



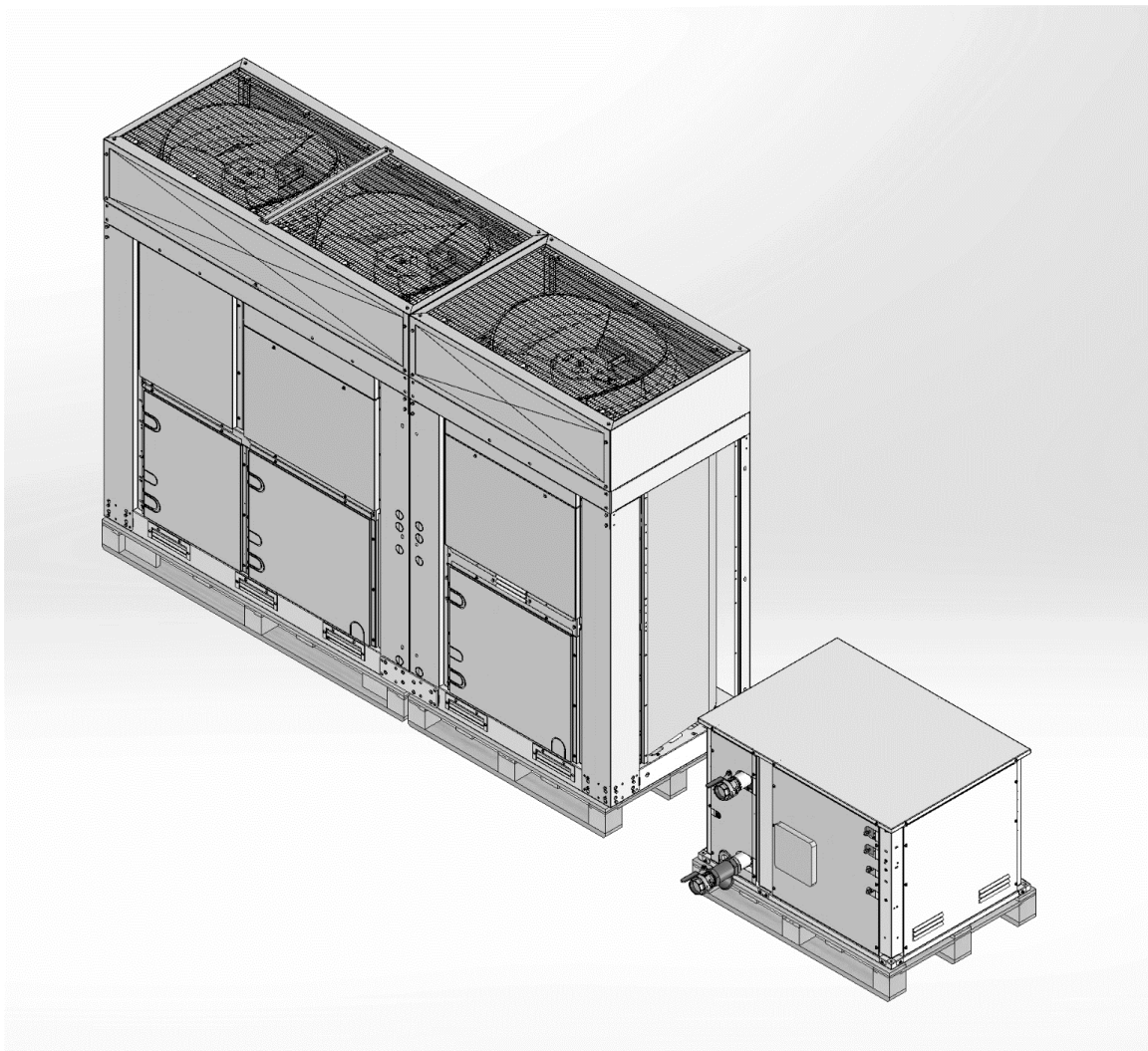
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Installation and Maintenance Manual D-EIMHP01505-22_09EN

Air to water heat pump units with scroll compressors – split version

EWYT~CZ(I/O)



Original Instructions

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1. INTRODUCTION

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. The appliance shall not be accessible to the general public: it must be installed in a safety area, protected from easy access.

This manual provides information on the standard functions and procedures of all units in the series, and it is an important supporting document for qualified personnel but can never replace it.

All units are delivered with **wiring diagrams, certified drawings, nameplate, and Declaration of Conformity**. These documents show all technical data for the unit you have bought. In case of any discrepancies between the contents of the manual and the documentation provided with the unit, always rely on the unit because **it is an integral part of this manual**. Read this manual carefully before installing and starting up the unit.

Improper installation could result in electric shock, short circuits, leaks, fire, or other damage to the equipment or injure to people.

The unit must be installed by professional operators / technicians in compliance with the laws in force in the country of installation.

The start-up of the unit must also be performed by authorized and trained personnel and all activities must be carried out in full compliance with local laws and regulations.



INSTALLATION AND START UP ARE ABSOLUTELY FORBIDDEN IF ALL INSTRUCTIONS CONTAINED IN THIS MANUAL ARE NOT CLEAR.

If you are unsure about assistance and for more information, contact an authorized representative of the manufacturer.

1.1. Precautions against residual risks

1. Install the unit according to the instructions set out in this manual.
2. Regularly carry out all the maintenance operations foreseen in this manual.
3. Wear protective equipment (gloves, goggles, helmet, etc.) suited to the work in hand; do not wear clothes or accessories that can get caught or sucked in by flows of air; tie back long hair before entering the unit.
4. Before opening the machine panel, make sure that it is firmly hinged to the machine.
5. The fins on heat exchangers and the edges of metal components and panels can cause cuts.
6. Do not remove the guards from mobile components while the unit is operating.
7. Make sure that mobile component guards are fitted correctly before restarting the unit.
8. Fans, motors, and belts drives might be running before entering, always wait for these to stop and take appropriate measures to prevent them from starting up.
9. The surfaces of the machine and pipes can get very hot or cold and cause the risk of scalding.
10. Never exceed the maximum pressure limit (PS) of the water circuit of the unit.
11. Before removing parts on the pressurised water circuits, close the section of the piping concerned and drain the fluid gradually to stabilize the pressure at the atmospheric level.
12. Do not use your hands to check possible refrigerant leaks.
13. Disable the unit from the mains using the main switch before opening the control panel.
14. Check that the unit has been grounded correctly before starting it.
15. Install the machine in a suitable area; do not install it outdoors if it is intended for use indoors.
16. Do not use cables with inadequate sections nor extension cord connections, even for very short periods or emergencies.
17. For units with VFD, wait 10 minutes after removing the electric power supply before accessing the inside of the switch board.
18. The unit contains pressurised refrigerant gas: the pressurised equipment must not be touched except during maintenance, which must be entrusted to qualified and authorized personnel.
19. Connect the utilities to the unit following the indications set out in this manual and on the panels of the unit itself.
20. To avoid an environmental risk, make sure that any leaking fluid is collected in suitable devices in accordance with local regulations.
21. If a part needs to be dismantled, make sure it is correctly reassembled before starting the unit.
22. When the rules in force require the installation of firefighting systems near the machine, check that these are suitable for extinguishing fires on electrical equipment and on the lubricating oil of the compressor and the refrigerant, as specified on the safety data sheets of these fluids.
23. Keep all the safety devices in good working order and check them periodically according to the regulations in force.
24. Keep all lubricants in suitably marked containers.
25. Do not store inflammable liquids near the unit.
26. Solder or braze only empty pipes after removing all traces of lubricant oil; do not use flames or other heat sources close to pipes containing refrigerant fluid.
27. Do not use naked flames near the unit.
28. The machinery must be installed in structures protected against atmospheric discharge according to the applicable laws and technical standards.
29. Do not bend or hit pipes containing pressurised fluids.
30. It is not permitted to walk or rest other objects on the machines.
31. The user is responsible for overall evaluation of the risk of fire in the place of installation (for example, calculation of the fire load).

32. During transport, always secure the unit to the bed of the vehicle to prevent it from moving about and overturning.
33. The machine must be transported according to the regulations in force considering the characteristics of the fluids in the machine and the description of these on the safety data sheet.
34. Inappropriate transport can cause damage to the machine and even leaking of the refrigerant fluid. Before start-up, the machine must be checked for leaks and repaired accordingly.
35. The accidental discharge of refrigerant in a closed area can cause a lack of oxygen and, therefore, the risk of asphyxiation: install the machinery in a well-ventilated environment according to EN 378-3 / ISO 5149-3 and the local regulations in force.
36. The installation must comply with the requirements of EN 378-3 / ISO 5149-3 and the local regulations in force.

1.2. General description

The unit purchased is a Heat Pump, that is a machine designed to cool/heat the water within certain limits which will be listed below. The unit operates based on the compression, condensation, and evaporation of the coolant gas as per the Carnot cycle and is composed mainly of the following parts depending on the Mode of Operation.

The unit is in "split" configuration, which means it is made up of two main parts:

- The Indoor Unit, which will be installed in an enclosed space and contains the water circuit and the plate heat exchanger
- The Outdoor Unit, which will be installed in the open air and contains the compressor, the coil and the fans.

The two units will be connected through the refrigerant piping system built in the structure.

To ensure the correct operation of the heat pump, the outdoor and indoor units shall be electrically connected (refer to the wiring diagram supplied with the units).

Cooling or Conditioning Mode:

- One or more scroll compressors which increase the pressure of the refrigerant gas from evaporation pressure to condensation pressure.
- A condenser where the refrigerant gas condenses under high pressure and transfers heat to the air.
- An expansion valve which allows the pressure of condensed liquid refrigerant to be reduced from condensation pressure to evaporation pressure.
- An evaporator, where the low-pressure liquid refrigerant evaporates and chills the water.

Heating Mode or Heat Pump:

- One or more scroll compressors which increase the pressure of the refrigerant gas from evaporation pressure to condensation pressure.
- A condenser where the refrigerant gas condenses under high pressure and transfers heat to the water.
- An expansion valve which allows the pressure of condensed liquid refrigerant to be reduced from condensation pressure to evaporation pressure.
- An evaporator, where the low-pressure liquid refrigerant evaporates.
- The operation of the heat exchangers can be inverted using the 4way valve, with which the use of the heating/cooling unit can be seasonally inverted.

All units are fully assembled in the factory and tested before shipping. The EWYT~CZ(I/O) range consists of models with a single cooling circuit and models with two cooling circuits.

The machine uses R32 refrigerant fluid suitable for the entire field of application of the machine.

The controller is prewired, set up and tested at the factory. Only normal field connections such as piping, electrical connections and pump interlocks are required, simplifying installation, and increasing reliability. All safety and operation control systems are installed at the factory in the control panel.

The instructions in this manual are applicable to all models in this series unless otherwise specified.

1.3. Information about the refrigerant

This product contains R32 refrigerant that has a minimal environmental impact, thanks to its low value of Global Warming Potential (GWP). According to ISO 817, R32 refrigerant is classified as A2L, which is slightly flammable, since the flame propagation rate is low, and nontoxic.

R32 refrigerant can burn slowly when all the following conditions are present:

- The concentration is between the lower and upper flammability limit (LFL & UFL)
- Wind velocity < propagation of flame velocity
- Energy of the ignition source > Minimum ignition energy

But pose no risk under the normal usage conditions for air conditioning equipment and work environment.

Safety class (ISO 817)	A2L
PED Group	1
Practical limit (kg/m³)	0.061
ATEL/ ODL (kg/m³)	0.30
LFL (kg/m³) @ 60 °C	0.307
Vapor density @25 °C, 101.3 kPa (kg/m³)	2.13
Molecular mass	52.0
Boiling point (°C)	-52
GWP (100 yr ITH)	675
GWP (ARS 100 yr ITH)	677
Autoignition temperature (°C)	648
Maximum surface temperature (°C)	548

Table 1 – Physical properties of R32 refrigerant

1.3.1. Safety Devices General Description

The indoor unit is provided with a leak detection system and an integrated emergency fan.

The leak detector is embedded within the indoor unit and directly connected to the Unit's control device. In case of gas leakage, the detector will automatically trigger the shut-down of the unit to prevent accidents. Furthermore, the emergency fan will also be triggered and turned on in order to disperse the refrigerant.



This unit is equipped with electrically powered safety measures. For the safety measures to be effective, the unit must be electrically powered at all times after installation, other than when servicing.

Circulation airflow activated by a leak detection system

When the **leak detection system** is activated, the following actions take place and continue for at least 5 min after the **leak detection system** has been reset:

- energize the fan of the appliance to deliver indoor airflow at or above the minimum airflow Q_{min} (240 m³/h);
- disable the compressor operation unless the compressor operation reduces the leak rate, or the total amount released to the indoor space.

Threshold level	
Alarm	Shut down
36000ppm	

- Eventual machinery rooms or special machinery rooms shall be **clearly marked** as such on the entrances to the room, together with warning notices indicating that unauthorized persons shall not enter and that smoking, naked light or flames are prohibited. The notices shall also state that, in the event of an emergency, only authorized persons conversant with emergency procedures shall decide whether to enter the machinery room. Additionally, warning notices shall be displayed prohibiting unauthorized operation of the system
- The owner / operator shall keep an updated logbook of the refrigerating system.

1.4. Installation Site Requirements for the Indoor Unit



Also read the following requirements:

- **General installation site requirements. See the “General safety precautions” chapter.**
- **Service space requirements.**
- **Refrigerant piping requirements (length, height difference).**



Local building codes and safety standards shall be followed; in absence of local codes and standards refer to EN 378 3 / ISO 5149-3 as a guide.

- 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 unit is levelled.
 - Select the location of the unit in such a way that the sound generated by the unit does not disturb anyone, and the location is selected according to the applicable legislation.
 - Take care that in the event of a water leak, water cannot cause any damage to the installation space and surroundings.
 - During installation, avoid the possibility that anybody can climb on the unit or place objects on the unit.
 - All piping lengths and distances have been taken into consideration (see “4.1 About the piping length”).
- 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 refrigerant leaks.
 - 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.



Appliance NOT accessible to the public, install it in a secured area, protected from easy access. This unit is suitable for installation in a commercial and light industrial environment

1.4.1. Installation room area requirements



The indoor unit must meet the Toxicity (EN 378) and Flammability (IEC 60335-2-40) requirements for the installation

The EWYT~CZ(I/O) Units are labelled as “Enhanced Tightness Refrigerating Systems”. This, in accordance with the IEC 60335-2-40 Annex GG.2 Section.

In order to be considered an “Enhanced Tightness Refrigerant System”, the unit shall fulfil all of the following conditions:

- a) No compressor or pressure vessel (BPHE > 15 l) type refrigerant containing components shall be located indoors.
- b) Refrigerant distribution assemblies shall meet all applicable requirements of this standard.
- c) Refrigeration systems shall use only permanent joints indoors except for site-made joints directly connecting the indoor unit to the refrigerant piping.
- d) Refrigerant containing parts in indoor units shall be protected from damage in the event of catastrophic failure of moving parts, e.g., fans.
- e) Systems where the equipment pipes in the occupied space in question are installed in such a way that it is protected against accidental damage.
- f) The refrigeration system of each indoor unit shall be tightness tested at the factory with detection equipment with a capability of 3 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected.
- g) Vibrations exceeding 0,30 G rms, when measured with a low pass filter at 200 Hz, are not allowed in the refrigerant containing parts in the occupied space under normal operation.
- h) Indoor heat exchangers shall be protected from freezing.
- i) The maximum fan operating speed shall be less than 90% of the maximum allowable fan speed as specified by the manufacturer of the fan wheel.

All the conditions above mentioned have been tested and verified.

The indoor unit is provided with a leak detection system and an integrated emergency fan.

1.4.1.1. Toxicity Requirement (EN 378)

With respect to the toxicity value, the maximum refrigerant quantity is evaluated through the following formula:

$$T \rightarrow M_T = \text{Toxicity Limit} \times \text{Room Volume} = 0,3 \times H \times A$$

Where:

- T = Toxicity Requirement Formula
- M_T = Refrigerant Max Quantity [kg]
- 0,3 = R32 Toxicity Limit
- H = Room Height [m]
- A = Room Area [m²]



If the actual charge of the unit $M_r > M_T$ the unit shall be installed in a Machinery Room according to EN 378-3.

1.4.1.2. Flammability Requirement (IEC 60335-2-40)

To avoid the installation of any countermeasure the maximum refrigerant quantity with respect to the flammability value shall be evaluated through the following formula:

$$B \rightarrow M_B = CF \times LFL \times H \times A$$

Where:

- **B = Flammability Minimum Space Requirements without any countermeasure**
- M_B = Refrigerant Max Quantity [kg]
- CF = Concentration factor (see table below for comparison Ed.6 vs Ed.7)
- LFL = Lower Flammability Limit (for R32, LFL = 0,307) [kg/m³]
- H = Room Height (but not more than 2,2 [m])
- A = Room Area [m²] →

When the actual charge of the unit $M_r > M_B$ (but $< M_A$) a safety alarm (Sound+Light) **or** ventilation (Natural or Forced) shall be employed in accordance with EN 60335-2-40.

If a countermeasure is installed the maximum refrigerant quantity with respect to the flammability value shall be evaluated through the following formula:

$$A \rightarrow M_A = CF \times LFL \times H \times A$$

Where:

- **A = Flammability Minimum Space Requirements with one additional countermeasure**
- M_A = Refrigerant Max Quantity [kg]
- CF = Concentration factor (see table below for comparison Ed.6 vs Ed.7)
- LFL = Lower Flammability Limit (for R32, LFL = 0,307) [kg/m³]
- H = Room Height (but not more than 2,2 [m])
- A = Room Area [m²]

If the actual charge of the unit $M_r > M_A$ a safety alarm (Sound+Light) **and** ventilation (Natural or Forced) shall be employed in accordance with EN 60335-2-40.



The formulas provided above are with reference to a fixed room height of 2,2m

1.4.1.3. Flammability Requirement (IEC 60335-2-40) – Lowest Underground Floor

On the other hand, if the indoor unit is installed on the lowest underground floor, the maximum refrigerant quantity with respect to the flammability value shall be evaluated through the following formula:

$$L \rightarrow M_L = CF \times LFL \times H \times A$$

Where:

- A = **Flammability Minimum Space Requirements for lowest underground floor**
- M_L = Refrigerant Max Quantity [kg] for lowest underground floor installation
- CF = Concentration factor (see table below for comparison Ed.6 vs Ed.7)
- LFL = Lower Flammability Limit (for R32, LFL = 0,307) [kg/m³]
- H = Room Height (but not more than 2,2 [m])
- A = Room Area [m²]



For the lowest underground floor, if the actual charge of the unit $M_r > M_L$ the unit shall be installed in a Machinery Room according to EN 378-3.

Usage Example for IEC 60335-2-40 Ed.7:

Room Height H = 3m; A = 20m²

- B: $M_B = 0,75 \times 0,307 \times 2,2 \times A = 10,2 \text{ kg}$
- A: $M_A = 0,5 \times 0,307 \times 2,2 \times A = 6,8 \text{ kg}$
- T: $M_T = 0,3 \times 3 \times S = 0,9 \times A = 18 \text{ kg}$

Then, in these conditions, if:

Not Lowest Underground Floor:

- $M_r > 18 \text{ kg} \rightarrow$ Machinery Room (EN378 – 3) Required
- $10,2 \text{ kg} < M_r < 18 \text{ kg} \rightarrow$ Ventilation (Natural or Forced) + Alarms (sound & light) Required
- $M_r < 10,2 \text{ kg} \rightarrow$ No countermeasures required

Lowest Underground Floor:

- $M_r > 10,2 \text{ kg} \rightarrow$ Machinery Room (EN378 – 3) Required
- $6,8 \text{ kg} < M_r < 10,2 \text{ kg} \rightarrow$ Ventilation (Natural or Forced) + Alarms (sound & light) Required
- $M_r < 6,8 \text{ kg} \rightarrow$ At least 1 countermeasure required

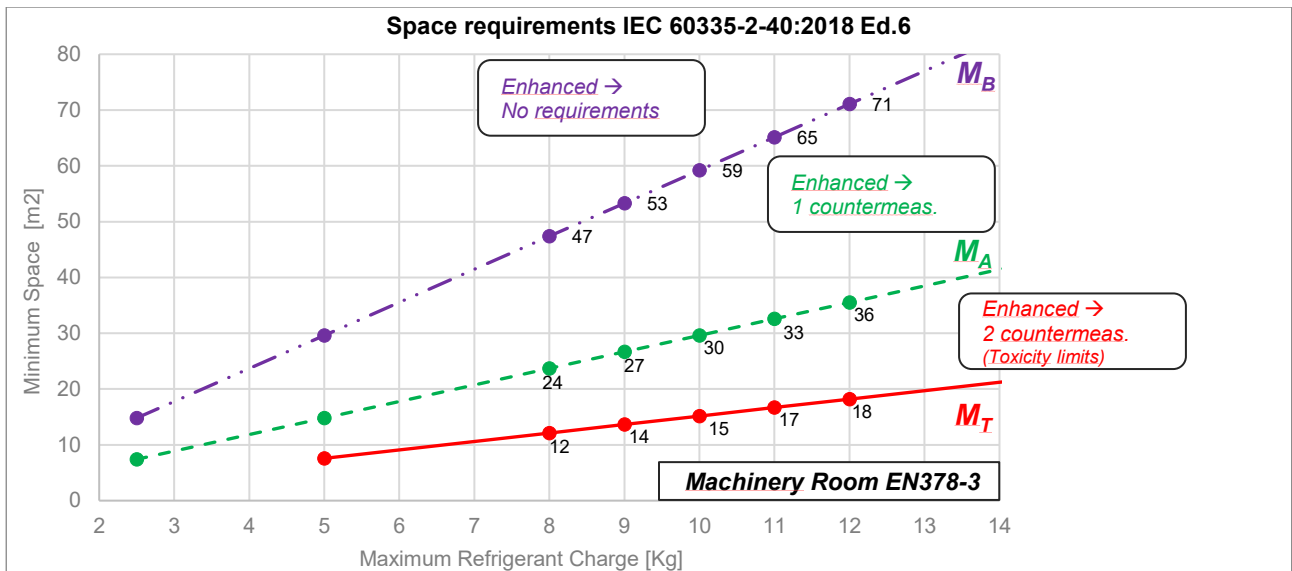
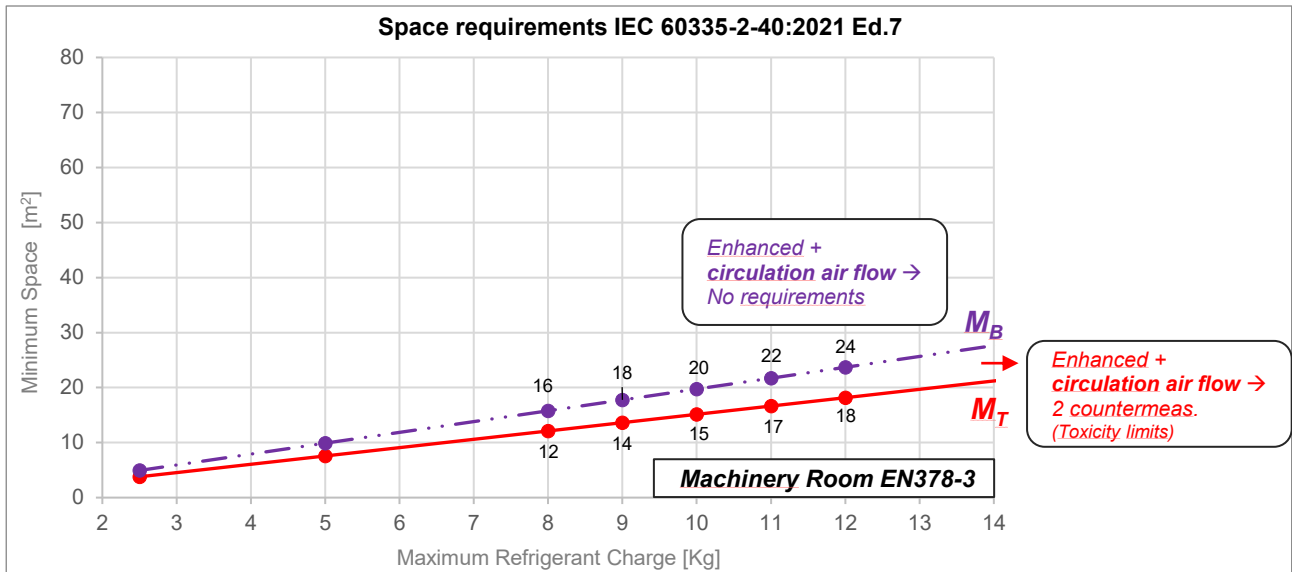


Table 2 – Space requirements: NOT Lowest Underground Floor

CF = Concentration factor Not lowest underground floor		
	IEC 60335-2-40 Ed.6	IEC 60335-2-40 Ed.7
M_T	NA	
M_A	CF = 0,5	NA
M_B	CF = 0,25	CF = 0,75

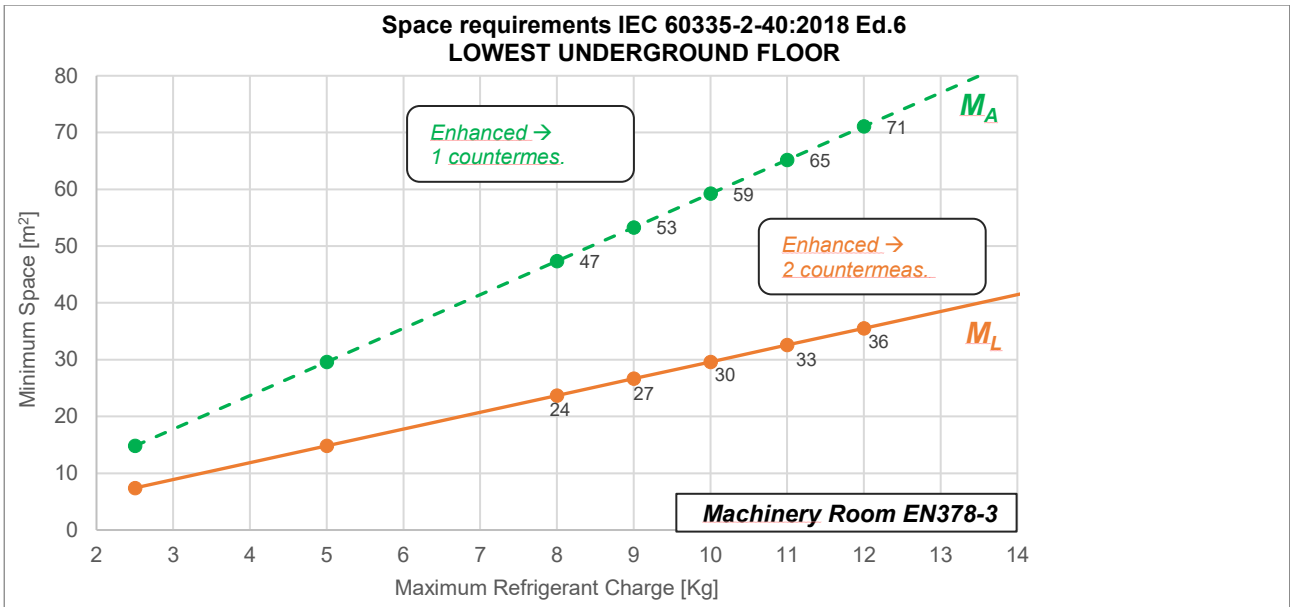
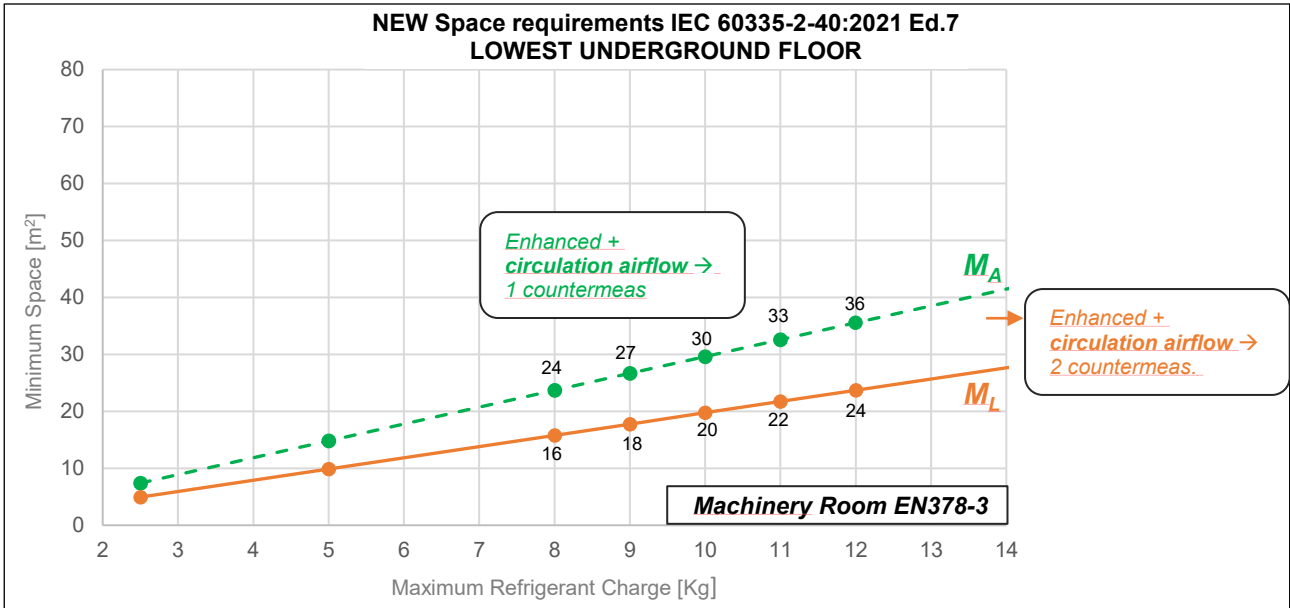


Table 3 – Space requirements: Lowest Underground Floor

CF = Concentration factor Lowest underground floor		
	IEC 60335-2-40 Ed.6	IEC 60335-2-40 Ed.7
M_A	CF = 0,25	CF = 0,5
M_L	CF = 0,5	CF = 0,75

1.4.2. Countermeasures

The safety countermeasures cited above refer to the IEC 60335-2-40 Annex GG.11 section.

1.4.2.1. Natural Ventilation

Opening Conditions for Natural Ventilation:

- The area of any openings above 300 mm from the floor shall not be considered in determining the compliance with $A_{NV Min}$.
- At least 50% of the required opening area $A_{NV Min}$ shall be below 200 mm from the floor.
- The bottom of the lowest openings shall not be higher than the point of release when the unit is installed at not more than 100 mm from the floor.
- Openings are permanent and cannot be closed.
- The height of the opening between the wall and floor which the rooms are not less than 20 mm.
- A second higher opening shall be provided. The total size of the second opening shall not be less than 50% of the minimum opening area for $A_{NV Min}$ and shall be at least 1,5 m above the floor.
- Natural ventilation below ground level cannot be used.

$$A_{NV} = \frac{1}{720 \cdot LFL} \cdot \sqrt{\frac{M}{LFL \cdot (M - 29)}}$$

For the refrigerant R32, LFL = 0,307. Thus:

$$A_{NV} = 120 \text{ cm}^2 \text{ (R32 Refrigerant)}$$



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

1.4.2.2. Mechanical Ventilation

Operation shall be according to GG.8.31 of the IEC 60335-2-40 Annex GG.11 section and for all indoor units in the same space which are served by a single refrigerant system, the fan shall be switched on to provide the minimum circulation airflow per GG.10.2 of the IEC 60335-2-40 Annex GG.11 section.

The airflow shall be determined according to the following formula:

$$Q = \frac{10}{0,25 \cdot LFL}$$

$$Q_{min} = \frac{10}{0,25 \cdot 0,307} = 131 \text{ m}^3/\text{h}$$

1.4.2.3. Safety Alarms

The safety alarm system shall warn both audibly and visibly, such as both a loud buzzer (15 dBA above the background level) and a flashing light.

At least one safety alarm inside the occupied space shall be installed.

For the occupancy listed below, the safety alarm system shall also warn at a supervised location, such as the night porter's location, as well as the occupied space:

- Rooms, parts of buildings, building where sleeping facilities are provided.
- Rooms, parts of buildings, building where people are restricted in their movement.
- Rooms, parts of buildings, building where an uncontrolled number of people are present.
- Rooms, parts of buildings, building to which any person has access without being personally acquainted with the necessary safety precautions.

The safety alarm shall be turned on by the signal from the leak detection system. The safety alarm shall also alert an authorized person to take appropriate action.

2. RECEIPT OF THE UNIT

Inspect the unit immediately after delivery. Make sure that the machine is intact in all its parts and that there are no deformations due to impacts. All components described in the delivery note must be inspected and checked.

Should any damage occur upon receipt of the machine, do not remove the damaged material, and immediately make a written complaint to the transport company, requesting the inspection of the unit; do not repair until an inspection by the transport company representative is carried out.

Immediately report the damage to the manufacturer representative, a set of photographs would be helpful in recognizing responsibility. The restitution of the machinery is intended as ex-factory Daikin Applied Europe S.p.A.

Daikin Applied Europe S.p.A. declines all responsibility for any damage that the machinery may suffer during transport to the destination.

Use extreme caution when handling the unit to prevent damage to components. Before installing the unit, check that the model and power supply voltage shown on the nameplate are correct. Responsibility for any damage after acceptance of the unit cannot be attributed to the manufacturer.

2.1. Storage

If it is necessary to store the unit before installation, it is necessary to observe some precautions:

- do not remove the protective plastic.
- protect the unit from dust, bad weather and any rodents.
- do not expose the unit to direct sunlight.
- do not use heat sources and / or open flames near the machine.

Although the unit is covered with a heat shrink plastic sheet, it is not intended for long-term storage and must be removed and replaced by tarpaulins or the like, more suitable for a longer period.

Environmental conditions must be within the following limits:

- Minimum ambient temperature: -20 °C
- Maximum ambient temperature: +48 °C
- Maximum R.H.: 95% not condensing

Storage at a temperature below the minimum or over the maximum values can cause damage to the components. Storage in a humid atmosphere may damage electrical components.

3. OPERATING LIMITS

Operation out of the mentioned limits may damage the unit. In case of any doubt contact the manufacturer representative. In the following figure are illustrated the operation ranges both in cooling and heating mode, in terms of Leaving water temperature (LWT) and Ambient temperature (OAT).

OAT	Outside ambient temperature
ELWT	Evaporator Leaving water temperature

OPERATION RANGE COOLING – EWYT_CZ
EWYT021~064-CZ

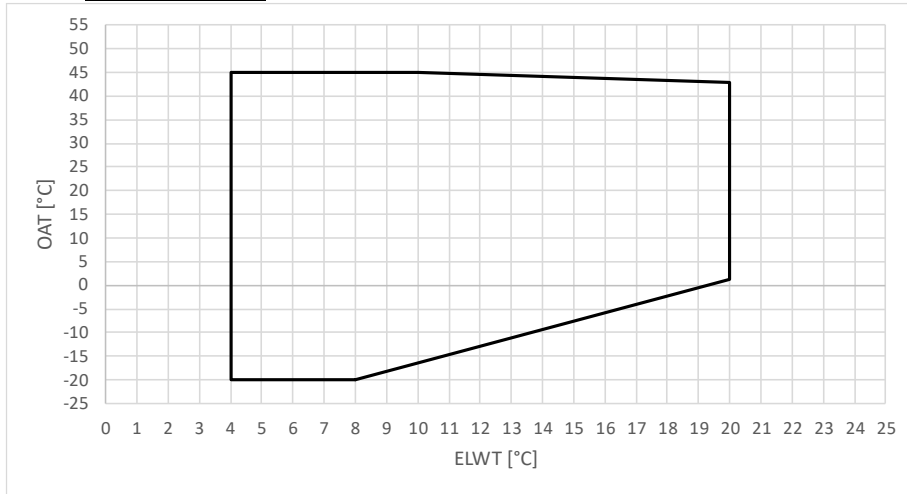


Figure 1 – Operating limits on EWYT_CZ in cooling mode

OPERATION RANGE HEATING – EWYT-CZ
EWYT021~064-CZ

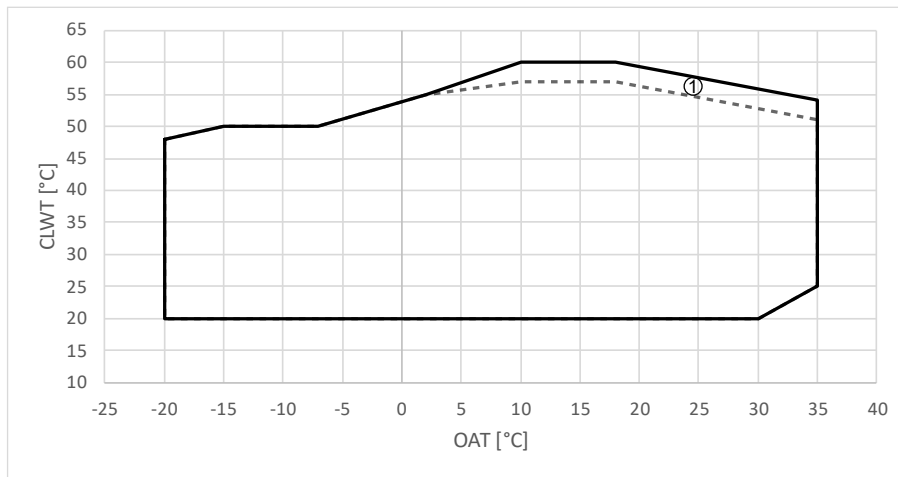


Figure 2 – Operating limits on EWYTCZ in heating mode

OAT	Outside ambient temperature
CLWT	Condenser Leaving water temperature
Ref. 1	Certain unit sizes might work in part load in this area



The charts shown above constitute a guideline on operating limits in the range. Refer to the CSS selection software for the actual operating limits in the working conditions for each model.

4. MECHANICAL INSTALLATION

4.1. Safety

Before installation and commissioning of the machinery, the people involved in this activity must have acquired the information necessary to perform these tasks, applying all the information gathered in this manual. In particular:

- the unit must be firmly anchored to the ground when it must not be moved.
- the unit can only be lifted using the lifting points indicated by labels fixed to its base.
- always protect operating personnel with personal protective equipment appropriate to the activities to be performed. The individual devices commonly used are helmet, glasses, gloves, headphones, safety shoes. Further personal and collective protection devices must be adopted after having carried out an adequate analysis of the specific risks in the relevant area, according to the activities to be carried out.

4.2. Handling and lifting

Avoid bumping and/or jolting during loading/unloading unit from the truck and moving it. Do not push or pull the unit from any part other than the base frame. Secure the unit inside the truck to prevent it from moving and causing damages. Do not allow any part of the unit to fall during transportation or loading/unloading.

Equipment, ropes, lifting accessories and handling procedures must comply with local regulations and current legislation.

The ropes and hooks used must have an appropriate capacity for the load. Refer to the plate on the unit for the weight of the specific machine.

All units of the series are supplied with lifting points indicated by labels: only these points may be used for lifting the unit.

The installer has the responsibility to ensure the selection and correct use of the lifting equipment.

Alternatively, the machine may be moved with a forklift, as shown in the following paragraphs. When lifting the machine, make sure it is levelled properly so it will not overturn.

4.2.1. Lifting the Outdoor MONO unit

The outdoor part of the machine must be lifted slowly and well levelled. Always use protective devices to prevent damage to the belt and note the position of the unit's centre of gravity. Adjust the lifting equipment if necessary to ensure that the unit is levelled.

The unit(s)- both Mono and Dual- can be lifted, using the buttonholes in the base, by:

- lifting straps
- forklift, where the dimensions of the forks permit.

The ropes and hooks used must have an appropriate capacity for the load.

N.B.: Follow the lifting instructions provided in the unit lifting label.

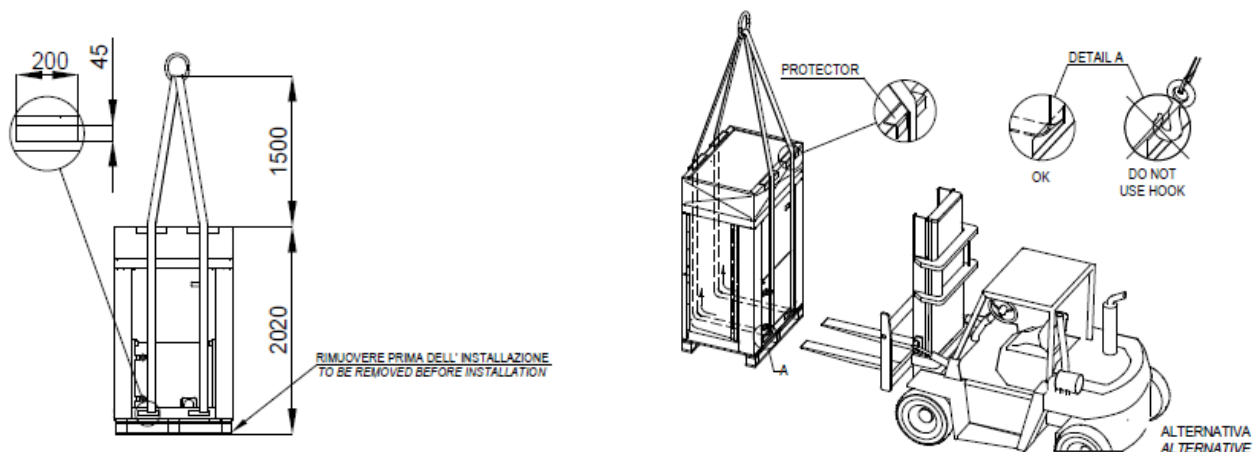


Figure 3 – Lifting the outdoor MONO unit

4.2.2. Lifting the Outdoor DUAL unit

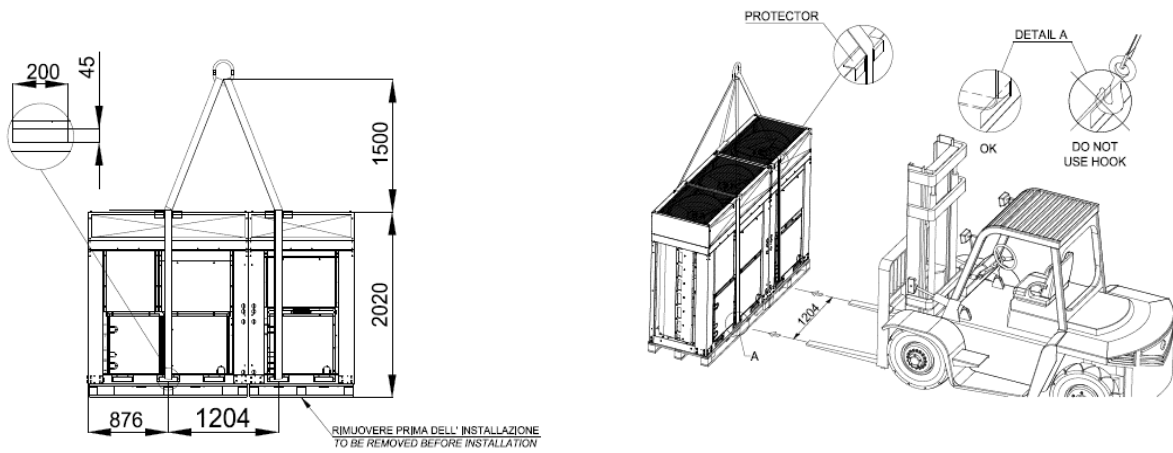


Figure 4 – Lifting the outdoor DUAL unit

4.2.3. Lifting the INDOOR unit

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

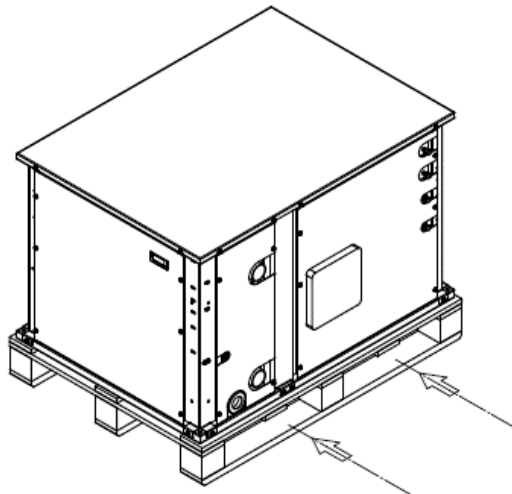


Figure 5 – Indoor Unit Handling & LIFTING

4.3. Outdoor Unit Positioning and assembly

All the outdoor units are designed for installation outdoors, either on balconies or on the ground, provided that the installation area is free of obstacles that could reduce air flow to the condensers coil.

The unit must be installed on a robust and perfectly level foundation; should the unit be installed on balconies or roofs, it might be necessary to use weight distribution beams.

For installation on the ground, a strong concrete base, at least 150 mm thickness and wider than the unit must be provided. This base must be able to support the weight of the unit. In heavy snowfall areas, this thickness should be increased. The frame of the unit must be levelled using metal plate spaces.

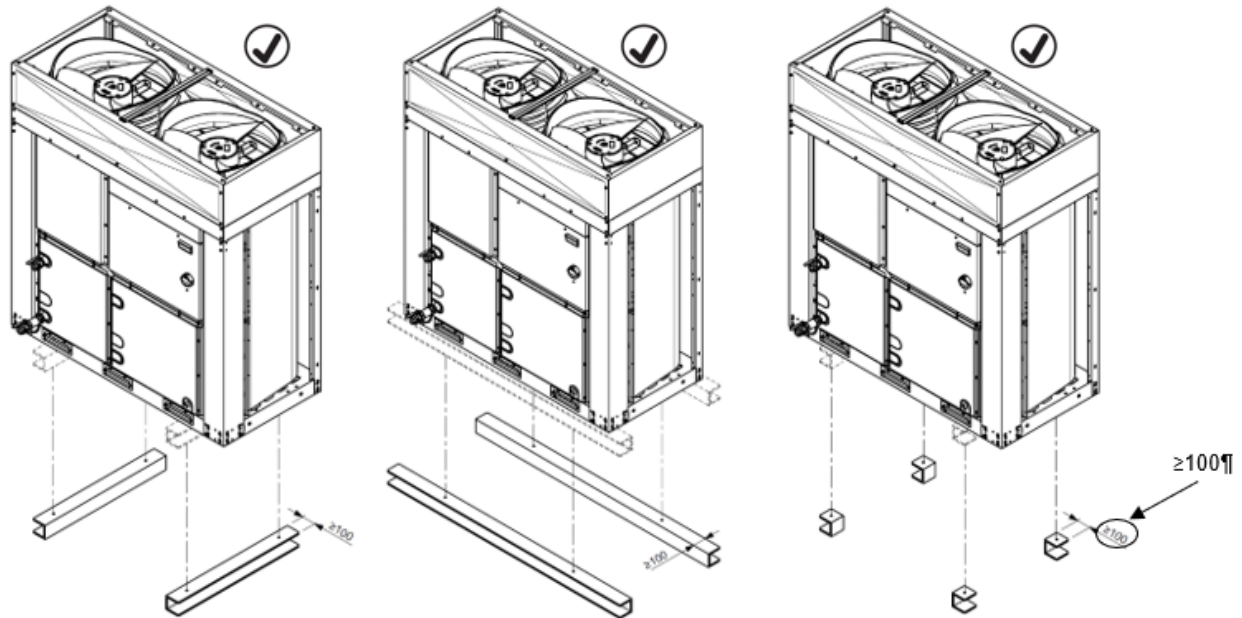


Figure 6 – MONO unit positioning

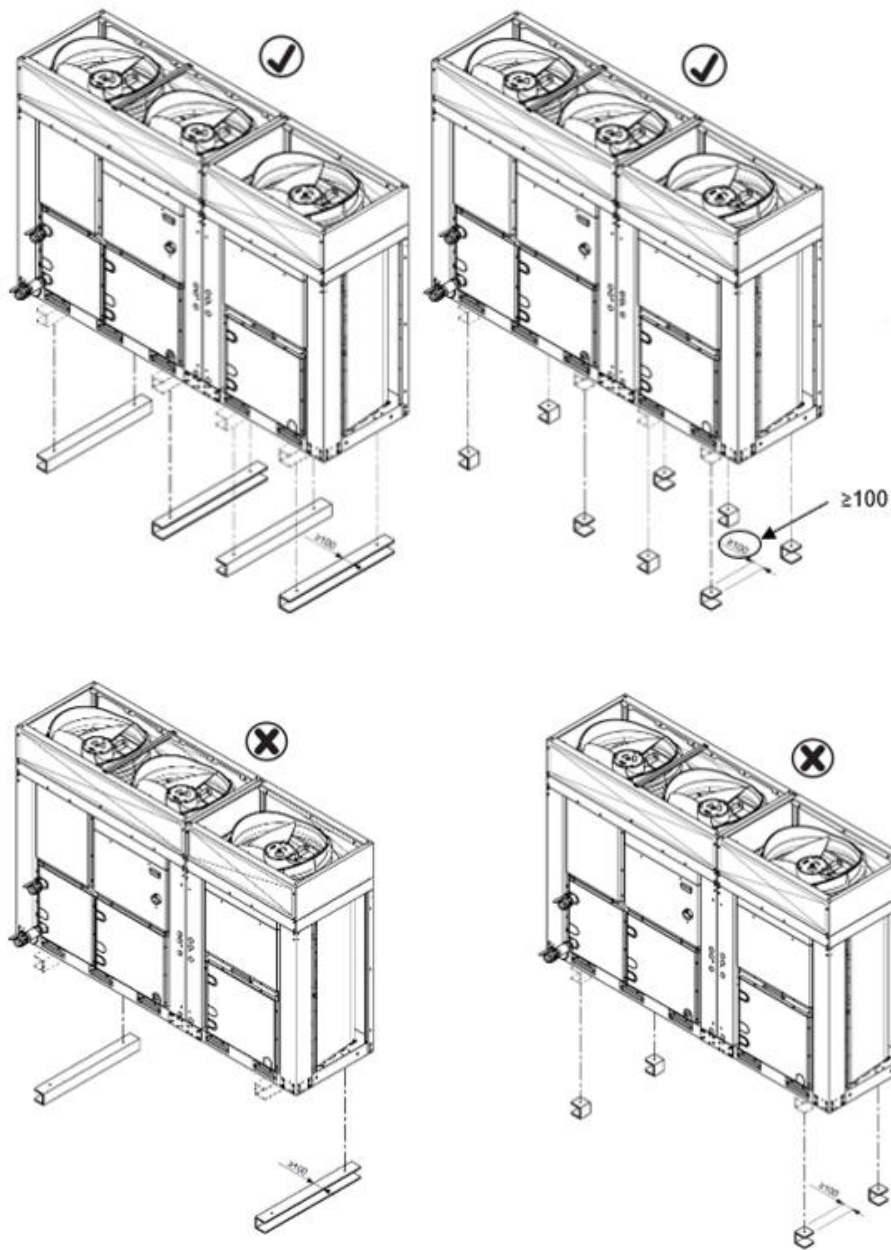


Figure 7 – DUAL unit positioning

The base can be installed either longitudinally or transversely. In the following figures are illustrated the mounting holes location:

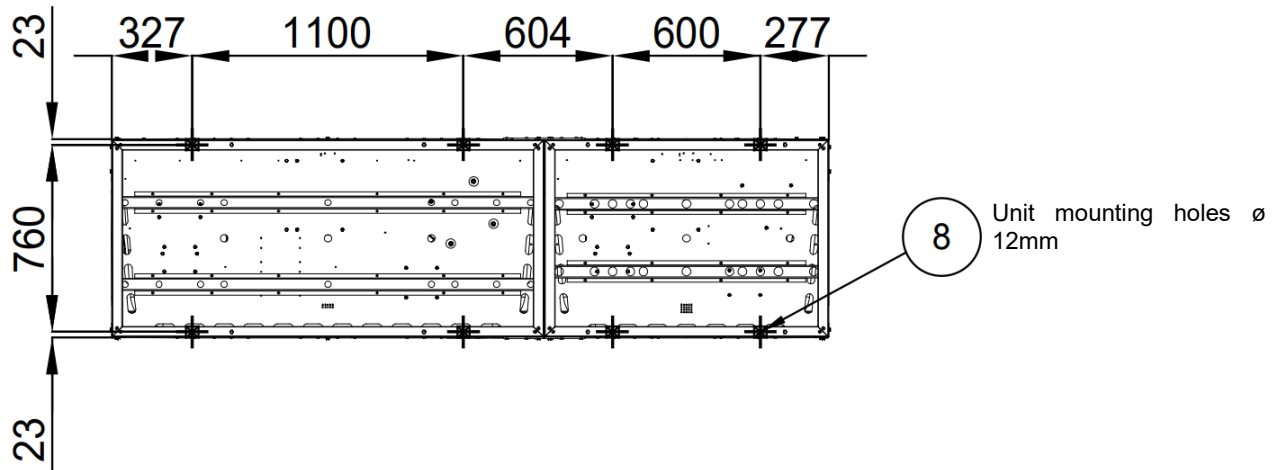


Figure 8 – Mounting holes location (bottom view)

To fasten the unit to the floor, use M10 bolts.

Before unit commissioning, the flatness must be verified by using a laser levelling device or other similar devices. The flatness shall not be over 5 mm for units within 7 m length.

To ensure best performance on the installation site, the following precautions and instructions must be followed:

- Avoid air flow recirculation;
- Make sure that there are no obstacles to hamper air flow;
- Make sure to provide a strong and solid foundation to reduce noise and vibrations;
- Avoid installation in particularly dusty environments, in order to reduce soiling of condensers coils.

4.3.1. Outdoor Unit Minimum space requirements

It is fundamental to respect minimum distances on all units to ensure optimum ventilation to the condenser coils.

When deciding where to position the unit and to ensure a proper air flow, the following factors must be taken into consideration:

- avoid any warm air recirculation.
- avoid insufficient air supply to the air-cooled condenser.

Both these conditions can cause an increase of condensing pressure, which leads to a reduction in energy efficiency and refrigerating capacity.

Any side of the unit must be accessible for post installation maintenance operations and vertical air discharge must not be obstructed. The Figure below shows the minimum space required.

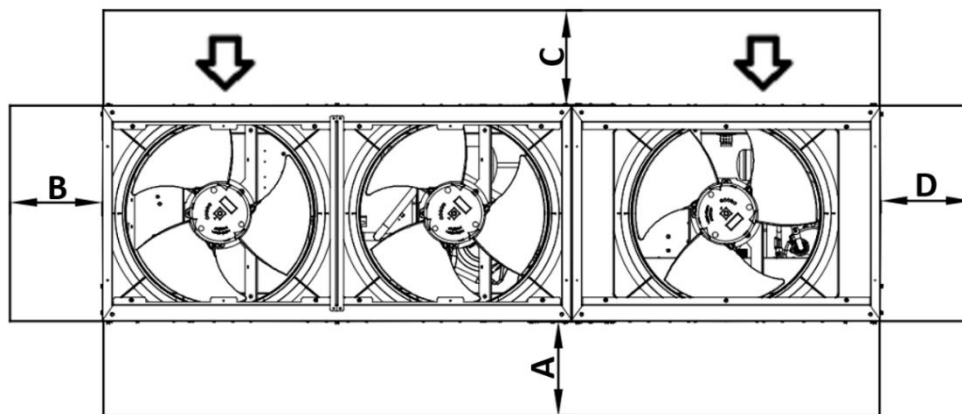


Figure 9 – DUAL unit

Where:

A	: Electrical panel side
B/D	: Side view of battery
C	: Front view of battery

If the unit is installed in a free field, the distances indicated are:

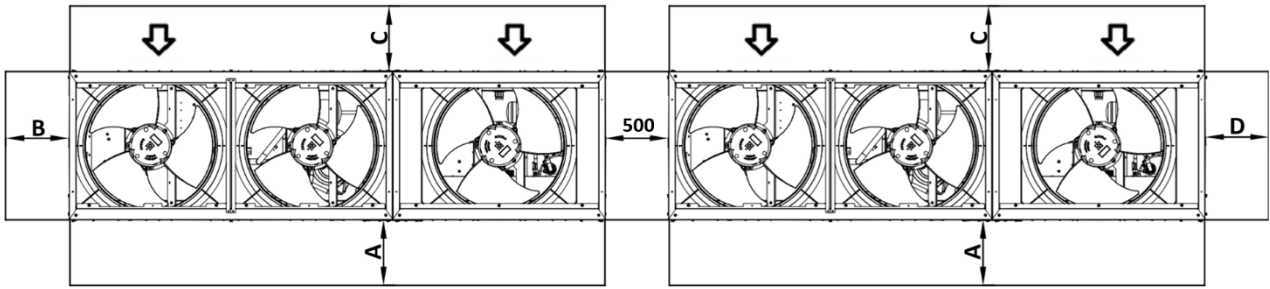


Figure 10 – Units installed side by side along their shorter sides, B or D

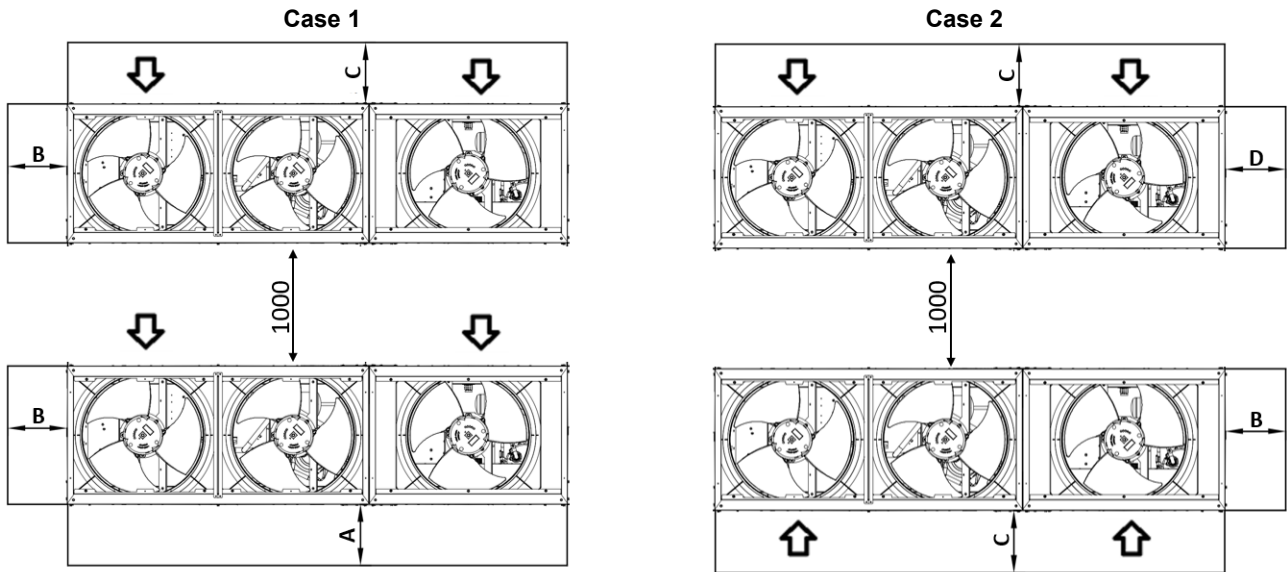


Figure 11 – Units installed side by side along their longer sides (Case 1 and Case 2)

The minimum distances, reported above, ensure functionality of the unit in most applications.

4.4. Indoor Unit Positioning and assembly

The outdoor and indoor unit shall be installed before connecting the refrigerant and water piping.



Also read the precautions and requirements in the following chapters:
General safety precautions
Preparation

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

The preferred installation is on a solid longitudinal foundation (steel beam frame or concrete).



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

There are two sides which can be mounted facing the wall. It is important to respect the minimum distances in any case.

The unit must be fixed to prevent it from tilting.

Observe the minimum installation space requirements.

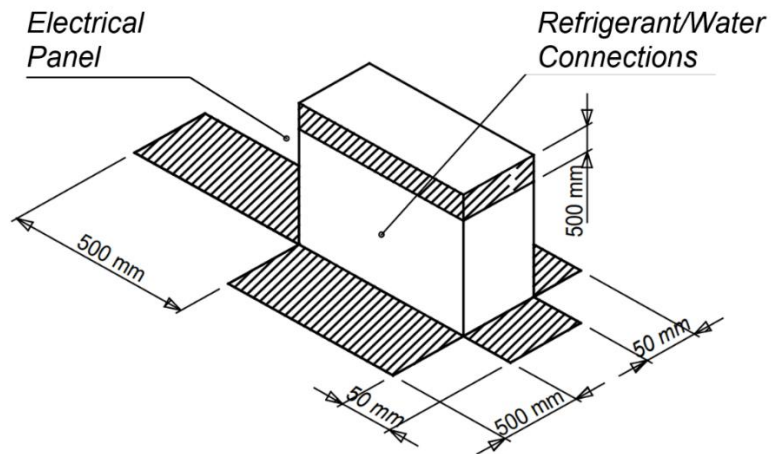
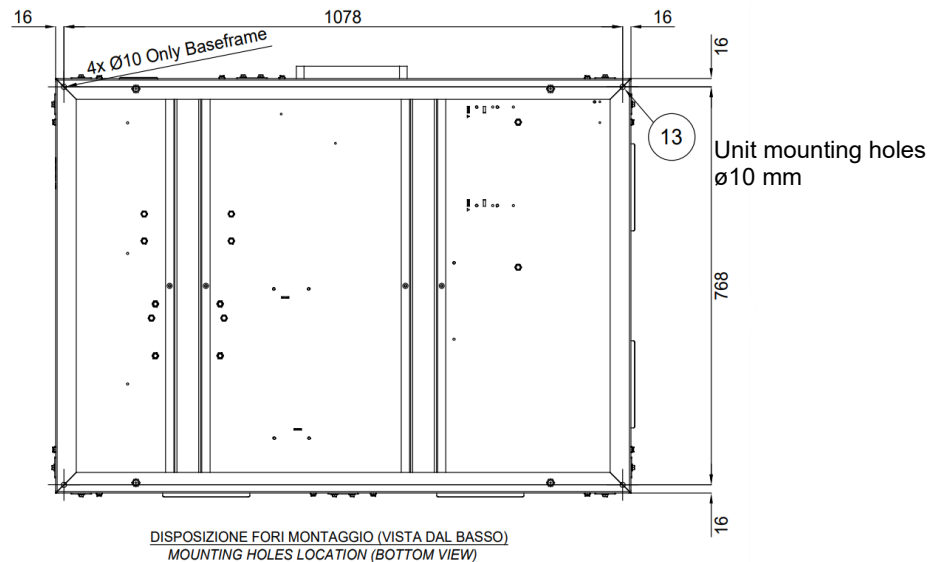


Figure 12 – Indoor Unit minimum space requirements

The indoor unit and the equipment pipes shall be installed in such a way that it shall be protected against accidental damage in the occupied space.



Fasten the unit in place using four foundation M8 bolts.



The Indoor unit is intended only for indoor installation. Do not install this unit outside, the IP grade is not suitable for an outdoor installation.

4.5. Additional installation site requirements

- When installing, take strong winds, typhoons or earthquakes into account, improper installation may result in the unit turning over.
- Take care that in the event of a water leak, water cannot cause any damage to the installation space and surroundings.
- Be sure that the air inlet of the unit is not positioned towards the main wind direction. Frontal wind will disturb the operation of the unit. If necessary, use a screen to block the wind.
- Ensure that water cannot cause any damage to the location by adding water drains to the foundation and prevent water traps in the construction.

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.

Example: Behind the building (case I).

If the outdoor unit is exposed to direct sea winds, install a Windbreaker (case II).

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

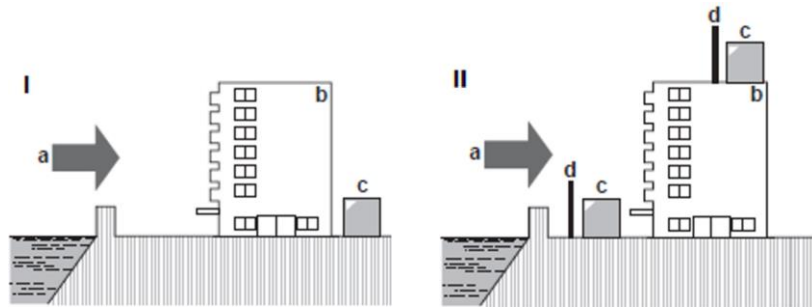


Figure 13 – Seaside installation of the outdoor unit

Legend:

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



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

To prevent exposure to wind and snow, install a baffle plate on the air side of the outdoor unit: in heavy snowfall areas it is very important to select an installation site where the snow will NOT affect the unit. If lateral snowfall is possible, make sure that the heat exchanger coil is NOT affected by the snow. If necessary, install a snow cover or shed and a pedestal. For instructions on how to install the snow cover, contact your dealer.



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

4.6. Combining Units and Options

The outdoor and indoor model can be combined as indicated in the following table.

Unit Compositions	
Size 21kW	1x EWYT021CZI-A1 + 1x EWYT021CZO-A1
Size 32kW	1x EWYT032CZI-A1 + 1x EWYT032CZO-A1
Size 40kW	1x EWYT040CZI-A1 + 1x EWYT040CZO-A1
Size 64kW	1x EWYT064CZI-A2 + 1x EWYT064CZO-A2

4.7. Preparing Refrigerant Piping



The refrigerant R32 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:** R32 does not contain any chlorine, does not destroy the ozone layer, and does not reduce earth's protection against harmful ultraviolet radiation. R32 can contribute slightly to the greenhouse effect if it is released. Therefore, pay special attention to check the tightness of the installation.



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.
- Temper grade: use piping with temper grade in function of the pipe diameter as listed in table below.

Pipe Ø	Temper grade of piping material
Any	Light annealed R220

Table 4 – Temper Grade for piping material

- The pipe thickness of the refrigerant piping shall comply with the applicable legislation. The minimal pipe thickness for R32 piping must be in accordance with the table below.

Pipe Ø	Thickness
6,35 mm/9,52 mm/12,7 mm	0,80 mm
16,00 mm	1,00 mm
22,20 mm	1,10 mm
28,6 mm	1,15 mm

Table 5 – Pipe thickness for R32

To select the piping size

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

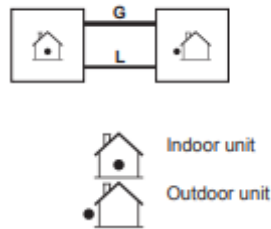


Figure 14 – Piping scheme Indoor unit - Outdoor unit

Piping dimensions Indoor Unit – Outdoor Unit		
INDOOR UNIT	G = Gas Piping	L = Liquid Piping
EWYT021CZI-A1	Ø 28,6 mm	Ø 9,52 mm
EWYT032CZI-A1	Ø 28,6 mm	Ø 12,7 mm
EWYT040CZI-A1	Ø 28,6 mm	Ø 12,7 mm
EWYT064CZI-A1	Ø 28,6 mm	Ø 12,7 mm on Circuit 1, Ø 9,52 mm on Circuit 2

Table 6 – Piping diameters table

When the indoor unit connections do not match the diameter of the specified piping requirements, the piping diameter requirements must be met using reducers/expanders (supply with the unit) on the indoor unit connections.

The table below shows the maximum length and height that the piping system between the indoor unit and the outdoor unit can reach. It is strictly necessary to stay within those limits, otherwise it is not guaranteed the proper functioning of the unit.

Maximum piping length and height difference	
Maximum allowable piping length	30 m
Height difference between indoor and outdoor unit	≤ 10 m

Table 7 – Piping length and height difference table



If these maximum lengths and heights will not be respected, Daikin Applied Europe S.p.A. will not guarantee the correct functioning of the units.

4.8. Noise and sound protection

The unit is a source of noise mainly due to the rotation of compressors and fans. The noise level for each model size is listed in sales documentation. If the unit is correctly installed, operated, and maintained the noise emission level do not require any special protection device to operate continuously close to the unit without any risk.

4.9. Water circuit for connection with the unit

The following equipment on the water circuit are provided with the indoor unit.

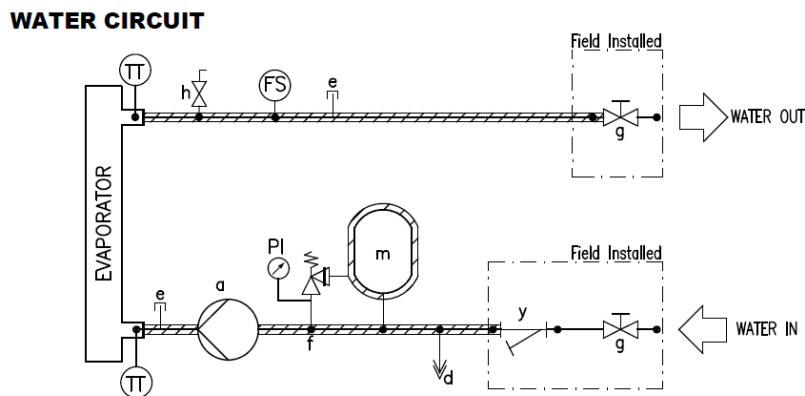


Figure 15 – Hydraulic diagram

WATER CIRCUIT EQUIPMENT			
a	PUMP	m	EXPANSION VESSEL
d	DRAIN	y	WATER FILTER
e	PLUGGED FITTING	TT	TEMPERATURE SENSOR
f	SAFETY VALVE 3BAR ½"	PI	PRESSURE GAUGE
g	SHUT OFF VALVE	FS	FLOWSWITCH
h	AIR VENT		

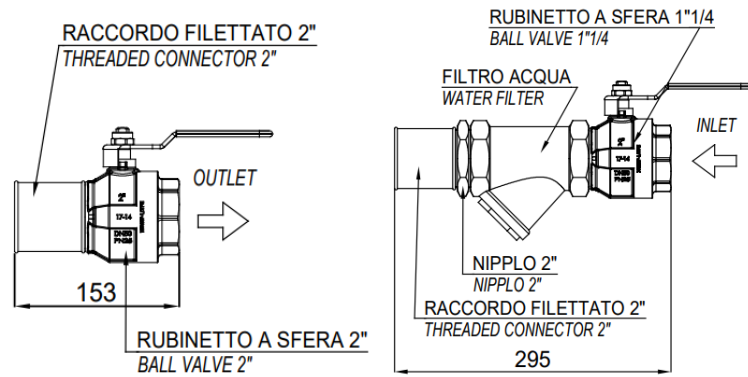


Figure 16 – Hydraulic elements

N.B.: The filter and the shut off valves are supplied together with the unit inside the cabinet and shall be installed before operating.

4.9.1. Water piping

Piping must be designed with the lowest number of elbows and the lowest number of vertical changes of direction. In this way, installation costs are reduced considerably, and system performance is improved.

The water system must have antivibration mountings to reduce transmission of vibrations to the structures.

Protection of the water circuit is necessary in the winter season, even with the unit not operating.

- Before insulating water piping, check that there are no leaks. The complete hydraulic circuit must be insulated to prevent condensation and reduced refrigeration capacity. Protect the water pipes from frost during winter (using for example a heating cable).
- Check that the water pressure does not exceed the design pressure of the water side (3 bar).

Select the piping diameter in relation to the required water flow and available external static pressure of the pump. See the following table for the recommended water piping diameter.

Unit	Water piping diameter
EWYT021~040CZI-A1	1 1/4"
EWYT064CZI-A2	2"

Table 8 – Water piping diameters

4.9.2. Flow switch

The purpose of the flow switch is to stop the unit in the event of interrupted water flow, thus protecting the BPHE from freezing.

This is a palette flow switch appropriate for uninterrupted use outdoors (IP65).

The flow switch is set up to intervene when the water flow of the BPHE reaches the minimum acceptable flow value (see the table below).

Model	Flow switch Setpoint [l/min]
EWYT021CZI-A1	22
EWYT032CZI-A1	31
EWYT040CZI-A1	31
EWYT064CZI-A2	57

Table 9 – Flow Switch Setpoint

4.9.3. Repairing and checking the water circuit connection

The units have water inputs and outputs for connecting the heat pump to the water circuit of the system. This circuit must be connected to the unit by an authorized technician and must comply with local regulations.



If dirt penetrates the water circuit, there could be problems.

Therefore, always remember the following when connecting the water circuit:

- ***Only use pipes that are clean inside.***
- ***Keep the end of the pipe facing downward when removing any burrs.***
- ***Cover the end of the pipe when inserting it through a wall to avoid dust and dirt getting in.***
- ***Clean the pipes of the system located between the filter and the unit, with running water, before connecting it to the system.***

4.9.4. Water pressure

Check whether the water pressure is above 1 bar. If it is lower, add water.

The maximum operating pressure is 3 bar.

4.10. Water treatment

Before putting the unit into operation, clean the water circuit.

The BPHE must not be exposed to flushing velocities or debris released during flushing. It is recommended that a suitably sized bypass and valve arrangement is installed to allow flushing of the piping system. The bypass can be used during maintenance to isolate the heat exchanger without disrupting flow to other units.

Any damage due to the presence of foreign bodies or debris in the BPHE will not be covered by warranty. Dirt, scales, corrosion debris and other material can accumulate inside the heat exchanger and reduce its heat exchanging capacity. Pressure drop can increase as well, thus reducing water flow. Proper water treatment therefore reduces the risk of corrosion, erosion, scaling, etc. The most appropriate water treatment must be determined locally, according to the type of system and water characteristics.

The manufacturer is not responsible for damage to or malfunctioning of equipment caused by failure to treat water or by improperly treated water. In the following table are listed the acceptable water quality limits:

DAE Water quality requirements	BPHE
pH (25°C)	7.5-9.0
Electrical conductivity (25°C)	<500 µS/cm
Chloride ion	
Chlorine molecular	<1.0mg Cl ₂ /l
Sulphate ion (SO ₄ ⁻⁻ /l)	<100 mg SO ₄ ⁻⁻ /l
Alkalinity	<100 mg CaCO ₃ /l
Total Hardness	80-150 mg CaCO ₃ /l
Iron	
Copper	
Ammonium ion (NH ₃)	<0.5mg NH ₄ ⁺ /l
Silica	
Dissolved Oxygen	
Total dissolved solids	
Hydrogen carbonate (HCO ⁻⁻⁻)	60-200 mg HCO ₃ /l
(HCO ⁻⁻⁻)/(SO ₄ ⁻⁻)	>0.5
(Ca+Mg)/(HCO ⁻⁻⁻)	>1.6

Table 10 – Acceptable water quality limits

4.11. Water pressure drops for filters

In the following figure the water filter pressure drops are illustrated.

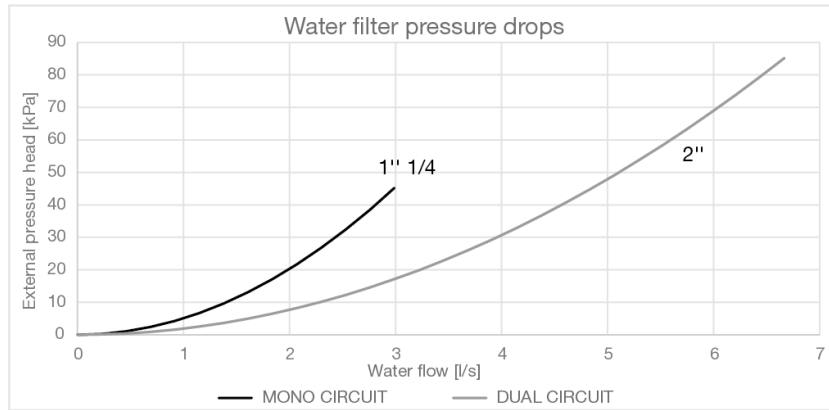


Figure 17 – Water filter pressure drops

4.12. Indoor Unit Pump

Before starting up the pump, ensure that the hydraulic circuit is filled correctly with a minimum static pressure of 1 bar as protection from cavitation. Furthermore, to ensure correct venting of the piping system make sure the venting valve indicated on the hydraulic diagrams with the letter “h”, is open.

In the following figure are illustrated the External pressure head (kPa) for the water pump.

EWYT-CZP – Pump Low lift

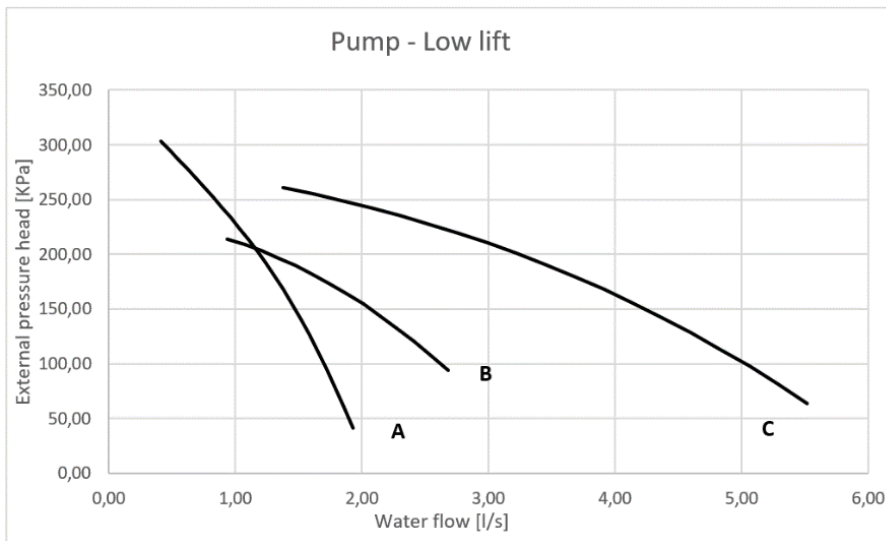


Figure 18 – External pressure head of water pump

External static pressure refers to the difference between pump external static pressure and evaporator and water filter pressure drop. Water flow range refer to pump only. For water flow limits of the unit refer to water flow section.

Pump Curves	
Model	Pump curve
EWYT021CZI-A1	A
EWYT032CZI-A1	B
EWYT040CZI-A1	B
EWYT064CZI-A2	C

Table 11 – Pump curves associated with each unit size

4.13. Operating stability and minimum water content in the system

For the correct functioning of the machines, it is important to guarantee a minimum water content inside the system, avoiding an excessive number of compressor startups and stops. In fact, every time the compressor starts working, an excessive amount of oil from the compressor enters the refrigerant circuit and at the same time there is an increase in the temperature of the compressor stator, generated by the inrush current of the starting. In order to prevent damage to the compressor, the control system will therefore permit no more than 10 startups per hour. The plant where the unit is installed must therefore ensure that the overall water content allows constant operation of the unit and consequently also greater environmental comfort.

4.13.1. Cooling Mode

The chilled water content of the systems should have a minimum water amount to avoid excessive stress (start and stops) on the compressors.

Design considerations for water volume are the minimum cooling load, the water temperature setpoint differential and the cycle time for the compressors.

As a general indication, the system water content should not be less than the values deriving from the following formula:

$$\begin{aligned} \text{Single circuit Unit} &\rightarrow 5 \frac{\text{lt}}{\text{kW nominal}} \\ \text{Dual circuit Unit} &\rightarrow 3,5 \frac{\text{lt}}{\text{kW nominal}} \end{aligned}$$

kW_{nominal} = Cooling capacity at 12/7°C OAT=35°C

The above rule of thumb derives from the following formula, as the relative volume of water capable of maintaining the water temperature setpoint differential during the minimum load transient avoiding an excessive starts and stops of the compressor itself (which depends on the compressor technology):

$$\text{Water Volume} = \frac{CC [W] \times \text{Min load } \% \times \text{DNCS}[s]}{FD \left[\frac{g}{L} \right] * SH \left[\frac{J}{g^{\circ}C} \right] * (DT)[^{\circ}C]}$$

CC = Cooling Capacity

DNCS = Delay to next Compressor Start

FD = Fluid Density

SH = Specific Heat

DT = Water Temperature Setpoint Differential

A properly designed storage tank should be added if the system components do not provide sufficient water volume. By default, the unit is set to have a water temperature setpoint differential in line with Comfort Cooling application which allows to operate with the minimum volume mentioned in the previous formula.

However, if a smaller temperature differential is set, as in the case of Process Cooling applications where temperature fluctuations must be avoided, a larger minimum water volume will be required.

To ensure proper operation of the unit when changing the value of setting, the minimum water volume must be corrected.

In case of more than one installed unit, the overall capacity of the installation must be considered in the calculation so summing the water content of each unit.

4.13.2. Heating Mode

The heating water content of the systems should have a minimum water amount to avoid excessive decrease of the water setpoint during the defrost cycle to guarantee the proper environmental comfort.
As a general indication the system water content should not be less than the values deriving from the following formula:

$$\text{Single circuit Unit} \rightarrow 16 \frac{lt}{kW \text{ nominal}}$$

$$\text{Dual circuit Unit} \rightarrow 8 \frac{lt}{kW \text{ nominal}}$$

$kW_{nominal}$ = Heating capacity at 40/45°C OAT=7°C

The above rule of thumb derives from the following formula, as the relative volume of water capable of maintaining the system temperature within an acceptable ΔT (which depends on the heating application) during the defrost transient:

$$\text{Water Volume} = \frac{CC [W] \times MDD [s]}{FD \left[\frac{g}{L} \right] * SH \left[\frac{J}{g^{\circ}C} \right] * DT [^{\circ}C]}$$

CC = Cooling Capacity during defrost operation
MDD = Max Defrost Duration
FD = Fluid Density
SH = Specific Heat
DT = Acceptable Water Temperature Differential

The water temperature difference is considered acceptable for the Comfort Heating application which allows to operate with the minimum volume mentioned in the previous formula.
However, if a smaller water temperature difference is considered acceptable, a larger minimum water volume will be required.
A properly designed storage tank should be added if the system components do not provide sufficient water volume.

In case of more than one installed unit, the overall capacity of the installation must be considered in the calculation so summing the water content of each unit.

Note: The indication is intended as a general guideline and not intended to substitute the evaluation made by qualified technical personnel or by HVAC engineers. For more detailed analysis is better to consider the use of other more detailed approach.
These considerations refer to the water volume always flowing through the unit. If there are bypasses, branch of the system that can be excluded, that parts should not be accounted in the water content calculation.

4.14. Water flow limits

To ensure correct operation of the unit, the value of the water flow in the evaporator must be within the declared range for that unit. A water flow lower than the minimum value shown in the following table could cause problems with freezing, fouling and poor control. A water flow rate higher than the maximum value shown in Table 12 will result in an unacceptable load loss and excessive erosion of the pipes, with vibrations that can cause breakage.

Unit flow limits		
MODEL	Min flow [l/s]	Max flow [l/s]
EWYT021CZI-A1	0.84	1.90
EWYT032CZI-A1	1.01	2.66
EWYT040CZI-A1	1.01	2.66
EWYT064CZI-A2	1.41	5.50

Table 12 – Operating limits

4.15. Calibrating the expansion vessel

The expansion vessel's starting pressure depends on the difference between the level at which the unit is installed and the highest point in the water circuit, and is calculated as follows:

$$P_i = 0.3 + (H/10) \text{ (bar)}$$

- P_i Initial pressure
- H Difference between the level at which the unit is installed and the highest point in the circuit

A unit with an onboard pump has a 12 litres expansion vessel with an initial pressure of 1 bar.

Maximum water volume

Refer to the graph below to determine the maximum water volume in order to calibrate the expansion vessel:

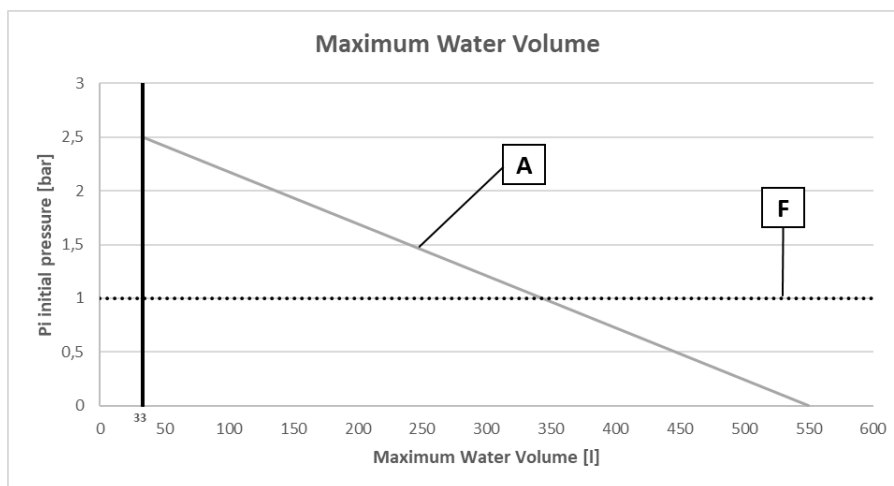


Figure 19 – Initial expansion vessel pressure based on maximum water volume

- A** Circuit without glycol
- F** Default

The default value for initial pressure, shown in the figure, refers to a difference in H of 7 metres.

If the total water volume of the entire circuit exceeds the permitted maximum volume, another expansion vessel must be installed. If the difference in system H is less than 7 metres and the initial pressure reading is lower than the maximum permitted value (refer to the graph), no adjustment of initial pressure is required.

If it is necessary to change the default initial pressure value (1 bar), take the following recommendations into consideration:

- Use dry nitrogen only to set the initial pressure in the expansion vessel.
- An inappropriate initial pressure setting in the expansion vessel will result in malfunctioning of the system.

Changes to the initial pressure of the expansion vessel must be made by reducing or increasing nitrogen pressure using the Schrader valve on the expansion vessel.



Only an authorised installer can adjust the initial pressure of the expansion vessel.

To check water volume: examples

Example 1

The unit is installed 5 m below the highest point in the water circuit. The total water volume in the water circuit is 250 litres. No actions or changes required.

Example 2

The unit is installed at the highest point in the water circuit. The total water volume in the water circuit (without the glycol) is 420 l.

Actions:

As the total water volume (420 l) is higher than the pre-set water volume (340 l), pre-pressure must be reduced. The required pre-pressure is:

$$P_g = (0.3 + (H / 10)) \text{ bar} = (0.3 + (0/10)) \text{ bar} = 0.3 \text{ bar}$$

The corresponding maximum water volume is about 490 l (see graph).

As 420 l is less than 490 l, the expansion vessel is appropriate for the installation.

5. ELECTRICAL INSTALLATION

5.1. General specifications

Refer to the specific wiring diagram for the unit you have bought. Should the wiring diagram not be on the unit, or should it have been lost, please contact your manufacturer representative, who will send you a copy. In case of discrepancy between wiring diagram and electrical panel/cables, please contact the manufacturer representative.



- **Be sure to keep the power line and transmission line apart from each other. Transmission wiring and power supply wiring may cross but may not run parallel.**
 - **Transmission wiring and power supply wiring may not touch internal piping in order to avoid wire damage due to high temperature piping.**
 - **Firmly close the lid and arrange the electrical wires to prevent the lid or other parts from coming loose.**
-

Electrical equipment is capable of operating correctly in the intended ambient air temperature. For very hot/cold environments (refer to **Errore. L'origine riferimento non è stata trovata.**, "**Errore. L'origine riferimento non è stata trovata.**"), additional measures are recommended (contact the manufacturer representative).

The electrical equipment is capable of operating correctly when the relative humidity does not exceed 50% at a maximum temperature of +40 °C. Higher relative humidity are permitted at lower temperatures (for example 90% at 20 °C).

5.2. Indoor/outdoor connection

For the indoor/outdoor wiring connection, be sure to follow the limits below:

- Maximum wiring length: 30m.
- Always use vinyl cords with 0.75 to 1.25mm² sheath pr cables (2-core wires).

If the unit-to-unit cables do not meet these requirements, it may result in malfunction of transmission.

5.3. Electric connections

Provide an electrical circuit to connect the unit. It must be connected to the copper cables with an adequate section relative to the absorption values and according to the current electrical standards.

Daikin Applied Europe S.p.A. declines all responsibility for an inadequate electrical connection.



The connections to the terminals must be made with copper terminals and cables, otherwise overheating or corrosion may occur at the connection points with the risk of damaging the unit. The electrical connection must be carried out by qualified personnel, in compliance with the laws in force. There is a risk of electric shock.

The power supply to the unit must be set up in such a way that it can be switched on or off independently from that of other system components and other equipment in general, by means of a general switch.

The electrical connection of the panel must be carried out maintaining the correct sequence of the phases. Refer to the specific wiring diagram for the unit you have bought. In case of discrepancy between the wiring diagram and electrical panel/cables, please contact the manufacturer representative.



Do not apply torque, tension or weight to the main switch terminals. Power line cables must be supported by appropriate systems.

To avoid interference, all control wires must be connected separately from the power cables. To do this, use several electrical passage ducts.

Install a earth leakage breaker.

To avoid it from malfunctioning due to harmonics, use a a earth leakage breaker that is compatible with harmonics.



Before any electrical connection work to the compressor motor and / or the fans, make sure that the system is switched off and the main switch of the unit is open. Failure to observe this rule could result in serious personal injury.

5.4. Cable requirements

The cables connected to the circuit breaker must respect the insulation distance in the air and the surface isolation distance between the active conductors and the earth, according to IEC 614391 table 1 and 2, and to the local national laws. The cables connected to the main switch must be tightened using a pair of keys and respecting the unified clamping values, relative to the quality of the screws of the washers and nuts used.

Connect the earth conductor (yellow / green) to the PE ground terminal.

The equipotential protection conductor (earth conductor) must have a section according to table 1 of EN 602041 Point 5.2, shown below.

In any case, the equipotential protection conductor (earth conductor) must have a cross section of at least 10 mm², in accordance with point 8.2.8 of the same standard.

Section of the copper phase conductors feeding the equipment S [mm ²]	Minimum cross section of the external copper protection conductor Sp [mm ²]
S ≤ 16	S
16 < S ≤ 35	16
S > 35	S/2

Table 13 – Table 1 of EN602041 Point 5.2

5.4.1. Maximum cable dimension

Maximum cable dimension that can be physically connected to the main switch of the unit.

Model	Max cable size [mm ²]	Model [A]
EWYT021CZO-A1	16	63
EWYT032CZO-A1	16	63
EWYT040CZO-A1	16	63
EWYT064CZO-A2	50	100

Model	Max cable size [mm ²]	Model [A]
EWYT021CZI-A1	6 (rigid) / 4 (flexible)	12
EWYT032CZI-A1	6 (rigid) / 4 (flexible)	12
EWYT040CZI-A1	6 (rigid) / 4 (flexible)	12
EWYT064CZI-A2	6 (rigid) / 4 (flexible)	12

5.4.2. Safety device requirements

The power supply must be protected with a Residual current device, as indicated in the table below.

Main switch and Fuses can be added in accordance with the applicable legislation.

Selection and sizing of the wiring should be done in accordance with the applicable legislation based on the maximum unit current.

Indoor Unit	Customer Protection - Mandatory	Fuses - Not Mandatory
EWYT021CZI-A1	RESIDUAL CURRENT DEVICE TYPE A	13A
EWYT032CZI-A1		12A
EWYT040CZI-A1		12A
EWYT064CZI-A2		12A

Outdoor Unit	Customer Protection - Mandatory	Fuses - Not Mandatory
EWYT021CZO-A1	RESIDUAL CURRENT DEVICE TYPE A	40A
EWYT032CZO-A1		63A
EWYT040CZO-A1		63A
EWYT064CZO-A2		100A



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

5.5. Phase unbalance

In a three-phase system, the excessive unbalance between the phases is the cause of engine overheating. The maximum permitted voltage unbalance is 3%, calculated as follows:

$$Unbalance \% = \frac{(V_x - V_m) * 100}{V_m}$$

Where:

V_x = phase with greatest unbalance

V_m = average voltage

Example:

the three phases measure 383, 386 and 392 V respectively.

The average is:

$$\frac{383 + 386 + 392}{3} = 387 V$$

The unbalance percentage is:

$$\frac{(392 - 387) * 100}{387} = 1.29 \%$$

less than the maximum allowed (3%).

5.6. Master Wiring Diagram

The following electric diagram shows the best solution for the whole system (Indoor + Outdoor Unit). It is recommended for field installation

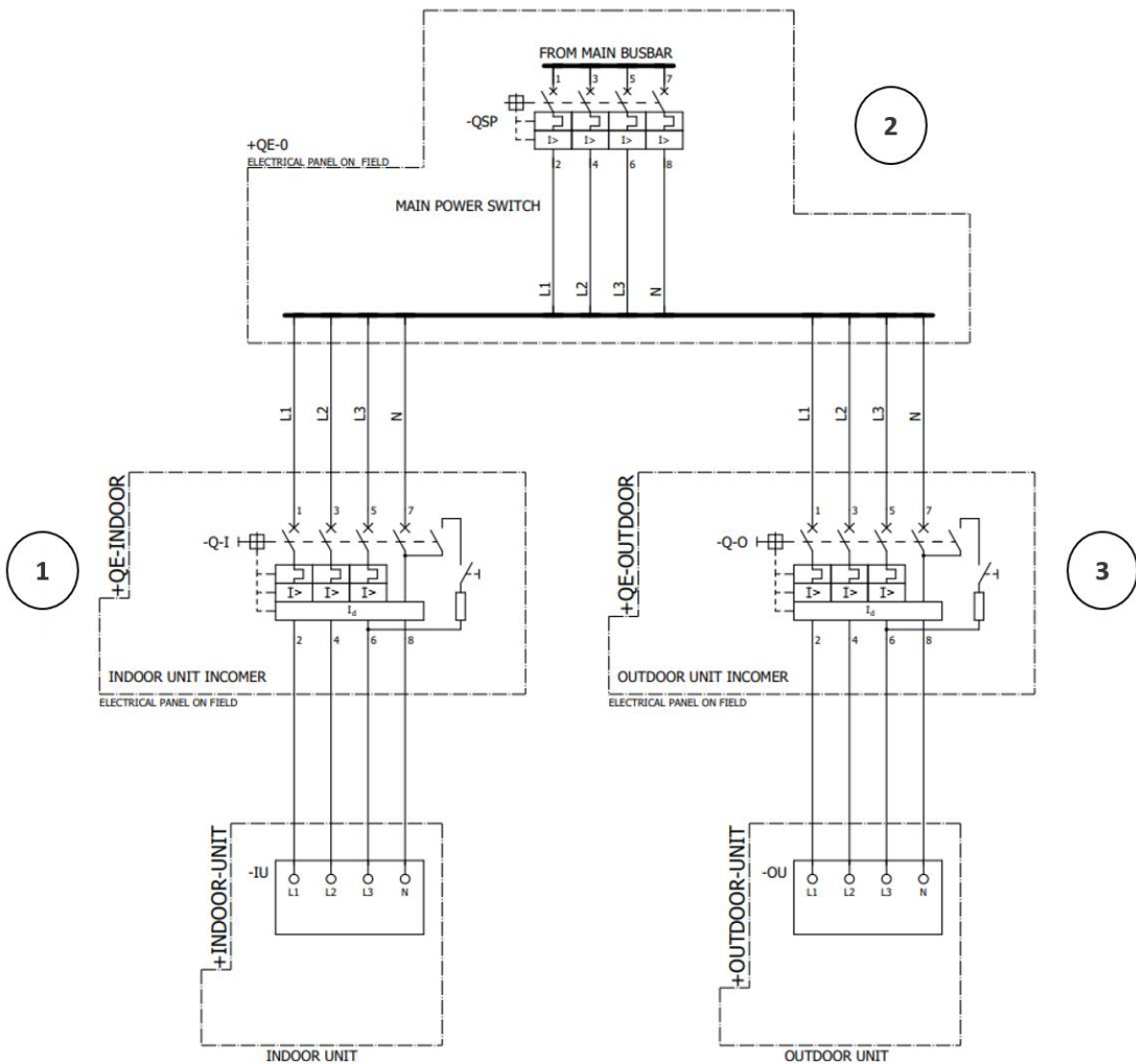


Figure 20 – Master Wiring diagram

SWITCH DISCONNECTOR – 3P+N (QSP)		
Unit	Data supply voltage /current	Current Size Main Switch (A)
EWYT021CZ—A1	360 Vac /25,90 A	D63
EWYT032CZ—A1	360 Vac / 41,46 A	D100
EWYT040CZ—A1	360 Vac / 45,90 A	D100
EWYT064CZ—A1	360 Vac / 74,63 A	D125

Table 14 – Reference No. 1

UNIT NOMINAL & CURRENT SIZE CIRCUIT BREAKER (Q-I)		
Unit	In (A)	Idn (mA)
EWYT021CZI—A1	C13	300 Type A
EWYT032CZI—A1	C13	300 Type A
EWYT040CZI—A1	C13	300 Type A
EWYT064CZI—A2	C13	300 Type A

Table 15 – Reference No. 2

UNIT NOMINAL & CURRENT SIZE CIRCUIT BREAKER (Q-O)		
Unit	In (A)	Idn (mA)
EWYT021CZO—A1	C32	300 Type A
EWYT032CZO—A1	C63	300 Type A
EWYT040CZO—A1	C63	300 Type A
EWYT064CZO—A2	C100	300 Type A

Table 16 – Reference No. 3

6. CONNECTING THE REFRIGERANT PIPING

Precautions when connecting the refrigerant piping



RISK OF BURNING



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



**Before the connecting procedure, it is important to prevent any impurities from entering the piping system.
The cap on the connections of the indoor and outdoor unit shall be removed only during the installation of the connecting piping.**



**It is highly recommended, prior to the installation of the units, to perform a vacuum within the piping system using a 2-stage vacuum pump with a non-return valve that can evacuate to a gauge pressure of -100.7 kPa (-1.007 bar) (5 Torr absolute). Then, once the vacuum is completed, let the system in vacuum for at least 2 hours. After that, pressurise the system with nitrogen gas to a maximum gauge pressure of 4.0 MPa (40 bar). Never set the gauge pressure higher than the maximum operation pressure of the unit, i.e., 4.0 MPa (40 bar).
Once the connecting operations begins, is it possible to depressurize the system letting the nitrogen inside flow out of the piping system.**

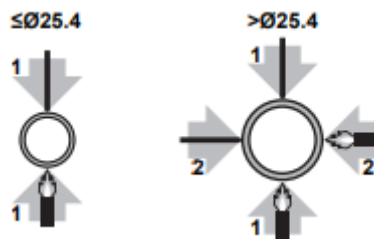


Connect the refrigerant piping securely before running the compressor. If the refrigerant piping is NOT connected and the stop valve is open when the compressor is run, air will be sucked in. This will cause abnormal pressure in the refrigeration cycle, which may result in equipment damage and even injury.

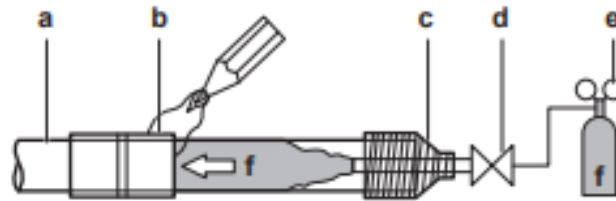
6.1. To braze the pipe end



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



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



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

Figure 21 – Pipe Brazing

- Do NOT use antioxidants 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 any 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.

6.2. Using the ball valve

The outdoor unit is shipped with ball valves in **CLOSED** position. The piping connections are sealed with a plug which is brazed to the connection. To install the piping system, it is necessary to remove the seal plugs.

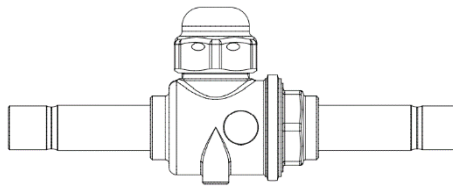


Figure 22 – Ball-Valve



Before removing the plugs on the piping connections, ensure that the ball valves are in CLOSED position.



Before removing the plugs on the piping connections, it is possible to check the absence of refrigerant through the charging ports mounted on each side of the unit. Check for refrigerant leaking through the ball valves.



In case of presence of refrigerant, this must be removed before removing the plugs on the piping connections and during all the brazing processes.



- **The outdoor unit is shipped with refrigerant inside (pre-charge). The quantity varies for each model.**
- **The indoor unit is shipped with nitrogen inside.**

To open/close the ball valve

- 1 Remove the ball valve cover.
- 2 Turn the pin with the use of adjustable wrench until they stop turning.
- 3 When the stop valve CANNOT be turned any further, stop turning. The valve is now open/closed.



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

6.3. To connect the refrigerant piping to the outdoor unit



All field piping must be installed by a licensed refrigeration technician and must comply with the relevant local and national regulations.



Before installing the refrigerant piping system, it is important to perform a leak test with the use of leak detection tools, especially in the surroundings of the ball valves. Ensure that the ball valves are in CLOSED position during the leak test.



The outdoor unit will be shipped with a certain amount of refrigerant inside (pre-charge). It is important to ensure that no refrigerant is present within the lines of pipe that need to be brazed (after the ball valves). If refrigerant is present, remove it before performing the brazing process.

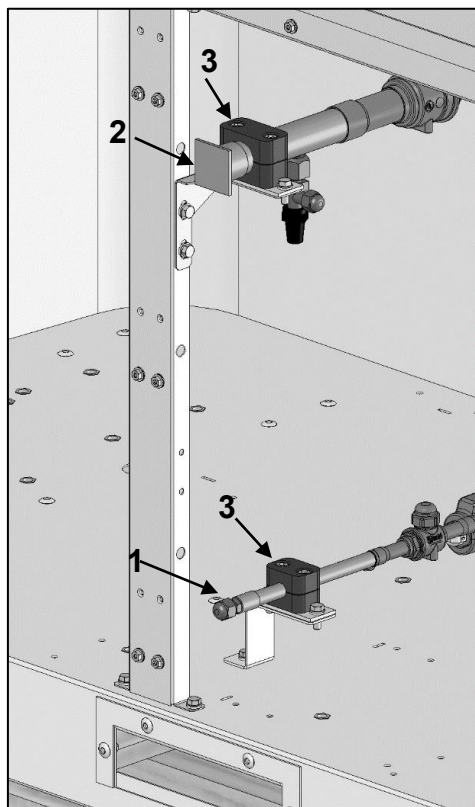


Before any connecting operation begins, make sure to remove the plastic supports on the piping ends, otherwise the heat from the brazing process may cause damage to them.

Once successfully performed the leak test and verified that no refrigerant is present within the piping that needs to be brazed, it is possible to connect the piping system to the outdoor unit.

To connect the piping to the outdoor unit, use the following procedure:

1. Remove the panel.
2. Remove the plastic brackets (3) near the piping ends before brazing, otherwise the heat generated may damage them.
3. At first unsolder and remove the Shrader valve (1) and the cap (2).
4. Then, proceed to braze the piping ends of the outdoor unit to the piping system. Remember to keep the unit's ball valves in **CLOSED** position during all these phases, since the outdoor unit has refrigerant inside.
5. Once connected the piping, wait for it to cool down and then reinstall the plastic brackets.
6. Reinstall the panel.
7. Seal the piping and wiring intake holes using sealing material (field supply), otherwise the capacity of the unit will drop, and small animals may enter the machine.



Here above is shown the detail of the external piping of the outdoor unit, which has to be connected to the piping system.

UNIT	Gas Piping	Liquid Piping	Unit Connection Gas Side	Unit Connection Liquid Side
EWYT021CZ(O/I)-A1	Ø 28,6 mm	Ø 9,52 mm	Ø 28,6 mm F	Ø 12,7 mm F
EWYT032CZ(O/I)-A1	Ø 28,6 mm	Ø 12,7 mm	Ø 28,6 mm F	Ø 12,7 mm F
EWYT040CZ(O/I)-A1	Ø 28,6 mm	Ø 12,7 mm	Ø 28,6 mm F	Ø 12,7 mm F
EWYT064CZ(O/I)-A2	Ø 28,6 mm	Ø 12,7 mm on Circuit 1, Ø 9,52 mm on Circuit 2	Ø 28,6 mm F	Ø 12,7 mm F



After all the piping has been connected, make sure that there isn't any gas leak. Use nitrogen to perform a gas leak detection test.



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.



Use a 2-stage vacuum pump with a non-return valve that can evacuate to a gauge pressure of -100.7 kPa (-1.007 bar) (5 Torr absolute). Make sure the pump oil does not flow in opposite sens into the system while the pump is not working.



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.



NEVER directly touch any accidental leaking refrigerant. This could result in severe wounds caused by frostbite.

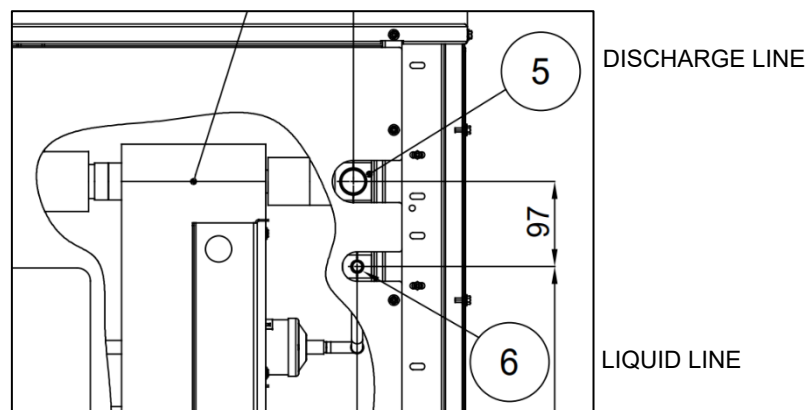
6.4. To connect the refrigerant piping to the indoor unit



Before any connecting operation begins, make sure to remove the plastic brackets on the piping ends, otherwise the heat from the brazing process may cause damage to them.



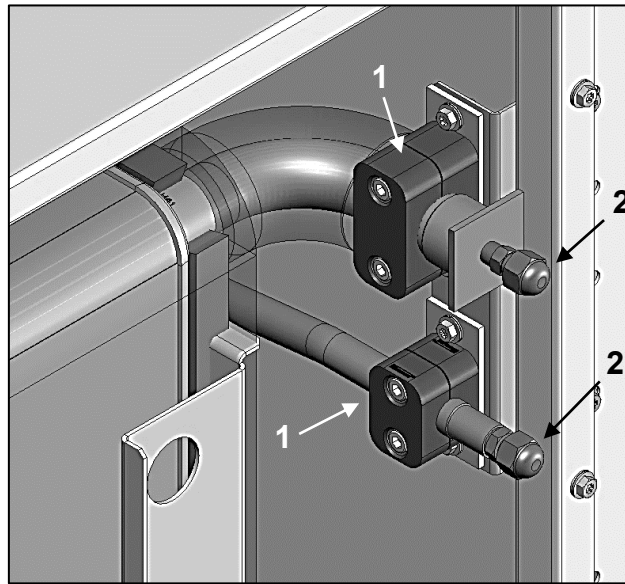
The connecting procedure for the indoor unit requires the gas pipe to be brazed first. While performing the brazing process for the liquid pipe (thus the last one, considering that the outdoor unit has already been connected) it is fundamental to braze without the use of the nitrogen. This is because the nitrogen gas would not have any outlet once the piping has been connected, and it would cause the pressurising of the pipe. DO NOT use nitrogen while brazing the liquid pipe (i.e., the last pipe to be brazed).



The connection process can be performed with the following procedure:

1. Remove the panel
2. Remove the plastic brackets (1), otherwise the heat generated from the welding process could damage them.
3. Remove the caps on the piping ends (2) and let the nitrogen flow out of the unit.
4. Braze the piping ends with the procedure shown above to the piping system.
5. Once the piping has cooled down, reinstall the plastic brackets.
6. Reinstall the panel.

Once completed, it is possible to perform a leak test and vacuum within the piping system (outdoor unit excluded, remember to keep the ball valves in **CLOSED** position during these phases, otherwise the refrigerant within the outdoor unit may leak) and the indoor unit.



6.5. Checking the refrigerant piping

Make sure the refrigerant piping is connected between the outdoor unit and the indoor unit. Make sure that the ball valves on the outdoor unit are in **CLOSED** position. The refrigerant piping to be checked concerns only the indoor unit and the piping system.

Typical workflow

Checking the refrigerant piping typically consists of the following stages:

1. Checking for leaks in the refrigerant piping system.
2. Performing vacuum drying to remove all moisture, air or nitrogen from the refrigerant piping.
3. Insulating the refrigerant piping



Use a 2-stage vacuum pump with a non-return valve that can evacuate to a gauge pressure of -100.7 kPa (-1.007 bar) (5 Torr absolute). Make sure the pump oil does not flow oppositely into the system while the pump is not working.



Use this vacuum pump for R32 exclusively. Using the same pump for other refrigerants may damage the pump and the unit.

6.5.1. Pressure Leak Test



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

Break the vacuum by pressurising with nitrogen gas to a maximum gauge pressure of 4.0 MPa (40 bar). Never set the gauge pressure higher than the maximum operation pressure of the unit, i.e., 4.0 MPa (40 bar).

6.5.2. To perform vacuum drying



Before any vacuum procedure begins, it is necessary to make sure that the expansion valve within the indoor unit is FULLY OPEN. Otherwise, it will not be possible to perform a complete vacuum process. Follow the procedure stated in this manual to open the expansion valve.

The first step in order to correctly perform vacuum within the indoor unit + piping system requires to make sure that the expansion valve inside the indoor unit is **fully open**. To open the valve, it is necessary to have already electrically connected the unit. Then, through the HMI control module, follow the procedure below to open the expansion valve.

1. Turn on the power supply to the Indoor unit. Remember to keep the Modbus communicating cable between the indoor unit and the outdoor unit **DISCONNECTED**.
2. Insert service password
3. Depending on the HMI being used, choose one of the two paths:
 - With the EvCO HMI module:
Go to page [14.22] and select “1” (for mono circuit units) or “3” (for dual circuit units) parameter:

0= Default Value
1= Force to open Circuit 1 Expansion Valve
3= Force to open Circuit 1 and Circuit 2 Expansion Valves
 - With the Siemens HMI module
Go to the path “Main Menu→Commission Unit→Manual Control→Unit→IU Exv Ctrl” and select “Open C1” (for mono circuit units) or “OpenAll” (for dual circuit units) parameter:

Normal= Default value
OpenC1= Force to open Circuit 1 Expansion Valve
OpenAll= Force to open Circuit 1 and Circuit 2 Expansion Valves
4. Wait for 1 minute.
5. Turn OFF the power supply to the indoor unit. Remember to keep the Modbus communicating cable between the indoor and outdoor units **DISCONNECTED**. **It is now possible to proceed with the vacuum and piping connecting phases.**
6. It is now possible to proceed with piping connection and vacuum phases.

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

1. Check that the expansion valve within the indoor unit (i.e the one used in chiller mode) is set to **100% OPEN**. Otherwise, it would not be possible to perform a vacuum on the whole refrigerant circuit. To set the opening percentage of the expansion valve follow the procedure above.
2. Use the receiver valve(s) in the outdoor unit to perform the vacuum.
3. Evacuate the system to a target vacuum of -100.7 kPa (-1.007 barg) (5 Torr absolute).
4. Check that, with the vacuum pump turned off, the target vacuum is maintained for at least 1 hour.
5. 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.



In case of EWYT064CZ(I/O) the operation must be performed on both circuits.

6.5.3. To insulate the refrigerant piping

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

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

Ambient Temperature	Humidity	Minimum Thickness
≤ 30 °C	75% to 80% RH	15 mm
≥ 30 °C	≥ 80% RH	20 mm



RISK OF BURNING Be sure to insulate local pipes, as touching them can cause burns.

6.6. Charging Refrigerant

Once vacuum drying is finished, additional refrigerant charging can start.

6.6.1. Precautions when charging refrigerant



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



While charging the refrigerating gas, make sure to follow one of the procedures stated below:

- **PLATE HEAT EXCHANGER FILLED WITH WATER:** Turn on the water pump during the charging process to let the water circulate. This is to avoid that the expansion that happens while the refrigerating gas fills the heat exchanger leads to an excessive cooling of the water which may then freeze. The continuous circulation of the water will prevent the water itself from freezing. To manually turn on the water pump, see further details on the Operating Manual.
- **PLATE HEAT EXCHANGER EMPTY (NO WATER INSIDE):** It is possible to charge the refrigerant without turning on the water pump.



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.
Make sure that the ball valves on the outdoor unit are in OPEN position during the charging operation.

6.6.2. To determine the additional refrigerant amount



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

The additional refrigerant charge calculation is based on the liquid piping size. This refrigerant quantity must be added during on-field installation, according to the length of the piping system. The outdoor units are charged in the factory with the refrigerant quantity stated in the table below.

Factory Refrigerant Charge (Pre-Charge)		
Unit [Outdoor]	Quantity [Kg]	Liquid Piping Diameter [mm]
EWYT021CZO-A1	3,5	9,52
EWYT032CZO-A1	4,55	12,7
EWYT040CZO-A1	4,69	12,7
EWYT064CZO-A2	4,48 [Circuit 1]; 3,5 [Circuit 2]	12,7 [Circuit 1]; 9,52 [Circuit 2]

The additional refrigerant charge shall be calculated with the formula below:

$$R_{tot} [Kg] = R_{fxd} [Kg] + R_{\phi} [Kg]$$

R_{fxd} is the additional refrigerant charge dependent on the unit model as reported in the table below, while R_{ϕ} is the additional charge dependent on the liquid piping diameter.

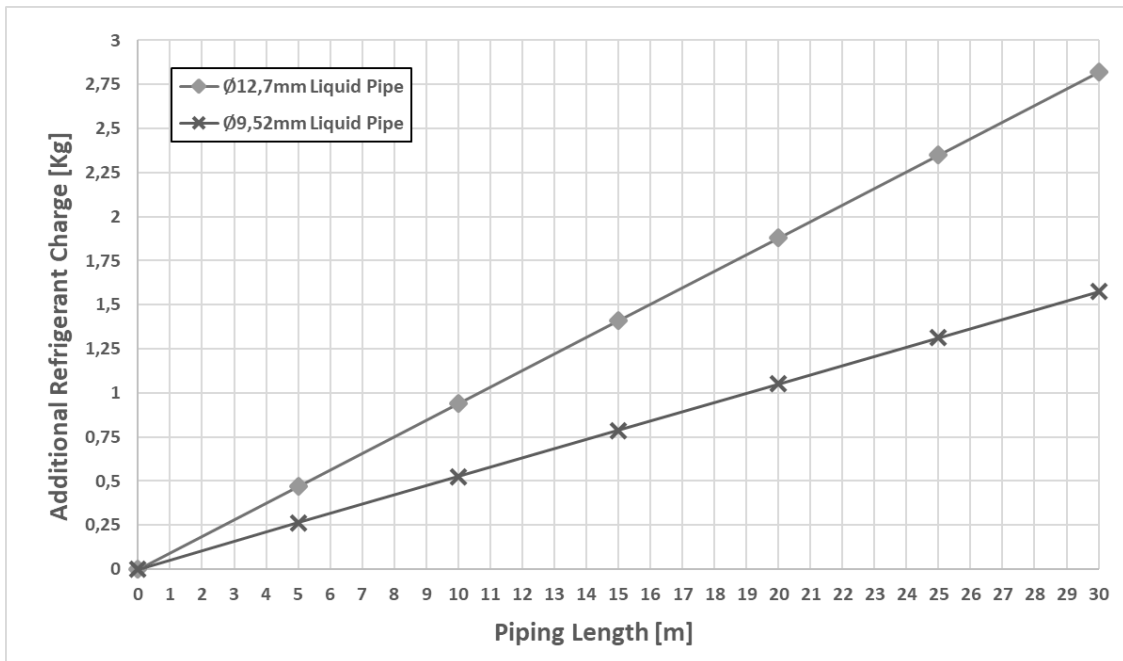
Unit [Outdoor]	R_{fxd} [Kg]
EWYT021CZO-A1	3,8
EWYT032CZO-A1	4,95
EWYT040CZO-A1	5,11
EWYT064CZO-A2	4,82 [Circuit 1]; 3,8 [Circuit 2]

$$R_{\phi 9,52} [Kg] = (X_{\phi 9,52} \cdot 0,0525)$$

$$R_{\phi 12,7} [Kg] = (X_{\phi 12,7} \cdot 0,094)$$

Where:

- R Additional refrigerant to be charged [in kg and rounded off to 1 decimal place]
- $X_{1,2}$ Total length [m] of liquid piping size at ϕ_a



6.6.3. Pre-charging refrigerant

1. Calculate the additional amount of refrigerant to be added using the formula mentioned in "6.6 To determine the additional refrigerant amount".
2. The outdoor units will be shipped with an initial amount of charge (pre-charge) which differs for each unit. Once installed, the technician shall add the extra quantity based on the formula above mentioned.
3. Once the additional refrigerant quantity has been added, it is possible to set the ball valves on the outdoor unit in **OPEN** position.



If the system does not contain any refrigerant (e.g., after refrigerant reclaim operation), the unit must be charged with its original amount of refrigerant (refer to the nameplate on the unit).

6.6.4. Checks after charging refrigerant

- Are all ball valves open?
- Is the amount of refrigerant, that has been added, recorded on the refrigerant charge label?



Make sure to open all stop valves before operating. Operating with the stop valves closed will damage the compressor.



DAIKIN APPLIED EUROPE S.p.a.
Via Piani di Santa Maria, 72
00072 Ariccia (Roma) - Italia



Model **EWYT021CZO-A1**
Serial Number **X000001**
Poscode **B12345**



B12345X000001H

	Factory	Field	TOT	
R-32	12,9 Kg	AB Kg	Kg	GWP = 675 IPX4
R-32 C1	8,9 Kg	CD Kg	Kg	FAN Efficiency: 38,8% / N = 49 (A, Static) / N (2015) = 40
R-32 C2	4,0 Kg	EF Kg	Kg	VSD Integrated
tCO ₂ eq:	19,8	GH		3N~ 50 Hz 400 V 20,6 A
tCO ₂ eq - C1:	10,8	IL		PS high: 42,9 bar
tCO ₂ eq - C2:	9,8	MN		PS low: 30 bar
				HP switch: 42,2 bar








265 Kg






Contains fluorinated greenhouse gases

Prod. Date: 07/2022

Made In Italy

To fix the fluorinated greenhouse gases label

1. Fill in the label as follows:

- A: total refrigerant charge added
- B: total refrigerant charge (Pre+Add)
- C: total refrigerant charge added C1
- D: total refrigerant charge (Pre+Add) C1
- E: total refrigerant charge added C2 (only for dual version)
- F: total refrigerant charge (Pre+Add) C2 (only for dual version)
- G: total tCO₂ eq added
- H: total tCO₂ (Pre+Add)
- I: total tCO₂ eq added C1
- L: total tCO₂ (Pre+Add) C1
- M: total tCO₂ eq added C2
- N: total tCO₂ (Pre+Add) C2



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.

7. OPERATION

7.1. Operator's responsibilities

It is essential that the operator is appropriately trained and becomes familiar with the system before operating the unit. In addition to reading this manual, the operator must study the microprocessor operating manual and the wiring diagram to learn the start-up sequence, unit operation, the shutdown sequence and the operation of all the safety devices.

During the unit initial start-up phase, a technician authorized by the manufacturer is available to answer any questions and to give instructions as to the correct operating procedures.

The operator must keep a record of operating data for every installed unit. Another registration must also be kept for all the periodic maintenance and assistance activities.

If the operator notes abnormal or unusual operating conditions, he is advised to consult the technical service authorized by the manufacturer.



If the unit is switched off, the compressor oil heater cannot be used. Once the unit is reconnected to the mains, leave the compressor oil heater charged for at least 6 hours before restarting the unit. Failure to observe this rule may cause damage to the compressors due to excessive accumulation of liquid inside them.

This unit represents a substantial investment and deserves the attention and care to keep this equipment in good working order.

However, during operation and maintenance it is essential to observe the following instructions:

- Do not allow unauthorized and / or unqualified personnel to access the unit.
- It is forbidden to access the electrical components without having opened the unit main switch and switched off the power supply.
- It is forbidden to access the electrical components without using an insulating platform. Do not access the electrical components if water and/or moisture are present.
- Verify that all operations on the refrigerant circuit and on the components under pressure are carried out exclusively by qualified personnel.
- The replacement of the compressors must be carried out exclusively by qualified personnel.
- Sharp edges and the surface of the condenser section could cause injury. Avoid direct contact and use adequate protection devices.
- Do not introduce solid objects into the water pipes while the unit is connected to the system.
- It is absolutely forbidden to remove all protections of moving parts.

In case of sudden stop of the unit, follow the instructions on the Control Panel Operating Manual which is part of the on-board documentation delivered to the end user.

It is strongly recommended to perform installation and maintenance with other people.



Avoid installing the unit in areas that could be dangerous during maintenance operations, such as platforms without parapets or railings or areas not complying with the clearance requirements around the unit.

8. MAINTENANCE

Personnel working on the electrical or the refrigeration components must be authorized, trained and fully qualified. Maintenance and repair requiring the assistance of other skilled personnel should be carried out under the supervision of the person competent in the use of flammable refrigerants. Any person conducting servicing or maintenance on a system or associated parts of the equipment should be competent according to EN 13313.

Persons working on refrigerating systems with flammable refrigerants should have competence in safety aspects of flammable refrigerant handling supported by evidence of appropriate training.

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

Always protect the operating personnel with personal protective equipment appropriate for the tasks to be performed. Common individual devices are: Helmet, goggles, gloves, caps, and safety shoes. Additional individual and group protective equipment should be adopted after an adequate analysis of the specific risks in the area of relevance, according to the activities to be performed.

electrical components	Never work on electrical components until the machine's main power supply has been cut off with the main switch on the electrical panel. Wait 10 minutes after cutting off the machine's power supply before opening the electrical panel, to prevent the risk of high voltage due to firing of the capacitors.
refrigerating system	<p>The following precautions should be taken before working on the refrigerant circuit:</p> <ul style="list-style-type: none"> • obtain permit for hot work (if required); • ensure that no flammable materials are stored in the work area and that no ignition sources are present anywhere in the work area; • ensure that suitable fire extinguishing equipment is available; • ensure that the work area is properly ventilated before working on the refrigerant circuit or before welding, brazing or soldering work; • ensure that the leak detection equipment being used is no sparking, adequately sealed or intrinsically safe; • ensure that all maintenance staff have been instructed; • always perform the following procedure before working on the refrigerant circuit: <ul style="list-style-type: none"> • remove refrigerant (specifying residual pressure); • purge circuit with inert gas (e.g. nitrogen); • evacuate at a pressure of 0.3 bar (ass.) (or 0.03 MPa); • purge circuit with inert gas (e.g. nitrogen) again; • open the circuit. <p>If compressors or compressor oils are to be removed, it should be ensured that it has been evacuated to an acceptable level to ensure that there is no flammable refrigerant remaining within the lubricant.</p> <p>Only refrigerant recovery equipment designed for use with flammable refrigerants should be employed.</p> <p>If the national rules or regulations permit the refrigerant to be drained, this should be done safely, using a hose, for example, through which the refrigerant is discharged into the outside atmosphere in a safe area. It should be ensured that an inflammable explosive refrigerant concentration cannot occur near an ignition source or penetrate into a building under any circumstance.</p> <p>In the case of refrigerating systems with an indirect system, the heat transfer fluid should be checked for the possible presence of refrigerant.</p> <p>After any repair work, the safety devices, for example refrigerant detectors and mechanical ventilation systems, should be checked and the results recorded.</p> <p>It should be ensured that any missing or illegible label on components of the refrigerant circuit is replaced.</p> <p>Sources of ignition should not be used when searching for a refrigerant leak.</p>

8.1. Pressure / temperature table

°C	Bar	°C	Bar	°C	Bar	°C	Bar
-28	2.97	-2	7.62	24	16.45	50	31.41
-26	3.22	0	8.13	26	17.35	52	32.89
-24	3.48	2	8.67	28	18.30	54	34.42
-22	3.76	4	9.23	30	19.28	56	36.00
-20	4.06	6	9.81	32	20.29	58	37.64
-18	4.37	8	10.43	34	21.35	60	39.33
-16	4.71	10	11.07	36	22.45	62	41.09
-14	5.06	12	11.74	38	23.60	64	42.91
-12	5.43	14	12.45	40	24.78	66	44.79
-10	5.83	16	13.18	42	26.01	68	46.75
-8	6.24	18	13.95	44	27.29	70	48.77
-6	6.68	20	14.75	46	28.61	72	50.87
-4	7.14	22	15.58	48	29.99	74	53.05

Table 17 – R32 Pressure/Temperature

8.2. Routine maintenance

This unit must be maintained by qualified technicians. Before beginning any work on the system, the personnel shall assure that all security precautions have been taken.

Neglecting unit maintenance could degrade all parts of the units (coils, compressors, frames, pipes, etc.) with negative effect on performances and functionality.

There are two different levels of maintenance, which can be chosen according to the type of application (critical/noncritical) or to the installation environment (highly aggressive).

Examples of critical applications are process cooling, data centres, etc.

Highly Aggressive Environments can be defined as follows:

- Industrial environment (with possible concentration of fumes result of combustion and chemical process).
- Coastal environment.
- Highly polluted urban environment.
- Rural environment close to of animal excrement and fertilizers, and high concentration of exhaust gas from diesel generators.
- Desert areas with risk of sandstorms.
- Combinations of the above.

Unit exposed to a highly aggressive environment can face corrosion in a shorter time than the ones installed on a standard environment. Corrosion causes a rapid rusting of the frame core, consequently, decreases unit structure lifetime. To avoid that, it is necessary to wash periodically the frame surfaces with water and suitable detergents.

In case of part of unit frame paint came off, it is important to stop its progressive deterioration by repainting the exposed parts using proper products. Please contact factory to get the required products specifications.

In case of just salt deposits are present, it is enough to rinse the parts with fresh water.

Checklist for yearly maintenance of the indoor unit

Indoor Unit: Yearly maintenance plan	
Element	Description
Water pressure	
Water filter	
Water pressure relief valve	Turn the red knob on the valve counterclockwise and check if it operates correctly: If you do not hear a clacking sound, contact your local dealer. In case the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then contact your local dealer.
Water pressure	Keep water pressure above 1 bar. If lower, add water.
Water filter	Clean the water filter. NOTICE: handle the water filter with care. DO NOT use excessive force when you reinsert the water filter so as NOT to damage the water filter mesh.
Pressure relief valve hose	Check the condition and routing of the hose. Water must drain appropriately from the hose.
Switch box	Carry out a thorough visual inspection of the switch box and look for obvious defects such as loose connections or defective wiring.

Table 18 – Yearly maintenance checklist for the indoor unit

List of Activities	Weekly	Monthly (Note 1)	Yearly/ Seasonal (Note 2)
General:			
Reading of operating data (Note 3)	X		
Visual inspection of unit for any damage and/or loosening		X	
Verification of thermal insulation integrity		X	
Cleaning		X	
Paint where necessary			X
Analysis of water (4)			X
Check of flow switch operation		X	
Electrical Installation:			
Verification of control sequence			X
Verify contactor wear – Replace if necessary			X
Verify that all electrical terminals are tight – Tighten if necessary		X (Quarterly)	
Clean inside the electrical control board			X
Visual inspection of components for any signs of overheating		X	
Verify operation of compressor and electrical resistance		X	
Refrigeration circuit:			
Check for any refrigerant leakage (leak test)		X	
Analyse compressor vibrations			X
Hydraulic circuit (Indoor Unit):			
Check for any water leakage		X	
Check hydraulic connections		X	
Check the pressure at the pump inlet		X	
Clean the water filter			X
Check the glycol concentration			X
Check the water flow rate		X	
Check the safety valve			X
Coil section (Outdoor Unit):			
Check the cleaning of coils and water heat exchangers (Note 5)			X
Verify that fans are well tightened			X
Verify the coil fins			X
BPHE (Indoor Unit):			
Check the cleaning of the BPHE			X

Table 19 – Standard Routine Maintenance Plan

Notes:

1. Monthly activities include all the weekly ones.
2. The annual (or early season) activities include all weekly and monthly activities.
3. Daily reading of the operating values of the unit allows maintaining high observational standards.
4. Check for any dissolved metals.
5. Clean condenser banks with clean water and water heat exchangers with appropriate chemicals. Particles and fibres could clog up the exchangers, especially for water exchangers pay attention if water rich in calcium carbonate is used. An increase in pressure drops or a decrease in thermal efficiency means that the heat exchangers are clogged. In environments with a high concentration of airborne particles, it might be necessary to clean the condenser bank more often.
6. Units placed or stored in a Highly Aggressive Environment for long time without operation are still subject to those routine maintenance steps.

List of Activities (Note 8)	Weekly	Monthly (Note 1)	Yearly/ Seasonal (Note 2)
General:			
Reading of operating data (Note 3)	X		
Visual inspection of unit for any damage and/or loosening		X	
Verification of thermal insulation integrity		X	
Cleaning		X	
Paint where necessary			X
Analysis of water (4)			X
Check of flow switch operation		X	
Electrical Installation:			
Verification of control sequence			X
Verify contactor wear – Replace if necessary			X
Verify that all electrical terminals are tight – Tighten if necessary			X
Clean inside the electrical control board		X	
Visual inspection of components for any signs of overheating		X	
Verify operation of compressor and electrical resistance		X	
Measure compressor motor insulation			X
Refrigeration circuit:			
Check for any refrigerant leakage (leak test)		X	
Analyze compressor vibrations			X
Hydraulic circuit (Indoor Unit):			
Check for any water leakage		X	
Check hydraulic connections		X	
Check the pressure at the pump inlet		X	
Clean the water filter			X
Check the glycol concentration			X
Check the water flow rate		X	
Check the safety valve			X
Coil section (Outdoor Unit):			
Checking the cleaning of the air heat exchanger (Note 6)		X	
Check the cleaning of water heat exchangers (Note 6)			X
Verify that fans are well tightened			X
Verify coil fins		X	
BPHE (Indoor Unit):			
Check the cleaning of the BPHE			X

Table 20 – Routine Maintenance Plan for Critical Application and/or Highly Aggressive Environment

Notes:

1. Monthly activities include all the weekly ones.
2. The annual (or early season) activities include all weekly and monthly activities.
3. Daily reading of the operating values of the unit allows maintaining high observational standards.
4. Check for any dissolved metals.
5. Clean condenser banks with clean water and water heat exchangers with appropriate chemicals. Particles and fibers could clog up the exchangers, especially for water exchangers pay attention if water rich in calcium carbonate is used. An increase in pressure drops or a decrease in thermal efficiency means that the heat exchangers are clogged. In environments with a high concentration of airborne particles, it might be necessary to clean the condenser bank more often.
6. Units placed or stored in a Highly Aggressive Environment for long time without operation are still subject to those routine maintenance steps.

8.2.1. Air Heat Exchanger Maintenance

Routine cleaning of air heat exchanger surfaces is essential to maintain proper operation of the unit, avoid corrosion and rusting. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit.

Remove surface dirt, leaves, fibres, etc. with a vacuum cleaner (preferably with a brush or other soft attachment rather than a metal tube), compressed air blown from the inside out, and/or a soft bristle (not wire!) brush. Do not impact or scrape the coil with the vacuum tube, air nozzle, etc.

Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibres and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibres must be completely removed prior to using low velocity clean water rinse.



A monthly clean water rinse is recommended for coils that are applied in coastal or industrial environments to help to remove chlorides, dirt, and debris. It is very important when rinsing that the water temperature is below 55 °C.

Galvanic corrosion of the Copper/Aluminium connection can occur under the plastic protection; during the maintenance operations or periodic cleaning, check the aspect of the plastic protection of the copper/aluminium connection. If it is inflated, damaged, or removed contact the manufacturer representative for advice and information.

8.2.2. Electrical Maintenance



All electrical maintenance activities must be followed by qualified personnel. Make sure the system is switched off and the main switch of the unit open. Failure to observe this rule could result in serious personal injury. When the unit is turned off, but the disconnection switch is in the closed position, the unused circuits will still be active.

The maintenance of the electrical system consists of the application of some general rules as follows:

1. the current absorbed by the compressor must be compared to the rated value. Normally the value of the absorbed current is lower than the rated value that corresponds to the absorption of the full load compressor at the maximum operating conditions.
2. at least once every three months all the security checks must be made to verify their functionality. Each appliance, with aging, can change its point of operation and this must be monitored to adjust it or replace it. The pump interlocks and flow switches must be checked to make sure that they interrupt the control circuit if they intervene.

9. SERVICE AND LIMITED WARRANTY

All units are factory tested and guaranteed for 12 months as of the first start-up or 18 months as of delivery. These units have been developed and constructed according to high quality standards ensuring years of failure free operation. **However, the unit requires maintenance even during the warranty period, from the time of installation and not just from the commissioning date.** We strongly advise stipulating a maintenance contract with a service authorized by the manufacturer to ensure efficient and problem free service, thanks to the expertise and experience of our personnel.

It must be borne in mind that operating the unit in an inappropriate manner, beyond its operating limits or not performing proper maintenance according to this manual can void the warranty.

Observe the following points, to conform to warranty limits:

1. The unit cannot function beyond the specified limits.
2. The electrical power supply must be within the voltage limits and without voltage harmonics or sudden changes.
3. The three-phase power supply must not have an unbalance between phases exceeding 3%. The unit must stay turned off until the electrical problem has been solved.
4. No safety device, either mechanical, electrical, or electronic must be disabled or overridden.
5. The water used for filling the water circuit must be clean and suitably treated.
6. The value of the BPHE water flow must be included in the declared range for the unit considered, refer to the CSS selection software.

10. REFRIGERANT CIRCUIT SCHEME

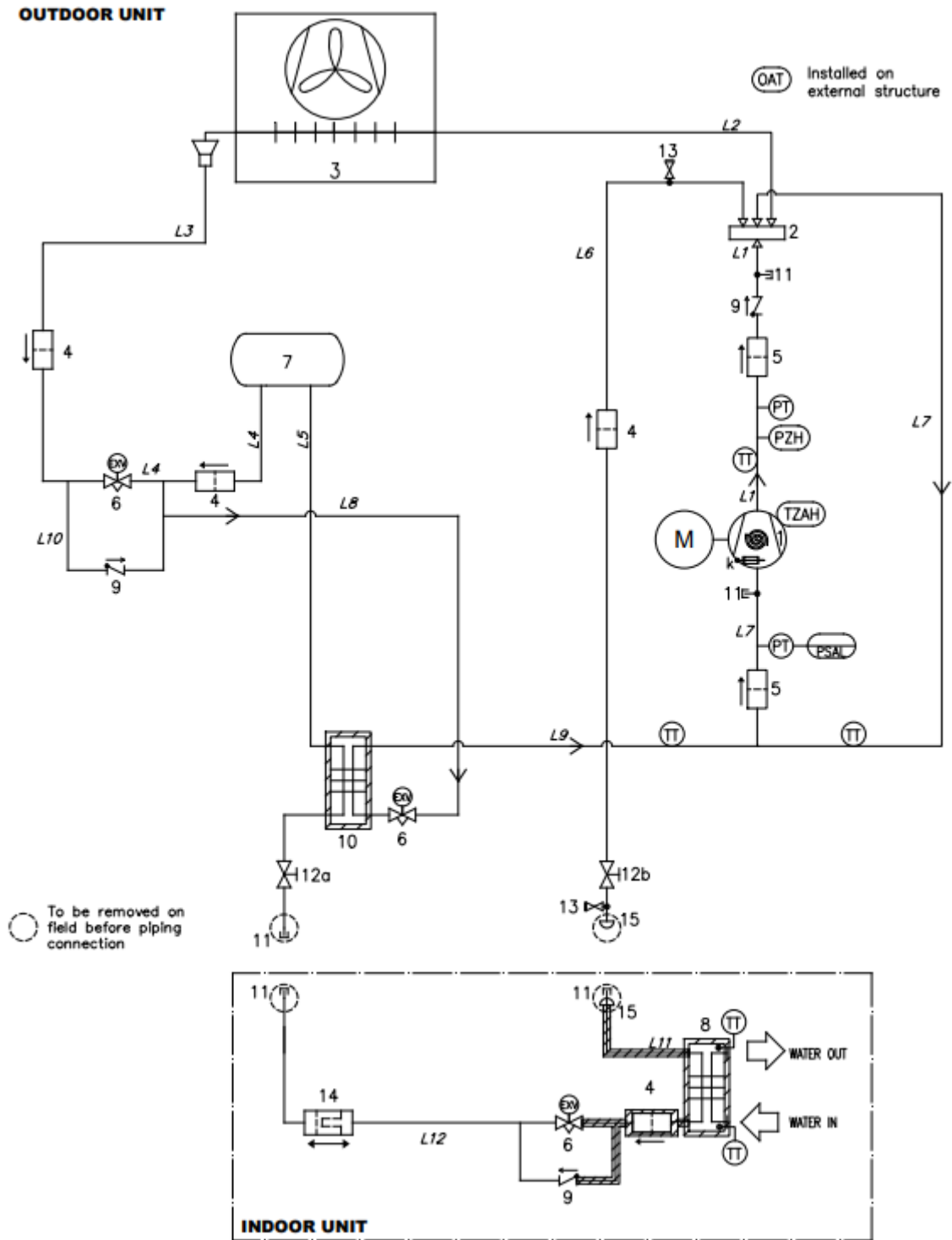


Figure 23 – Refrigerant circuit (P&ID) diagram for MONO circuit EWYT~CZ unit

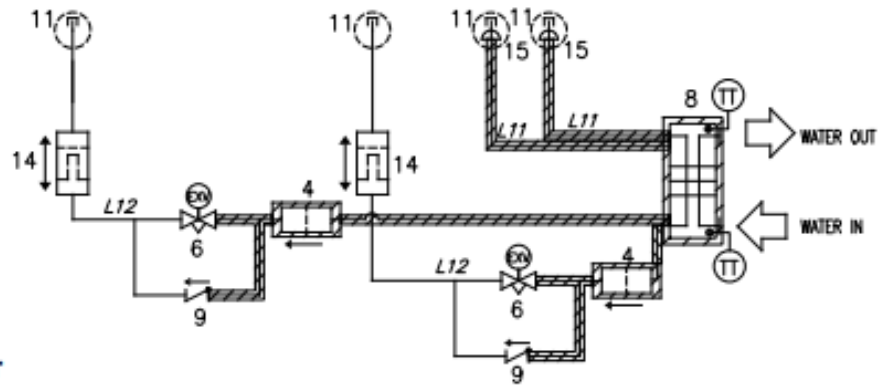
EQUIPMENT	
ID	DESCRIPTION
1	SCROLL COMPRESSOR
2	4 WAY VALVE
3	TUBES&FINS HEAT EXCHANGER (COIL)
4	BIFLUX FILTER
5	MECHANICAL FILTER
6	ELECTRONIC EXPANSION VALVE
7	LIQUID RECEIVER
8	HEAT EXCHANGER (BPHE)
9	CHECK VALVE
10	SUBCOOLER (BPHE)
11	ACCESS FITTING (1/4" SAE FLARE)
12	SHUT-OFF VALVE
13	RECEIVER VALVE 1/4" x 1/4"
14	DRIER FILTER
15	COPPER PIPE CAP
k	Crankcase heater

LINE	
ID	DESCRIPTION
L1	DISCHARGE
L2	4 WAY VALVE – COIL
L3	COIL – EXV
L4	EXV – LIQUID RECEIVER
L5	LIQUID RECEIVER OUT
L6	BPHE EXCHANGER – 4 WAY VALVE
L7	SUCTION
L8	LIQUID – SUBCOOLER
L9	SUBCOOLER – COMPRESSOR
L10	CHECK VALVE LINE
L11	BPHE – COMPRESSOR (INDOOR UNIT)
L12	SUBCOOLER – BOHE (INDOOR UNIT)

INSTRUMENT	
ID	DESCRIPTION
PT	PRESSURE TRANSDUCER
PZH	HIGH PRESSURE SWITCH 42.2 bar
PSAL	LOW PRESSURE LIMITER (CONTROLLER FUNCTION)
TZAH	HIGH TEMPERATURE SWITCH (MOTOR THERMISTOR)
TT	TEMPERATURE TRANSDUCER *
OAT	OUTSIDE TEMPERATURE TRANSDUCER

* the TEMPERATURE probes on the refrigerant side are thermal insulated.

REFRIGERANT	PED GROUP	LINE	PS (bar)	Ts (°C)
R32	1	HIGH PRESSURE GAS	42.9	+10/+120
		HIGH PRESSURE LIQ	42.9	-10/+65
		LOW PRESSURE	30	-30/+60













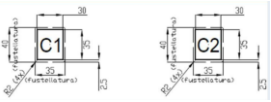













INDOOR UNIT

Figure 25 – Refrigerant circuit (P&ID) diagram for DUAL circuit EWYT~CZ indoor unit

REFRIGERANT	PED GROUP	LINE	PS (bar)	Ts (°C)
R32	1	HIGH PRESSURE GAS	42.9	+10/+120
		HIGH PRESSURE LIQ	42.9	-10/+65
		LOW PRESSURE	30	-30/+60

11. LIST OF THE LABELS APPLIED TO THE UNITS

Labels	Label Number	Description	Location
		Hazardous voltage warning	On the electric panel (outside)
		A2L symbol	On the electric panel (outside)
		Manufacturer's logo	On the electric panel (outside)
		Lifting instruction*	One on the unit frame and one on the packaging
		Lift point label	One on the unit panel near the unit lifting holes
		Unit ID plate information	On the unit frame (outside)
		Circuit 1/2 Label	On the refrigerant side connections panel
		Water outlet	On the unit panel near the outlet connection
		Water inlet	On the unit panel near the inlet connection
		Minimum distance from Fan	On the fan panel
		Contains greenhouse gas	On the unit frame
		Procedure of vacuum indoor unit	On the panel of the refrigerant pipe connections

* Labels on the unit packaging

Table 21 – Labels applied to the Unit

With the exception of the unit's identification plate, which is always in the same position, the other plates may be located in different positions depending on the model and the options present on the unit.

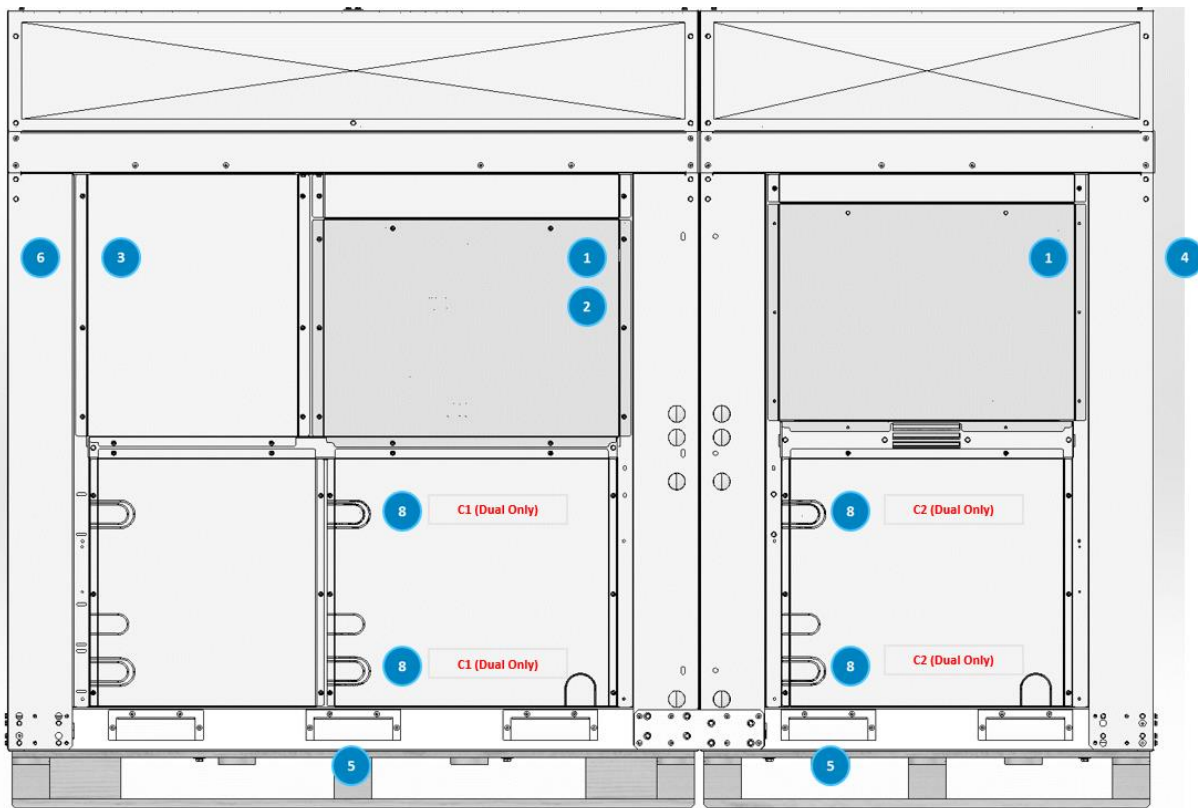


Figure 26 – Labels on the outdoor unit

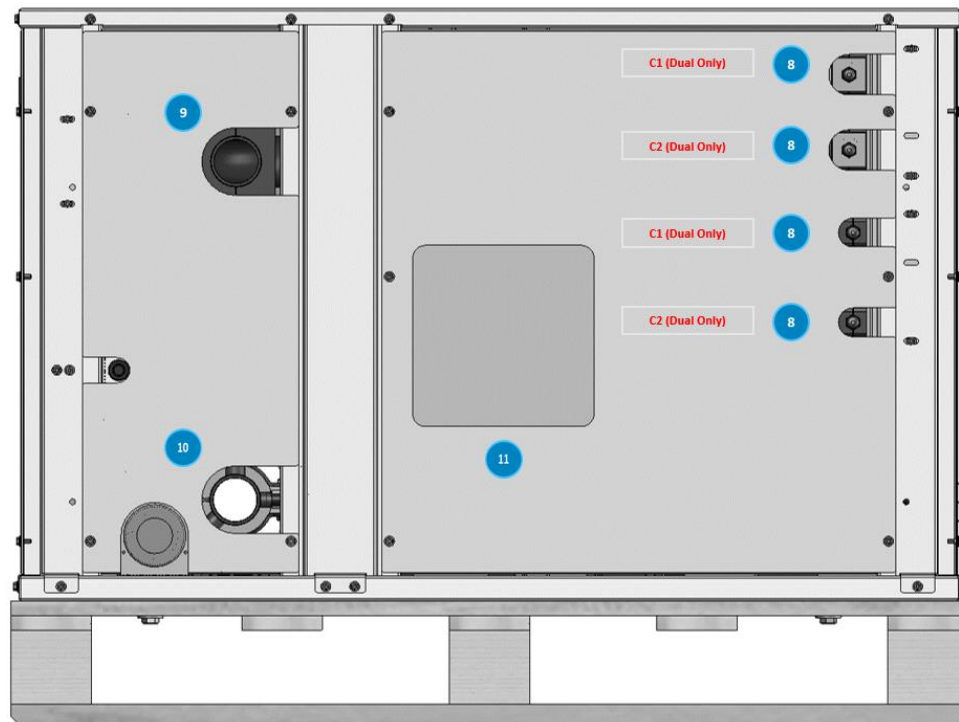


Figure 27 – Labels on the indoor unit

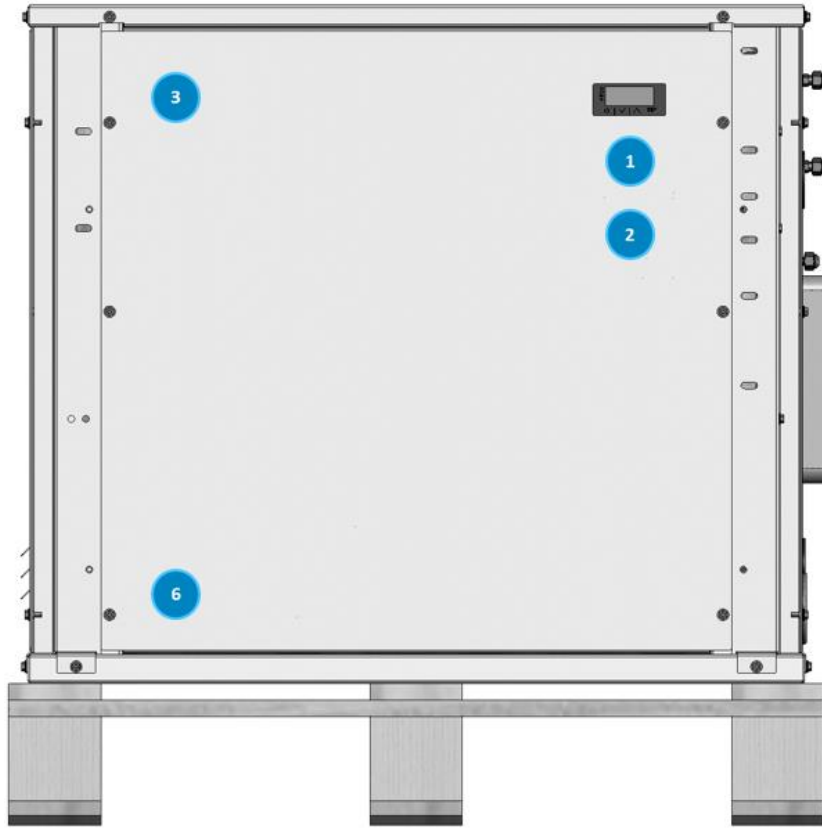


Figure 28 – Labels on the indoor unit – Electric panel side

12. COMMISSIONING



Only authorized DAIKIN personnel should conduct commissioning.

This general commissioning checklist can be used as a guideline and reporting template during the commissioning and hand-over to the user.

For more detailed commissioning instructions, please contact the local Daikin Service department or authorized representative of the manufacturer.



For a complete commissioning factory suggest following the commissioning guide and checklist for Daikin Service authorized technicians.



Factory suggests upgrading software to last software version available. Refer to the local Daikin Service department for software update.

General	Yes	No	N/A
Check for external damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Open all isolation and / or shutoff valves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Verify that the unit is pressurised with refrigerant in all of its parts before making the connection to the hydraulic circuit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chilled Water	Yes	No	N/A
Piping complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water System filled and vented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pumps installed & operational (rotation checked)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strainers installed and clean	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Controls (3way valves, bypass valves, etc.) operable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flow switch installed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water system operated and flow balanced to meet unit design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Condenser Water	Yes	No	N/A
Cooling tower flushed, filled and piping vented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pumps installed & operational (rotation checked)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strainers installed and clean	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Controls (3way valves, bypass valves, etc.) operable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water system operated and flow balanced to meet unit design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrical	Yes	No	N/A
Power leads connected to unit main terminal block	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power leads have been checked for proper electrical phasing UVW for L1, L2, & L3 respectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All interlock wiring complete and complies with Daikin specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump starter and interlocks wired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooling tower fans and controls wired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wiring complies with National Electrical Code and local codes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Miscellaneous	Yes	No	N/A
Unit installed in accordance with Daikin IOM specifications (leveling, space requirements, ...)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thermometer wells, thermometers, gauges, control wells, controls, etc., installed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A minimum system load of 60% of machine capacity is available for testing and adjusting controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Table 22 – Checks before starting up the unit



This list must be completed and sent to the local Daikin Service department at least two weeks before the start-up date.

13. IMPORTANT INFORMATION ON THE REFRIGERANT USED

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

Refrigerant type:	R32
GWP Value (global warming potential):	675

The refrigerant system is charged with fluorinated greenhouse gases and the refrigerant charge is impressed on the plate.



In Europe, the greenhouse gas emissions of the total amount of refrigerant in the system (expressed in equivalent tonnes of CO₂) is used to determine the frequency of maintenance. Follow the applicable legislation.

14. PERIODIC CHECKS AND COMMISSIONING OF PRESSURE EQUIPMENT

The units are included in category II and III of the classification established by the European Directive 2014/68/EU (PED). For units belonging to these categories, some local regulations require a periodic inspection by an authorized person. Please check with your local requirements.

15. DISMISSION AND DISPOSAL

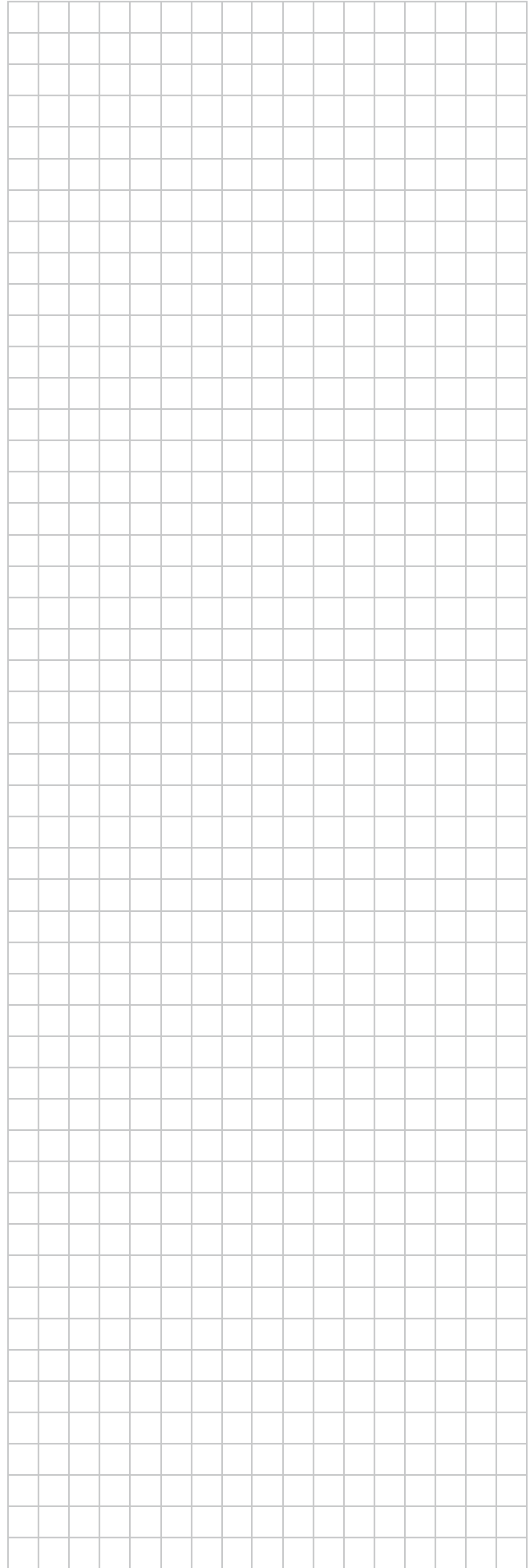
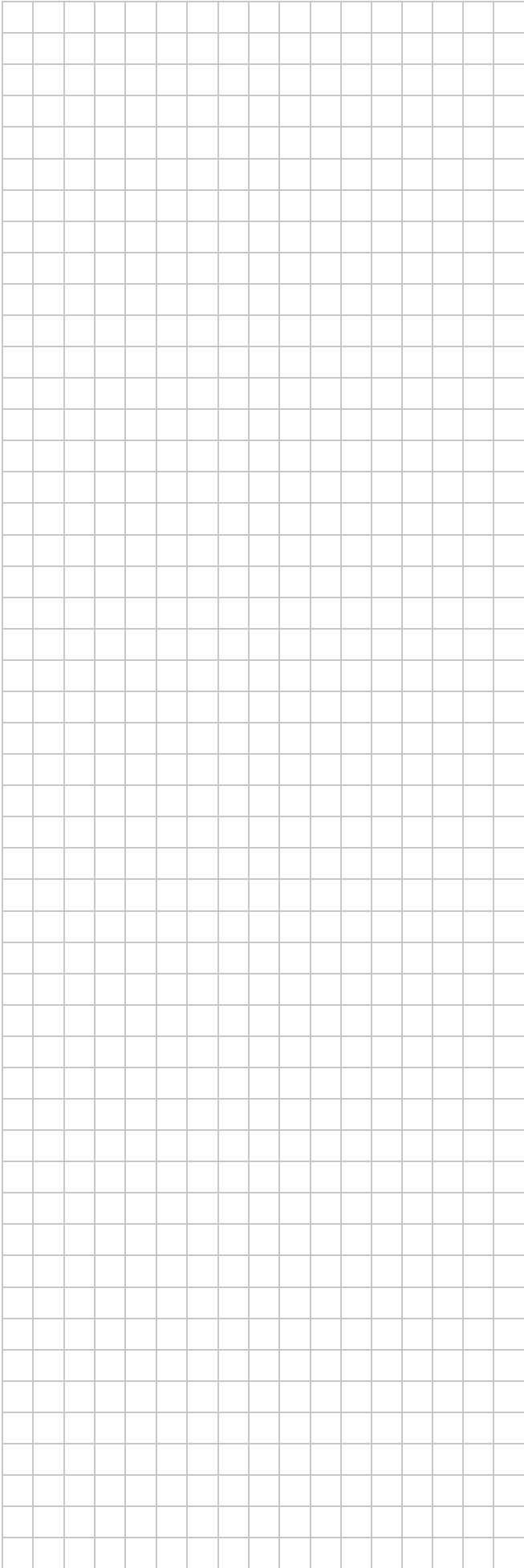
The units are made of metal, plastic, and electronic parts. All these components must be disposed of in accordance with local disposal laws and if in scope with the national laws implementing the Directive 2012/19/EU (RAEE).

Lead batteries must be collected and sent to specific waste collection centres.

Avoid the escape of refrigerant gases into the environment by using suitable pressure vessels and tools for transferring the fluids under pressure. This operation must be carried out by competent personnel in refrigeration systems and in compliance with the laws in force in the country of installation.



Notes



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DAIKIN APPLIED EUROPE S.p.A.

Via Piani di Santa Maria, 72 - 00072 Ariccia (Roma) - Italia

Tel: (+39) 06 93 73 11 - Fax: (+39) 06 93 74 014

<http://www.daikinapplied.eu>