38UQZ 016-020-024
40ALZ 016-020-024

Split-System Air-to-Air Heat Pumps

Carier is participating in the Eurovent Certification Programme. Products are as listed in the Eurovent Directory of Certified Products.

Installation, Operation and Maintenance Instructions

CONTENTS

START-UP CHECK LIST Start up date: .....

Equipment sold by: ..... Contract No: .....

Installed by: ..... Contract No: .....

Site address: .....

Equipment type and serial No: 38UQZ .....

40ALZ.....

ELECTRICAL DATA:

Supply voltage Ph 1: . ..... Volts Ph 2: ..... Volts Ph 3 .....Volts

Nominal voltage: ..... Volts % network voltage: .....

Current draw Ph 1: ..... Amperes Ph 2: ..... Amperes Ph 3: ..... Amperes

Control circuit voltage: ..... Volts Control circuit fuse: ..... Amperes

Main circuit breaker rating: .....

PHYSICAL DATA:

Outdoor unit 38UQZ:

Entering air temp.: .....°C

Leaving air temp.: .....°C

Pressure drop (air): .....kPa

Discharge air pressure: .....Pa

Fan motor input: Ph. 1: .....Volts

Ph. 2: .....Volts

Ph. 3: .....Volts

Indoor unit 40ALZ:

Entering air temp.: ..... °C

Leaving air temp.: ..... °C

Pressure drop (air): .....kPa

Discharge air pressure: .....Pa

Fan motor input: Ph. 1: .....Volts

Ph. 2: .....Volts

Ph. 3: .....Volts

SAFETY DEVICE SETTING 38UQZ UNIT:

High pressure switch: cut-out: ..... kPa cut-in: .....kPa

Low pressure switch: cut-out: ..... kPa cut-in: .....kPa

Step controller: cut-out 1st step: .....°C cut-in 1st step: ..... °C

cut-out 2nd step: .....°C cut-in 2 nd step: ..... °C

Oil level: .....

Oil visible in sight glass? .....

ACCESSORIES

Commissioning engineer (name): .....

Customer agreement

Name: ..... Date: .....

Remarks:

Note: Complete this start-up list at the time of installation

Table 1 - Physical data

Indoor unit 40ALZ		**016**	**020**	**024**
Outdoor unit 38UQZ		**016**	**020**	**024**
Cooling capacity*	kW	43.3	53.5	67.0
Heating capacity**	kW	45.5	57.5	78.4
Refrigerant charge (R-407C)***	kg	7.8 x 2	8.4 x 2	12.8 x 2
Outdoor unit 38UQZ		**016**	**020**	**024**
Weight	kg	480	555	590
Compressor		Reciprocating		
Quantity		2	2	2
Oil charge (each)	l	4.0	4.0	4.0
Oil type		POE-160 PZ		
Outdoor heat exchanger		Copper tubes, pre-treated aluminium fins		
Face area	m^2	2.29 x 2	2.29 x 2	2.29 x 2
Number of rows ... fins/m		2 ... 472	2 .. 555	3 ... 555
Test pressure	bar	30	30	30
Fan		Axial		
Quantity		2	2	2
Nominal air flow	l/s	5850	11200	10700
Refrigerant line diameters	inch			
Suction line		1-1/8	1-1/8	1-1/8
Liquid line		5/8	5/8	5/8
Indoor unit 40ALZ		**016**	**020**	**024**
Weight	kg	290	305	325
Refrigerant-air heat exchanger		Copper tubes, pre-treated aluminium fins		
Face area	m^2	1.06	1.06	1.36
Number of rows … fins/m		4...555	6...472	6...555
Test pressure	bar	30	30	30
Fan		Two, double-inlet centrifugal		
Nominal air flow	l/s	2820	3120	3370
Air flow range	l/s	2390-3250	2650-3600	2860-3880
Available static pressure (dry/wet coil)	Pa	160/120	180/120	210/160
Air filter		Class M1, washable		
Quantity		2	2	2
Width x height	mm	632 x 615	632 x 615	632 x 780

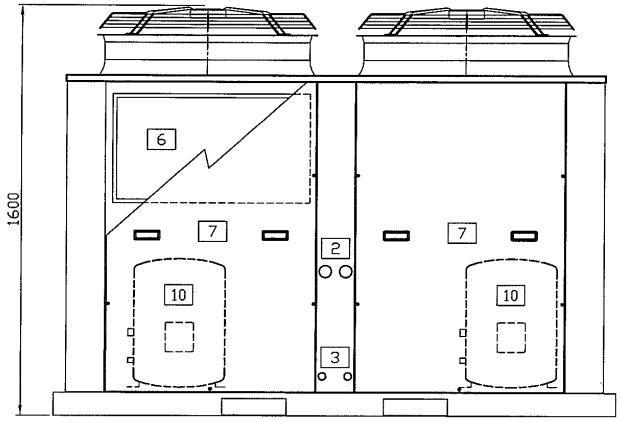
* Based on an outdoor air temperature of 35°C db and an indoor air entering temperature of 19°C wb and 27°C db.
** Based on an outdoor air temperature of 6°C wb and an indoor air entering temperature of 21°C db.
*** The refrigerant charge is for the complete system (38UQZ and 40ALZ), but excludes the refrigerant connection lines.

Table 2 - Electrical data

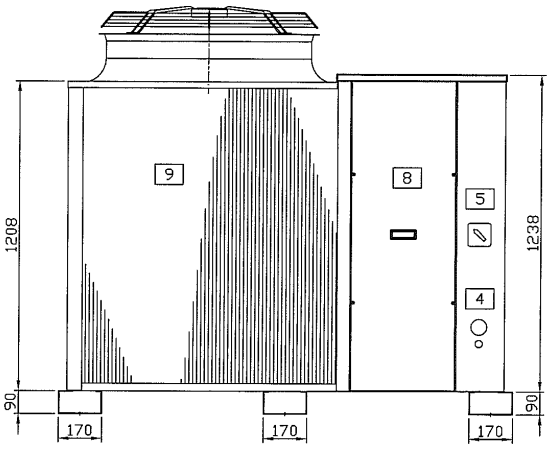
38UQZ-40ALZ		**016**		**020**		**024**	
Nominal supply	V-ph-Hz	230-3-50	400-3-50	230-3-50	400-3-50	230-3-50	400-3-50
Voltage range	V	207-253	360-440	207-253	360-440	207-253	360-440
Nominal power input	kW						
Cooling*		19.77	19.77	27.50	27.50	33.90	33.90
Heating**		17.07	17.07	24.50	24.50	32.00	32.00
Nominal current drawn	A						
Cooling*		57.95	33.50	77.19	44.62	95.36	56.12
Heating**		52.47	30.33	68.42	39.55	91.17	52.70
Effective power input	kW						
Cooling*		18.64	18.64	26.36	26.36	32.50	32.50
Heating**		15.94	15.94	23.36	23.36	30.60	30.60
Effective current drawn	A						
Cooling*		54.64	31.59	73.99	42.77	91.42	52.84
Heating**		49.00	28.32	65.24	37.71	87.18	50.39
Starting current	A	205.2	118.6	288.6	166.8	358.3	207.1
Maximum power input	kW						
Cooling***		22.92	22.92	30.10	30.10	37.97	37.97
Heating+		21.06	21.06	29.60	29.60	40.27	40.27
Maximum current drawn	A						
Cooling***		65.60	37.92	83.39	48.50	105.36	60.90
Heating+		60.55	35.00	81.62	47.18	110.93	64.12

* Based on an outdoor air temperature of 35°C db and an indoor air entering temperature of 19°C wb and 27°C db.
** Based on an outdoor air temperature of 6°C wb and an indoor air entering temperature of 21°C db.
*** Based on an outdoor air temperature of 46°C db.
\+ Based on an indoor air temperature of 24°C db and an outdoor air temperature of 18°C wb.

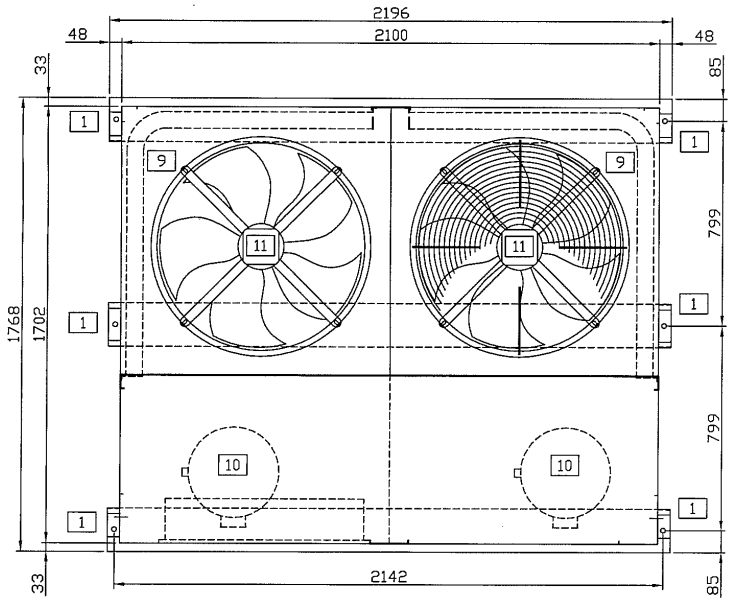
Fig. 1 - 38UQZ dimensions, mm



Side view



Rear view

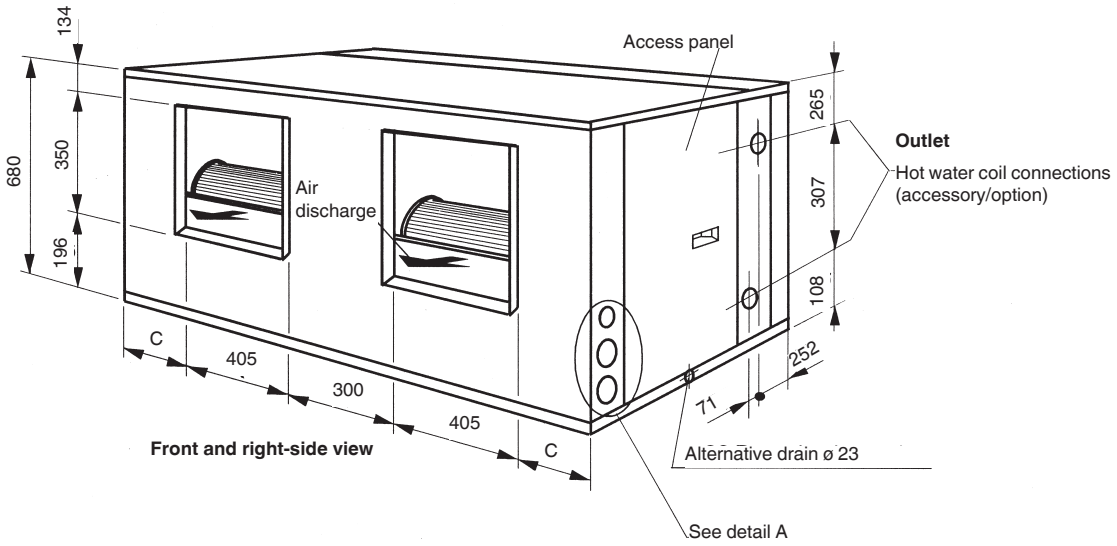


Plan view

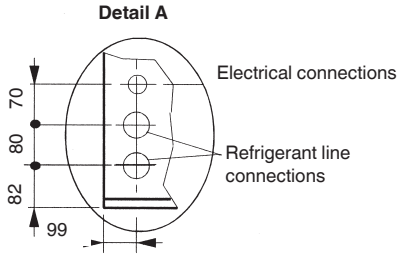
① Unit support (6 fixing points, ø 19 mm)
② Suction line connecction, ø 1-1/8”
③ Liquid line connection, ø 5/8”
④ Cable entry
⑤ Main disconnect switch
⑥ Control box
⑦ Front access panel
⑧ Side acces panel (both sides)
⑨ Heat echangers
⑩ Compressors
⑪ Fans

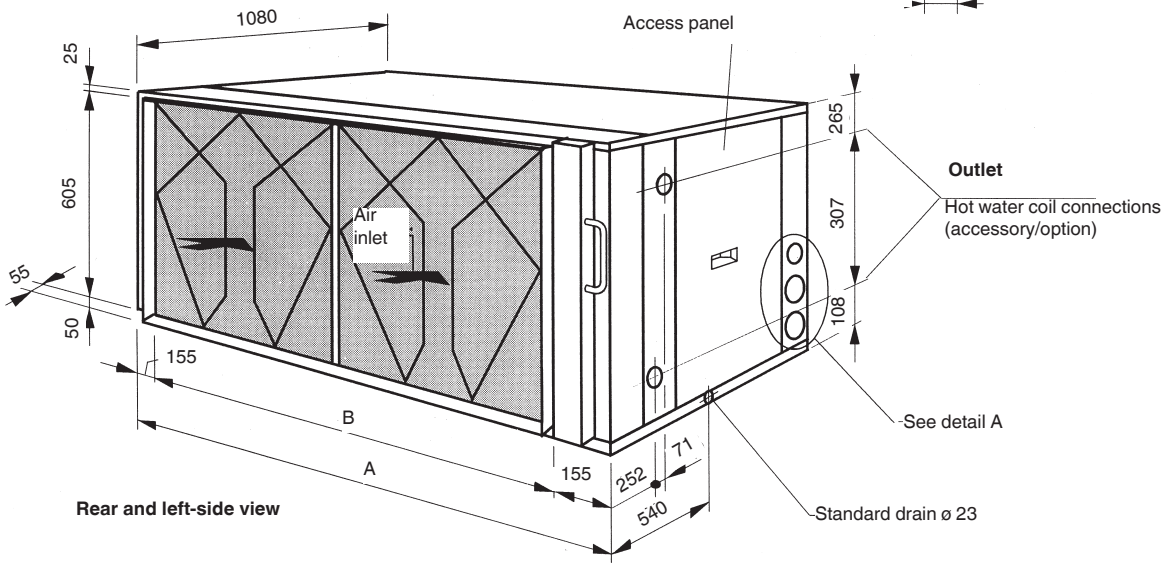
When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Fig. 2 - 40ALZ dimensions, mm



Note: The air discharge can be changed from horizontal to vertical (see page 17).





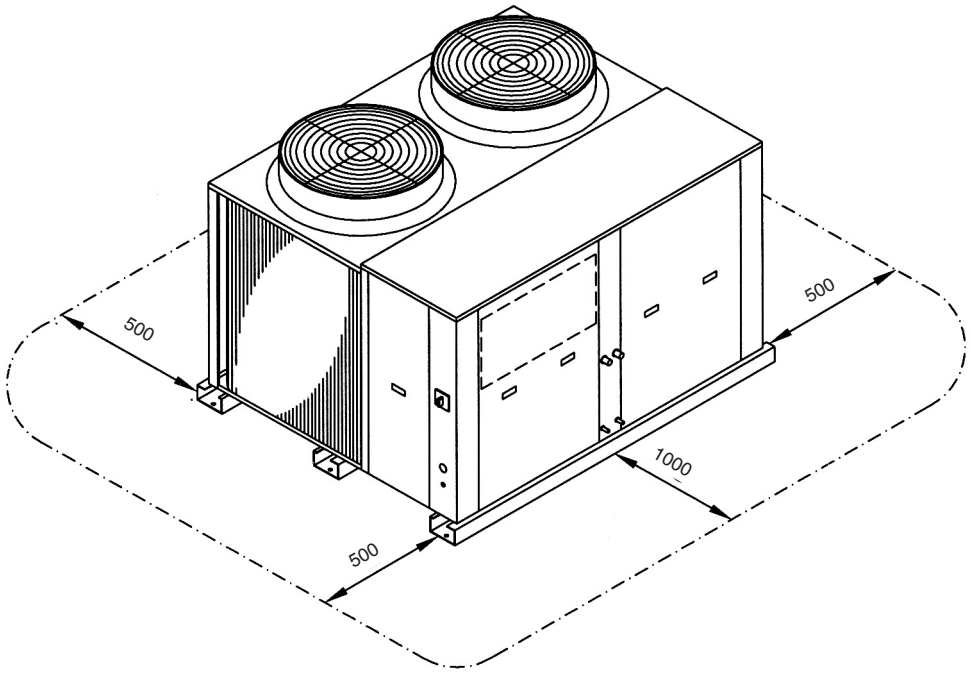
Dimensions, mm

40ALZ	A	B	C
016, 020	2125	1815	507
024	2625	2315	757

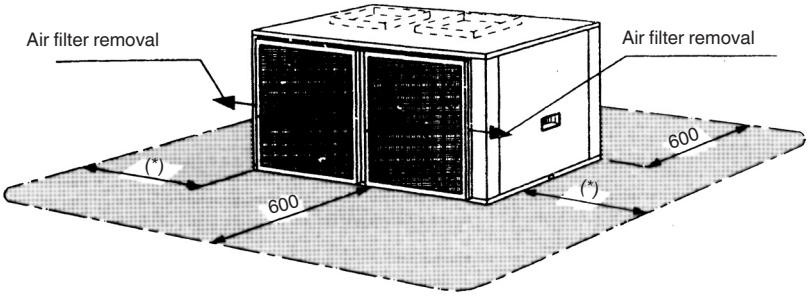
When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Fig. 3 - Service clearance, mm

38UQZ 016-024



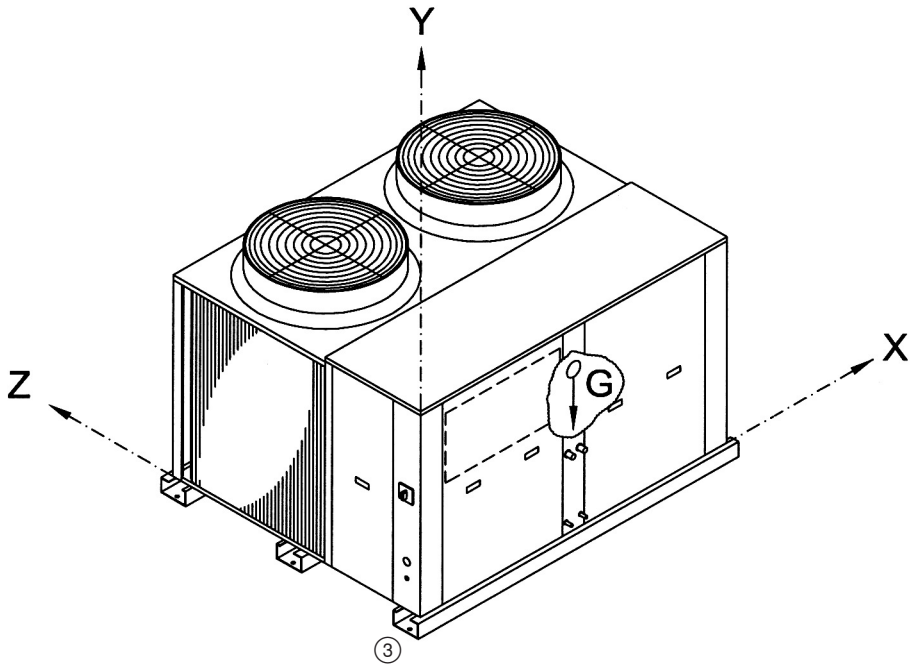
40ALZ (all sizes)



* Required service space for the removal of the air filter and the fans (in case of a breakdown). Clearance should be the same as the unit width.

Fig. 4 - Centre of gravity coordinates (mm - approx.)

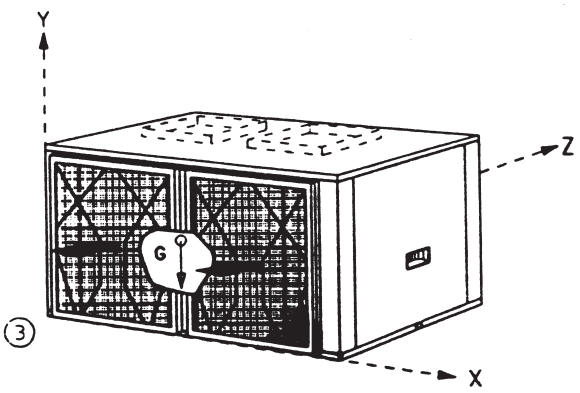
38UQZ 016-024



38UQZ	016	020	024
XG*	1060	1060	1070
YG*	300	340	380
ZG*	280	320	400

* Measured from point ③

40ALZ (all sizes)

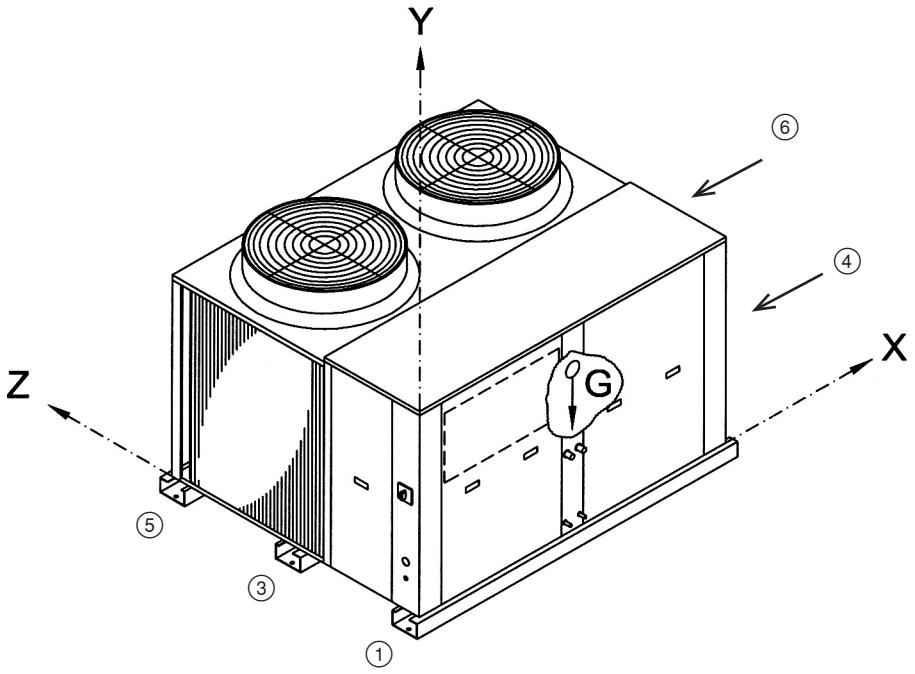


40ALZ	016	020	024
XG*	1620	1625	1870
YG*	230	230	230
ZG*	520	520	520

* Measured from point ③

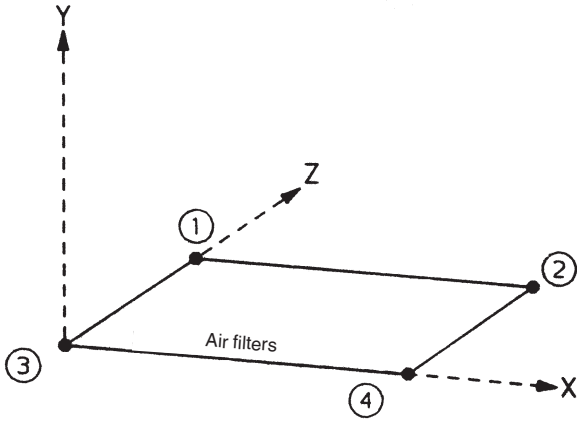
Fig. 5 - Weight distribution (kg - approx.)

38UQZ 016-024



Point	38UQZ		
	016	020	024
①	180	210	221
②	180	210	221
③	29	33	36
④	29	33	36
⑤	31	34	38
⑥	31	34	38

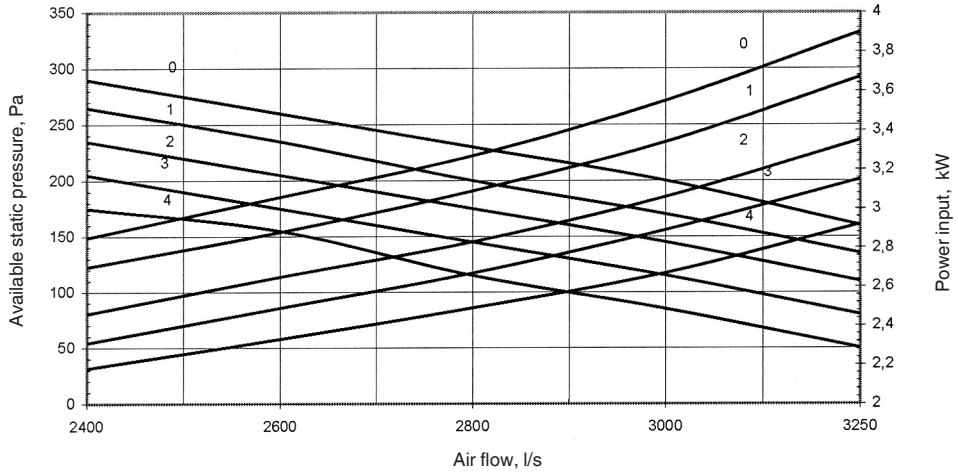
40ALZ



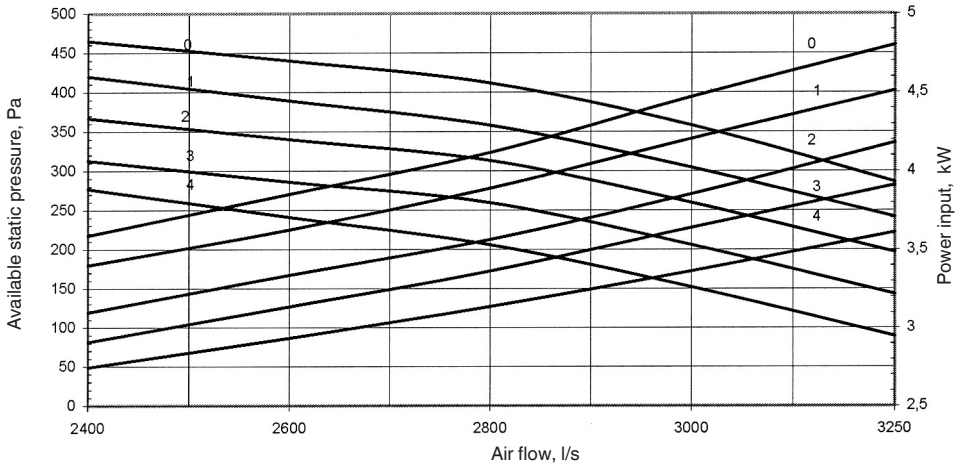
Point	40ALZ		
	016	020	024
①	43	46	53
②	47	51	53
③	100	104	110
④	100	104	109

FAN PERFORMANCE CURVES

40ALZ 016 (standard)

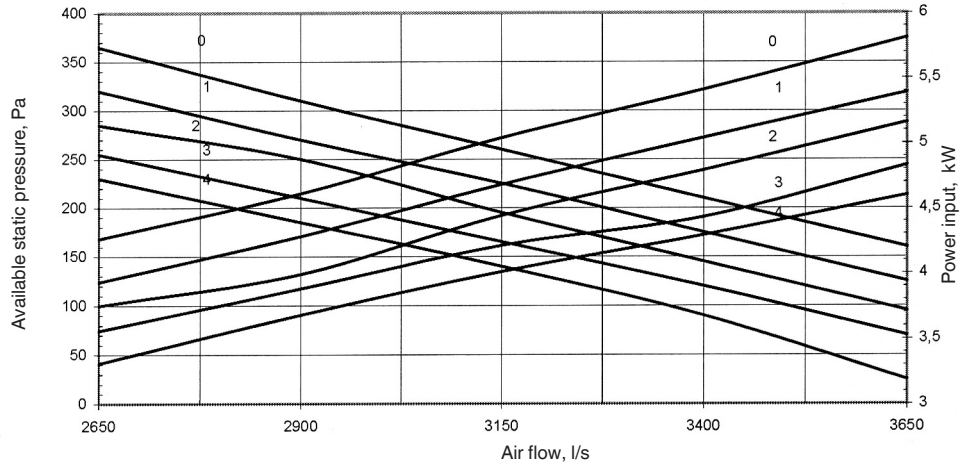


40ALZ 016 (high-pressure option)

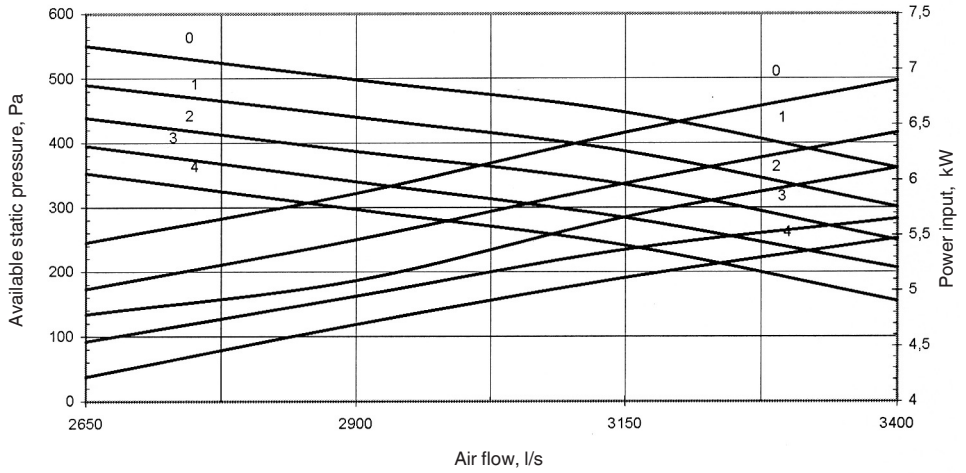


		Indoor fan speed	
Curve	**Pulley position**	**Standard, r/s**	**High-pressure option, r/s**
0	Closed	17.78	21.42
1	1	17.21	20.74
2	2	16.51	19.89
3	3	15.88	19.14
4	4	15.23	18.35
Factory setting	2	16.51	19.89

40ALZ 020 (standard)

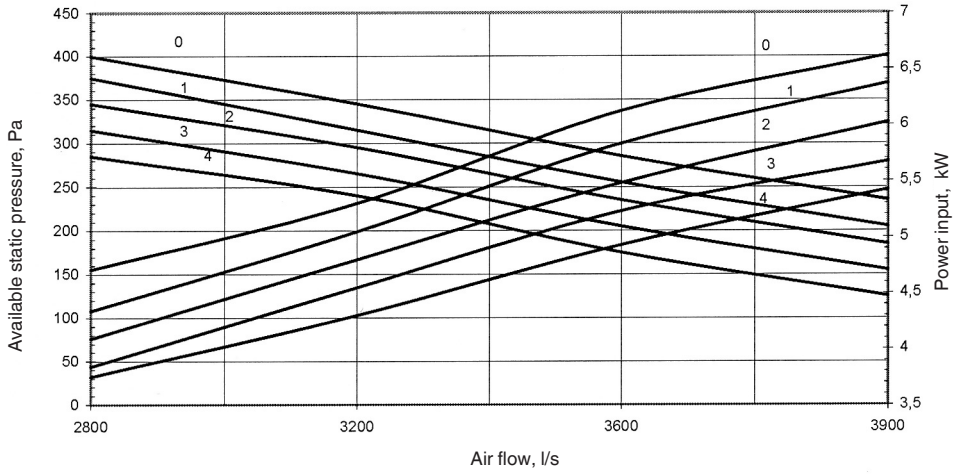


40ALZ 020 (high-pressure option)

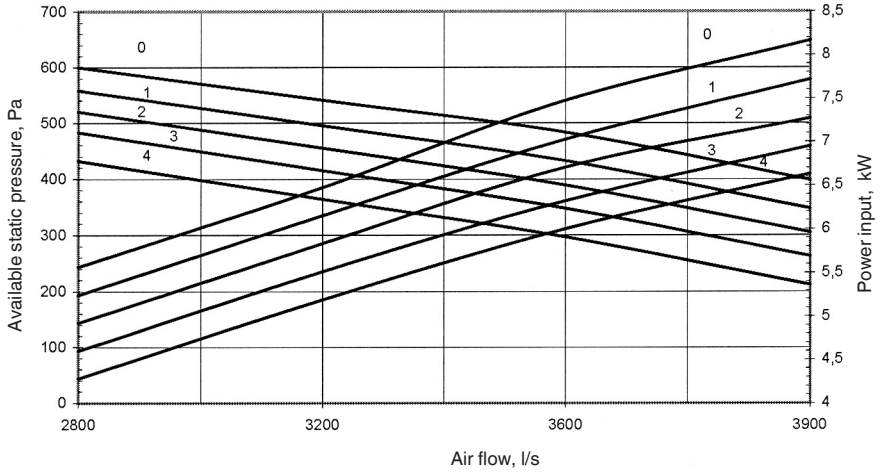


		Indoor fan speed	
Curve	**Pulley position**	**Standard, r/s**	**High-pressure option, r/s**
0	Closed	20.73	24.11
1	1	20.15	23.43
2	2	19.62	22.82
3	3	19.02	22.12
4	4	18.48	21.49
Factory setting	2.5	19.32	22.47

40ALZ 024 (standard)



40ALZ 024 (high-pressure option)



		Indoor fan speed	
Curve	**Pulley position**	**Standard, r/s**	**High-pressure option, r/s**
0	Closed	20.42	23.67
1	1	19.91	23.08
2	2	19.37	22.45
3	3	18.87	21.87
4	4	18,28	21.19
Factory setting	4	18.28	21.19

PRELIMINARY CHECKS

Check equipment received

Carry out an external check to ensure that the units have not been damaged during transport.

If there are any signs of damage or oil, contact the shipping company before installing the units. Send the claim documents directly to the shipping company, stating clearly what has been damaged. Carrier is not responsible for damage sustained during shipment, handling and storage.

Check the contents correspond to those listed on the delivery note. Inform your nearest Carrier office if anything is missing. To prevent loss or damage, do not remove the original packaging until the unit has reached the final installation site, where the installation must be carried out by qualified personnel.

ATTENTION: Ensure that the unit power supply complies with the power supply at the installation site.

SAFETY CONSIDERATIONS

Installation and servicing of air conditioning equipment can be hazardous due to system pressure and electrical components.

Only trained and qualified service personnel should install, start-up or service air conditioning equipment. Untrained personnel can perform the basic maintenance functions of cleaning and replacing filters.

All other operations should be performed by trained service personnel.

When working on air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for unbrazing operations.

When handling or charging refrigerant, evacuating the refrigerant circuit, carrying out leak test, etc., ensure that adequate precautions are taken.

ATTENTION - VERY IMPORTANT

- ***To prevent electrical shock or equipment damage, make sure disconnects are open before electrical connections are made. If this action is not taken, personal injury may occur.***
- ***Before performing service or maintenance operations on the unit, turn off the main power switch to the outdoor unit 38UQZ. Electrical shock could cause personal injury.***
- ***During unit operation, some of the refrigerant circuit elements could reach a temperature in excess of 90°C so only trained or qualified personnel should access areas protected by access panels.***
- ***The 40ALZ units are designed for ducted installation (indoor air discharge). If ducts are not used the installer must place a protection grille in the discharge.***
- ***Moving, lifting, transporting and positioning the units must be done with all outside panels installed.***
- ***Move and position the units with care.***
- ***Do not start up the units until all electrical and refrigerant connections have been made and the system has been charged with the necessary oil and refrigerant quantity.***
- ***Ensure that the equipment used to move the units is appropriate for the unit weight.***
- ***The location or base on which the 38UQZ outdoor units are installed must be able to support the operating weight of these units.***
  The system used to fix or support the 40ALZ indoor units must also be able to support their weight.
- ***The units are supplied with a dry nitrogen holding charge which must be removed before making the refrigerant line connections and charging the units.***
- ***The 38UQZ and 40ALZ units should not be installed in an explosive atmosphere.***
- ***The unit can operate in normal radioelectric atmospheres in residential, commercial and light industrial installations.***

  For other applications check the electromagnetic radiation around the units. The units are tested in accordance with applicable standards on electromagnetic compatibility.
- ***Do not connect R-22 units to R-407C units, e.g. do not connect a 38UQ outdoor unit to a 40ALZ indoor unit or a 38UQZ to a 40AL.***

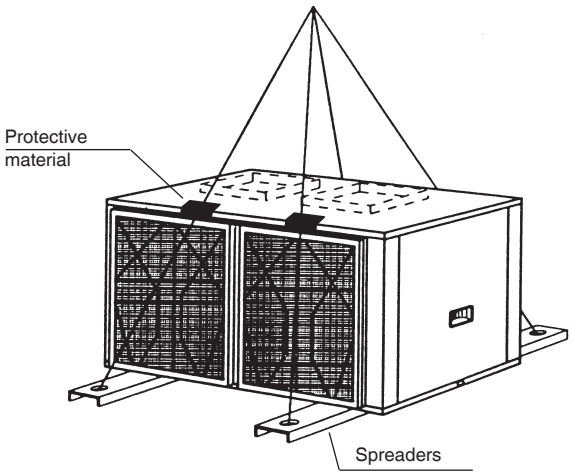
UNIT TRANSPORT, LIFTING AND HANDLING

- Ensure the lifting and transport equipment used is able to support the unit weight (see Table 1).
- When rigging, use spreaders to prevent damage to the panels (see Figs. 6 and 7).

40ALZ models

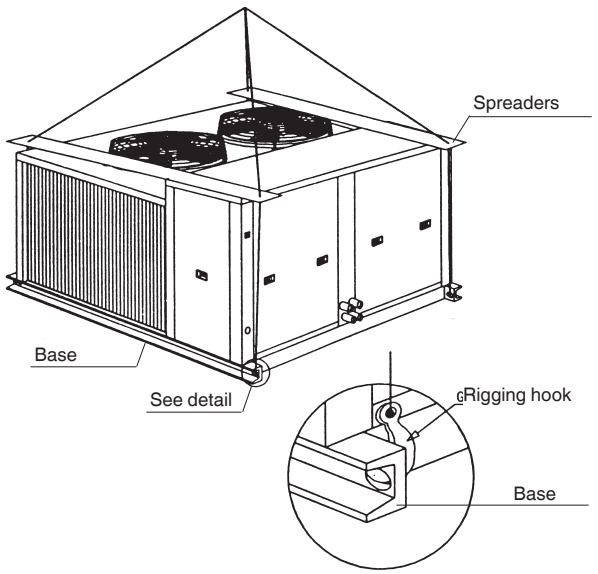
- Insert protective material between the lifting cables and the casing.

Fig. 6



38UQZ models

Fig. 7



ATTENTION

- ***To prevent transport damage, do not unpack the units until they have reached their final location.***
- ***Never roll or tip the unit more than 5°.***
- ***Do not remove the plastic packing material from the 38UQZ units until they have reached their final location. This protects the units from dust in the atmosphere.***
- ***The 40ALZ units must also be protected by plastic packing material until they reach their final location.***

IMPORTANT: Make sure that all unit panels are fixed in place before moving. Raise and set down the unit carefully.

UNIT INSTALLATION

38UQZ outdoor units

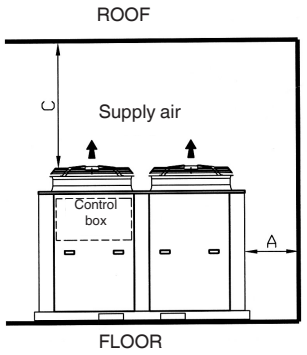
Clearance between units, walls and other objects
These units have been designed for outdoor installation.

IMPORTANT: It is not possible to connect outdoor supply and return air ducts to the 38UQZ outdoor units.

- The surface on which the units are mounted must be able to support the unit weight (See Table 1 - Physical Data).
- Leave sufficient clearance around the unit for service and maintenance (see Fig. 3).
- Select a location free of dust or foreign matter which may cause coil clogging.
- Leave sufficient clearance for free air circulation (outdoor supply and return air).
- For minimum clearances between the units and walls or roofs, see Figs. 8, 9 and 10.

Fig. 8 - 38UQZ 016-024

FRONT VIEW



PLAN VIEW

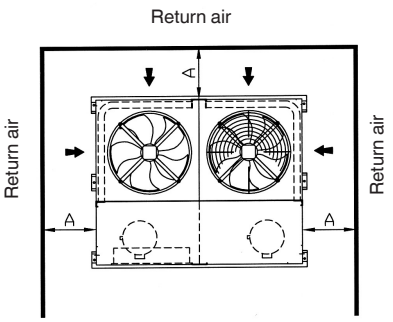


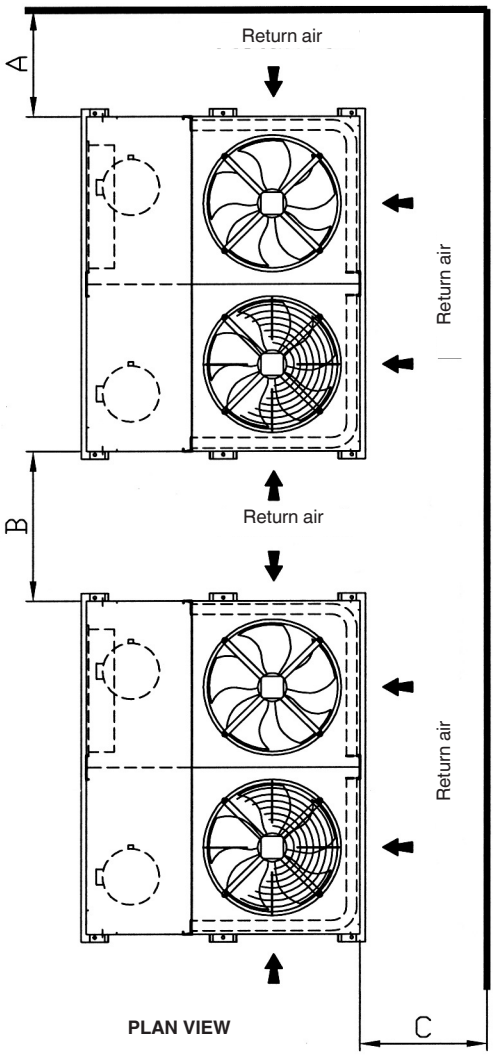
Table 3 - Minimum clearances (mm)

A	C*
500	Free

* There must not be any obstacle, ceiling or roof near the unit.

- If several units are installed close to each other in the same area, ensure the minimum clearance between them to allow free air flow.
- The clearance between the units must be sufficient to ensure that the discharge air from one unit does not mix with the supply air of another unit.

Fig. 9 - 38UQZ 016-024

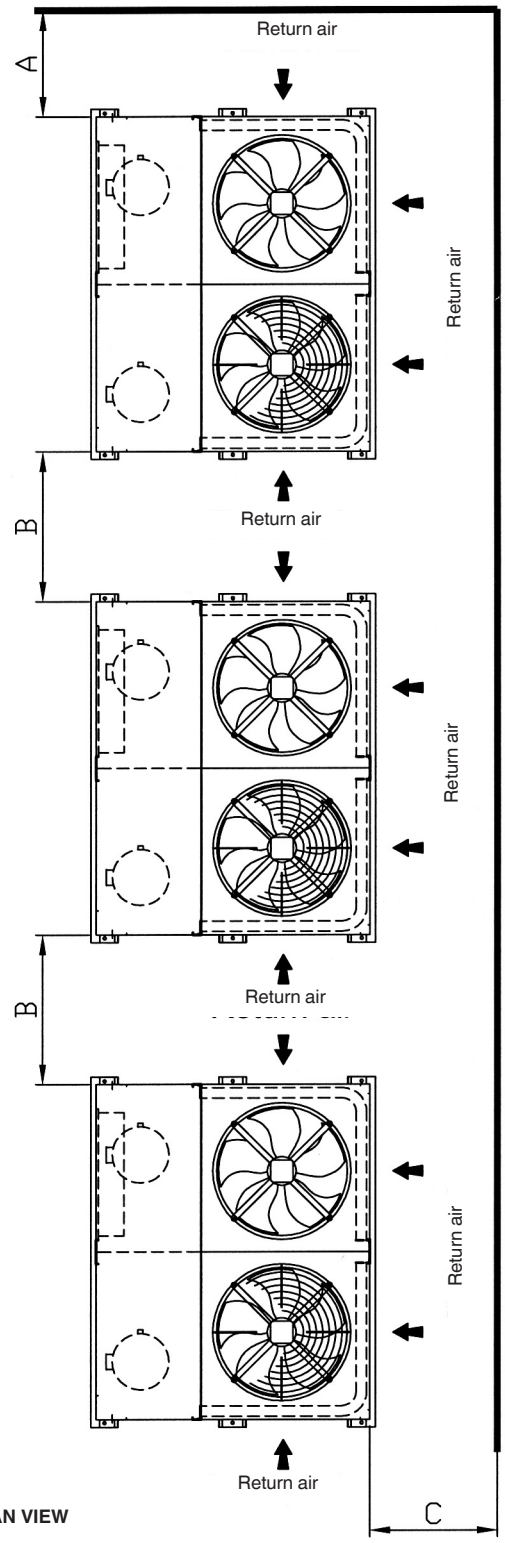


- The air enters through three sides and is discharged through the top.

Table 4 - Minimum clearances between units (mm)

38UQZ	A	B	C
016-024	500	700	500

Fig. 10 - 38UQZ 016-024



- The air enters through three sides and is discharged through the top.

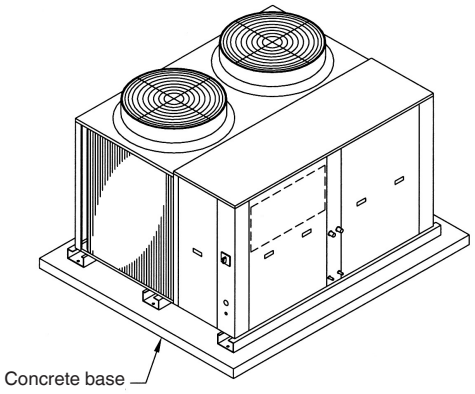
Table 5 - Minimum clearances between units (mm)

38UQZ	A	B	C
016-024	500	700	500

Installation on the ground

- 38UQZ units can be positioned on the floor of a patio, on the ground or on a lawn. If installed on the ground or on the lawn they should be mounted on a 100 mm high concrete base that is 100 mm larger than the base unit on all four sides.

Fig. 11

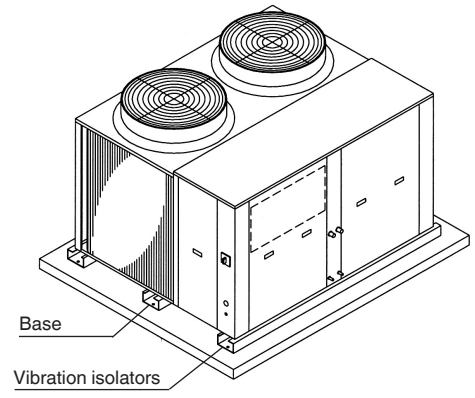


- If this type of installation is used, ensure that the units are not affected by flooding, snow accumulation or leaves.
- Ensure that the units are secured to prevent injuries to people handling or working on the units.

IMPORTANT: Rainwater, and in heat pump mode defrost water, is drained through the unit base. For this reason the units must be elevated above the concrete base to allow correct drainage.

- **Rainwater and defrost water drainage**
  38UQZ units incorporate drillholes in the base in order to correctly drain any condensate or rainwater and defrost water which may enter the unit in the fan area. Ensure correct drainage.
- Provide suitable vibration isolators to prevent noise transmission and vibrations during unit operation.

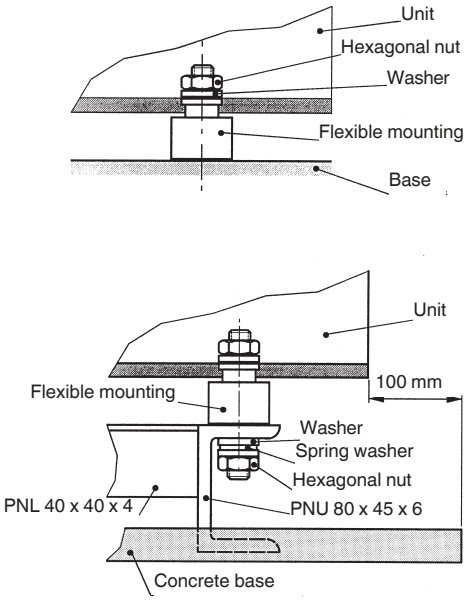
Fig. 12



- The 38UQZ models incorporate fixing holes in the base profile to attach the units to the floor.
- 38UQZ models can have several vibration isolator types, as shown in Fig. 13.

IMPORTANT: Units must be installed in accordance with applicable local, national and European installation and safety standards and regulations.

Fig. 13



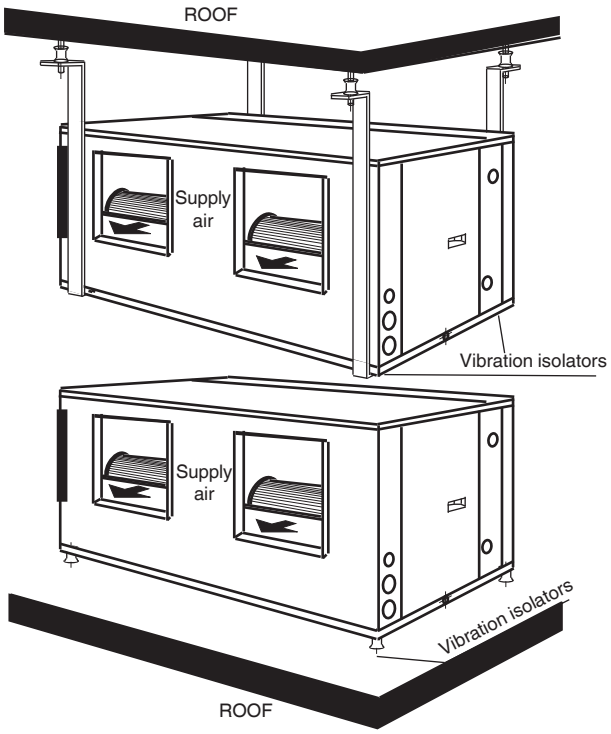
40ALZ indoor units

These units have been designed for indoor installation, connected to supply and return air ducts.

When selecting the installation site, observe the following points:

- Ensure that the condensate water collected in the drain pan is correctly evacuated.
- Leave sufficient clearance for installation and maintenance (see Fig. 3 - Service clearances).
- If the units are not ducted, ensure that the return air is sufficient for the required air flow.
- See Table 1 - Physical Data, for unit weights and ensure that the installation surface can support the unit weight.
- In accordance with applicable standards and laws the unit can be suspended from the ceiling or floor-mounted (see Fig. 14).

Fig. 14

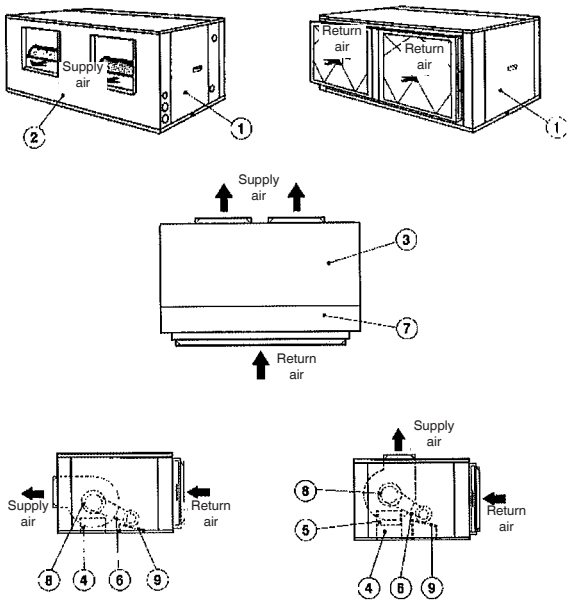


The units leave the factory with the air discharge set to horizontal. It can be changed to vertical discharge by following the steps below.

Change from horizontal (standard) to vertical discharge with changing the position of the motor. See Fig.15, depending on model.

a) Detach the side access panels ①.
b) Remove the drive belt(s) ⑥.
c) Unscrew the fans from the brackets ④ securing them to the base.
d) Detach the rear panel with the fan outlets ② and the top panel ③.
e) Detach the tension base together with the motor ⑨ and position it on the opposite side from where it was.
f) Remove the fan pulley ① and reposition it on the other side.
g) Interchange the position of panels ② and ③, fastening them correctly to the unit.
h) Bolt the U-bracket ④ to each fan.
i) Bolt the U-bracket ⑤ to the angle iron ④ holding the fans to the base.
j) Replace the drive belt(s) and ensure that the tension is correct.
k) Replace the access panels ①.

Fig. 15 - Repositioning unit air discharge (40ALZ)



Legend

① Side access panel
② Rear discharge panel
③ Top panel
④ Angle iron to attach fan to base
⑤ U-bracket
⑥ Drive belt(s)
⑦ Roof panel
⑧ Fan pulley
⑨ Base

Condensate drainage

40ALZ units are supplied with a condensate drain pan with two drain pipes (outside diameter 23 mm). These tubes leave the factory separately wrapped so it is easy to check them.

The connection to the drain pipe can be vertical (see Fig. 16) or horizontal (see Fig. 17).

- Vertical drain: Remove the prepunched knockout(s) in the unit base.
- Horizontal drain: Drainage through holes in the side of the unit base, to the right- or left-hand side.

Fig. 16 - Vertical drain

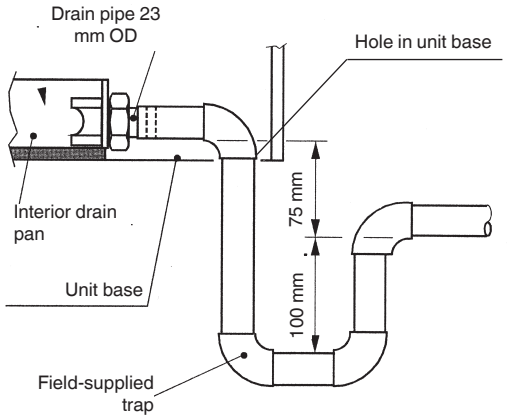
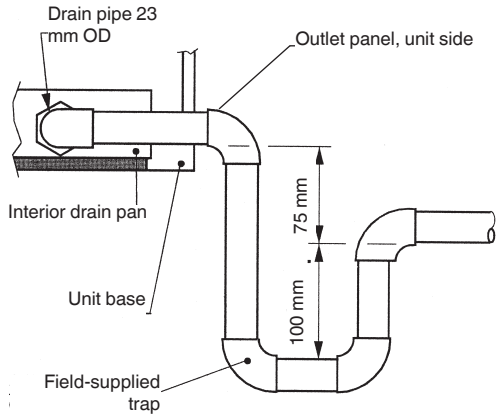


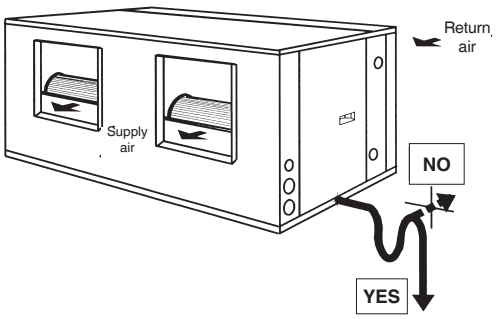
Fig. 17 - Horizontal drain



The field-installed trap must be below the drain pan.

The drain pipe must never be higher than the drain pan.

Fig. 18



Ductwork

The ductwork dimensions should be determined in accordance with the air flow to be carried, and the available static pressure of the unit. The different air flows and power input values for each unit are shown in the fan performance curves.

It is recommended to observe the following considerations:

a) Whatever type of ductwork is used, it should not be made of materials which are flammable, or which give off toxic gases in the event of a fire. The internal surfaces should be smooth, and not contaminate the air which passes through.

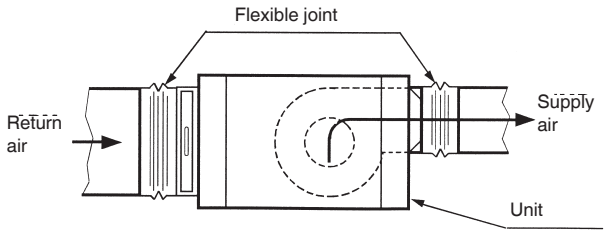
b) At the points where the ducts join the unit, it is recommended to use flexible connections which absorb vibrations, prevent noise inside the ductwork and allow access to the unit (see Fig. 19).

c) Bends near the unit outlet should be avoided as much as possible. If unavoidable, they should be as slight as possible, and internal deflectors should be used when the duct has large dimensions.

d) The installation of baffles in the supply air outlet ducts significantly dampens the noise created by the air flow.

e) The ratio between the duct sides should not exceed 1:3 (rectangular ducts).

Fig. 19 - Side view



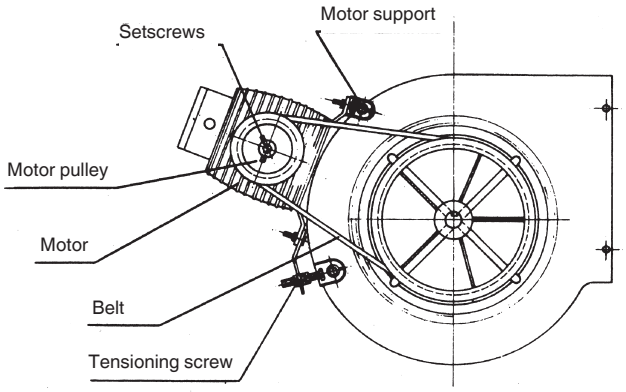
f) Adjust the belts and pulleys to obtain air flows and static pressures that differ from the nominal values, if required.

The units are factory-set to supply nominal air flow and nominal static pressure, as shown in the fan performance curves.

When indoor pressure and air flow requirements differ from nominal ratings, the motor pulley can be adjusted for different available static pressure values:

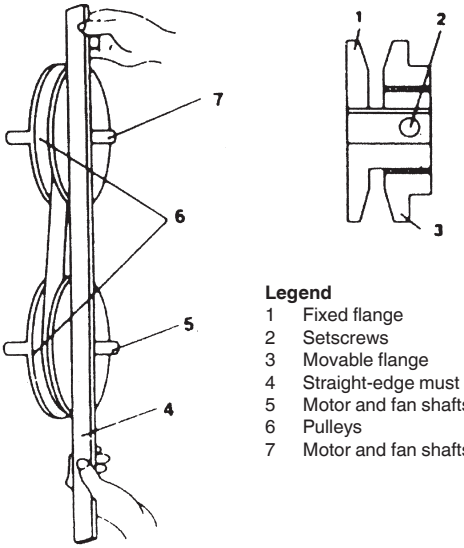
1. Move the motor along its track in order to remove the belt (see Fig. 20).
2. Loosen the pulley setscrews and rotate as necessary (see fan performance curves).
3. Tighten the setscrews.
4. Replace the belt(s) in the channel of the pulley.
5. Tighten the belt(s), using the tension screw nut and washer (see Fig. 21).
6. Check the new fan speeds with a tachometer.
7. After the first operating hours, check the belt tension and if necessary retighten the belts (see Fig. 21).

Fig. 20



Align the pulleys using a ruler.

Fig. 21



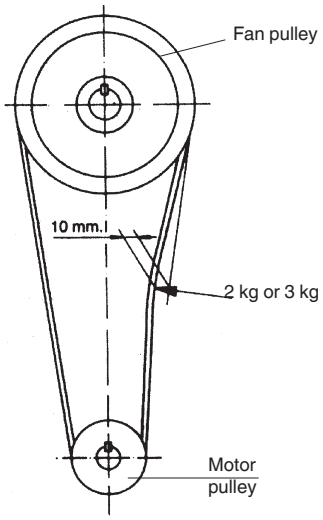
Legend

1 Fixed flange
2 Setscrews
3 Movable flange
4 Straight-edge must be parallel with belt
5 Motor and fan shafts must be parallel
6 Pulleys
7 Motor and fan shafts must be parallel

To align fan and motor pulleys:

1. Loosen fan pulley setscrews. Slide fan pulley along the pulley shaft and align with the motor using a ruler, making sure that it is parallel to the belt (see Fig. 21).
2. Tighten the fan pulley setscrews.
   To adjust the belt tension, loosen the motor mounting plate bolts and slide the motor mounting plate until the belt is tight.
3. Belt tension (see Fig. 22)
   The minimum belt deflection is 10 mm when the force shown in Fig. 22 is applied.

Fig. 22



ATTENTION: Once the motor pulley opening or closing has been set, check that the setscrews have been correctly tightened.

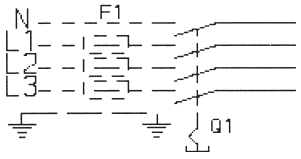
ELECTRICAL CONNECTIONS

WARNING: To prevent electrical shock or equipment damage, make sure disconnects are open before electrical connections are made. If this action is not taken, personal injury may occur.

NOTE: The power supply for the units has to be in accordance with applicable standards and laws, the low voltage directive, etc.

- Connect the power supply for the complete system (outdoor unit and indoor unit) via the 38UQZ outdoor unit (see Fig. 23).
- Consult the wiring diagram supplied with the unit, that shows all power connections between the 38UQZ outdoor unit and the 40ALZ indoor unit and the general power supply to the system.
- The connection cables between the units must not be lighter than the flexible Neoprene-covered cable (type H05 RN-F), with an appropriate wire section for the supply to the 40ALZ unit.
- The power of the optional electric heater of the indoor unit is supplied via the main disconnect switch of the 38UQZ unit (see Fig. 1).

Fig. 23 - General unit power supply



Legend
Q1: Main unit power supply disconnect switch.
Located in the outer panel of the 38UQZ unit.
F1: Field-installed fuses.

- Route all cables through the conduits in the 38UQZ units to the terminals of the main disconnect switch (see unit wiring diagram).
- Voltage to the unit must be within 10% of the nominal given in the electrical data table with a maximum phase imbalance of 2%. Contact your local power company for correction of an incorrect line voltage.
- Take special care when making the earth connection. This is the first cable to be connected, and it must be longer than the live cables.
- **Operation of the unit on improper line voltage constitutes abuse and is not covered by the Carrier warranty.**

IMPORTANT: To ensure the correct unit power supply it is necessary first to determine the wire section. The unit electrical data (see Table 2 - Electrical Data) and the line length (max. admissible voltage loss 5%) must be taken into consideration.

If the indoor unit includes an electric heater, this must be taken into consideration when sizing the system power supply cable (38UQZ-40ALZ) and the isolator switch and fuses.

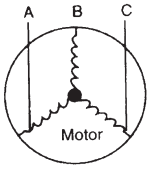
- Never operate a unit if the voltage imbalance exceeds 10%. The following formula must be used to determine the percentage of voltage imbalance.

Voltage imbalance % =

$$\frac{\text{Largest deviation from average voltage}}{\text{Average voltage}}$$

Example: Nominal supply: 400-3-50

AB = 404 V
BC = 399 V
AC = 394 V



$$\text{Average voltage} = \frac{404 + 399 + 394}{3} = 399 = 400\ \text{V}$$

Determine maximum deviation from average voltage:

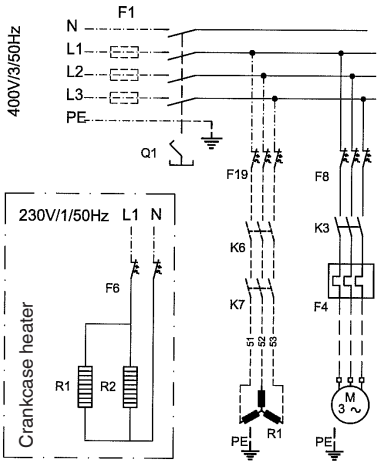
AB = 404 - 400 = 4
BC = 400 - 399 = 1
AC = 400 - 394 = 6

Largest deviation is 6 volts. Percentage voltage imbalance is therefore:

$$\frac{6}{400} \times 100 = 1.5\ \%$$

- The cables marked ① from the 40ALZ indoor units are run to the 38UQZ outdoor unit control box for connection to the fan motor, and in the case of the optional electric heater also cables marked ②.

Fig. 24



Legend

F8	Thermomagnetic indoor fan switch (included in the control box).
K3	Indoor fan motor contactor (included in the control box).
F4	Indoor fan motor thermal protection (included in the control box).
F1	General fuses of the installation (field-supplied).
Q1	Unit main disconnect switch (included in the 38UQZ panel).
F19	Thermomagnetic switch of the optional electric heater.
K6	Optional electric heater contactor.
R1, R2	Optional crankcase heater.
F6	Thermomagnetic switch of the optional crankcase heater.
M	40ALZ indoor fan motor.
①	Connection cables between the 40ALZ indoor unit fan motor and the 38UQZ control box.
②	Cables from the 40ALZ unit of the outdoor unit for the power supply of the heating coil.

NOTE: The cables shown by the broken lines are not factory-supplied.

- If the units include options or accessories, such as heating coils for electric heaters or the compressor crankcase heater, proceed as follows:
  Heating coils for electric heater - connect in accordance with the wiring diagram downstream of the 38UQZ main disconnect switch. Do not exceed the power in kW recommended by Carrier. Use correctly sized main fuses and the new unit power supply cable section. If the power input of the electric heater plus the power input of the indoor and outdoor fan plus the power input of the compressor is higher than the total power input given in Table 2 - Electrical Data, new fuses and power supply cable sections must be used.

- **Thermostat connection**
  Thermostat/unit connection must be via a loom manufactured in accordance with the wiring diagram accompanying the unit and the thermostat installation instruction.

NOTE: Refer to the applicable thermostat installation manuals for each model.

REFRIGERANT LINE CONNECTIONS

Connection between units

The 38UQZ outdoor units must be connected with the 40ALZ indoor units with refrigerant-grade copper pipes for correct operation.

For each compressor in the 38UQZ outdoor unit a pipe for refrigerant gas and another pipe for liquid refrigerant must be installed.

For copper-pipe refrigerant connection lines the following points must be observed:
- Ensure that the line length is as short as possible.
- The number of bends or elbows must be the minimum possible.
- Design the lines with the correct diameter for the required compressor oil suction velocity.
- Route the lines so that they do not obstruct the normal building use. Avoid exposing them to extreme high or low temperatures.
- Install them where they cannot be damaged.
- If they are routed outside the building, protect them against extreme temperatures and damaging environmental influences.
- Insulate the suction/discharge line along its complete length, and the liquid line if this is indicated.

IMPORTANT: Always use refrigerant-grade deoxidized and dehydrated copper tubing between the indoor and outdoor units.

- Carefully protect the copper pipes during transport, installation and connection, against possible ingression of water or moisture.
- Also prevent entry of any contaminants or foreign substances.
- Four operations are very important:
  - Pipe cleaning
  - Pipe leak tightness
  - Correct leak tests
  - Correct evacuation
- When pipes are soldered, cut or flared, etc. ensure that no residue or shavings can enter the pipes. Blow any residue away from the pipe ends and check them carefully.

Refrigerant piping design

The design and sizing of the pipe diameters depends on the unit location which can be:

Fig. 25 - Outdoor unit above the indoor unit

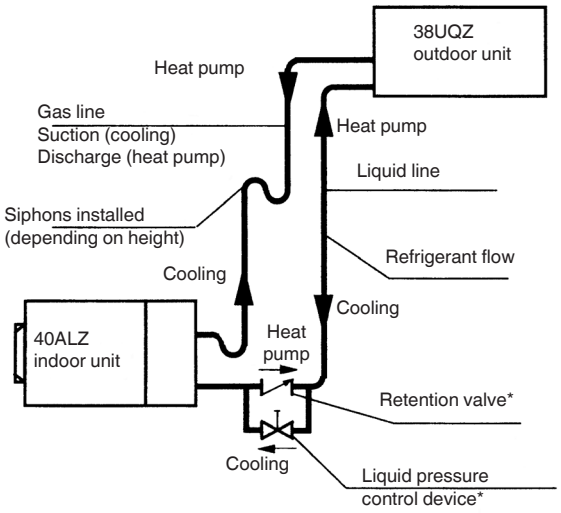
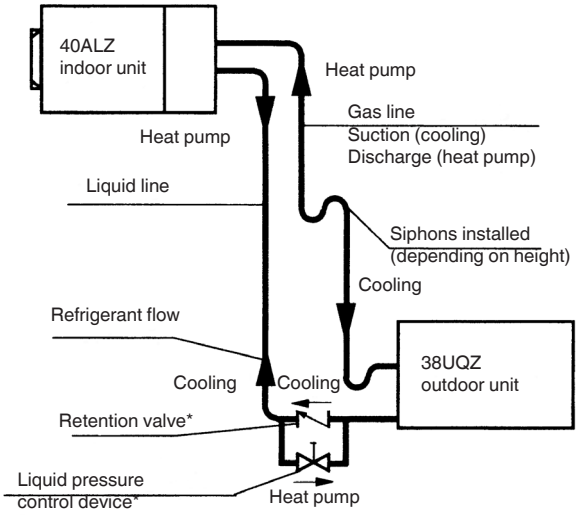
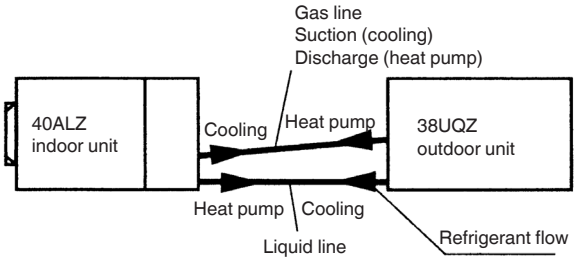


Fig. 26 - Indoor unit above the outdoor unit



* Install when the liquid column height exceeds 10 m.

Fig. 27 - Both units on the same level



In the 38UQZ heat pump units the gas line is always the suction line in cooling mode. If the cycle is reversed to heating mode it becomes the discharge line, changing the refrigerant gas flow direction. The liquid line does not change and always carries liquid refrigerant in one direction or other, depending on the operating mode.

Depending on the unit installation, the piping design is as follows:

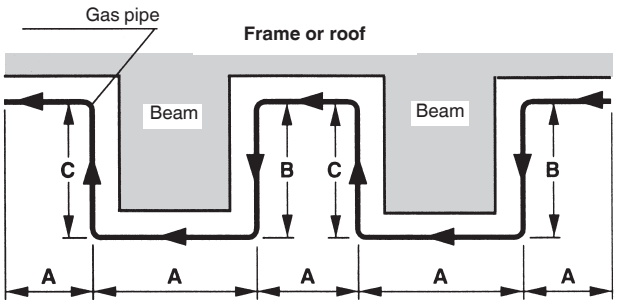
Outdoor unit above the indoor unit (Fig. 25)
The most unfavourable gas line condition is during cooling mode, with suction in ascending direction. In heating mode the gas line is the discharge line and descending and does not have problems with the oil flow. The liquid line refrigerant flow direction is descending in cooling mode and ascending in heat pump mode, and is calculated as explained later.

Indoor unit above the outdoor unit (Fig. 26)
For heat pump units this type of installation limits the height difference between the units, and the discharge line speed is approximately half of the suction line speed. The suction line flow is descending in cooling mode, so that the oil flow is not so problematic. The most unfavourable condition is the discharge line that is ascending in heat pump mode. The liquid line flow direction is ascending in cooling mode and descending in heat pump mode, and is calculated as explained later.

The outdoor and indoor units are on the same level (Fig. 27)
First make an actual outline diagram of the lines and an exact calculation of the total equivalent length. If the diagram shows any level changes to overcome (beams and other structural elements) the resulting section (ascending and descending) must be included in the calculations. This means that for a gas pipe the diameter of the horizontal sections, the vertical ascending and descending sections must be calculated separately.

This means that in this type of installation, as in any other, a section called horizontal can include sections that are not all horizontal (see Fig. 28).

Fig. 28



- Horizontal sections = A
- Vertical descending sections = B
- Vertical ascending sections = C

The calculation of the suction or discharge line, for example, includes sections “A”, as well as sections “B” and sections “C” so that the total of the pressure loss is the total of the three sections in their equivalent lengths.

Pipe diameter calculation procedure

Suction and discharge line
To size the pipes:

- Make a diagram with the actual outline of the pipes in the system. Record the dimensions (in metres) of the various sections and the elements to be included (siphons, elbows, valves, etc.).

- Calculate the equivalent length of:
  Vertical sections: length in metres of the straight section pipe run plus the equivalent length of the accessories installed (elbows, siphons, etc.).

  Horizontal sections: length in metres of the actual pipe run plus the equivalent length of the accessories installed (elbows, etc.).
- The total length is the sum of the equivalent lengths of the vertical and horizontal sections.
- For the vertical sections distinguish between ascending vertical refrigerant flow sections and descending flow sections.
- Depending on the installation, the suction line (gas) can be:
  1. The outdoor unit is above the indoor unit. Suction, in cooling, with ascending refrigerant flow and discharge, in heat pump mode, with descending refrigerant flow.
  2. The outdoor unit is below the indoor unit. Suction, in cooling, with descending refrigerant flow and discharge, in heat pump mode, with ascending refrigerant flow.
  3. Units on the same level. The refrigerant flow direction varies from one to the other direction, depending on the operating cycle.
- The liquid line is affected as explained later, depending on the unit installation.
- In the first installation type the gas line is calculated as ascending suction line, and it is checked if the selected diameter applies to the gas discharge line, if this is descending.

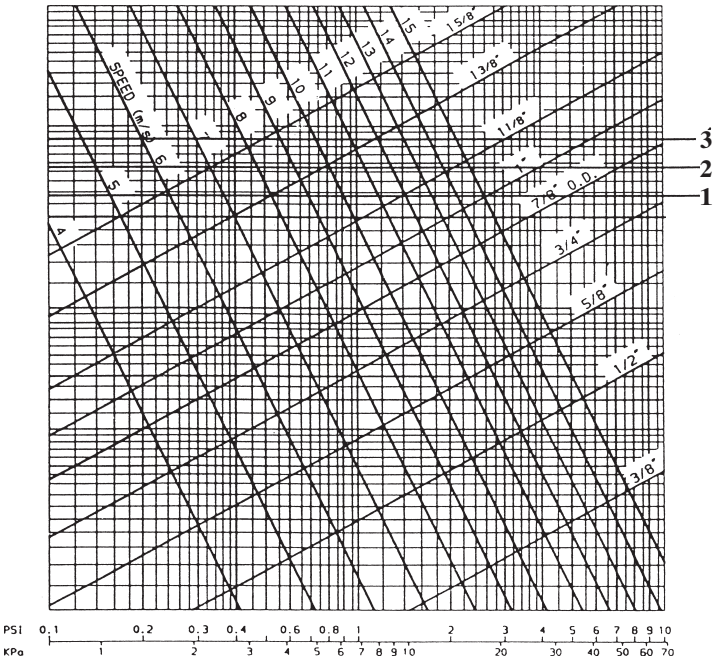
  In the second reverse installation type the discharge line is calculated as ascending, and it is checked if the diameter applies to the suction line, if this is descending.
- The suction and discharge lines must comply with the following points:
  - Maximum admissible pressure loss for the total length = 20 kPa (3 psi).
  - Minimum velocity in ascending sections = 6 m/s.
  - Horizontal or descending sections: the velocity can be between 4 and 6 m/s.
  - Maximum line velocity = 15 m/s.
  - The horizontal sections must have a 2% slope towards the compressor.
  - In the vertical sections with ascending gas flow, it is advisable to install siphons every 8 m in height. Install the first siphon at the base of the column.
  - Select the suction and discharge line diameter (Figs. 29 and 30).

Always calculate the diameter for the most unfavourable line, that has the refrigerant gas flow in ascending direction. Then you will see if the selected diameter for this line is sufficient along its full length, when the unit changes the operating cycle and the refrigerant flow is descending.

NOTE: See Table 1 for the standard outlet connection diameters.

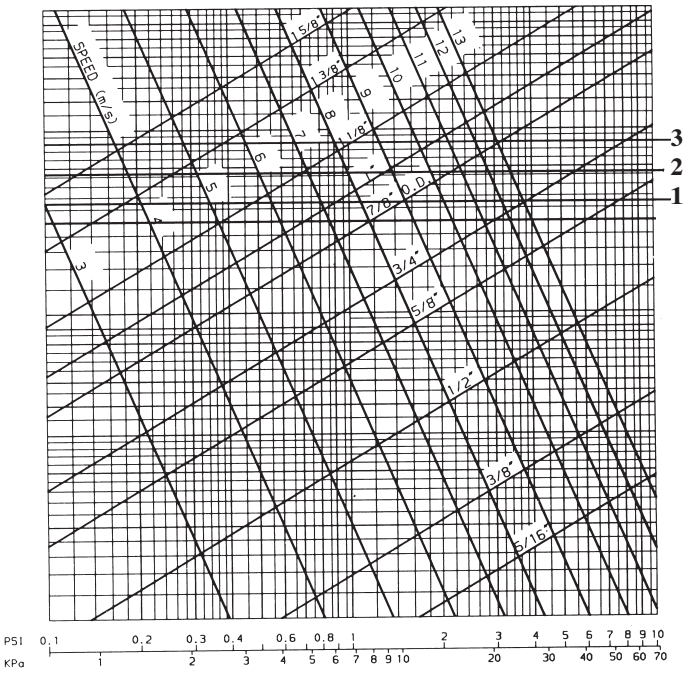
Suction or discharge line diameter selection (Figs. 29 and 30)

Fig. 29 - Suction line diameter



Pressure loss/10 m equivalent length in m

Fig. 30 - Discharge line diameter



Pressure loss/10 m equivalent length in m

Legend
1 - 38UQZ 016 + 40ALZ 016
2 - 38UQZ 020 + 40ALZ 020
3 - 38UQZ 024 + 40ALZ 024

Selection process:
- Enter the diagram in Fig. 29 or Fig. 30 horizontally at the model number given in the legend.
- The model number lines run horizontally and intersect the various diameter curves (lines going from right to left) and the various gas velocity curves (lines going from left to right).

- Select a diameter and a velocity, and record the one shown in the specified design conditions for the suction or discharge line.
- For the intersection point of the model number line with the selected diameter and velocity run down vertically to find out the pressure loss in kPa or psi for each 10 m equivalent length (length in line metres plus accessories). For other lengths the pressure loss is directly proportional.

Verify that the suction line diameter is sufficent for the discharge line.

Liquid line
The liquid line diameter can be selected using the table below.

Table 6 - Liquid line diameter

	Total equivalent length		
Models	**Up to 10 m**	**From 10 to 30 m**	**From 30 to 45 m**
38UQZ 016 + 40ALZ 016	5/8"	5/8"	3/4"
38UQZ 020 + 40ALZ 020	5/8"	3/4"	3/4"
38UQZ 024 + 40ALZ 024	5/8"	3/4"	7/8"

- For heights above 15 m it is recommended to subcool the liquid line if the flow is ascending - subcool 1 K for each 3,6 m in excess height. In this case add more refrigerant.
- Depending on the actual design calculate the equivalent total line length. This is the sum of the linear metres plus the sum of the equivalent metres of the accessories (bends, valves, etc.).
- From Table 6, select the liquid line diameter for the model and the total equivalent length.

Liquid line requirements:
- Do not insulate the liquid line, except where it is exposed to the outside.
- If the liquid refrigerant flow is descending and the column height exceeds 10 m, a pressure-balancing valve must be installed in the lower part to equalise the pressures between this point and the higher liquid column. If the height is more than 10 m it is recommended to install a manual bypass control valve with a non-return valve in the lower part of the vertical columns (see Figs. 25 and 26).

  The manual control valve permits equalisation of the pressures between the highest and lowest point of the liquid column. Adjust the valve so that the pressure at the expansion system inlet is the same as at the highest liquid column point.

  Control in cooling mode: The non-return valve permits liquid flow when the refrigerant flow is ascending.
- The pressure loss in the liquid line must not be higher than 34 kPa (5 psi).
- In long lines it is advisable to install expansion bends.
- The liquid line must not be isolated, except at the points indicated above.

ATTENTION: Before connecting the refrigerant lines carefully follow the steps below:
- ***Remove the nitrogen holding charge from the refrigerant circuits.***
- ***Use silver alloy rod for soldering purposes, and ensure that this work is done in a nitrogen atmosphere.***
- ***Check the pipes for leaks before welding the joint to the unit pipes.***
- ***Once these connections have been made, carry out another leak test.***

REFRIGERANT CHARGE

The 38UQZ and 40ALZ units are supplied with a nitrogen holding charge. This must be removed before soldering the connecting refrigerant lines to the unit. Once the soldering has been completed, the complete refrigerant circuit must be evacuated then the correct quantity of R-407C refrigerant for each system must be charged.

WARNING: If any brazing is to be done the refrigerant circuit must be filled with nitrogen. Combustion of refrigerant R-407C produces toxic phosgene gas.

To evacuate and charge the unit with refrigerant, use devices that are suitable and specific for refrigeant R-407C, used in these units:
- A pump for exclusive use with R-407C or with a non-return valve in the R-22 pump.
- Hose connections and pressure gauge jumper for R-407C.
- R-407C cylinder in brown colour. Charging is always by weight, using scales and a bottle. Only charge liquid refrigerant.
- Leak detection - it is difficult to detect R-407C refrigerant leaks.

Refrigerant R-407C consists of a non-azeotropic blend of 23% of R-32, 25% of R-125 and 52% of R-134a, and is characterised by the fact that at the time of the change in state the temperature of the liquid/vapour mixture is not constant. All checks must be pressure tests, and the appropriate pressure/temperature ratio table must be used for the interpretation of the values.

Leak detection is especially important for units charged with refrigerant R-407C. Depending on whether the leak occurs in the liquid or the vapour phase, the proportion of the different components in the mixture remaining in the unit is not the same.

The following basic guidelines must be observed:
a) Whenever there is a leak the complete refrigerant R-407C charge that remains in the circuit must be removed.
b) After the leak has been repaired, evacuate the circuit.
c) Take into consideration that:
   - All leaks must be repaired immediately by qualified personnel.
   - Refrigerant must never be discharged to the atmosphere.
   - Use a refrigerant reclaim unit.
   - Any loss of oil from the system during maintenance must be stopped immediately and the collected oil must be removed in accordance with applicable regulations.

d) If, when the unit is run, symptoms of loss of charge (for example, low pressure switch tripping or abnormally low cooling capacities) are detected, first conduct a leak test. For the latter all refrigerant must be removed from the circuit. Transfer the refrigerant to a storage tank and then clean the circuit as described earlier.

e) Before adding the refrigerant charge proceed as follows:
   - Draw a vacuum in the refrigerant circuit until a pressure of 667 Pa (-755 mm Hg) has been reached for at least two hours. At a greater distance between units the period must be longer. **The period of time of the vacuum is important.**
   - Check that there are no refrigerant leaks.

   Continue to charge refrigerant as described below:

   Total charge = unit charge plus additional charge per metre suction line and per metre liquid line.

   - The refrigerant charge for the 38UQZ and 40ALZ units is given in Table 1 - Physical Data.
   - For each metre of refrigerant connection line installed, refrigerant has to be added in accordance with the table below for the liquid and gas lines:

Table 7 - Refrigerant charge (g/m)

Diameter	1/2"	5/8"	3/4"	7/8"	1-1/8"	1-3/8"
Liquid line	75	120	180	250	420	645
Suction line	14	23	34	47	81	123

OIL RECHARGE

If any oil needs to be added to fill the siphons and above all when the total line length is high, use the same type and brand as used in the compressors.

START-UP

Necessary checks/precautions before start-up:

- Confirm that the electrical power source agrees with the unit nameplate rating.
- Ensure that the power connections between speed and thermostat have been made and correctly tightened.
- Check that there are no refrigerant leaks in the soldered refrigerant lines, and that the refrigerant and oil charges are correct.
- Check the 40ALZ drain connection and that the water is drained correctly.
- Ensure that the unit is level and well-supported.
- Check for proper fan rotation direction
- Check the condition of the ductwork in case damage has occurred during installation.
- The air filter should be clean and in place.
- All the panels should be fitted and firmly secured with the corresponding screws.
- Make sure that compressors float freely on the mounting springs.

WARNING: The compressors are mounted on vibration isolators. Do not loosen or remove the support mounting bolts.

IMPORTANT: Actual start-up should only be done under the supervision of a qualified refrigeration mechanic.

Initial checks

With the unit in operation, ensure that the values shown on the high and low pressure gauges are within the normal limits. It is advisable to simulate unit shutdown due to high and low pressure, in order to make sure that the pressure-stats work properly. To do so, proceed as follows with the unit operating in cooling mode:

- **High pressure shutdown:** Completely cover the outdoor air inlet, or disconnect the outdoor fan and motor. The unit should stop at a pressure of 2844 kPa.
- **Low pressure shutdown:** Cover the indoor air inlet, or disconnect the indoor fan and motor. Observe the low pressure gauge. The unit should stop at a pressure of 265 kPa.

The pressure switches are automatically reset. As this takes some time, the unit will stop, the pressures will equalise, and then the unit will be reset and will start up again.

Check that the motor and compressor consumptions are approximately the same as those shown in the fan performance curves and in the cooling capacity tables for the unit operating conditions (indoor and outdoor temperatures, air flow and static pressures, based on the speed, etc.).

UNIT COMPONENTS

The 38UQZ and 40ALZ units incorporate the following components:

- Three-phase hermetic reciprocating compressors with internal thermal protection in the 38UQZ units.
- Refrigerant-to-air heat exchangers (evaporators and condensers) made of copper tubes and pre-treated, water-resistant aluminium fins.
- All-copper refrigerant circuit. R-407C refrigerant control in the 40ALZ indoor units using thermostatic expansion valves or throttle valves depending on the model. Thermal expansion valves in bypass mode with a non-return valve and the expansion valves.
- High and low pressure switch and filter drier (38UQZ).
- Soldered copper refrigerant connection lines.
- Complete internal wiring. Main on/off disconnect switch in the 38UQZ outdoor units. These units also include the complete electrical boxes with compressor contactors. Thermomagnetic disconnect switches for compressors, fan motors and crankcase heater.
- Fans:
  The 40ALZ indoor units have centrifugal fans driven by three-phase motors with adjustable belt-pulley drives. The 38UQZ outdoor units have direct-drive propeller fans.
- Thermal and acoustical insulation. Flexible shock absorbers in all moving components.
- Air filters in the 40ALZ indoor units.
- Defrost control using a time/temperature-activated thermostat. Compresor crankcase heaters. Liquid slugging tank. Discharge line muffler and thermal protection. Four-way reversing valve.
- Pre-painted galvanised sheet steel casings.
- The indoor and outdoor units can be used with the accessory ambient thermostat in heat pump mode.

DESCRIPTION OF UNIT PROTECTION DEVICES

The unit includes the following compressor protection devices:

- **Internal compressor protection device** for all 38UQZ units to avoid superheat.
- **Short-cycle protection** standard for units 38UQZ.
- **Indoor fan motor thermomagnetic switch in the 38UQZ unit control box.**
- **Thermomagnetic compressor, indoor fan motor and crankcase heater disconnect switch, in the 38UQZ unit control box.**
- **High pressurestat:** This protects the unit against excessive condensing pressure.

  The high pressurestat has factory-fixed non-adjustable settings. To check, see section Initial checks.

- **Low pressurestat:** This protects the 40ALZ units against excessive low pressure in the evaporator or in the refrigerant lines. It is not operational in heat pump mode.

  The low pressurestat has factory fixed non-adjustable settings. To check, see section Initial checks.
- Discharge line thermal protection.
- Defrost control thermostat. Time and temperature activated control. Defrost start and stop temperature limit. Controls the time between defrost cycles and defrost duration.

CAUTION: When any of these cuts out, the unit stops and will not re-start until the contacts have been reclosed after rectification of the fault, when resetting is automatic.

Table 8 - Pressure switch, overheat switch, defrost thermostat and anti short cycle switch settings

	Cut-out	Cut-in	Reset	
High pressurestat	*2844 kPa	*1863 kPa	Automatic	
Low pressurestat	*265 kPa	*363 kPa	Automatic	
* Factory-calibrated				
Discharge line thermal switch		*120°C		
* Factory-calibrated				
Anti-short cycle setting		3 minutes		
Defrost thermostat or control				
Defrost temperature:				
Start		-3°C*		
End		+19°C*		
Time between defroat cycles (minutes)		30*	45	90
Maximum defrost time		12 minutes		

* Refrigerant temperature in the outdoor heat exchanger.

WARNING: Alteration of factory settings other than the design setpoint, without manufacturer's authorisation, may void the warranty.

Table 9 - Operating limits

Zone	Air temperature °C	
	Dry bulb	Wet bulb
Cooling operation:		
Indoor		
Maximum	+35	+21
Minimum	+19	+14
Outdoor		
Maximum	+46	-
Minimum	19*	-
Heating operation:		
Indoor		
Maximum	+27	-
Outdoor		
Maximum	+24	+18
Minimum	-10	-
Indoor air flow		
Maximum	+15% of nominal value	
Minimum	-15% of nominal value	
Hot water coil (accessory/option)		
Maximum water temperature	80°C	

* With head pressure control, the unit will operate at temperatures below 19°C.

ATTENTION: Operation of the units at temperatures, air flows, etc. outside the limits indicated in the table above can cause serious damage to the units and will void the Carrier warranty.

ATTENTION: Before starting any servicing or maintenance operation on the unit, make sure that the power supply has been disconnected. A current discharge could cause personal injury.

In order to obtain maximum performance from the unit special attention should be paid to the following points:

- **Electrical connections:** The supply voltage should be within the limits permitted by the compressor and the unit. Ensure that no faulty contacts exist in the terminal blocks, contactor boards, etc. Make sure that all the electrical connections are properly tightened, and that all the electrical components (contactors, relays, etc) are firmly secured to the corresponding rails.

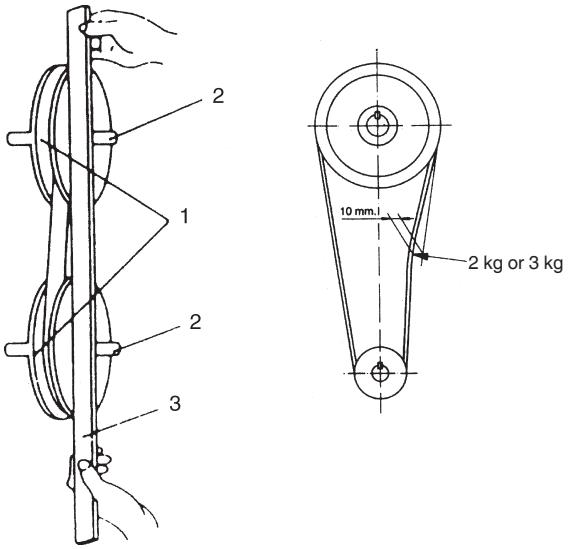
  Pay special attention to the condition of the connecting cables between the control elements and the electrical box, and to that of the unit power supply cable. They should not be twisted and there should be no slits or notches in the insulation. Check the starting and running consumptions are within the limits specified in the corresponding technical information.
- **Drainage:** Frequently check that the drain is not obstructed, and that the condensate pan is clean and level. Ensure that the condensate drain pan of the 40ALZ unit is perfectly clean and does not contain sludge or other foreign substances, corrosion, etc. and is level.

  Also verify the defrost water outlet in the 38 UQZ units.
- **Inlet filter:** This should be cleaned periodically. The frequency depends on the purity of the entering air. The filter may be cleaned with a household vacuum cleaner, or by immersing it in water.
- **Refrigerant circuit:** Ensure that there is no leakage of refrigerant or oil from the compressor. Check that the high and low side operating pressures are normal. Make sure that the coils are not dirty, if necessary clean with water and air. Straighten bent aluminium fins with a suitable fin comb. Check for unusual compressor noise.

  Check for correct operation of the 4-way or cycle reversing valve.
- **Controls:** Check the operation of all electric controls, high and low pressurestats, thermostats, etc.
- **Fans:** The fan of the 38UQZ unit must rotate freely. There must not be any foreign elements in the fans of the 40ALZ indoor units. Please check:
  a) the condition of the pulleys
  b) the condition of the belts
  c) the belt tension.

  Periodically check the condition of the belts and pulleys and ensure that they are correctly aligned. Also ensure that the belt tension is correct. At the first start-up, and after a longer shut-down period, recheck the belt tension after a few hours of operation.

Fig. 31



Legend
1 Pulleys
2 Motor and fan shafts must be parallel
3 Straight-edge must be parallel with belt

- **Lubrication:** Both the motors and the fans have factory-lubricated and sealed bearings, and need no further lubrication.

  The compressor has its own oil supply, including the amount for the siphons and refrigerant lines. Oil should not be added unless a leak has occurred. Always use oil of the same brand and type that was used for the original charge.

Servicing recommendations

- Before replacing any of the elements in the cooling circuit, ensure that the entire refrigerant charge is removed from both the high and low pressure sides of the unit.
- The control elements of the cooling system are highly sensitive. If they need to be replaced, care should be taken not to overheat them with blowlamps whilst soldering. A damp cloth should be wrapped around the component to be soldered, and the flame directed away from the component body.
- Silver alloy soldering rods should always be used.
- If the total unit gas charge has to be replaced, the quantity should correspond to the original unit gas and liquid charge, plus the required charge for the refrigerant lines. The unit should be properly evacuated beforehand.
- During unit operation all panels should be in place, including the electrical box access panel.
- If it is necessary to cut the lines of the refrigerant circuit, tube cutters should always be used and never tools which produce burrs. All refrigerant circuit tubing should be of copper, specially made for refrigeration purposes.

Compressor replacement

NOTE: This operation must be done by a qualified technician.

When an internal fault occurs, the compressor must be replaced. This must be done as detailed below:

- Disconnect the unit from the electrical supply.
- Remove the panels.
- Remove the gas from the refrigerant circuit using recovery equipment to avoid harming the atmosphere.
- Electrically disconnect the compressor.
- Unbraze or unscrew the suction and discharge lines, taking care not to damage the rest of the components.
- Remove the fastenings from the compressor.
- Replace the compressor, ensuring that it contains sufficient oil.
- Check if the oil of the defective compressor contains any acidity from burnt-out windings.
- If the oil contains acid, this will also be present in the refrigerant circuit. All the acid must be removed from the refrigerant circuit, otherwise the new compressor will also be damaged. In order to remove the acid proceed as follows:
  a) Thoroughly clean the refrigerant circuit using dry nitrogen in the opposite direction to the refrigerant flow, or another cleaning element. Also carefully clean the separate parts of the refrigerant circuit.

     Install anti-acid filters in the liquid line. Solder the refrigerant lines. Evacuate the lines and charge them with refrigerant. Operate the unit for some time. Remove the oil and check the acidity.

     If there is still acid present, repeat the steps above several times, until no acid exists.

  b) If you do not want to carry out the procedure described under (a), introduce an anti-acid substance into the refrigerant circuit, if the refrigerant line length is short.
  c) It is also possible to install an anti-acid filter in the suction lines.
  d) Analyse the refrigerant circuit acidity several times and replace the anti-acid filters several times until no acidity exists.
  e) Remove the filter from the liquid line in the 38UQZ units. Install a new filter when no acid remains in the circuit.
- Once the defective compressor has been replaced by a new one and the oil has been analysed, proceed as follows:
  - Braze or screw in the lines.
  - Connect the compressor according to the wiring diagram.
  - Evacuate the compressor.
  - Carry out a leak test. Repair any leaks detected.
  - Fill the refrigerant charge indicated on the nameplate, plus the required charge for the refrigerant connection lines.

Table 10 - Options/accessories

38UQZ-40ALZ	Option	Accessory
Heating coils for 40ALZ indoor units:		
A - electric resistance heaters	x	x
B - hot-water coils	x	x
Head pressure control for cooling operation at outdoor air temperatures below +19°C (38UQZ)*	x	x
Special drives for higher indoor unit fan static pressure (40ALZ - installed in the units on request)	-	x
Room thermostat	x	-

* To be requested at time of order, installed in the 38UQZ units.

FINAL RECOMMENDATIONS

The unit you have purchased has undergone strict quality control procedures before leaving the factory.

All components, including the control systems and electrical equipment, etc., are certified by our Quality Control Department, and tested under the harshest possible operating conditions in our laboratories. However, after leaving the factory, it is possible that one or more of these elements may be damaged due to causes beyond our control. In such an event, **the user should not work on any of the internal components, or subject the unit to operating conditions which are not specified in this manual,** since serious damage may result and the guarantee would be invalidated. Repair and maintenance work should always be left to the installer.

IMPORTANT: All recommendations concerning unit installation are intended to be as a guideline. Qualified technicians or installers must carry out the installation correctly and in accordance with applicable local, national and European standards and with the design conditions. They should also comply with all applicable regulations for air conditioning and refrigeration installations.

NOTE: The manufacturer does not accept responsibility for any malfunctions resulting from misuse of the 38UQZ and 40ALZ units, or from an incorrect installation and the damage caused by this.

Table 11 - Troubleshooting chart

Symptoms	Cause	Remedy
Unit does not start	No power supply	Connect power supply
	Main switch open	Close switch
	Low line voltage	Check voltage and remedy the deficiency
	A protection has tripped	Reset
	Contactor stuck open	Replace contactor
	Seized compressor	Replace compressor
Unit starts and stops frequently	Defective compressor contactor	Replace contactor
	Defective compressor	Replace compressor
	Refrigerant losses	Check. Remove the charge. Repair leaks. Evacuate. Recharge with refrigerant
Unit continuously cuts out at low pressure	Defective low pressurestat	Replace pressurestat
	Refrigerant losses	Check and add the necessary quantity
	Indoor fan does not operate	Check fan motor
Unit continuously cuts out at high pressure	Defective high pressurestat	Replace pressurestat
	Refrigerant losses	Check and correct
	Outdoor fan does not operate	Check fan motor
Abnormal system noise	Piping vibration	Support piping and check drainage
	Noisy compressor	Check and change if necessary
	Badly fitting panels	Install correctly
Water loss	Defective drainage connections	Check and tighten if necessary
Compressor loses oil	Leak in system	Repair leak

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