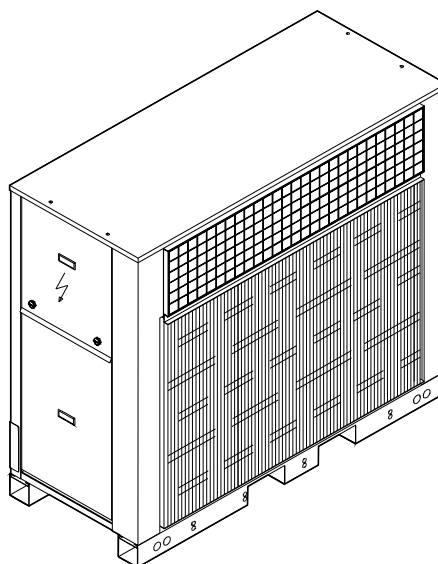




BY JOHNSON CONTROLS

# LARGE SPLIT AIR - AIR VITALITY SERIES Air Conditioners VCH 20A to 90A / VIR 25A to 90A



**User manual**

**Ref.: N-40380\_EN 0411**



# Index

<b>1</b>	<b>User manual.....</b>	<b>1</b>
<b>1.1</b>	<b>General description of the unit.....</b>	<b>2</b>
1.1.1	Technical specifications.....	2
1.1.2	Operating diagram.....	4
1.1.3	Parts of the VCH/VIR series.....	5
1.1.4	YKN2 Open Control Circuit.....	5
1.1.5	Service and Maintenance Access.....	6
<b>1.2</b>	<b>Intended use of the unit.....</b>	<b>6</b>
<b>1.3</b>	<b>Description of the unit's main control panel.....</b>	<b>7</b>
<b>1.4</b>	<b>Modes of operation.....</b>	<b>8</b>
1.4.1	Cold mode.....	8
1.4.2	Heat mode.....	8
1.4.3	General instructions.....	8
<b>1.5</b>	<b>Operating instructions.....</b>	<b>9</b>
1.5.1	Thermostat connections to the control board.....	9
1.5.2	Thermostat connections.....	9
<b>1.6</b>	<b>Safety and equipment protection systems.....</b>	<b>10</b>
<b>1.7</b>	<b>Placing the unit out of service for a planned stoppage or breakdown.....</b>	<b>10</b>
1.7.1	Placing the unit out of service for a planned stoppage.....	10
1.7.2	Placing the unit out of service for seasonal stoppage.....	10
1.7.3	Placing the unit out of service due to breakdown.....	11
1.7.4	Fault codes for the air conditioning unit.....	11
1.7.5	Restarting the air conditioning unit in the case of breakdown.....	12
<b>1.8</b>	<b>Regular maintenance activities for which the user is responsible.....</b>	<b>12</b>
1.8.1	Maintenance Schedule.....	12
1.8.2	Maintenance responsibilities of the user.....	14

1

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# User manual

## 1.1 General description of the unit

The VCH/VIR series models are reversible air-air units with centrifugal fans in the indoor unit and in the outdoor unit.

The VCH unit includes a compressor, condenser, centrifugal fan, controls and DPC-1 thermostat. The VIR indoor units include an evaporator coil, air filter and centrifugal fan.

The standard form of supply can be easily modified on site where required to give a compact unit.

The unit can be installed outdoor or indoors, as it is protected against outdoor environments and the fans are centrifugal, which accept ducts.

It is supplied fully fitted and factory-tested.

It is designed to provide significant energy savings and to give a long working life.

The start-up and automatic temperature setting involve the 24 volt ambient thermostat.

### 1.1.1 Technical specifications

#### Compressor

Of the hermetic, vertical type, mounted on antivibratory fixtures, especially designed for heat pump units with large mechanical components and low consumption motors.

- The VCH 20A, 25A, 30A and 40A units have just one compressor.
- The VCH 45A, 60A, 75A and 90A units have two compressors with 2 independent circuits.

They are supplied filled with POE oil to prevent the formation of foam and resistant to oil heating.

#### Compressor heater

Keeps the sump oil warm for easier start-up and to prevent oil from being released from the compressor.

#### Suction accumulator

Connected to the compressor suction pipe, this protects it from hammering by liquid.

#### Coils

These are large and made of copper tubes and aluminium fins. They are located inside the unit, fully protected against knocks during transportation or during installation. It can be supplied with "Blue Fin" or copper fins as optional.

#### Indoor fan (VIR 25A)

A centrifugal fan driven by an independent motor and belt transmission is fitted.

#### Indoor (VIR 40A, 45A, 60A, 75A and 90A) and outdoor (VCH 20A, 25A, 30A and 40A) fan.

Two centrifugal fans are fitted with a joint shaft and belt transmission, driven by one motor and connected to a single plenum.

#### Outdoor Units (VCH 45A, 60A, 75A and 90A)

Two independent centrifugal fans are fitted, each driven by an independent motor and connected to a single plenum.

The motor transmission to the fan involves belts. These fans have enough available pressure for the installation of ducts and optional accessories.

#### Cooling circuit

Made of welded copper pipes and includes access connections on the high and low-pressure sides. It is fitted with shut off valves on the suction side that are used in the factory to protect the compressor during the 45 bar pressure test that all units must pass.

## Refrigerant

The VCH and VIR units are supplied with pre-connections for welding. The refrigerant must be charged entirely on site. See refrigerant charges in the physical data table. The refrigerant used is R-410A.

## Electrical panel

Accessible directly from outside by 1/4-turn locks.

Includes:

- Connection strip.
- Guards.
- Electronic board and probes.
- Power contactors
- Switching relay.
- Phase control relay.
- Transformer.

It meets current European regulations. Protection rating, IP44.

## Phase control relay or phase sequence and fault probe relay

The electrical board in the unit includes a phase sequence and fault probe that detects any phase sequence different to R-S-T or detects that one of the phases is faults once the unit has been started and disconnects the power to the main board of the unit through an internal voltage-free contact, leaving it at a standstill.



### CAUTION

*Where the phase sequence is correct and the centrifugal fan of the indoor unit (VIR) rotates the correct way, exchange two phases at the bottom of the fan contactor.*

## Dryer filter

Connected to the cooling circuit to protect the components from humidity and particles carried by the refrigerant.

## Construction and rust protection features

All metal parts of the structure are made of galvanised aluminium steel plate.

The outdoor parts are treated with oven-polymerised polyester paint (RAL9002), guaranteeing a quality finish that lasts for many years (800 H.N.S. according to DIN 50021).

## Indoor heating resistors (optional)

Exposed cord-type for fast heat dissipation, avoiding temperature inertia that could affect the components.

## Unit base

The base of the unit is made with fixed beams that provide a solid foundation. Openings on the front of these beams can be used to attach a crane for hoisting the unit into position during the installation process.

The beams also have openings on the bottom to place the unit on dampers, if required.

## Service connections

For easier electricity connections with a minimal amount of work, electrical and control cables can be pulled through accessible areas of the unit.

1.1 General description of the unit

**Noise emissions**

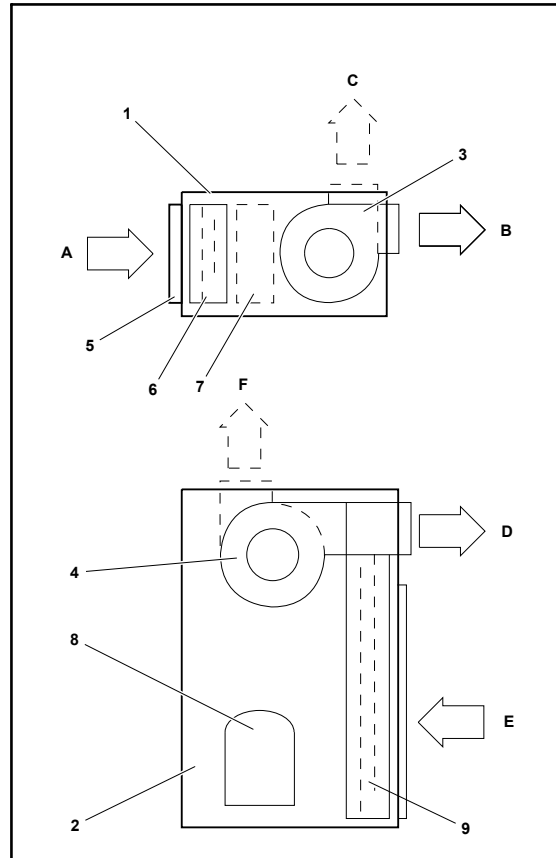
All units operate with extremely low noise emission levels. The compressors have anti-vibration mounts as well as vertical discharge fans that direct noise upwards, away from surrounding buildings and property.

**Thermal/Acoustic Insulation**

The inside of the evaporator area and the heating supply/accessory area are fully insulated. The insulation is 5 mm thick.

**1.1.2 Operating diagram**

- |   |  |
|---|--|
| 1. VIR indoor unit                                    | A. Air from indoors                          |
| 2. VCH outdoor unit                                   | B. Air to indoors                            |
| 3. Indoor fan   | C. Possibility of air to indoors (optional)  |
| 4. Outdoor fan  |  |
| 5. Filter   | D. Air to outdoors                           |
| 6. Indoor coil  | E. Air from outdoors                         |
|   | F. Possibility of air to outdoors (optional) |
| Optional:<br>7. water coil,<br>heating resistor, etc. |  |
| 8. Compressor   |  |
| 9. Outdoor coil                                       |  |



### 1.1.3 Parts of the VCH/VIR series

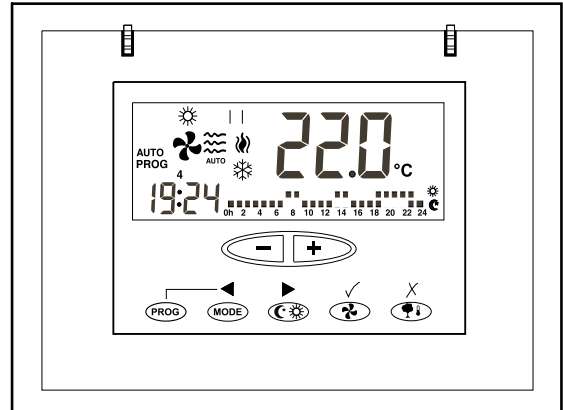
The VCH/VIR series range is made up of a series of air - air units with centrifugal fans in the indoor unit and the outdoor unit.

The outdoor unit includes:

- Compressor.
- Condenser.
- Centrifugal fan.
- Controls and DPC-1 thermostat.

The VIR indoor unit includes:

- Evaporator coil.
- Air filter.
- Centrifugal fan.



The unit can be located indoors or outdoors, as it is protected to withstand outdoor weather conditions.

The units is supplied fully fitted and factory-tested and is designed to provide a significant saving of energy and a long working life.

The air intakes and outlets on each VIR model can be configured vertically or horizontally (using the optional kit).

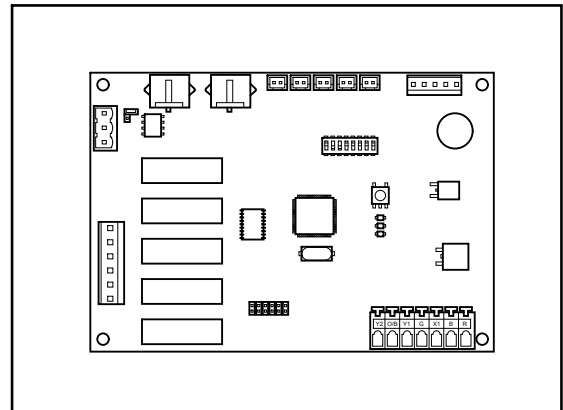
Software installed in the YKN2 Open electronic board provides electronic management for the units.

In addition, a wide range of accessories is available to adapt the units to the specific requirements of each application. The air conditioning units in the VCH/VIR series can operate in extreme weather conditions.

### 1.1.4 YKN2 Open Control Circuit

#### YKN2 Open Control Circuit

The control circuit is 24 V and can operate with the standard DPC-1 thermostat (communication) or with a 24 V thermostat with control signals (Y1, G, O/B, Y2).

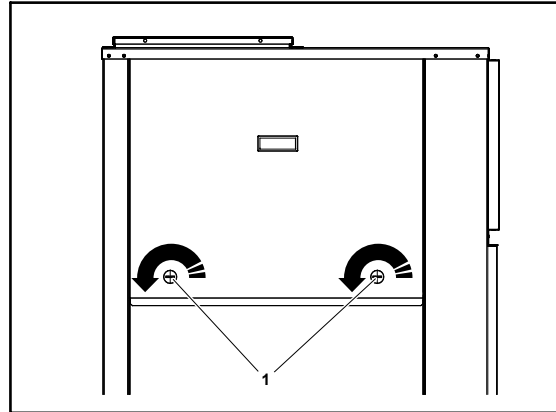


### 1.1.5 Service and Maintenance Access

The units are fitted with access panels with 1/4 turn closures on the control panel and levers offering fast, safe access to all components requiring service or maintenance.

Access to the control circuit is independent to the cooling system of the unit.

The unit is fitted with connections for specific manometers for easier reading of cooling circuit pressures.



## 1.2 Intended use of the unit

The VCH/VIR series of units is exclusively designed for the air conditioning of buildings and properties.

Therefore, the unit has a cold generating system, a heat pump and, as optional, auxiliary electrical resistors and hot water coil. Depending on the version that forces air to circulate through ducts to adjust the temperature of the building or property where it is installed. The air conditioning unit has a start-up and setting mechanism (by means of a thermostat) to manage its operations.

The unit should only be used for the purposes for which it was designed and built. Johnson Controls Inc. shall not be considered responsible for any damage caused by inappropriate use or maintenance of the unit that is any way inconsistent with that described in this document or others specifically provided with the unit.

Any use other than air conditioning will be considered inconsistent.

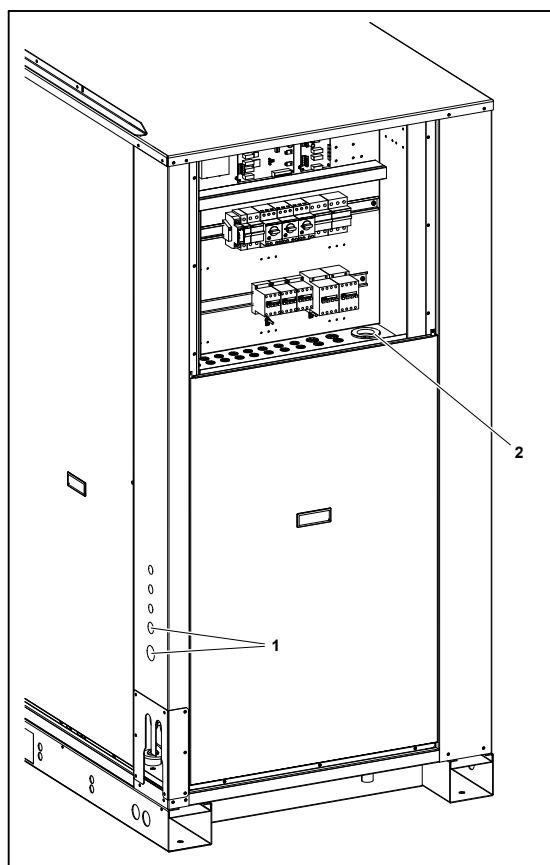


## 1.3 Description of the unit's main control panel

The main control panel is found on the unit itself and is protected from the outside by a removable metal panel.

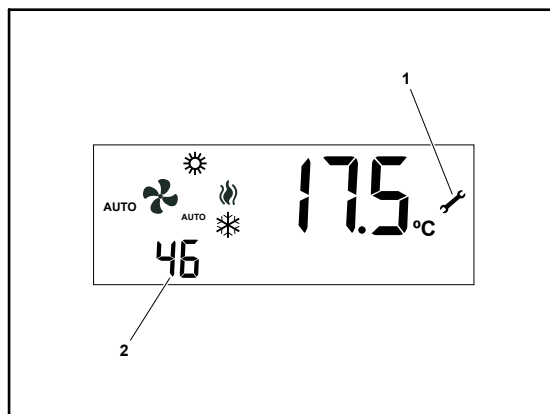
1. Connection entry.
2. Grommet support tray.

Given that the air conditioning unit is installed on the roof of a building or property, users must under no circumstances inspect or adjust the unit themselves. All of inspections or adjustments that may be made by the user are performed using the DPC-1 thermostat.



Should the air conditioning unit become faulty, the auto-diagnostics system in the unit will identify the source of the fault and will activate the indicator -1- on the DPC-1 thermostat screen. The bottom left of the screen will also display a two-digit figure -2- to indicate the part affected. See [Placing the unit out of service due to breakdown](#), see on page 11.

Where the thermostat screen continues to display the indicator -1- and any fault code or if the air conditioner does not start, contact a Johnson Controls Inc. Authorised Technical Assistance Service.



## 1.4 Modes of operation

The VCH/VIR range of air conditioning units includes different models. The operating mode for each one varies depending on the specific model. The VCH units have two operating modes: heat or cold.

### 1.4.1 Cold mode

The VCH model circulates refrigerant gas (R-410A) through a cooling circuit driven by one or two compressors (depending on models). The propelled gas circulates through an evaporator coil where it absorbs ambient heat and evaporates. To liquefy the evaporated gas, it is then circulated through a condenser coil where it releases the previously absorbed heat into the atmosphere.

To favour the evaporation and condensation of the refrigerant gas, the unit has supply and intake fans that force the air through each of the coils. In the case of the evaporator, the fan pushes air to the inside of the building or property through previously-installed distribution ducts. In the case of the condenser, the fan pushes fresh air through the coil and then sends it back outdoors.

A series of filters remove dust particles and pollen, etc. from the air sent inside the building or property.

### 1.4.2 Heat mode

The VCH model can also reverse the cooling circuit operation so that the coils exchange functions and send warm air to the inside of the building and the cold air outdoors.

### 1.4.3 General instructions



#### CAUTION

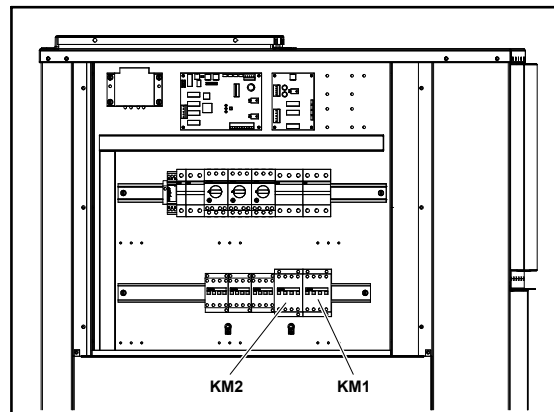
- *Always keep the electrical power supply connected to the unit.*
- *Only disconnect the unit if it is not to be used for a long period of time.*
- *When preparing for seasonal use, connect the unit to the electricity supply at least 8 hours before starting it.*

False start the compressors (connect them just long enough to make a few turns). To do so, use contactors **-KM1-** and **-KM2-**.

Wait for 5 to 7 minutes and repeat the false start.

Wait another 5 to 7 minutes and perform a last false start.

Then switch the compressors to full working order.



## 1.5 Operating instructions

A thermostat is used for starting and managing the air conditioning unit and for adjusting the temperature of the supply air.

Through this thermostat, the operating programme determines when to automatically start the air conditioning unit. The performance of the different unit components is also determined by the operating programme.

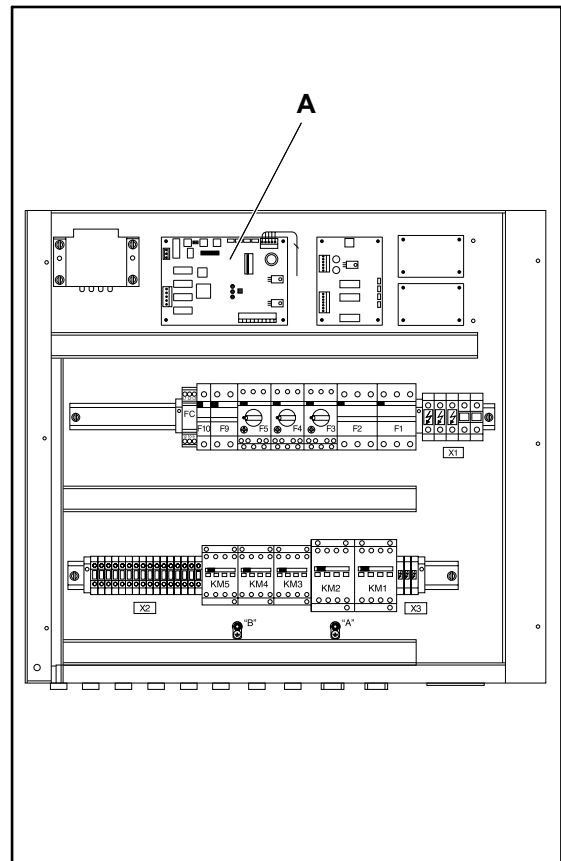
See the documents on the DPC-1 programmable digital thermostat with communication or the documents on the thermostat installed with the unit for further details on the start-up and adjustment mechanism.

### 1.5.1 Thermostat connections to the control board

A. Thermostat connection board.

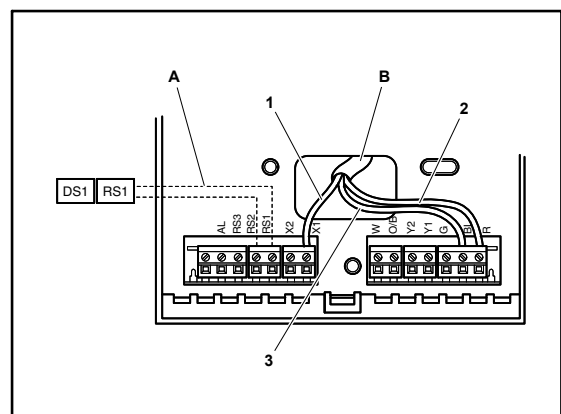
Board connection terminals

- X1 To terminal X1 of the DPC-1 thermostat.
- B White. To terminal B of the DPC-1 thermostat.
- R Red. To terminal R of the DPC-1 thermostat.
- Y1 –
- O/B –
- Y2 –



### 1.5.2 Thermostat connections

1. Yellow cable.
  2. Red cable.
  3. White cable.
- A. Shielded cable, 2 x 0,5 mm<sup>2</sup>. Maximum length: 100 m.
- B. Shielded cable, 10 x 0.22 mm<sup>2</sup>. Maximum length: 100 m.



## 1.6 Safety and equipment protection systems

The VCH/VIR range of air conditioning units includes an entire series of safety and protection systems intended to provide a high degree of safety for users and maintenance personnel.

Those not expressly authorised to use the air conditioning unit must not handle it or perform repair or maintenance work.

### Safety systems

Johnson Controls Inc. manufactures air conditioning units in accordance with EU occupational protection and user safety regulations, provided that the units are used and maintained in line with the instructions and indications given in this document.

Given that the air conditioning unit is installed on the roof of a building or property, users must under no circumstances inspect or adjust the unit themselves. All of inspections or adjustments that may be made by the user are performed using the DPC-1 thermostat.

The air conditioning unit is fitted with electrical protection systems to protect personnel responsible for its regular maintenance and upkeep.

As established by applicable electricity regulations, the electrical system is fitted with electricity surge and current leakage protection system consisting of differential circuit breakers and thermal magnetic switches (not supplied by the manufacturer, must be installed on site).

Under no circumstances is the user of the air conditioning unit exposed to live parts.

Likewise, access to moving parts by unauthorised persons is prevented. This involves placing appropriate safety locks on all of the removable covers on the unit.

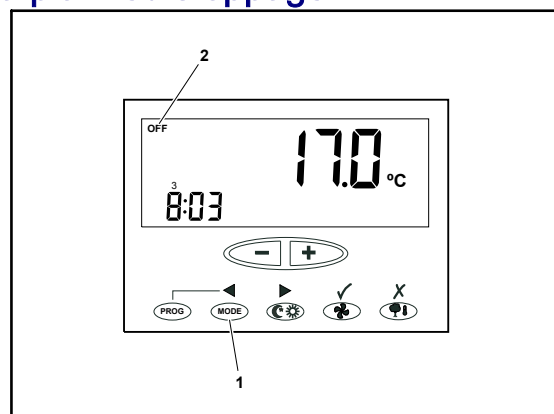
### Unit protection systems

The refrigerant circuit of the unit is protected against excessively high or low pressure and discharge temperature. It is also protected against repeated cold start-ups caused by the compressor suction probe when the summer cycle is activated.

## 1.7 Placing the unit out of service for a planned stoppage or breakdown.

### 1.7.1 Placing the unit out of service for a planned stoppage.

To stop the air conditioning unit with the DPC-1 thermostat, press the **MODE** button -1- on the thermostat repeatedly until **OFF-2-** is displayed on the screen.



### 1.7.2 Placing the unit out of service for seasonal stoppage

The power supply to the unit must be disconnected when placing the air conditioning unit out of service for long periods of time (seasonal stoppage).

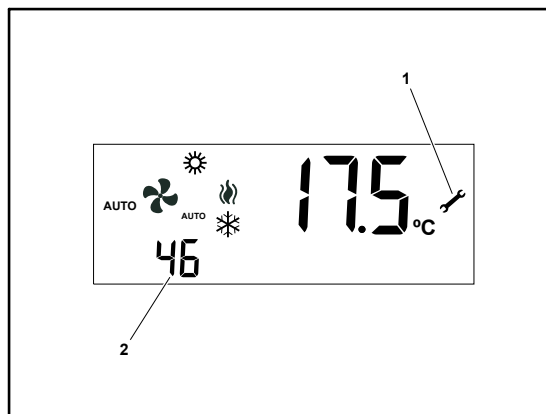
To do so, the differential circuit breaker and thermal magnetic switch on the unit power supply must be disconnected.

**CAUTION**

- Always keep the electrical power supply connected to the unit.
- Only disconnect the unit if it is not to be used for a long period of time.
- When preparing for seasonal use, connect the unit to the electricity supply at least 8 hours before starting it.

### 1.7.3 Placing the unit out of service due to breakdown

Should the air conditioning unit become faulty, the auto-diagnostics system in the unit will identify the source of the fault and will activate the indicator -1- on the DPC-1 thermostat screen. The bottom left of the screen will also display a two-digit figure -2- to indicate the part affected.



### 1.7.4 Fault codes for the air conditioning unit

Code	Description
11 / 21 / 31	Discharge temperature exceeded
12 / 22 / 32	High-pressure switch, outdoor fan thermal switch or compressor module thermal switch (depending on model)
13 / 23 / 33	Low pressure switch
14	Indoor fan thermal switch
15 / 25 / 35	Repeated cold start-up or suction temperature < -25 °C
41	Gas control 1 or resistor 1 fault
42	Gas control 2 or resistor 2 fault
43	Resistor stage 3 fault
44	Resistor stage 4 fault
45	Fault in economiser or hot water coil (outdoor supply, water return probe)
46	Smoke detector, high temperature, or supply temperature >80 °C
91	Ambient probe open or short circuited
92	Internal probe not calibrated
93	Communication error
94	fault with AL terminal connected
95	S5 digital probe not detected
96	S6 digital probe not detected
97	S7 digital probe not detected
98	S8 digital probe not detected
99	Digital outdoor probe not detected

## 1.8 Regular maintenance activities for which the user is responsible

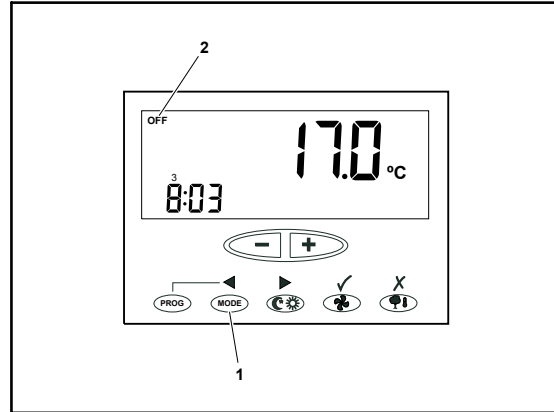
**NOTE**

- *The fault pilot light on the DPC-1 thermostat display will flash if a fault code between 0 and 90 is shown.*
- *The fault pilot light on the DPC-1 thermostat display will also flash if fault code 93 is shown.*

### 1.7.5 Restarting the air conditioning unit in the case of breakdown

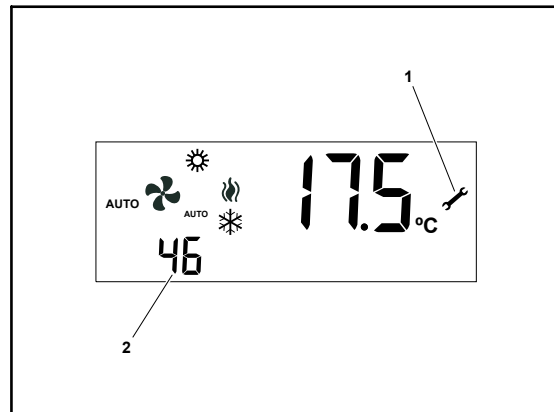
Where the unit is to be restarted, press the **MODE -1-** button on the thermostat repeatedly until **OFF -2-** is displayed on the screen.

Then, restart the unit by pressing the **MODE** button and selecting the required operating mode.



The unit will start up normally if the cause of the fault is no longer present. If the cause persists, it is possible to start the unit a maximum of three times within a 24-hour period.

Where the thermostat screen continues to display the indicator -1- and any fault code -2- or if the air conditioner does not start, contact a Johnson Controls Inc. Authorised Technical Assistance Service.



## 1.8 Regular maintenance activities for which the user is responsible

### 1.8.1 Maintenance Schedule

The HVAC unit is designed to require as little maintenance as possible. Nevertheless, to ensure the correct operation of the unit with a minimal use of electricity, a long working life and compliance with the regulations of each country, regular maintenance inspections must be made.

Johnson Controls Inc. shall not be considered responsible for any damage caused by improper maintenance of the HVAC unit, which includes anything inconsistent with that described in this document or others specifically provided with the unit.

To make them easier, maintenance tasks have been grouped by time intervals in a series of tables.

Maintenance operations	Frequency			
	1 month	2 months	6 months	annual
<i>Outdoor fan and indoor fan belts, see on page 13</i>		x		
<i>Air filters, see on page 13</i>	x			
<i>Indoor coil, see on page 13 (evaporator)</i>		x		
<i>Condensate tray and drain trap, see on page 13</i>		x		
<i>Outdoor coils, see on page 13 (condenser)</i>		x		
<i>Fresh air intake, see on page 14 (accessory)</i>	x			
<i>Cooling Circuit, see on page 14</i>			x	
<i>Electrical and mechanical operation, see on page 14</i>			x	
<i>Integrity of the unit structure and components, see on page 14</i>				x
<i>Hot water coil, see on page 14 (accessory)</i>				x

## Outdoor fan and indoor fan belts



### ATTENTION

*Before opening any access to the inside of the unit, disconnect all electricity supplies.*

Check their condition and correct tensioning. Any replacements must be of the same type and size as the original and tensioning must be checked again after 24 hours of operations.

## Air filters

Wash once removed from the unit, sliding them out from their guide rails.

## Indoor coil

You should visually inspect the coil when performing filter maintenance. The complete surface of the fins must be kept clean.



### ATTENTION

*Never use water hoses inside the compartment.*

Clean the fins using a soft brush or vacuum cleaning, taking care not to damage them.

## Condensate tray and drain trap

Remove any dirt or remains from the tray.

- Check that the water outlet and the drain trap are not blocked.
- Check that the water is correctly released.
- Prime the drain trap (fill with water) if required.

## Outdoor coils



### ATTENTION

*Never use water hoses inside the compartment.*

Remove all dirt or remains from the surface of both sides of the coils. Clean the surface of the fins using a soft brush or compressed air, taking care not to damage them. Given that they are exposed to the outdoors, water with suitable detergent may be required for cleaning. In this case, always clean from the inside out and from top to bottom.

## 1.8 Regular maintenance activities for which the user is responsible

### Fresh air intake

Where the unit is fitted with the economiser accessories or return fan, maintenance must be performed on the dampers, checking the correct working order of their components (shaft, louvers, motor).

### Cooling Circuit

Check the following at the start of each cooling or heating season:

- Operating pressures.
- Control elements.
- Temperature leaps.
- Other checks according to the rules of the trade.

### Electrical and mechanical operation

Check the following at the start of each cooling or heating season:

- The amps of all motors.
- The condition of the electrical connections.
- The working order of the safety controls.

The motor bearings for the indoor and outdoor fans are permanently lubricated and do not require maintenance.

### Integrity of the unit structure and components

Check:

- The correct condition of the unit structure and exterior components.
- No knocks or dents.
- correct fixture of bolts.
- The correct closure of access doors, including the condition of the sealing strip and locks.

### Hot water coil

Where the unit is fitted with this accessory, check the following at the start of the heating season:

- The control elements.
- System water filling.
- Bleeding of air from the coil.



#### NOTE

*Check that the proportion of antifreeze is correct, if necessary, depending on the area and the installation.*

## 1.8.2 Maintenance responsibilities of the user

Like any other machine, the HVAC unit requires regular maintenance, as the wear to which some of its parts are subjected can affect its mechanical reliability and the safety of those responsible for its maintenance.

In compliance with current regulations, the unit must be regularly inspected and the results recorded on the forms provided by the Labour and Health Authorities of the country where the HVAC unit is installed.

Users cannot access this form to perform maintenance and upkeep tasks on the unit.

There is no intent for the user to perform any maintenance tasks on the HVAC unit.





**DANGER**

*It is strictly prohibited for the user to carry out any maintenance or upkeep tasks on the HVAC unit.*

*This appliance is not destined for use by people (including children) with limited physical, sensorial or mental capacities, or without adequate experience or knowledge, unless they have received instructions or been supervised in the use of the appliance by an individual responsible for their safety.*

*Children must be supervised at all times to ensure that they do not play with the appliance.*

*Only trained Johnson Controls Inc. personnel with the necessary means and tools may carry out maintenance and upkeep work on the unit.*

*Trained personnel must be aware of the health and safety regulations and procedures applicable to HVAC units. They should also be aware of general procedures and those applying specifically to this unit.*

*Contact a Johnson Controls Inc. Authorised Technical Assistance Service for scheduled maintenance on this unit.*

To discover the maintenance operations a Johnson Controls Inc. Authorised Technical Assistance Service should regularly perform, see [Maintenance Schedule](#), see on page 12.

**PRODUCT DISPOSAL**

According to Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, the presence of the symbol on the product or in the documents included with the product indicates that this product is classified, according to current law, as an electrical and electronic device and, therefore, this product cannot be dealt with at the end of its working life as domestic or urban waste.

The product must be taken to collection points for the recycling of waste electrical and electronic equipment.

The appropriate management, reuse, assessment and recycling of these products protect human health and the environment.

