Installation, use and maintenance manual

Rooftop Packaged Unit

Models:
UATYQ20ABAY1
UATYQ25ABAY1
UATYQ30ABAY1
UATYQ45ABAY1
UATYQ50ABAY1
UATYQ55ABAY1
UATYQ65ABAY1
UATYQ75ABAY1
UATYQ90ABAY1
UATYQ110ABAY1
UATYQ115ABAY1
UATYQ20AFC2Y1
UATYQ25AFC2Y1
UATYQ30AFC2Y1
UATYQ45AFC2Y1
UATYQ50AFC2Y1
UATYQ55AFC2Y1
UATYQ65AFC2Y1
UATYQ75AFC2Y1
UATYQ90AFC2Y1
UATYQ110AFC2Y1
UATYQ115AFC2Y1
UATYQ20AFC3Y1
UATYQ25AFC3Y1
UATYQ30AFC3Y1
UATYQ45AFC3Y1
UATYQ50AFC3Y1
UATYQ55AFC3Y1
UATYQ65AFC3Y1
UATYQ75AFC3Y1
UATYQ90AFC3Y1
UATYQ110AFC3Y1
UATYQ115AFC3Y1

Installation, use and maintenance manual
Rooftop Packaged Unit

English

Contents

THANK YOU

Thank you for choosing our product.

It is the result of many years' experience and careful design and has been built with first-class quality materials and advanced technologies.

Declaration or certificate of conformity also guarantees that the equipment meets the requirements of the European Machinery Safety Directive.

The quality level is constantly monitored, and therefore our products are synonymous with Safety, Quality and Reliability.

Changes considered necessary for product improvement may be made to the stated data at any time without any obligation to give prior notice.

Thank you again

Read this manual carefully before installing, testing or starting this unit.

Give this manual and all complementary documentation to the operator of the system who will be responsible for keeping them so they are always available if needed.

The images and drawings contained herein are examples only.

1 INTRODUCTION

1.1 Conformity

With regard to relevant regulations and directives, please see the declaration of conformity in the "document folder".

1.2 Description

1.2.1 Symbols

A description of the main symbols used in this manual and on the labels affixed to the unit is given below.

Danger symbol; take extreme care.

Danger symbol; moving mechanical parts.

Danger symbol; live parts.

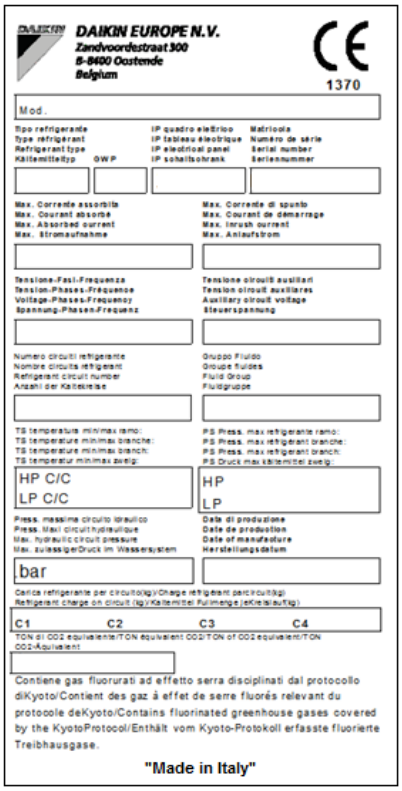
Warning symbol; important information

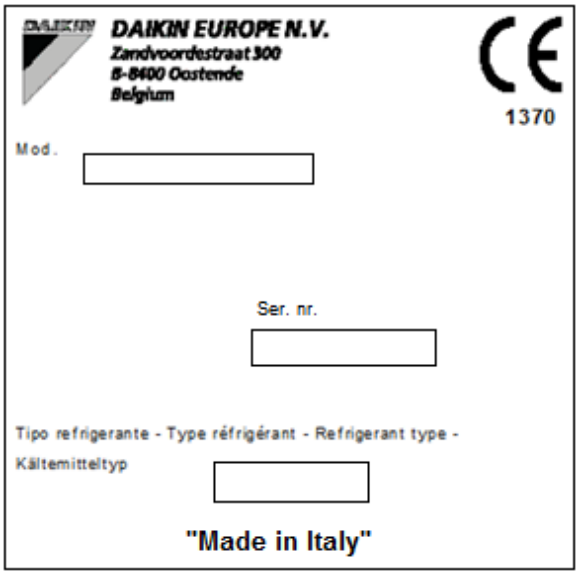
Note symbol; suggestions and advice

1.2.2 Labels

For the constructional features, technical data and available models, please refer to the technical catalogue.

The model, serial number, features, power supply voltage and so on are shown on the labels affixed to the unit (the following illustrations are shown only as an example).





The Manufacturer adopts a continuous development policy and, in this perspective, reserves the right to make changes and improvements to the documentation and to the units without prior notice.

The Technical Catalogue, the labels placed directly on the unit and the various diagrams referred to below, must be considered an integral part of this manual.

Do not remove or alter the labels placed on the unit.

2 SAFETY

2.1 General safety precautions

A space of about 2 metres around the unit is identified as external danger zone.

If the unit is positioned in an unprotected place that can be reached by unqualified persons, access to this area must be prohibited by special guarding.

The equipment operator is responsible for complying with regulatory obligations.

The equipment operator is the person who has actual control over the technical operation and free access, which means the possibility of monitoring its components and their operation and the possibility of granting access to third parties.

The equipment operator has the power (including financial power) to decide on technical modifications, checks and repairs.

The equipment operator may give instructions to employees or to external companies for carrying out maintenance and repair operations.

Only an authorised operator should be able to access the unit.

Installation and maintenance or repair of the unit must be carried out by personnel and companies holding a certificate issued by a certification body designated by a member state that certifies the requirements contained in Commission Regulation (EC) No. 517/2014.

The internal danger zone can be accessed by removing the protective devices and entering the unit.

On no account must unqualified personnel be allowed to enter the unit and no one should be allowed to enter before the power to it has been turned off.

The user can interact with the unit only through the control and external OK signals.

Only authorised knowledgeable personnel may access the unit in compliance with safety in the workplace regulations. Council Directive 89/391/EEC, of 12 June 1989, on the introduction of measures to encourage improvements in the health and safety of workers at work.

Also, knowledge and understanding of the manual are indispensable for reducing risks and for improving the health and safety of workers.

The operator who enters the unit must have sufficient knowledge to perform the various activities throughout the technical life of the machine.

The operator must know what to do when faced with possible anomalies, malfunctions or conditions of danger to himself or others, and in any case, he must comply with the following instructions:

Stop the unit immediately by using the emergency device.

Do not do anything that goes beyond your duties and technical knowledge.

Inform the manager immediately and do not take personal initiatives.

Before carrying out any work on the unit, make sure you have turned off the power supply to it. Refer to the section on maintenance work.

In units with capacitors and/or inverters, certain components can remain live for several minutes even after having turned off the main switch.

Wait 10 minutes before working on the electrical parts of the unit.

Circuits supplied from external sources (made with orange cable) can remain live even after the power supply to the unit has been turned off.

Work on the unit only if there is sufficient lighting for the type of work to be carried out.

The law regulating the use of stratospheric ozone depleting substances prohibits the release of refrigerant gases into the environment and obliges owners to recover and return them to the dealer or take them to special collection centres at the end of their operational life.

The refrigerant contained in the refrigerant circuit is included among the substances subject to special control regulations provided for by law and must therefore be disposed of as indicated above.

Particular care should be taken during maintenance operations in order to reduce refrigerant leaks as much as possible.

2.1.1 Discharge of the safety valves

If present on the refrigerant circuit, installation requirements and/or national regulations lay down that the discharge of the safety valves must be routed to the outside.

The conveying must be done with a pipe whose diameter must be at least that of the valve outlet, and the weight of the pipe must not be borne by the valve.

Always direct the discharge to areas where the jet cannot cause harm to anyone.

Risk of burns following contact with hot and cold parts.

2.2 Basic rules

All the units are designed and built in compliance with Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the approximation of the laws of the Member States relating to pressure equipment.

To ensure maximum safety, in order to prevent possible risks, follow the instructions below:

- this product contains pressurised vessels, live components, moving mechanical parts and very hot and cold surfaces that, in certain situations, can pose a risk: all maintenance work must be carried out by skilled personnel equipped with the necessary qualifications in accordance with current regulations. Before carrying out any operation, make sure that the personnel in charge has full knowledge of the documentation supplied with the unit.
- always have a copy of the documentation near the unit.
- The operations indicated in this manual must be integrated with the procedures indicated in the user instruction manuals of the other systems and devices incorporated in the unit. The manuals contain all the necessary information for safely managing the devices and the possible operating modes.
- use suitable protection (gloves, hard hat, protective glasses, safety shoes, etc.) for all maintenance or control operations carried out on the unit.
- Do not wear loose clothing, ties, chains, watches, etc., which can get caught in the moving parts of the unit.
- always use tools and protective equipment in excellent condition.
- The compressors and delivery gas pipes are at high temperature. Therefore, when working in the immediate vicinity, be careful to avoid touching any components of the unit without suitable protection.
- do not work in the discharge trajectory of the safety valves.
- if the units are positioned in unprotected places which can easily be reached by unqualified persons, suitable protection devices must be installed.
- the user must consult the installation and use system manuals, incorporated and attached to this manual.
- there may be potential risks that are not obvious. Warnings and signals are therefore displayed on the unit.
- Do not remove the warnings.

It is expressly forbidden to:

- remove or disable the safety guards;
- tamper with and/or modify, even partially, the safety devices installed on the unit.

If there are alarm warnings and consequent tripping of the safety devices, the user must call in skilled maintenance technicians to fix the problem immediately.

An accident can lead to serious injury or death.

The safety devices must be tested according to the guidelines in this manual.

The manufacturer does not assume any liability for damage/injury to persons, pets or objects arising from the re-use of individual parts of the unit for functions or assembly situations different from the original ones. Tampering with/ unauthorised replacement of one or more parts of the unit is prohibited.

The use of accessories, tools or consumables other than those recommended by the Manufacturer relieves the latter from civil and criminal liability.

Deactivation and scrapping of the unit must be carried out only by suitably trained and equipped personnel.

The units do not fall within the scope of Directive 2014/34/EU of the European Parliament and of the Council, of 26 February 2014, on the approximation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

2.3 Noise levels

The starting of the unit, with activation of its components, emits a sound whose intensity varies according to the operating level.

Correct site choice and correct installation prevent the unit from causing an annoying sound due to resonances, reflections and vibrations.

2.4 Residual risks

The unit uses technical means suitable for protecting people, animals and things against hazards that cannot reasonably be eliminated or sufficiently reduced through design.

The presence of an operator is not required for normal operation of the unit. The change from the "OFF" state to the "ON" state, and vice versa, of the unit can be carried out remotely or through the display, without having to enter areas at risk.

Access restriction is part of correct installation to eliminate residual risks during normal operation.

Removal of the restrictions gives access to cold parts, hot parts and sharp edges.

When the electrical boxes and the electrical control panel are open, live parts can be accessed.

Do not:

- remove or disable the safety guards;
- tamper with and/or modify, even partially, the safety devices installed on the unit.

In heat pump operation, during defrost cycles, the water drips onto the ground when the frost melts off the coils.

If the water is not properly drained, when the ambient temperatures are sub-zero, dangerous sheets of ice are formed.

Limit access to the area to prevent accidents.

2.5 Safety information on the refrigerant fluid

This product contains fluorinated greenhouse gases included in the Kyoto protocol. Do not release these gases into the atmosphere.

Type of refrigerant: R410A

GWP value: 2088.

GWP is the global warming potential.

The quantity of refrigerant fluid is indicated in the unit's data label. Periodic inspections are necessary to check for refrigerant fluid leaks in accordance with local and/or European regulations.

2.5.1 Hazards and health consequences

If accidentally released, rapid evaporation of the liquid can cause freezing.

In case of contact with the liquid:

- defrost the various part with water;
- remove clothing carefully;
- rinse thoroughly with water.

Contaminated clothing and shoes should be washed before reuse.

High vapour concentrations can cause headaches, dizziness, drowsiness and nausea, and may lead to unconsciousness and cardiac arrhythmia.

If inhaled move the victim to fresh air. Artificial respiration and/or oxygen may be necessary. Call a doctor immediately.

In case of contact with eyes, remove contact lenses. Rinse immediately with plenty of water, holding the eyelids open, for at least 15 minutes.

The safety data sheet drawn up by the producer of the refrigerant can be obtained from the manufacturer of the unit.

3 RECEIVING THE PRODUCT AND STORAGE

3.1 Reception

On receiving the unit, check that it is undamaged, bearing in mind that it left the factory in perfect condition.

Report any signs of damage immediately to the transporter and make a note of these on the Delivery Sheet before signing it.

The relevant sales department or the manufacturer should be informed of the extent of the damage as soon as possible.

The Customer must draw up a written and photographic report concerning any and all significant damage.

Disposal of the packing material is the responsibility of the consignee and must be carried out in compliance with the regulations in force in the country in which it is carried out.

3.2 Transport

The unit is sent from the warehouse using suitable vehicles, with correct clamping in order to prevent any possibility of movement whilst in transit by road that may damage it or cause accidents.

If there is to be trans-shipment to other vehicles to continue the journey, it is essential to adopt all necessary measures for ensuring the correct safety conditions, with regard to the vehicles used and the anchorage, in order to prevent damage.

If the unit is to be transported over uneven roads, the manufacturer must be informed beforehand so that suitable measures can be taken in order to prevent damage to the unit.

If it is to be transported by container, make sure it is correctly anchored.

3.3 Handling

Before each unit handling operation, check that the lifting capacity of the machinery used is compatible with the weight of the unit.

Handling must be carried out by adequately equipped qualified personnel.

In all lifting operations, make sure the unit is firmly secured in order to prevent accidental falls or overturning.

Lifting must be carried out by qualified and authorised personnel taking the necessary precautions; if carried out incorrectly, lifting can cause serious damage and physical injury.

The handling operations must be carried out slowly and sudden manoeuvres and knocks must be avoided.

Do not, under any circumstances, stand or pass under or near the unit when it is lifted off the ground. Use only the lifting system designed and prepared for the unit.

During unloading and positioning of the unit, great care must be taken to prevent sudden or violent manoeuvres, and the components of the unit must not be used as lifting points.

Make sure the machinery and lifting ropes are of suitable size and capacity and strictly follow their operating instructions. Use only equipment that is in excellent working order.

All work on the unit, including unpacking and connections, must be carried out with the unit resting on the ground.

Refer, in any case, to the lifting instructions provided with the unit.

A pallet is secured under the unit so that it can also be unloaded and handled with a suitable forklift truck.

If anti-vibration mounts are installed under the base of the unit, this must be done with the unit raised by no more than 200 mm from the ground and without putting any parts of the body under it.

Before sliding out the pallet, remove the screws fixing it to the unit.

Use a 10 mm spanner to unscrew the screws that are visible through the slotted holes of the base.

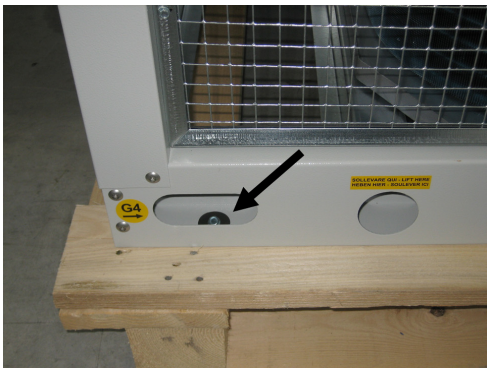


Fig. 1 Detail of position of pallet fixing screws

After the pallet has been removed, the unit should be lifted using only and solely the lifting slings and tubes supplied with it, inserted in the lifting eyes marked with the plates provided (yellow plates).

For smaller sizes "UATYQ20A***Y1, UATYQ25A***Y1 and UATYQ30A***Y1", the slings can be inserted directly through the lifting eyes.

For smaller sizes "1.2, 3.2 and 4.2", the slings can be inserted directly through the lifting eyes.

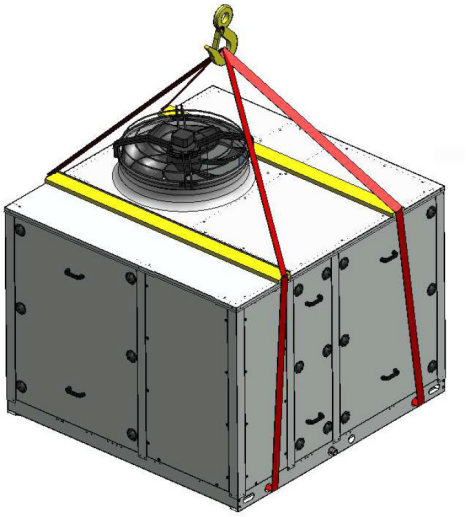


Fig. 2 Lifting with slings

To prevent the slings from being damaged on the edges of the lifting eyes, use suitable protective devices.

To prevent the slings from touching the unit, suitable protective devices must be placed on the upper edges.

For the other sizes, the unit should be lifted using only and solely the lifting slings and tubes supplied with it.

Fig. 3 Detail of hooking the sling to the lifting tube

To prevent the slings from touching the unit, suitable protective devices must be placed on the upper edges.

It is mandatory to use a lifting beam adjusted to the width of the unit in order to ensure lifting stability

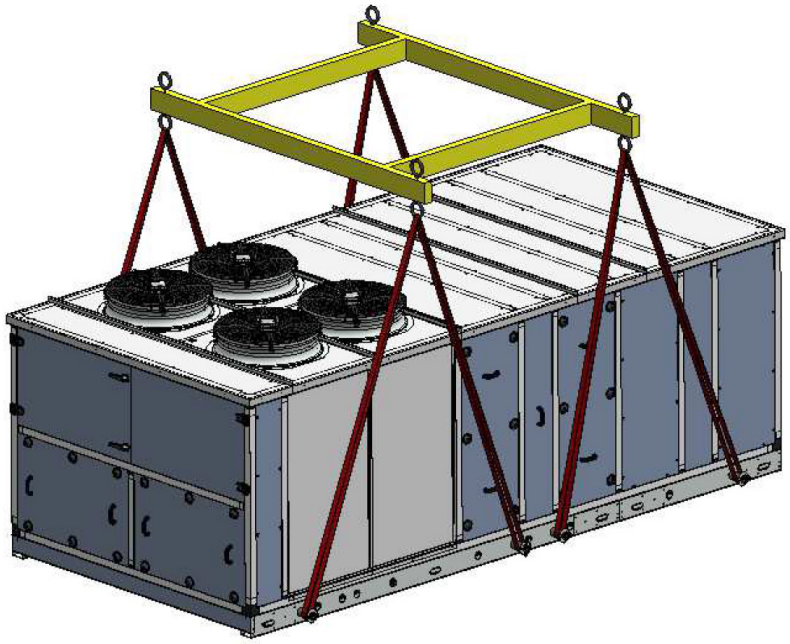


Fig. 4 Lifting with crane

3.4 Storage

There are no special requirements if the unit has to be stored temporarily before installation.

Since these units are intended for outdoor installation, they withstand normal atmospheric conditions without problem.

The unit must be placed on a flat surface that is suitable for bearing its weight, in order to avoid deformation of the structure with consequent possible breakage.

4 PRODUCT DESCRIPTION

4.1 Intended use

These units are made for air cooling and heating, and are generally used in applications in the air conditioning field.

These are high efficiency, self-contained air conditioners, for both summer and winter use, that allow complete thermo-hygrometric air handling to be achieved. They can be used in both commercial and industrial applications that, besides having load variability, can be characterized by high latent loads and need to guarantee optimum conditions for occupants.

Their use is recommended within the operating limits indicated in the technical catalogue.

4.2 Unintended use

The unit must not be used:

- in an explosive atmosphere;
- in a flammable atmosphere;
- in extremely dusty environments;
- in an environment that is not compatible with the stated IP protection rating;
- by untrained personnel;
- in a way that does not comply with the regulations in force;
- with incorrect installation;
- with power supply defects;
- with total or partial failure to comply with the instructions;
- with lack of maintenance and/or use of non-original spare parts;
- with inefficient safety components.

4.3 Control and safety devices

The unit is integrally managed by an electronic microprocessor control that, through the various installed temperature and pressure sensors, keeps its operation within the safety limits.

All the parameters involved with control of the unit are shown in the “Operating Manual” that is an integral part of the documentation of the unit.

The manual fully describes the logic with which the checks of the unit take place during the various operating stages.

The control and safety devices are shown in the Technical Catalogue.

4.4 Principles of operation

The basic operation of these units uses a reverse vapour compression cycle to change the thermo-hygrometric conditions of the air in the interior environment. The simplest configuration works in total air recirculation.

The refrigeration cycle allows heat to be transferred from a fluid at a lower temperature to a fluid at a higher temperature. Rooftop units are equipped with one or more refrigerant circuits; in cooling mode, air is cooled - and if necessary dehumidified - by a finned coil (evaporator); the removed heat is rejected to the outside by another finned coil (condenser).

In addition to this, the heat pump versions allow the evaporator and condenser roles to be reversed, thereby providing the heating function.

Besides air filtration, other functions are possible, which change according to the configuration and the selected accessories: partial air renewal, thermodynamic recovery, supplementary heating by electric heaters, free cooling/ free heating.

4.5 Structure

Depending on the sizes, the structure is made of galvanized sheet-iron coated with epoxy polyester powder at 180°C, which makes it highly resistant to weather conditions, or of extruded aluminium alloy profiles connected with glass fibre reinforced nylon joints.

The base and cover are made of thick, epoxy polyester powder coated, galvanized sheet-iron.

The panelling is made with 25mm thick sandwich panels consisting of a 0.5 mm thick externally pre-painted galvanized sheet-iron casing filled with polyurethane foam to guarantee the thermal and acoustic insulation of the unit. Alternatively, the panels are insulated with closed-cell insulating matting or with rock wool, for the "heat generator" section. The surface of the panels in contact with the treated air is made of galvanized sheet-iron to facilitate cleaning and sanitizing operations.

The non-removable panels are fixed to the structure with screws contained in nylon bushes with plug.

The removable panels are attached to the structure with nylon eccentrics or inserts and have handles to make them easier to remove.

4.6 Specifications

Direct expansion air conditioner with hermetic compressors, evaporating coil with radial fans and condensing coil with axial fans.

The unit is made in two sections that are joined together but functionally separate. One section is for transferring the energy absorbed from the treated interior environment into the atmosphere. The other section is for air handling and allows air conditioning of the confined environment to be treated.

In configurations where air exchange is envisaged, heat recovery and free cooling/free heating can be managed.

For heating, there may be a group of electric heaters.

4.7 Air system

4.7.1 Internal air fans

Depending on the configurations, there may be only supply fans or also return fans in the units.

The fans are radial fans with reverse blades, with external rotor motor directly coupled to the impeller.

The radial fans are called "EC", with electronically commutated brushless motor. The fan is powered by mains AC voltage, and speed control is obtained via DC 0-10V control signal coming from the microprocessor installed on the unit. This makes it possible to set the air flow rate through the parameter being displayed.

The motors have alarm signalling, which includes thermal overload protection, overcurrent, undervoltage, absence of one or more phases and seized rotor.

The EC fans are not provided with a contactor and are constantly live as soon as the main disconnect switch of the unit is closed.

4.7.2 Flow rate sensor for fans

Units with "EC" fans are provided with a differential pressure transducer that detects the pressure difference between the inside and the outside (upstream) of the intake nozzle. The air flow rate is proportional, for each fan/nozzle pair, to the square root of the pressure difference according to the equation:

$$Q = n \cdot k \cdot \sqrt{\Delta P}$$

where

- Q = total air flow [m3 / h]
- n = number of fans in the unit
- k = constant according to the fan nozzle
- ΔP = pressure difference measured on the nozzle [Pa]

The characteristic constant "K" for the nozzles used is:

- Fan of diameter 450: k = 217
- Fan of diameter 500: k = 281
- Fan of diameter 560: k = 350

The differential pressure value and the air flow rate can be shown directly on the display of the microprocessor that carries out automatic control of the air flow rate.

4.7.3 Air flow sensor

This device prevents the unit operating in the absence of air flow. The control is carried out by a differential pressure switch that measures the pressure difference between upstream and downstream of the evaporating coil and the air filter. The microprocessor alarm comes on later than intervention of the sensor.

To check their operation, open the automatic circuit breakers of the compressors, from the microprocessor card remove the terminal with the control signal for the EC fan (for identification, refer to the wiring diagram), and then switch on the unit. The microprocessor alarm should appear within a few tens of seconds.

4.7.4 Dirty filter sensor

The level of air filter clogging is checked by means of a differential pressure switch that measures the pressure drop between upstream and downstream of the filter.

The control panel will signal, via an alarm on the display, the need to replace or clean the filter. The machine will continue to work in any case.

The cut-in value is factory set and can be changed on the installed unit by turning the knob with graduated scale using a screwdriver.

The fouling of the filter may cause a decrease in the flow rate and therefore of the machine's performance; restoring the filter as quickly as possible from the time of reporting is recommended.

4.7.5 Air filters G4

The units are fitted with "G4" filters on the air supply side. To replace the filters, open the panel of the unit that shows the indication for access to the filters.

Cleaning or replacement is essential to ensure good operation of the unit and the correct air flow rate.

4.7.6 Programmable control

For some configurations and functionalities, a programmable control is used.

The figure shows the main screen.

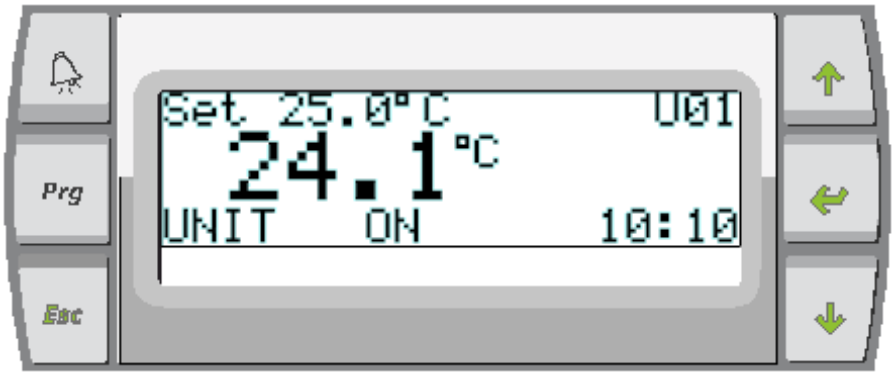


Fig. 5 Programmable control display

From the main screen, the "Prg" button is pressed to access the "Q0" screen of the "Menu" branch.

4.7.6.1 Switching the unit on/off

To switch the unit on or off, from the "Q0" screen of the "Menu" branch, scroll the various selections of the branches using the arrow buttons until the unit "On/Off" selection appears highlighted.

Confirm with the "enter" button to access the "N0" screen where the operating state of the unit is shown with the instruction for changing it.

The unit can be switched on from the keypad depending on whether all the other OK signal inputs for starting are closed/enabled.

The unit can always be switched off from the keypad.

4.7.6.2 Changing from cooling to heating and vice versa

The change of operation can take place in one of the following three ways, according to the programming required by the customer:

- automatically as the temperature changes in the environment to be controlled;
- manually using the keypad or by remote management;
- by means of the digital input.

When the change is made from the keypad, from the "Q0" screen of the "Menu" branch, scroll the various selections of the branches using the arrow buttons until the "Sum/Win" selection appears highlighted.

Confirm with the "enter" button to access the "R0" screen where the operating state of the unit is shown with the instruction for changing it.

4.7.6.3 Displaying and changing the operating set points

From the "Q0" screen of the "menu" branch, scroll the various selections of the branches using the arrow buttons until "Setpoint" appears highlighted. Inside the "Setpoint" loop, there are screens where the various set points can be changed within factory-set limits.

Confirm with the "enter" button to access the "S0" screen, where the cooling temperature set point is shown, and to position the cursor at the top left. The "enter" button is used to access the field for changing the value, which can be done using the "arrow" buttons. Press the "enter" button again to confirm the set value and return the cursor to the top left.

When the cursor is at the top left of the screen, the down arrow button is used to go to the "S1" screen where the heating temperature set point is shown.

The "enter" and "arrow" buttons can also be used in the same way to change and confirm the value of the set point shown in the screen and move on to the next one.

The other screens that can be accessed if included in the configuration of the unit, are the "S5" and "S7" screens for the air flow rate set points.

4.8 Wiring diagram

The wiring diagram is an essential part of the documentation and is present inside each unit.

It is essential to refer to this document if you are unsure about anything or need further explanations regarding the auxiliary electrical connections and power connections as well as for the electrical specifications.

In particular, refer to the wiring diagram as regards the possibility of remotely managing the functionalities that contemplate this.

5 INSTALLATION

During installation or whenever work must be carried out on the unit, it is essential to strictly follow the instructions in this manual, comply with the directions on the unit and in any case take all necessary precautions.

The pressures in the refrigerant circuit and the electrical components can create risky situations during installation and maintenance work.

5.1 Dimensions and weight

In order to correctly position the unit, please refer to the dimensional drawing supplied with the order confirmation for its size and weight.

5.2 Installation site

The following should be taken into account to establish the best place to install the unit and the relevant connections:

- size and origin of the aeraulic ducts;
- size and origin of the hydraulic piping;
- location of the power supply;
- accessibility for maintenance or repair operations;
- load-bearing capacity of the support surface;
- ventilation of the air-cooled condenser;
- orientation and exposure to solar radiation. Keep the condensing coil out of direct sunlight as far as possible;
- direction of prevailing winds. Do not position the unit in a such way that prevailing winds can cause air recirculation at the condensing coil;
- type of surface. Do not position the unit on dark coloured surfaces (e.g. tarred surfaces) so as to avoid overtemperatures during use;
- possible reflections, resonances and acoustic interactions with elements outside the unit.

Pay attention to the presence of flues, drains, vents and to the stale air of other systems. Air can be sucked from the fresh air damper and through the supply unit in the rooms to be air conditioned.

All the models in the range are designed and built for outdoor installation (terraces, gardens). They must therefore not be installed under canopies or near plants (even if these would cover only part of the unit), in order to avoid the possibility of air recirculation.

It is obligatory to observe the clearances specified in the dimensional diagram of the unit.

If the unit is installed in particularly windy areas, windbreaks must be installed to prevent malfunctioning of the unit.

During the defrost cycle, units in heat pump operation allow water to flow out that freezes with sub-zero temperatures. Although the unit is installed perfectly horizontal, make slopes in the support surface to direct the defrost water into drains, wells or in any case to places where there is no danger of accident.

5.3 Installation

The units are sent from the factory already tested and they need only the electrical, aeraulic and hydraulic connections for installation.

The only unassembled component shipped is the rain guard for units that envisage air exchange and are therefore equipped with external air damper.

5.3.1 Fitting of rain hoods

A rain guard can be fitted on the opening for the passage of external air.

Protection is achieved with hoods; the number of elements forming the guard depends on the size of the air passage.

The guard is supplied in a separate kit for fitting by the installer.

In addition to the hoods, the kit includes a protective mesh and self-drilling screws for fixing.

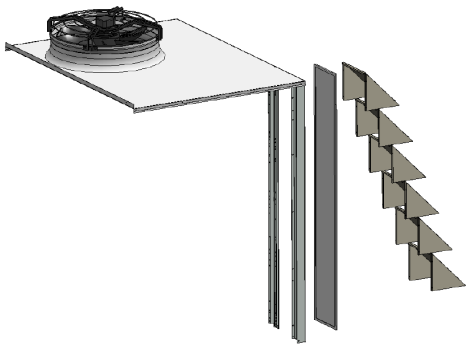


Fig. 6 Rain guard

The protective mesh is to be fixed between the guard and the frame of the unit and cover the entire opening.

Use a 6 mm screwdriver with socket to fix it.

To fit correctly:

- Rest the mesh filter against the edge of the external air opening;
- begin fitting from the upper part of the opening;
- using the holes on each element of the guard, secure them to the frame of the unit with the self-drilling screws provided.
- repeat this operation for all the elements of the guard.

5.3.2 External positioning

A solid base on which to position the unit must be created.

This base must be perfectly flat and horizontal. Its dimensions must be adequate for those of the unit.

The slab must be:

- made in a suitable foundation about 15-20 cm higher than the surrounding ground;
- flat, horizontal and able to bear at least 4 times the operating weight of the unit;
- at least 30 cm longer and wider than the unit.

Although the units transmit low levels of vibration to the ground, it is advisable to lay a strip of hard rubber between the base frame and the support surface.

If better isolation is required, it is advisable to use the anti-vibration mounts available as accessory.

The units should not be positioned near private offices, bedrooms or areas where low sound emissions are required.

It is also advisable not to install the units in narrow passages or small spaces, in order to avoid reverberations, reflections, resonances and acoustic interactions with elements outside the unit.

To avoid the risk of corrosion, do not install the units in an environment where there is an aggressive chemical atmosphere.

Particular attention should be given to atmospheres containing sodium chloride.

5.3.3 Anti-vibration mounts

In order to reduce vibrations transmitted to the structure, it is advisable to install the unit on rubber anti-vibration mounts, available as an option and to be requested when placing the order.

The dimensional diagram with footprint shows the position and load of each anti-vibration mount.

The anti-vibration mounts must be fixed on before positioning the unit on the ground.

To install the anti-vibration mounts, see the instructions attached to the optional extra.

When fixing the anti-vibration mounts, the unit should be lifted off the ground by no more than 200 mm and no parts of the body should be placed under the unit.

5.3.3.1 Rubber anti-vibration mounts

The anti-vibration mount consists of an upper metal bell in which there is a screw for fixing it to the base of the unit. The anti-vibration mount is fixed to the base through the two holes on the flange. The flange of the anti-vibration mount bears a number that identifies the hardness of the rubber support.

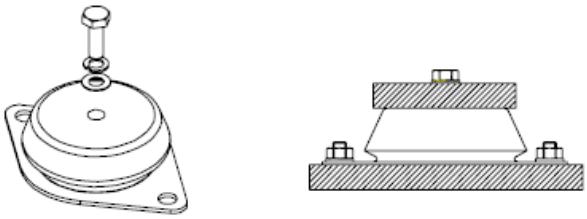


Fig. 7 Rubber/metal anti-vibration mounts

5.3.4 Minimum distances

The service spaces to comply with are shown on the dimensional drawings attached to the documentation of the unit.

It is essential to ensure an adequate volume of air on the suction and delivery side of the condensing coil.

It is very important to avoid recirculation between suction and delivery, as this would lower the performance of the unit or even stop its normal operation.

The presence of very high walls near the unit will impair its correct operation.

Units should be installed a minimum of three metres apart.

It is advisable to leave sufficient space between units to allow their larger components, such as heat exchangers and compressors, to be removed if necessary.

5.4 Electrical connections

All electrical operations must be carried out by personnel having the necessary legal requirements, and trained and informed on the risks connected with these operations.

The sizing and characteristics of the power lines and relevant components must be determined by staff qualified to design electrical systems, following the international and national regulations of the place of installation of the units in conformity with the regulations in force at the time of installation.

To install components outside the unit, you must refer to the wiring diagram supplied with the unit.

The wiring diagram, along with the manuals, must be kept carefully and made available for future work on the unit.

Overview:

- The electrical connections must comply with the information shown in the wiring diagram attached to the unit and the regulations in force in the place of installation.
- grounding is required by law;
- The installer must connect the earth cable to the PE terminal on the earth bar situated in the electrical control panel.
- Make sure the power supply voltage corresponds to the rated data of the unit (voltage, number of phases, frequency) stated on the plate on the unit.
- The standard supply voltage (see specific wiring diagram) must not fluctuate by more than ±10% and the unbalance between phases must always be less than 2%.
- The control circuit power supply is taken from the power line via a transformer situated in the electrical control panel; the control circuit is protected by fuses.
- Make sure the power line is correctly connected with a clockwise phase sequence.

In the electrical control panel, there is a phase sequence relay provided with two LEDs.

The green LED indicates the presence of the three-phase line.

The yellow LED indicates the correct phase sequence.

Fig. 8 Phase sequence relay

The contact of the phase sequence relay cuts off the 230 V power supply and therefore the controller will in any case be powered, but the fans and compressors will not start.

To fix the power cable, use power cable fixing systems that resist tensile and torsional stresses.
The weight of the cables must not be borne by the electrical connection system.

Make sure no voltage is present before carrying out any operation on electrical parts.

The cross-section of the cable and the line protection devices must correspond to those indicated in the wiring diagram.

The connections to the electrical control panel must be made maintaining the stated IP protection rating.

If you use a residual current device to protect the power line, in units with inverter, use type "B" or "B+" residual current devices, with minimum tripping threshold of 300 mA and delayed tripping.

The electrical connections to potential-free contacts, which are powered by external sources, must be suitably protected against overcurrent and earth faults.

The circuit of the potential-free contacts inside the electrical control panel is made using orange cable.

5.5 Condensate drain connections

All units are fitted with a condensate collection tray at the base of the finned air handling coil for the purpose of collecting the condensate that forms during normal operation in cooling mode.

Units operating in heat pump mode also have a condensate collection tray situated at the base of the source finned coil for the purpose of collecting the condensate that forms during operation in heating mode and the water that forms from frost during the defrost cycles.

The condensate collection trays are provided with a hose for conveying the water that is generated.

5.5.1 Condensate drain of the internal air coil

The condensate collection tray is provided with a male R 1" threaded pipe for connection.

Fig. 9 Connection to the condensate collection tray

The discharge pipe must always have a syphon at least 100 mm deep to prevent outside air from being sucked in through it.

It is good practice to make a syphon straight after the connection to the tray.

The pipe draining the condensate must never be connected to waste water drains or run-off water drains, only to rainwater systems to prevent any foul smelling gases from being sucked back.

5.5.2 Condensate drain of the external air coil

The condensate collection tray is provided with a male R 3/4" threaded pipe for connection.

Fig. 10 Connection to the condensate collection tray

The condensate drain of the external air coil can be left free.

Any condensate pipework connected to the unit must be protected from freezing.

5.6 Aeraulic connections

5.6.1 Return and supply ducts

The units have provision for various connections of both the return duct and the supply duct.

To identify these, refer to the dimensional drawing present in the documentation of the unit.

For the connection, the closing panels with which the unit was shipped must be removed.

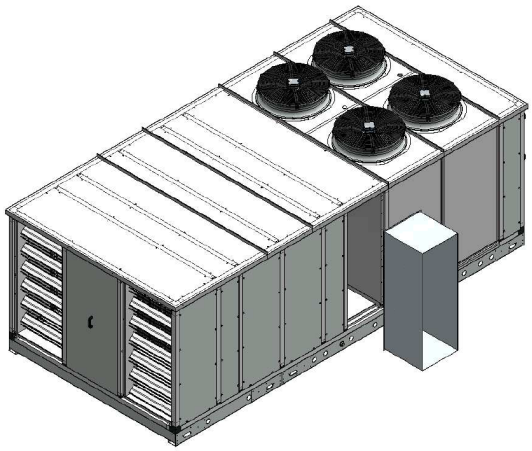


Fig. 11 Side connection

If the supply is downward, the panel on the bottom of the unit must be removed

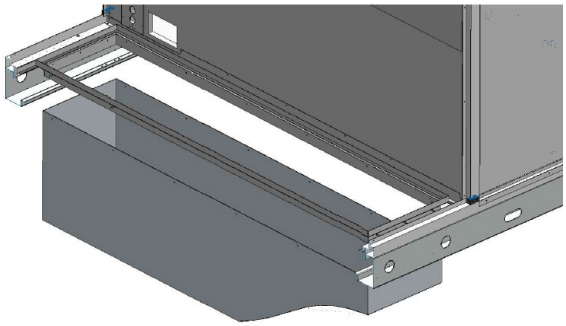


Fig. 12 Downward connection

The ducting must be suitably sized so as not to generate unforeseen concentrated and/or distributed head losses that can cause drops in the handled air flow rate below the design flow rate. The head losses in the ducting must not exceed the available pressure provided by the fans.

5.6.2 Connection of the ducts

Correct installation of the channels should comply with the following recommendations:

- the size of the ducting must be at least the size of the return inlet and supply outlet on the unit. It is preferable to enlarge the ducts near the machine made in accordance with the rules of good practice;
- always seal the joints so as to prevent air escaping from the channels.

6 COMMISSIONING

6.1 Preliminary operations

The unit should only be started up by qualified personnel authorised by the manufacturer.

All the units are pre-charged with refrigerant gas, so the refrigerant circuit is pressurised.

Check:

- that the electrical connection has been made correctly and that all terminals are properly tightened;
- that the voltage on the RST terminals is 400 V ± 10% (or the rated voltage of the unit if there are special voltages);
- that the gas pressure in the refrigerant circuits is shown on the pressure gauges (if present) or on the control display;
- that there are no refrigerant fluid leaks, using a leak detector if necessary (the presence of oil stains may be a sign of refrigerant leaks).

Be careful with the electrical checks and use only suitable tools.

Position the master switch of the unit to ON and check on the display of the control that the unit is OFF in order to prevent it from starting.

Check that the heaters for heating the oil in the compressor crankcases are powered correctly.

The crankcase heaters are powered when the main disconnect switch is closed and this must be done at least 12 hours before starting the unit.

To check that the heaters are working correctly, check that the lower part of the compressors is hot and in any case at a temperature of 10 - 15°C above the external temperature.

Check:

- that any sensors supplied with the unit are installed correctly according to the wiring diagram and the relevant documentation;
- that the remote control, if any, is connected as shown in the wiring diagram and that it is working correctly;
- that the connection to the aeraulic system has been made correctly, via the air supply and return channels;
- that a suitable syphon has been made on the condensate drain.

Before starting the unit, check that all the closing panels of the unit are in place and secured with fixing screws.

6.2 First starting

6.2.1 Preliminary checks

To operate, the unit must have the external OK signal input closed.

Refer to the wiring diagram supplied with the unit for connection of the external OK signal input.

If it is not necessary for system requirements, the external OK signal input must be short-circuited.

6.2.2 Functional tests

The main ventilation system will start a few seconds after the unit has started.

The starting of the compressors depends on the thermoregulation request and on possible activation of the air exchange on starting the washing function.

If the washing function is enabled, it can be overridden and stopped by pressing the "enter" button in the main screen.

Check that the values measured by the sensors of the control (temperatures, pressures) correspond to the real values.

If the unit has automatic control of the air flow rate of the main ventilation system, check on the user interface of the control that the set flow rate set point has been reached. Lower flow rate values indicate excessive head losses in the aeraulic circuit.

After a few hours of operation of the compressors, check that the liquid sight glass has a green ring: if it is yellow, there is moisture in the circuit. In this case, the circuit must be dried by qualified authorised personnel.

Check that bubbles do not appear at the liquid sight glass. The continuous passage of bubbles can indicate there is insufficient refrigerant and it needs to be topped up. However, the presence of a few bubbles is allowed.

It is mandatory to keep a register for the unit (not supplied), which allows you to keep track of the work carried out on the unit. This will make it easier to appropriately organize the work to facilitate the checks and the prevention of malfunctions.

State the following in the register: the type of refrigerant, the date and type of work done (routine maintenance or repair), description of the work with any parts replaced, measures implemented, the operator who carried out the work and his qualification.

6.3 Calibration of safety components

Any work on the unit must be carried out by qualified authorised personnel. Incorrect calibration values can cause serious damage to the unit and harm people.

The control and safety equipment is calibrated and tested in the factory before the unit is shipped.

However, after the unit has been started, the safety devices must be checked (only the high and low pressure switches).

The checks must be carried out as described in the "Periodic checks" chapter.

The calibration values are shown in the table

Control and safety components	Unit	Activation set point	Differential	Reset
High-pressure switch	From UATYQ20A* to UATYQ30A*:	37,8 barg	10,8 barg	Manual
	From UATYQ45A* to UATYQ115A*:	40.5 barg	7,5 barg	
Low-pressure switch	All units:	1,5 barg	2,0 barg	Automatic
High pressure safety valve	From UATYQ20A* to UATYQ30A*:	42 barg	-	-
	From UATYQ45A* to UATYQ115A*:	45 barg		

6.4 Checks during operation

With the circuits operating at 100% and stable at working conditions near the nominal ones, check:

- that the electrical absorption of the unit is close to the data shown in the wiring diagram. Considerably different values may be due to the reduced capacity operation of the unit, to working conditions very different from the nominal ones or to the malfunctioning of one or more components.
- that the difference between the condensing temperature of each circuit and that of the air is less than 25°C. If it is greater, check that all the fans involved are turning correctly and that there are no obstructions or dirt on the surface of the condensing coil;
- the superheating value of the suction gas: the optimal value is between 4 and 7°C;
- the subcooling value of the liquid leaving the condenser: the optimal value is between 5 and 10°C;
- that the liquid sight glass is green;
- that no bubbles appear on the sight glass placed in the liquid pipe. The continuous presence of bubbles may indicate a lack of refrigerant charge; the occasional or sporadic presence of bubbles is allowed;
- that the refrigerant filter is not blocked or clogged. To this end, it is sufficient to measure the temperature of the liquid pipe immediately before and immediately after the filter, and check that there are no significant differences (up to a couple of degrees C difference is allowed).
- that the condensate drain is working correctly.

6.5 Alarms and malfunctions

Possible malfunctions will trigger the protective devices and safety devices of the unit before serious faults occur.

All the “warnings” and “alarms” are recorded in the memory of the control and displayed on the display of the unit.

Before resetting an alarm, the cause that triggered it must be found and eliminated.

An alarm going off repeatedly quickly leads to serious damage to the unit.

Refer to the manual of the control for the alarms and warnings that appear on the display of the unit.

In case of anomalies not handled by the control panel, refer to the following troubleshooting section.

This troubleshooting section does not include causes due to deliberate work or tampering or particularly serious malfunctions, for which a thorough analysis is necessary.

SYMPTOM	LIKELY CAUSE	POSSIBLE SOLUTION
The unit does not start, the display is off.	No mains voltage.	Check that the main disconnect switch is in the “ON” position.
		Check for voltage in the power supply line.
	No voltage to the auxiliary circuit.	Check that the protective devices upline and downline of the transformer of the auxiliary circuit are undamaged.
		Reset the triggered protective device after eliminating the cause that triggered it
The unit does not start, the display is off, the control is powered correctly.	The unit is switched off from the display and the display is disconnected or not working.	Restore the connection of the display or replace it.
The unit does not start, the display is off, the control is powered correctly but the LEDs are not flashing.	The control is not working.	Replace the control.
The unit is operating normally, the display is off.	The connection of the display to the control is disconnected.	Restore the connection between the display and the control.
	The display is not working.	Replace the display.
The unit does not start, the display is on.	There is no 230V auxiliary power supply.	Check that the secondary circuit of the 230V transformer is intact.
		Check that the protective devices downline of the 230V transformer are intact.
		Check that the phase sequence is correct and that the phase sequence relay is intact.
Presence of oil on the discharge of the safety valve.	Opening of the valve due to failure of the protective devices to operate.	The valve must be replaced.
	Opening of the valve due to overtemperature.	Replace the valve and restore the charge.
Water leaks from the pump on first start-up	Bedding in the mechanical seal	Pressurize the pump body 2 or 3 times by closing and opening the delivery valve so as to correctly bed in the seal.

6.6 Temporary stop

The shutdown of the unit for a few days is considered as temporary.

The unit must be stopped using the display of the control, the external OK signal or via serial if included.

During the temporary stop, the unit must be powered correctly.

When the temporary stop is carried out in this way, all that needs to be done to restart the unit is to set the control to “ON”.

6.7 Stop for long periods of time

When the unit is not used for months this is considered a long period shutdown.

Should the unit be expected to stop for long periods, it is necessary to:

- turn the unit off by means of the control switch;
- disconnect the power supply using the switch / general switch of the unit;
- empty and clean the condensation drip tray;
- check that any return and exhaust air dampers are fully closed.

7 MAINTENANCE

All the operations described in this chapter must always be carried out by qualified and authorised personnel.

Before carrying out any work on the unit or accessing internal parts, make sure you have turned off the power supply to it.

The compressors and delivery pipes are very hot. Be particularly careful when working near them.

Be particularly careful when working near the finned coils as the aluminium fins are very sharp.

Do not access moving parts without guards.

In units with capacitors and/or inverters, certain components can remain live for several minutes even after having turned off the main switch.

Wait 10 minutes before working on the electrical parts of the unit.

Circuits supplied from external sources (made with orange cable) can remain live even after the power supply to the unit has been turned off.

Work on the unit only if there is sufficient lighting for the type of work to be carried out.

7.1 Adjustments

All the parameters that control the operation of the unit can be set through the user interface of the control.

Refer to the control manual should modifications be necessary, but contact the manufacturer first.

Calibrations regarding the safety of the unit cannot be modified (safety valves, high pressure switches, fuses, etc.) or are in any case protected from tampering (calibration of thermal overload protection devices, timers, etc.).

If in any case replacement becomes necessary, it is essential to use components supplied by the manufacturer (in the case of adjustable parts) or with the same sizes and characteristics (in the case of fuses).

7.2 External cleaning

The component of the unit that needs most care is the finned pack heat exchanger.

It is essential to keep it clean and free of dirt and/or deposits that can hinder or prevent air flow.

Regular cleaning of the surface of the coil is essential for the unit to work correctly and also increases the operating life of the exchanger and the unit.

Frequent and correct cleaning of the coils contributes to considerably reducing corrosion.

While cleaning the finned pack heat exchanger, the electrical control panel must be closed and the main disconnect switch must be locked in the "OFF" position.

Using a jet of water on the coil while it is still dirty will cause deposits and pollutants to remain inside the exchanger, which will make cleaning even more difficult. All the dirt and deposits must therefore be removed from the surface before rinsing.

For units installed in coastal or industrial areas or in areas where there are aggressive chemicals in the air, periodic rinsing with clean water is considerably beneficial and helps counter corrosive effects.

Never clean the coils with chemicals, water containing bleach or acid or basic detergents. These detergents can be difficult to rinse off and could accelerate corrosion on the joint between pipe and fin and in areas where different materials come into contact (Cu and Al).

7.2.1 Cleaning the coils

The coils can be cleaned with a vacuum cleaner or a brush with soft, non-metallic bristles.

Always clean in the direction of the fins and never perpendicularly to them. They can easily be bent and damaged.

Clean in the opposite direction to the normal air flow.

The coil can then be rinsed using only drinking water at low pressure (3-5 barg).

Rinsing must be carried out with a low pressure jet of water to avoid damaging the fins.

Never use jets of water or high-pressure compressed air to clean the coil. The force of the jet of air or water could bend the fins, with a consequent increase in aeraulic head losses on the exchanger and lowering of the performance of the unit.

7.3 Internal cleaning

It is essential to keep the installation site clean and tidy for correct maintenance of the unit and to keep it in good working order.

7.3.1 Cleaning the unit

Keep the inside of the electrical control panel and the compressor compartment clean.

After working on the unit, always clean the electrical control panel of any work remnants and extraneous components.

Restore the safety devices and protective devices that had to be removed in order to carry out the work.

Use a vacuum cleaner to eliminate small objects, work remnants and/or any dust.

Do not use compressed air

If you have to carry out work on compressors inside the compartment, before closing it again, check that the electrical box of the compressor is closed correctly and that any refrigerant circuit valves are in the correct state, and make sure you do not leave any materials inside the compartment.

7.4 Periodic checks

Carry out periodic checks to make sure the unit is working correctly:

OPERATION	RECOMMENDED FREQUENCY
Check the operation of all the control and safety equipment as described previously.	Monthly
Check the tightness of the electrical terminals in the electrical control panel and in the terminal boards of the compressors. The moving and fixed contacts of the contactors must be cleaned periodically and should be replaced whenever they show signs of deterioration.	Monthly
Check the refrigerant charge through the liquid sight glass.	Monthly
Make sure there are no oil leaks from the compressor.	Monthly
Check the crankcase heaters of the compressors.	Monthly
Clean the finned coil by following the instructions in the “External cleaning” section according to the type of coil installed	Monthly
Clean the air filters	Monthly
Clean the ventilation filters of the electrical control panel.	Monthly
Carry out the defrosting test.	Monthly
Check the moisture indicator on the liquid sight glass (green = dry, yellow = wet). If the indicator is not green, as indicated on the sight glass sticker, replace the filter.	4 months
Check the condition, fixing and balance of the fans.	4 months
Check that the noise emitted by the unit is normal.	4 months

This planning refers to an average installation; there could be installations in which it may be necessary to increase the frequency of some checks.

Current legislation may require longer intervals on periodic checks than the recommended ones, also with reference to the installed safety devices and the refrigerant charge present, without voiding the warranty on the unit.

7.5 Unscheduled maintenance

After correctly starting-up and carrying out the relevant checks, the units normally do not need any intervention by the customer service in order to check the charge of the refrigerant gas.

7.5.1 Special work

Over time, small leaks allowing the refrigerant gas to escape could be generated, so partially draining the circuit and causing malfunctioning of the unit.

In these cases, the points from which the refrigerant gas is escaping must be found. These must be repaired and the charge must be restored, working in compliance with current rules and regulations regarding equipment containing fluorinated greenhouse gases.

7.5.2 Exceptional work

With use of the unit, particular situations may occur that require work to be carried out promptly.

Even in an emergency, work on the unit must be carried out by skilled personnel in safe conditions.

The presence of oil on the unit, on the pipes or on parts of the unit can be a sign of gas leaks.

Repair the leakage point and restore the charge of refrigerant gas.

In the case of small oil leaks, clean the dirty parts with absorbent cloths, otherwise recover the leaked oil with absorbent sheets. In any case, the material used must be disposed of in accordance with current rules and regulations.

Check whether it is necessary to restore the oil charge.

8 DECOMMISSIONING

This unit contains greenhouse refrigerant gas.

It is prohibited to release it into the air, and it is mandatory to recover it and return it to the dealer or take it to special collection centres.

The law regulating the use of greenhouse substances prohibits the release of refrigerant gases into the environment and obliges owners to recover and return them to the dealer or take them to special collection centres at the end of their operational life.

The refrigerant gas present in the unit is included among the substances subject to special control regulations provided for by law and must therefore be disposed of as indicated above.

In the compressors and in the refrigerant circuit, there is lubricating oil that should be recovered and sent to special collection centres.

Disposal of the unit should be carried out by sending it to an authorised centre in compliance with the regulations in force in the country of installation.

UM_DKN_0001_Rooftop_EN_12-04-2018_rev01

DAIKIN EUROPE N.V.

Zandvoordestraat 300, B-8400 Oostende, Belgium

4P522680-1 2018.03