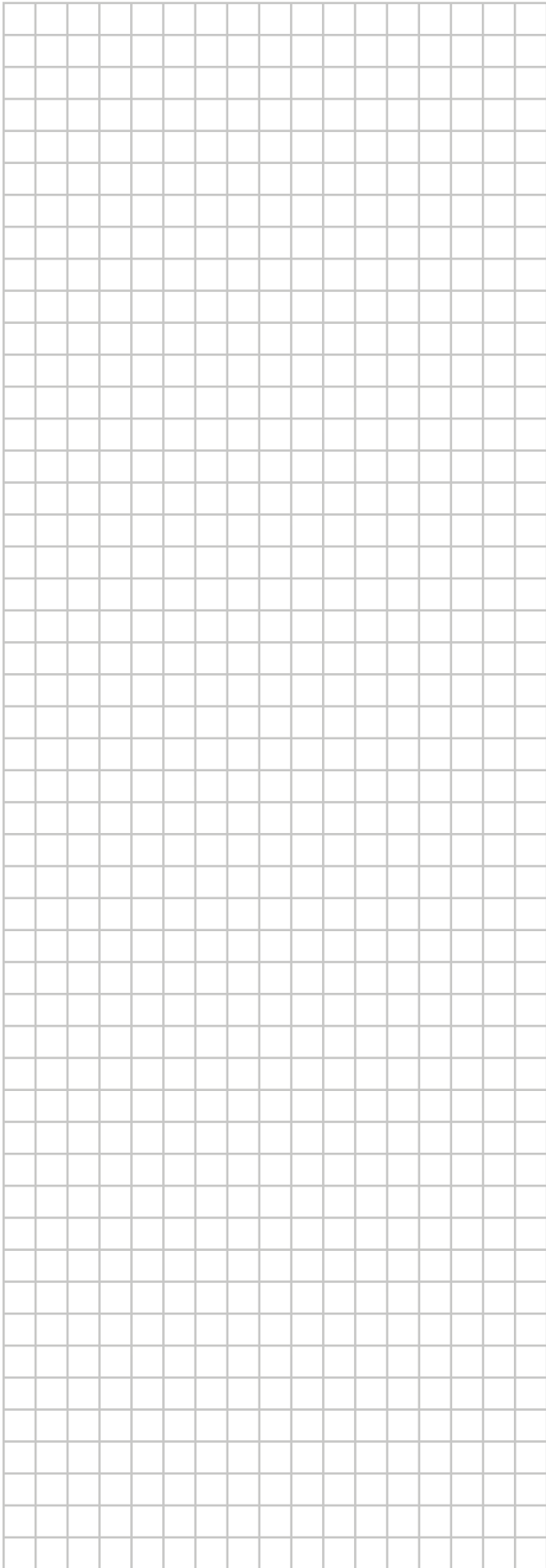
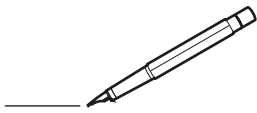
Instruction manual specified for a certain product or application, explaining how to operate it.

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.







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