



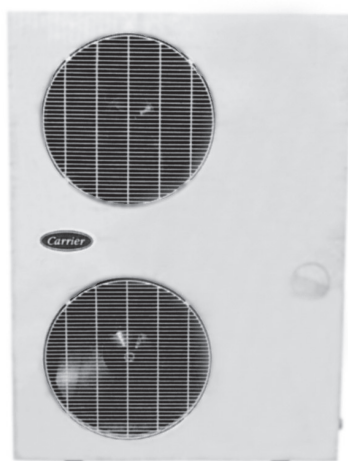
38XTZ 007-024 40ABZ 007, 008, 016, 020 and 024 40ALZ 011 and 014

Split system air-cooled air
conditioners

MASTER LINK I
Models 38XTZ 016 to 024



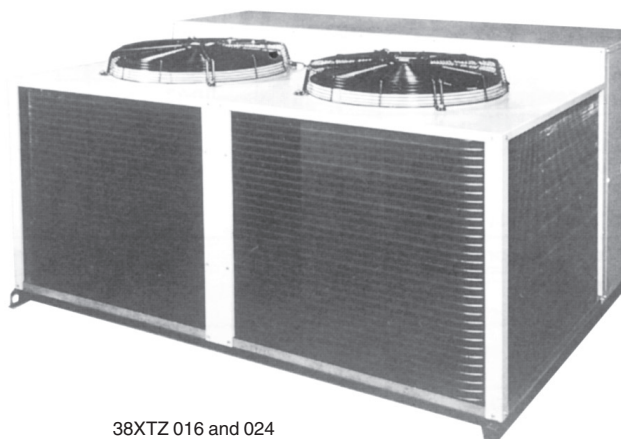
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38XTZ 007 and 008



40ABZ/ALZ



38XTZ 016 and 024

Installation, Operation and Maintenance Instructions

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START-UP CHECK LIST

Start up date:

Equipment sold by: Contract No:

Installed by: Contract No:

Site address:

Equipment type and serial No: 38XTZ

40ABZ/ALZ.....

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 38XTZ:

Indoor unit 40ABZ/ALZ:

Entering air temp.: °C

Entering air temp.: °C

Leaving air temp.: °C

Leaving air temp.: °C

Pressure drop (air): kPa

Pressure drop (air): kPa

Discharge air pressure: Pa

Discharge air pressure: Pa

Fan motor input: Ph. 1: Volts

Fan motor input: Ph. 1: Volts

Ph. 2: Volts

Ph. 2: Volts

Ph. 3: Volts

Ph. 3: Volts

SAFETY DEVICE SETTING 38XTZ 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 40ABZ/ALZ***		007	008	011***	014***	016	020	024
Outdoor unit 38XTZ		007	008	011	014	016	020	024
Cooling capacity*	kW	18.9	22.3	26.9	36.6	45.1	52.3	68.4
Refrigerant charge (R-407C)**	kg	6.35	6.80	8.35	8.27	6.7x2	6.6 x 2	8.6 x 2
Outdoor unit 38XTZ		007	008	011	014	016	020	024
Weight	kg	140	170	200	300	450	488	503
Compressor		Reciprocating, hermetic						
Quantity		1	1	1	1	2	2	2
Oil charge (each)	l	1.92	4.0	4.0	4.0	4.0	4.0	4.0
Refrigerant-air heat exchanger (condenser)		Copper tubes, aluminium fins						
Face area	m²	1.80	1.80	1.86	1.45	2.97	2.97	2.97
Number of rows		2	3	3	3	2	3	3
Fan		Propeller						
Quantity		2	2	1	2	2	2	2
Nominal air flow	l/s	1805	1639	2500	4445	5000	6239	6389
Indoor unit 40ABZ/ALZ***		007	008	011***	014***	016	020	024
Weight	kg	135	140	160	236	290	305	325
Refrigerant-air heat exchanger (evaporator)		Copper tubes, aluminium fins						
Face area	m²	0.69	0.69	0.70	1.03	1.14	1.14	1.14
Number of rows ... fins/m		4...394	4...394	4...472	3...394	4...394	5...472	5...551
Fan		Two, double-inlet centrifugal						
Nominal air flow	l/s	1416	1583	1777	2694	2722	2972	3250
Air filter		Washable						
Quantity		1	1	2	2	3	3	3
Width x height	mm	612 x 600	612 x 600	612 x 600	740 x 700	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.

** The refrigerant charge is for the complete system (38XTZ and 40ABZ or 40ALZ), but excludes the refrigerant connection lines.

*** Sizes 011 and 014 are 40ALZ models.

Table 2 - Electrical data (3 phase, 50 Hz)

38XTZ – 40ABZ/ALZ		007		008		011***		014***		016		020		024	
Nominal supply	V	220	380-415	220	380-415	220	380-415	220	380-415	220	380-415	220	380-415	220	380-415
Voltage range	V	198-253	342-440	198-253	342-440	198-253	342-440	198-253	342-440	198-253	342-440	198-253	342-440	198-253	342-440
Nominal power input*	kW	8.7	8.7	9.52	9.52	12.66	12.66	17.01	17.01	19.70	19.70	26.82	26.82	33.30	33.30
Nominal current drawn*	A	22.8	15.6	25.0	16.9	33.2	22.0	44.6	29.0	51.7	35.8	70.4	46.5	87.4	56.0
Starting current**	A	165	96	157	99	228	146	270	171	263	167	348	219	406	257
Maximum power input***	kW	9.5	9.5	10.6	10.6	14.0	14.0	18.4	18.4	21.8	21.8	29.3	29.3	34.7	34.7
Maximum current drawn***	A	24.9	17.0	27.8	18.5	36.7	23.7	48.3	31.1	57.2	38.6	76.9	51.0	91.1	58.0

* 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 40°C db for sizes 007, 011, 014, 020 and 024 and 44°C db for sizes 008 and 016.

*** 40ALZ models.

Note: The power input of the optional/accessory electric resistance heaters (that can be installed in the unit) is not included.

Table 3 - Operating limits

Zone	Air temperature °C	
	Dry bulb	Wet bulb
Indoor		
Maximum	+35	+21
Minimum	+19	+14
Outdoor		
Maximum	+40/44*	-
Minimum	19**	-
Indoor air flow		
Maximum	+20% of nominal value	
Minimum	-20% of nominal value	
Hot water coil (accessory/option)		
Maximum water temperature	80°C	

* Sizes 007, 011, 014, 020 and 024: 40°C

Sizes 008 and 016: 44°C

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

Table 4 - Standard refrigerant line diameters (inches)

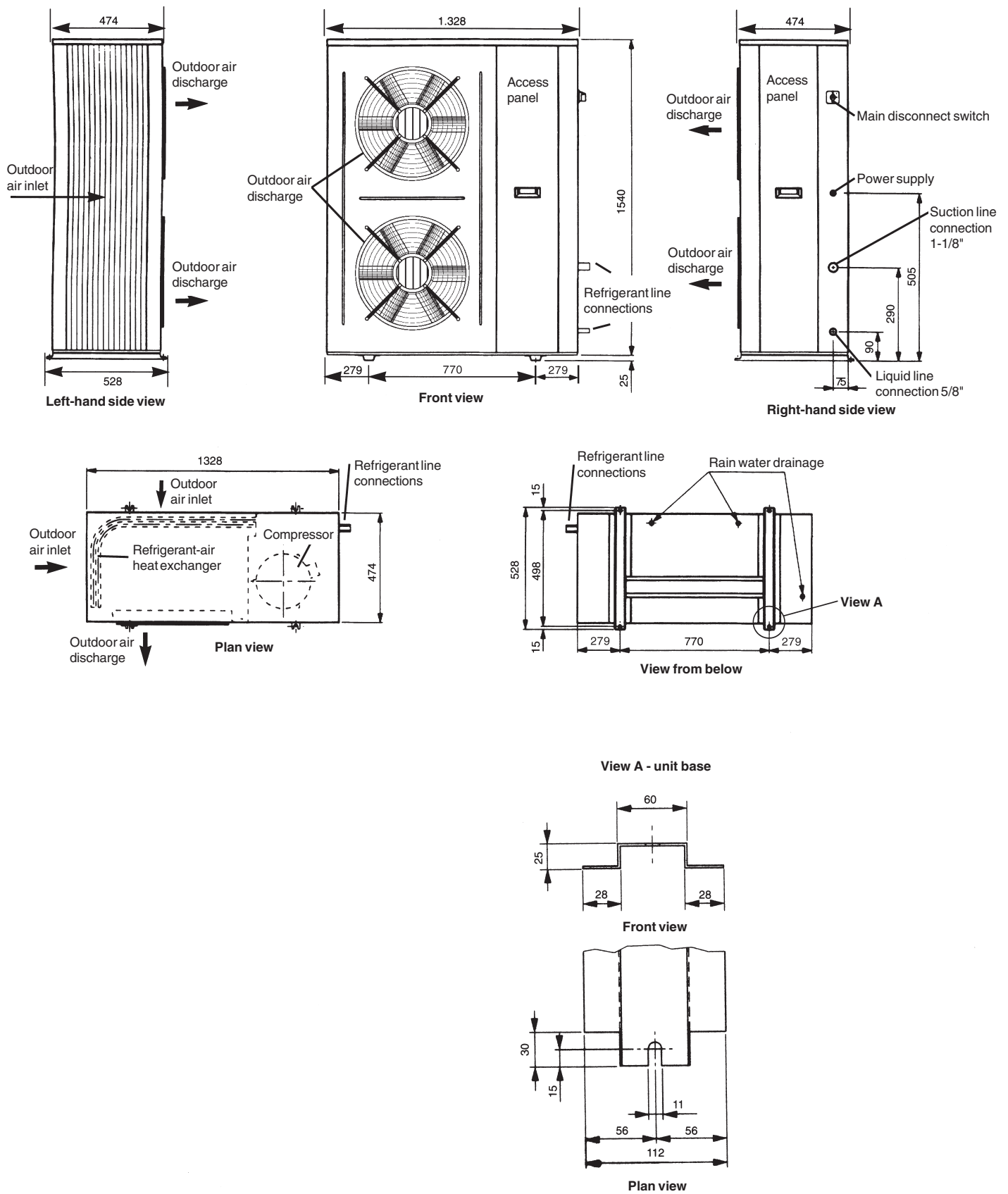
38XTZ 40ABZ/ALZ	Suction line ø	Quantity	Liquid line ø	Quantity
007	1-1/8	1	5/8	1
008	1-1/8	1	5/8	1
011	1-1/8	1	5/8	1
014	1-1/8	1	5/8	1
016	1-1/8	2	5/8	2
020	1-1/8	2	5/8	2
024	1-1/8	2	5/8	2

Note: These values are the refrigerant line diameters at the unit outlet.

The pipes are soldered copper-tube pipes.

Fig. 1 - Dimensions, mm

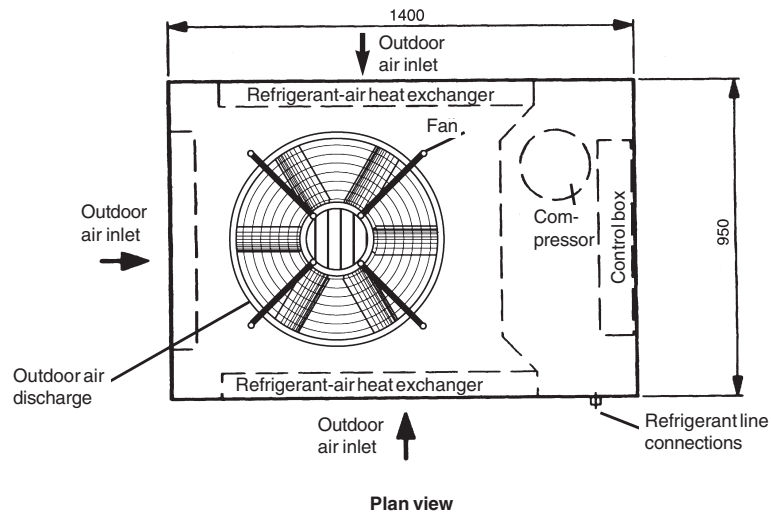
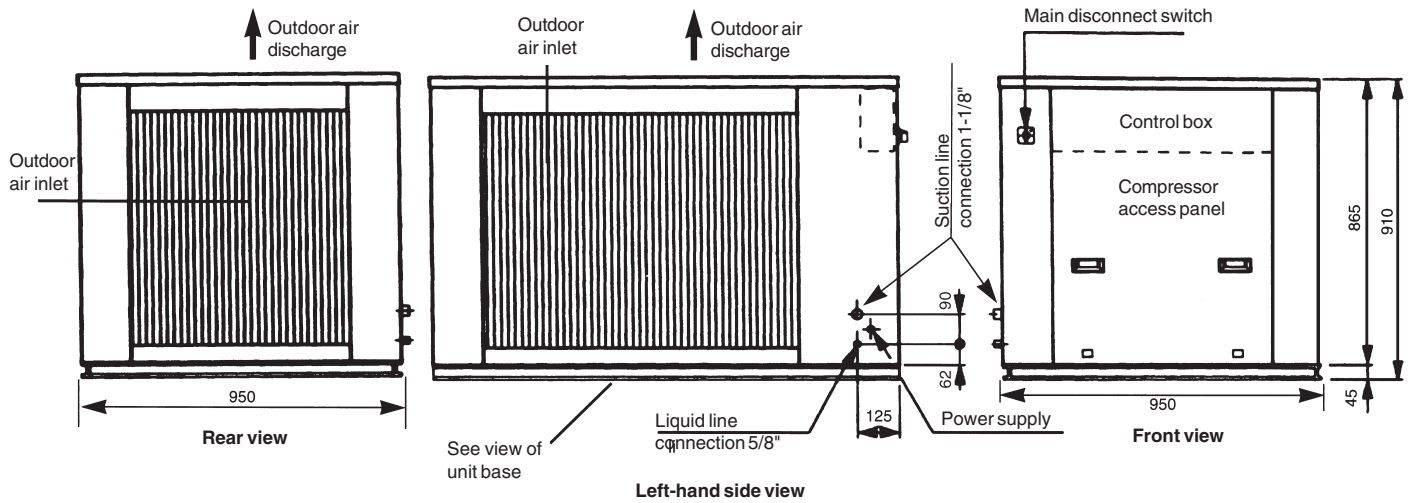
38XTZ 007, 008



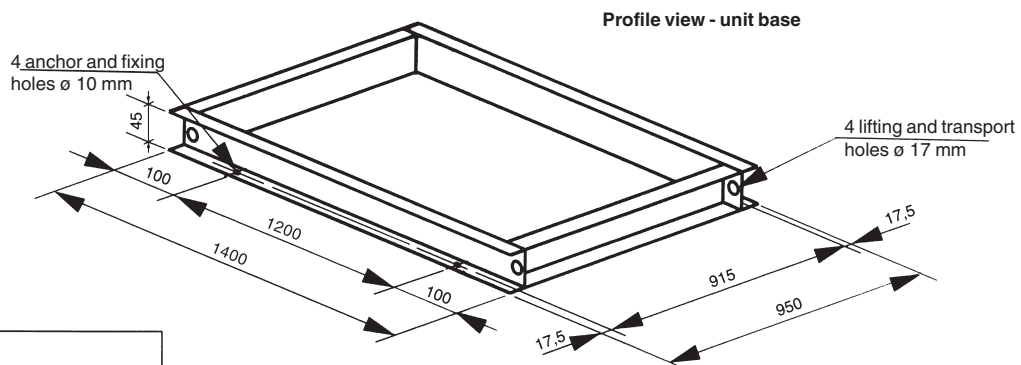
When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Fig. 2 - Dimensions, mm

38XTZ 011



Note:
Rain water is drained through the hole under the fan in the base panel.

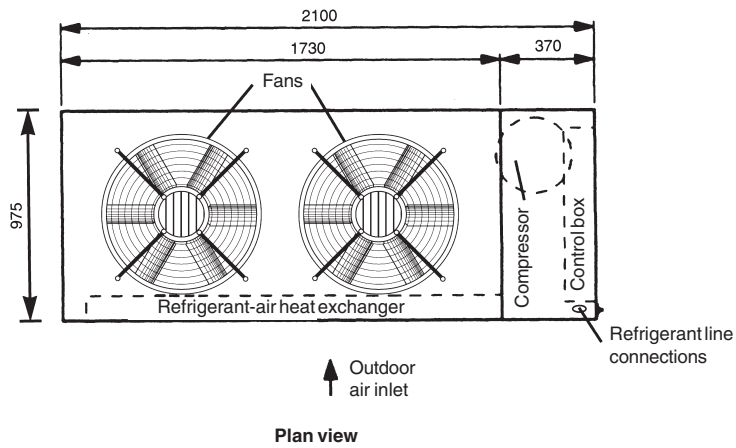
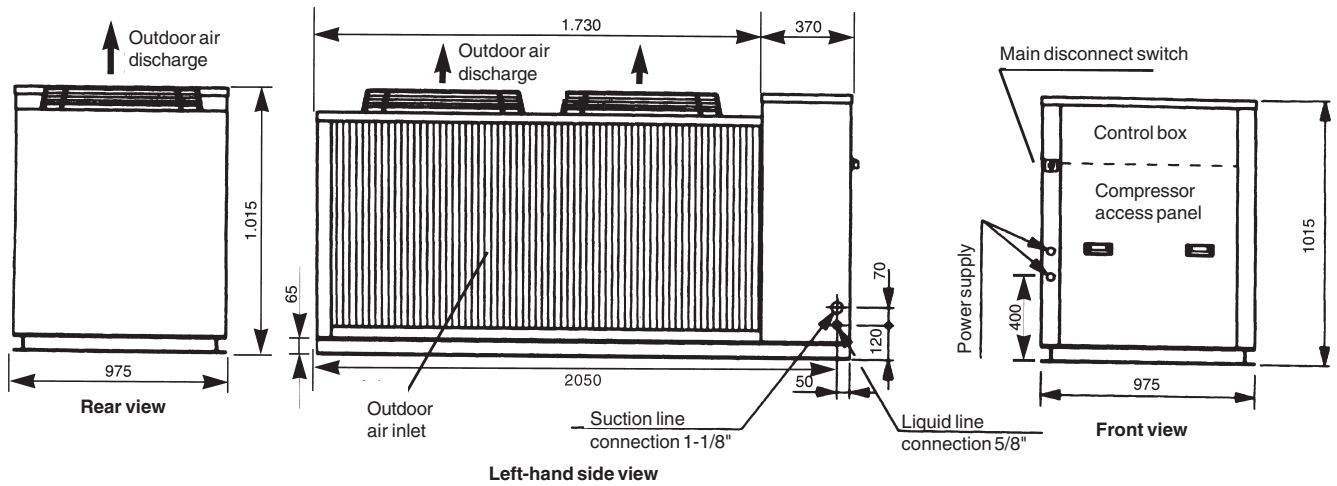


Note:
The unit includes four anchor holes in the base section.

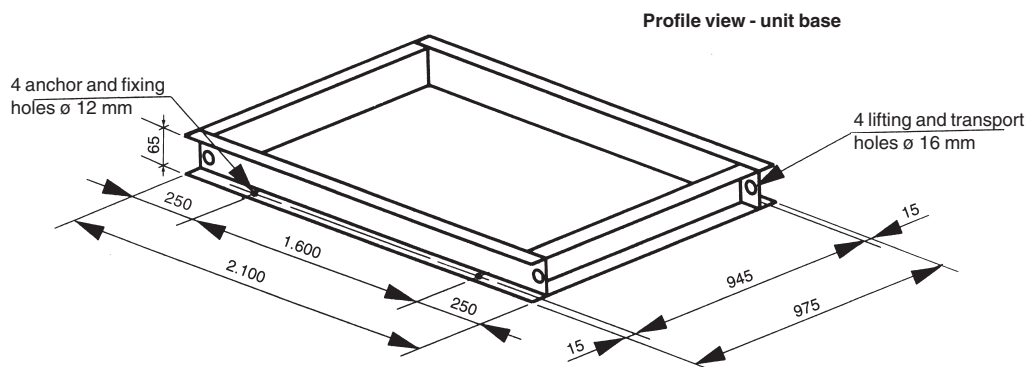
When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Fig. 3 - Dimensions, mm

38XTZ 014



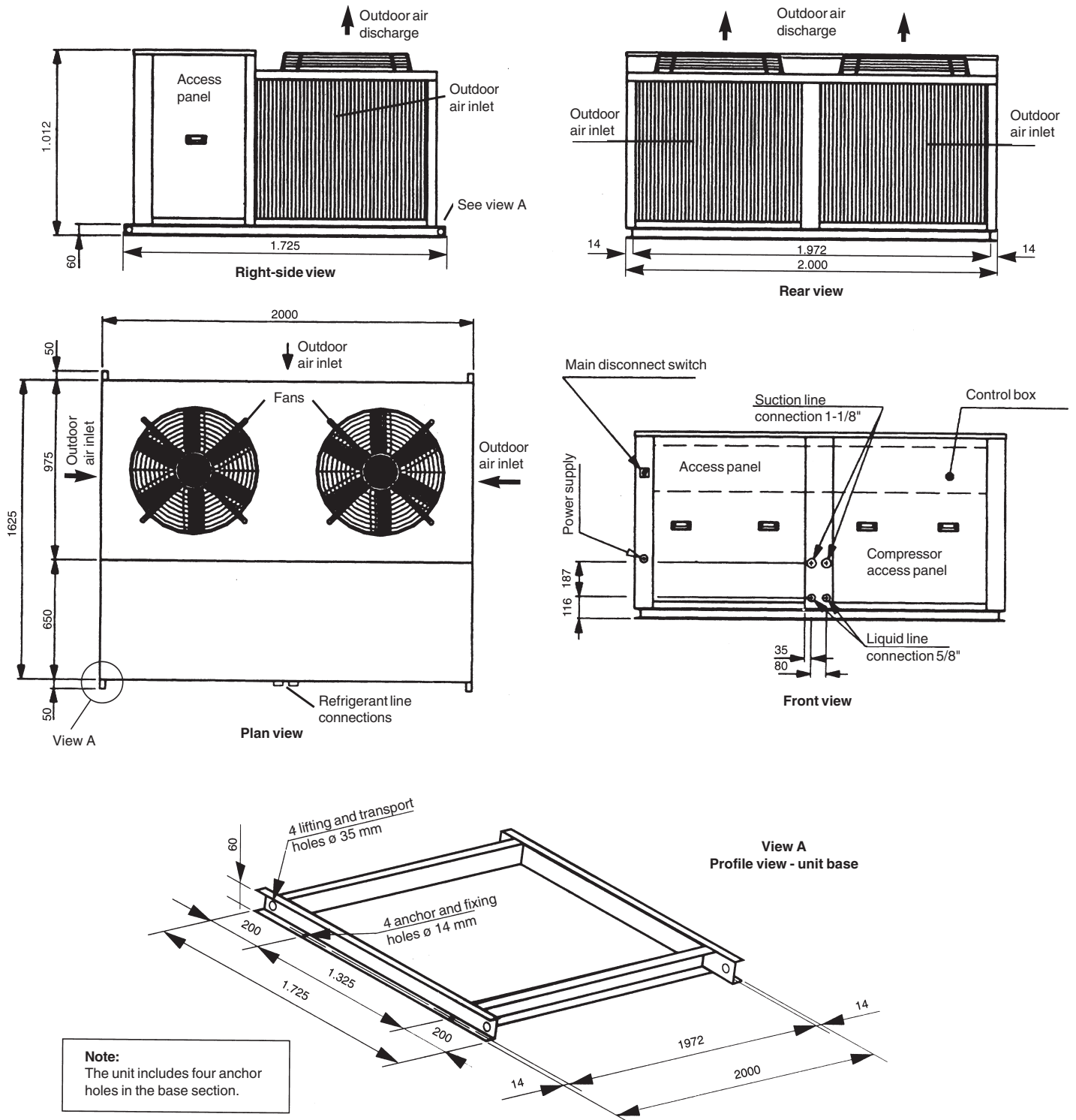
Note:
Rain water is drained through holes in the lower part of the base under the outdoor unit heat exchanger and the fans.



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

Fig. 4 - Dimensions, mm

38XTZ 016, 020 and 024

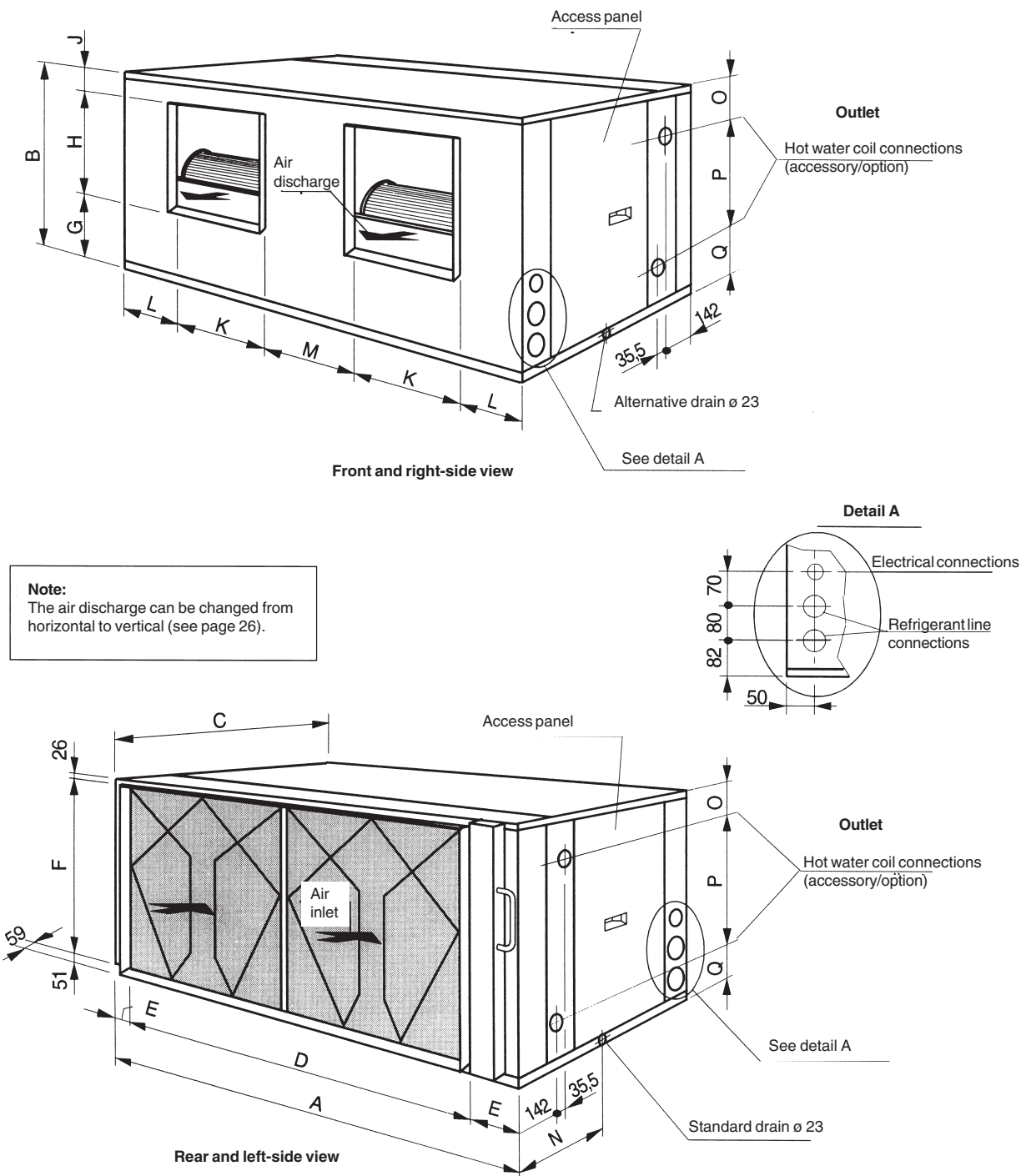


Note:
Rain water is drained through holes in the lower part of the base under the outdoor unit heat exchanger and the fans.

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

Fig. 5 - Dimensions, mm

40ABZ/ALZ 007-014



Dimensions, mm

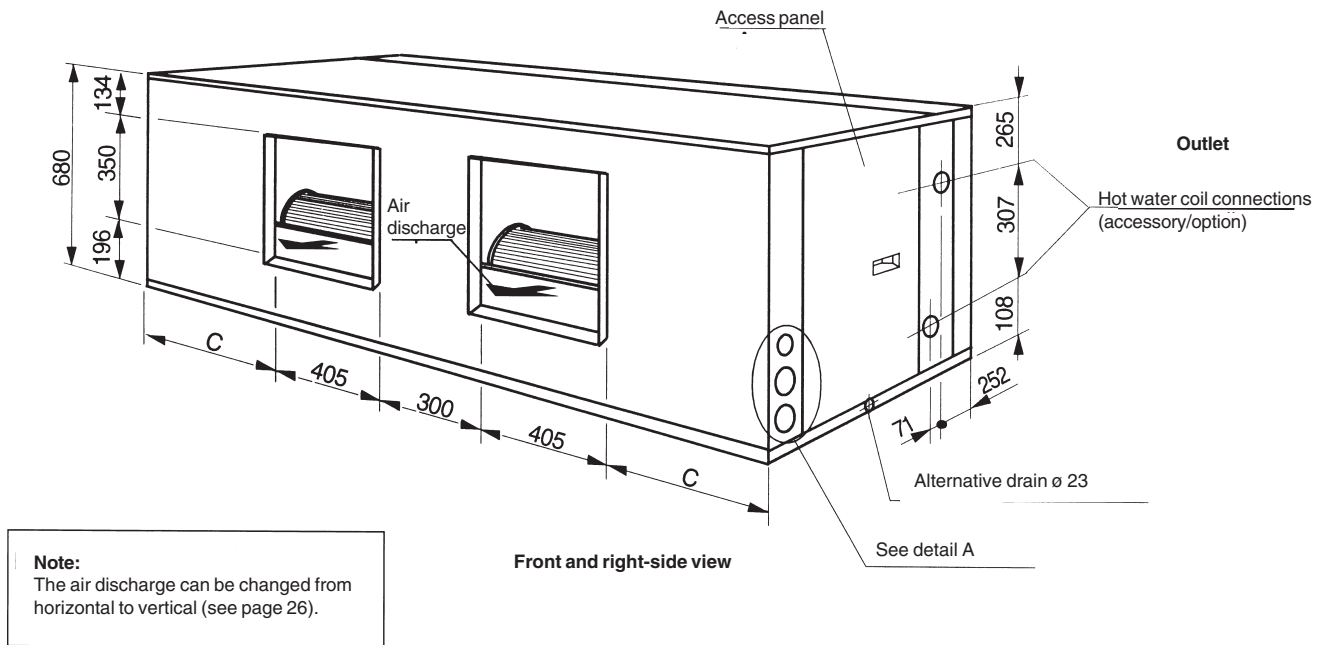
40ABZ/ALZ	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q
007, 008, 011	1348	662	807	1166	91	585	164	294	204	336	211	254	465	160	331	171
014	1588	788	910	1366	111	711	196	350	242	201	240.5	305	455	203	372	213

Note: Sizes 011 and 014 are 40ALZ.

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

Fig. 6 - Dimensions, mm

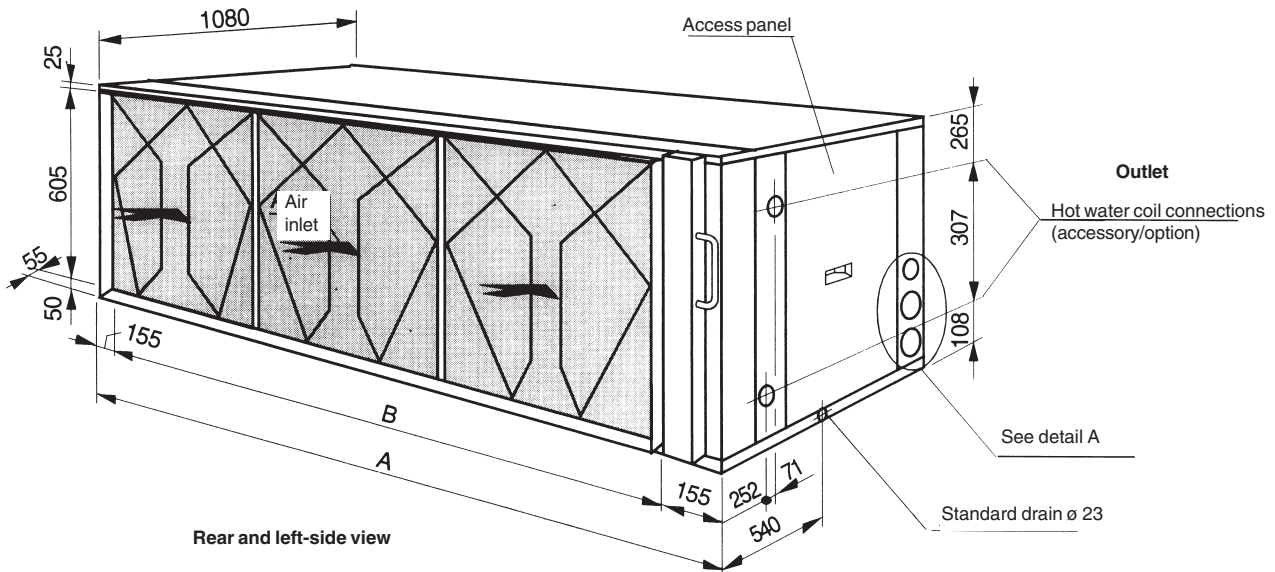
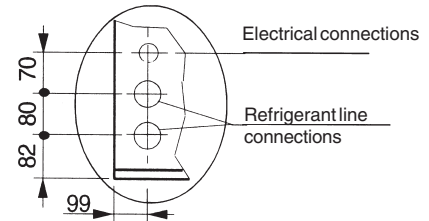
40ABZ 016-024



Dimensions, mm

40ABZ	A	B	C
016, 020	2125	1815	507.5
024	2625	2315	757.5

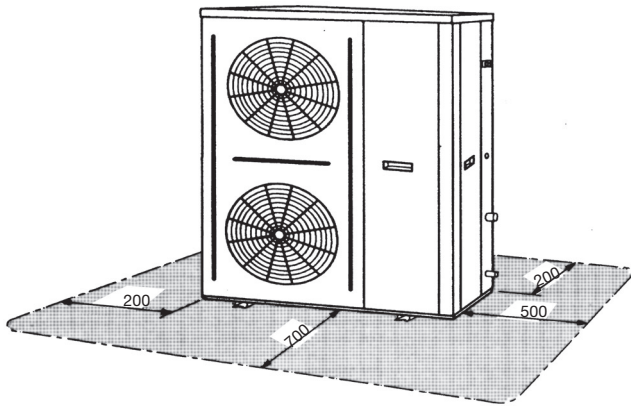
Detail A



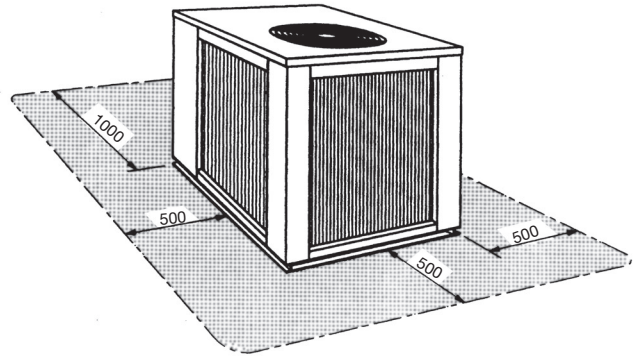
When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Fig. 7 - Service clearance, mm

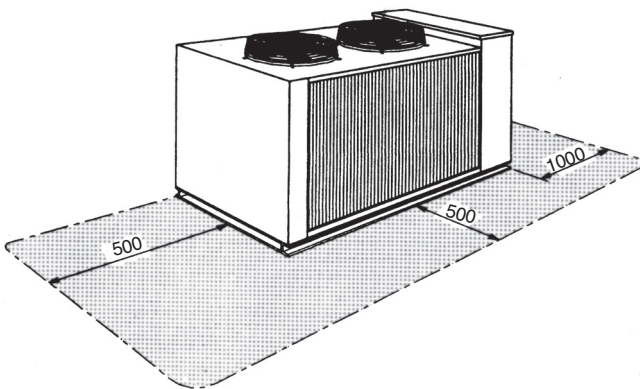
38XTZ 007, 008



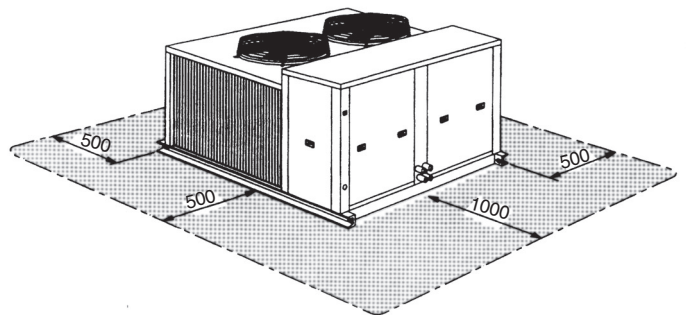
38XTZ 011



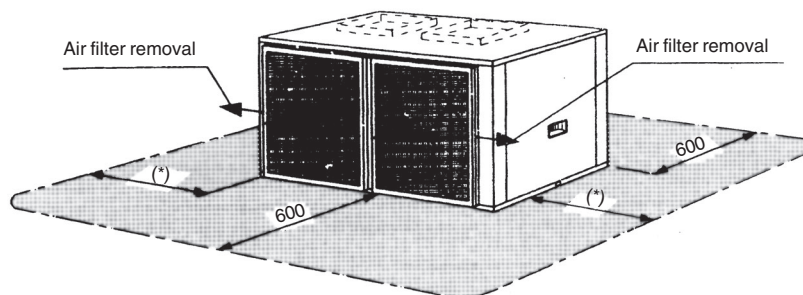
38XTZ 014



38XTZ 016, 020, 024



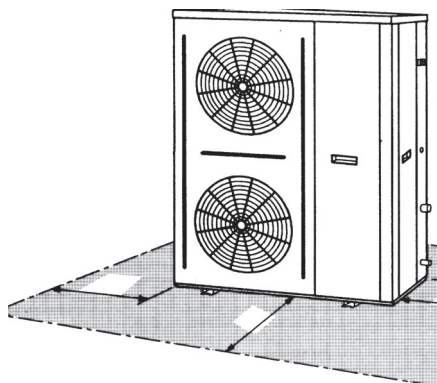
40ABZ/ALZ (all sizes)



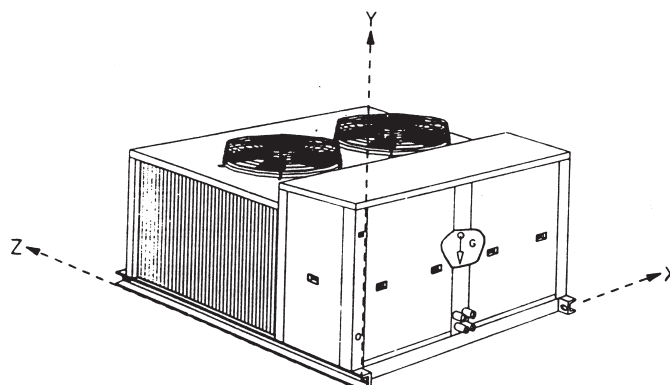
* Required service space for the removal of the air filter and the fans (in case of a breakdown). Clearance should be the same as the unit width.

Fig. 8 - Centre of gravity coordinates (mm - approx.)

38XTZ 007 and 008



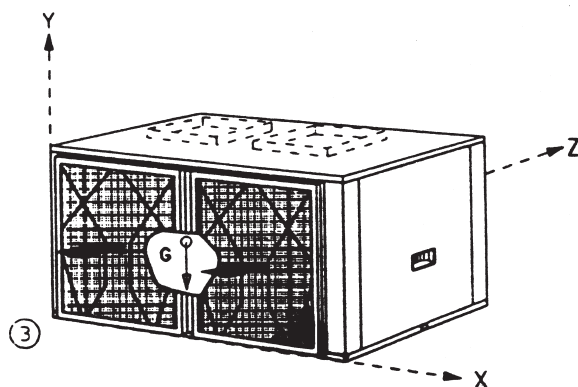
38XTZ 011 to 024



38XTZ	007	008	011	014	016	020	024
XG*	772	782	564	525	1000	1000	1000
YG*	380	380	412	536	405	431	430
ZG*	173	176	843	741	750	805	420

* Measured from point +

40ABZ/ALZ (all sizes)



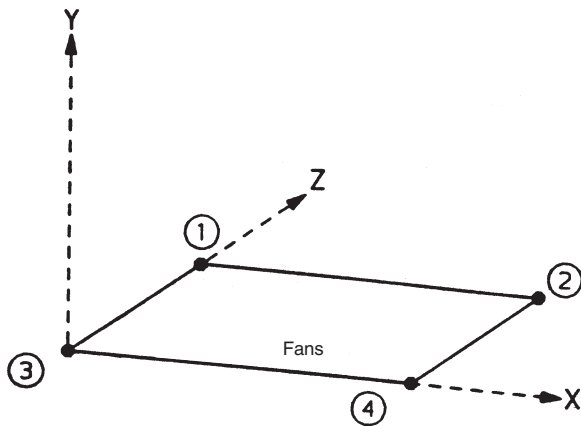
40ABZ/ALZ	007	008	011*	014*	016	020	024
XG**	943	950	955	1115	1620	1625	1870
YG**	225	225	225	257	230	230	230
ZG**	415	412	415	452	520	520	520

* Models 40ALZ

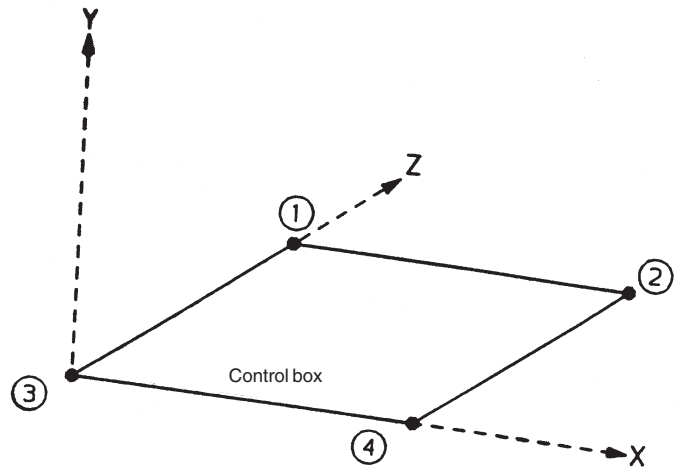
** Measured from point +

Fig. 9 - Weight distribution (kg - approx.)

38XTZ 007 and 008

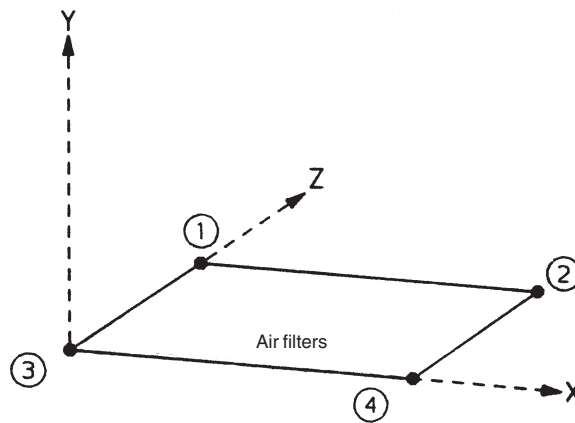


38XTZ 014 to 024



Point	38XTZ 007	008	011	014	016	020	024
1	29	34	50	40	90	105	110
2	39	49	50	60	90	105	110
3	30	35	36	80	135	139	141
4	42	52	64	120	135	139	142

40ABZ/ALZ



Point	40ABZ/ALZ* 007	008	011*	014*	016	020	024
1	21	32	37	54	43	46	53
2	48	33	38	55	47	51	53
3	20	37	42	63	100	104	110
4	46	38	43	64	100	104	109

* Models 40ALZ

Fig. 10 - Fan curves (standard)

40ABZ 007

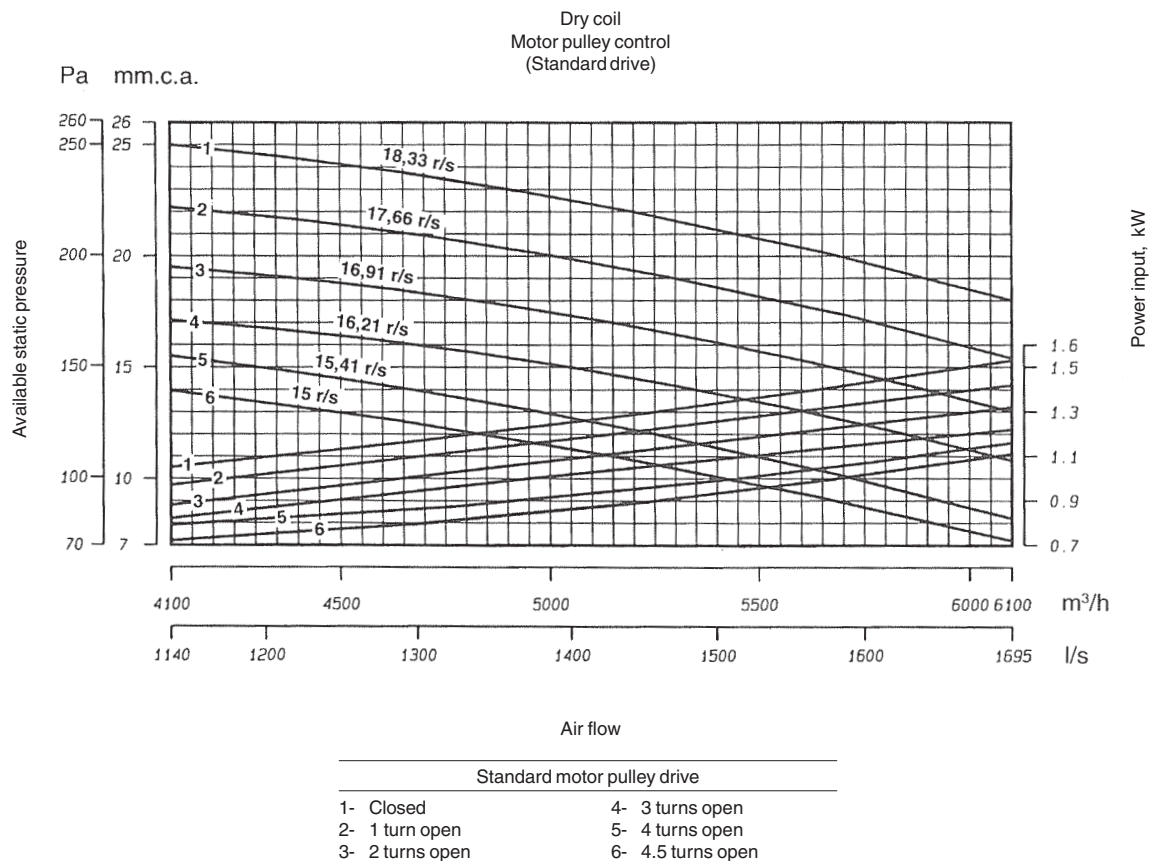
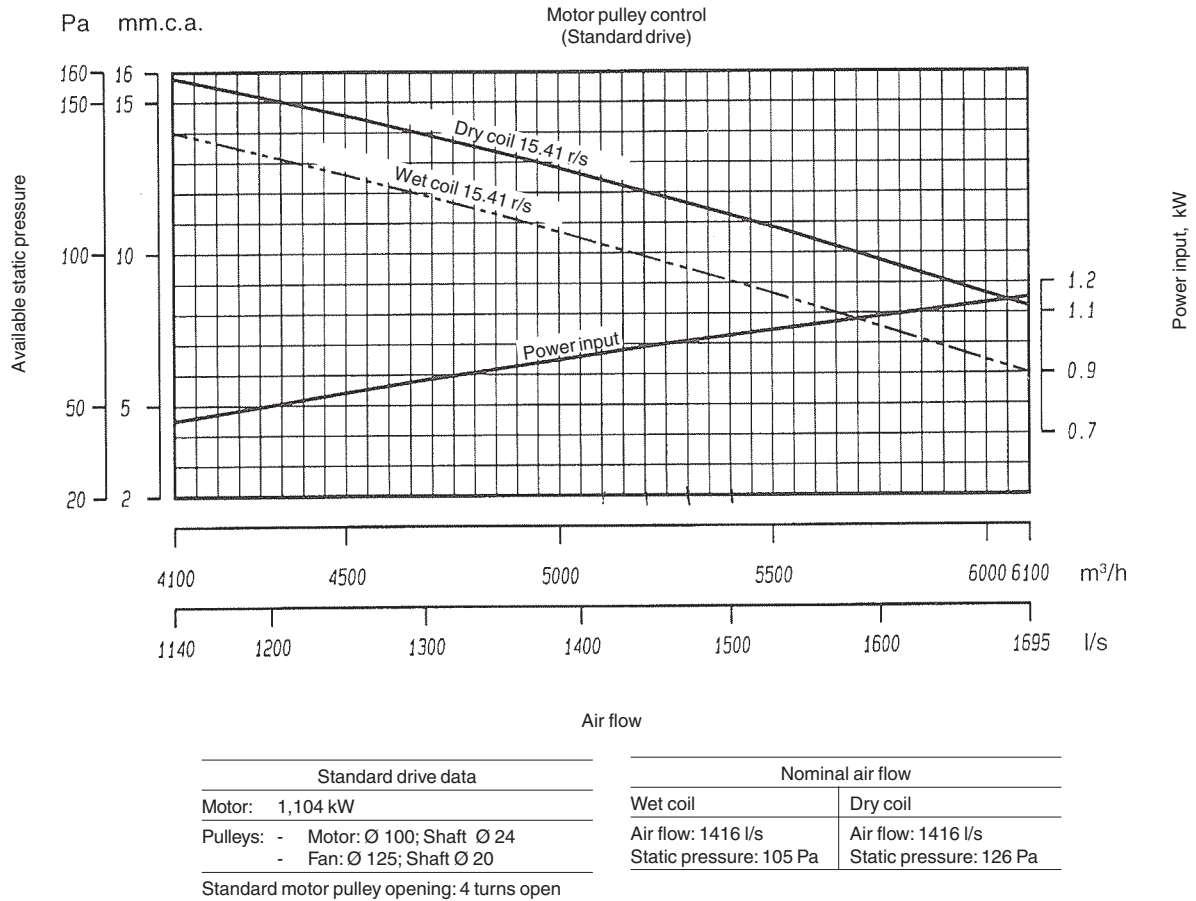
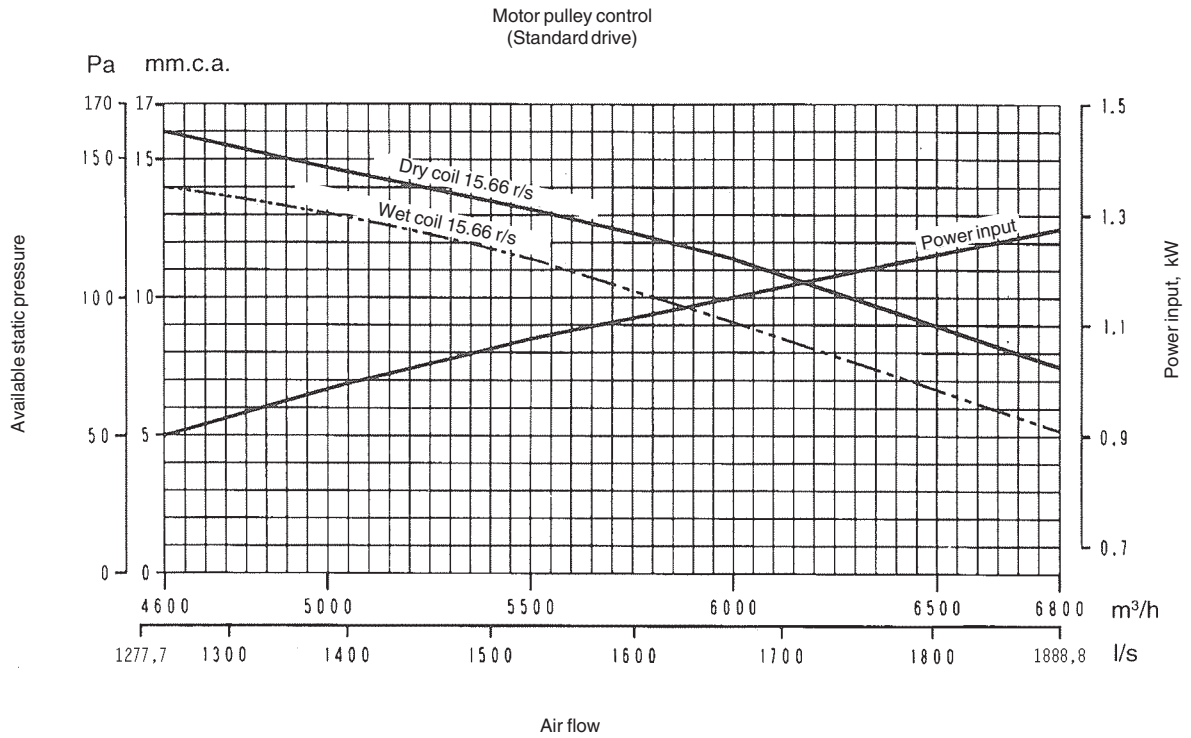
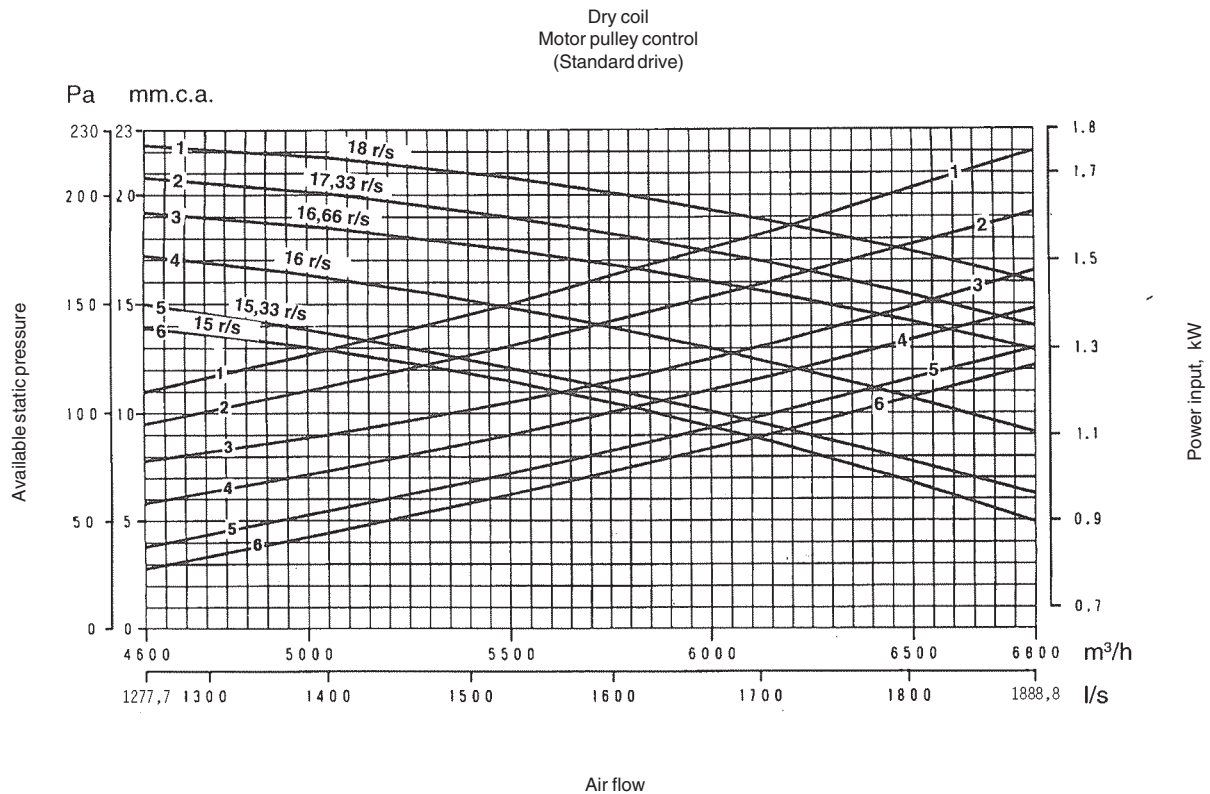


Fig. 11 - Fan curves (standard)

40ABZ 008



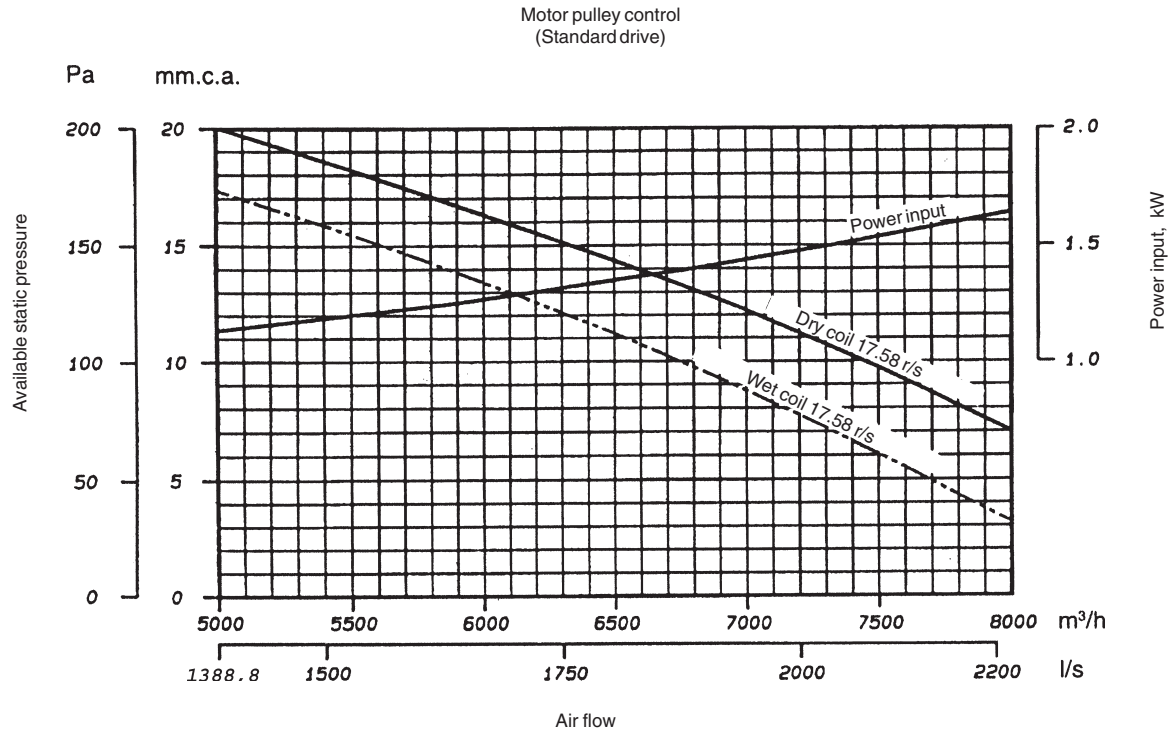
Standard drive data		Nominal air flow	
Motor:	1,104 kW	Wet coil	Dry coil
Pulleys:	- Motor: Ø 100; Shaft Ø 24	Air flow: 1583 l/s	Air flow: 1583 l/s
	- Fan: Ø 125; Shaft Ø 20	Static pressure: 105 Pa	Static pressure: 125 Pa
Standard motor pulley opening: 3.5 turns open			



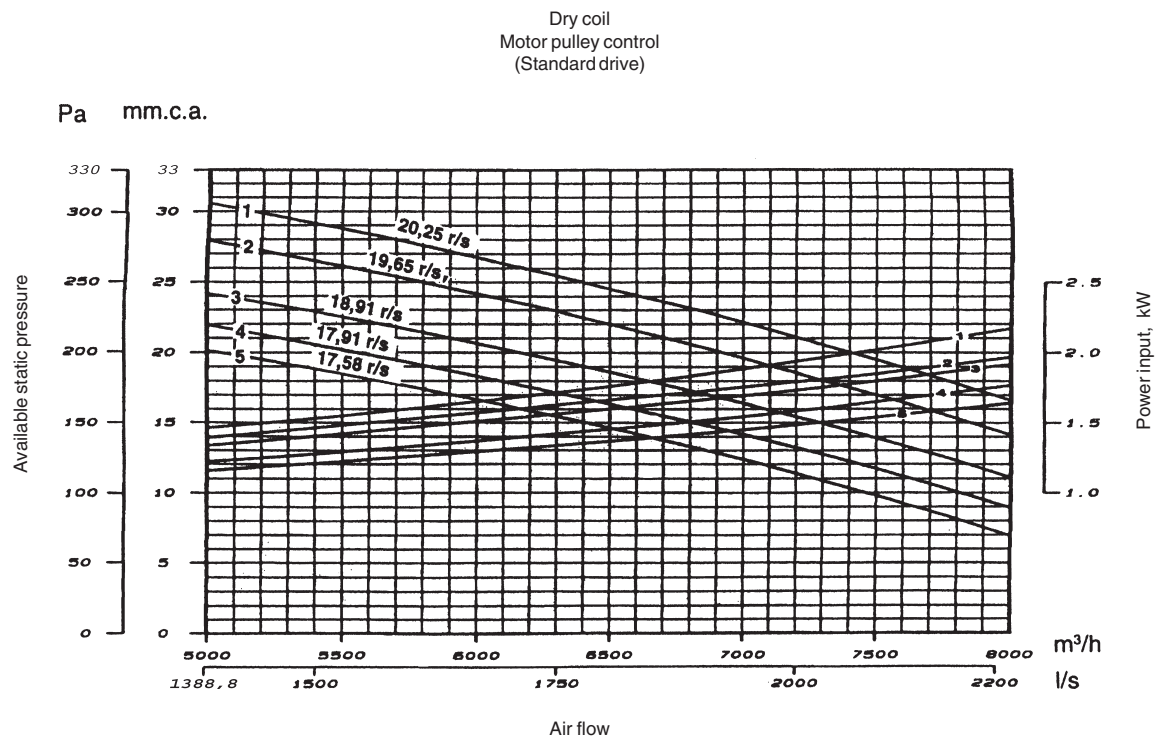
Standard motor pulley drive	
1- Closed	4- 3 turns open
2- 1 turn open	5- 4 turns open
3- 2 turns open	6- 4.5 turns open

Fig. 12 - Fan curves (standard)

40ALZ 011



Standard drive data		Nominal air flow	
Motor:	1,472 kW	Wet coil	Dry coil
Pulleys:	- Motor: Ø 125; Shaft Ø 24	Air flow: 1777 l/s	Air flow: 1777 l/s
	- Fan: Ø 150; Shaft Ø 20	Static pressure: 115 Pa	Static pressure: 148 Pa
Standard motor pulley opening: 4 turns open			



Standard motor pulley drive	
1- Closed	4- 3 turns open
2- 1 turn open	5- 4 turns open
3- 2 turns open	

Fig. 13 - Fan curves (standard)

40ALZ 014

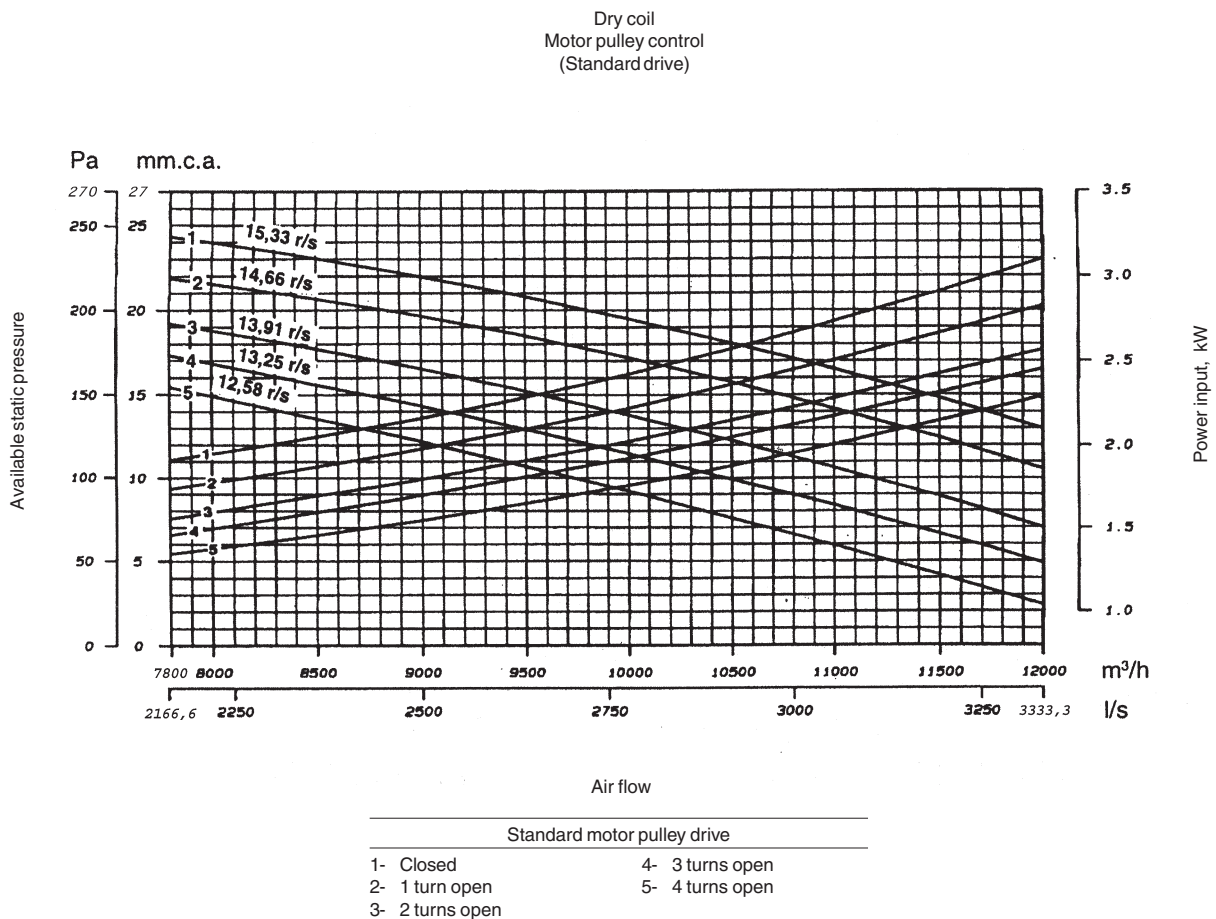
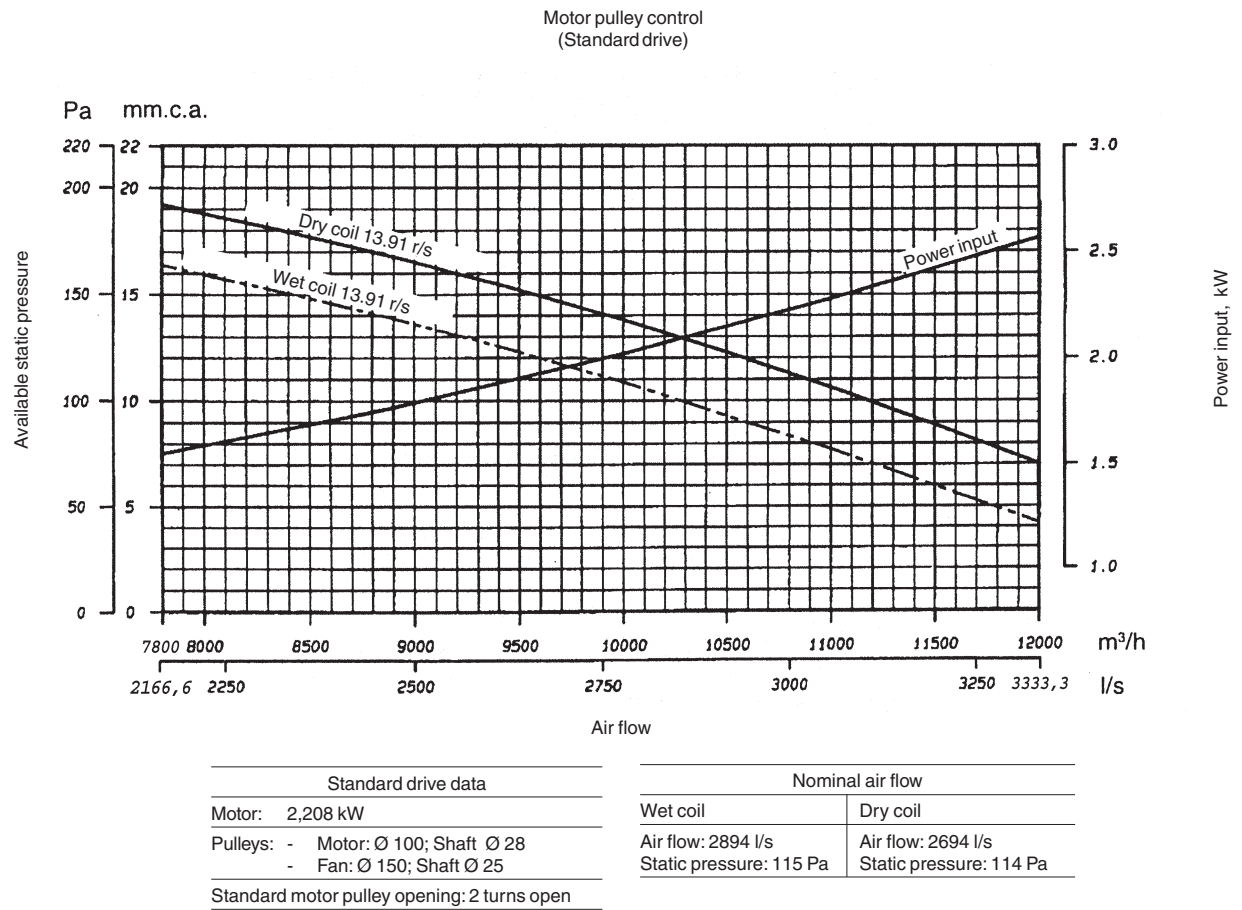


Fig. 14 - Fan curves (standard)

40ABZ 016

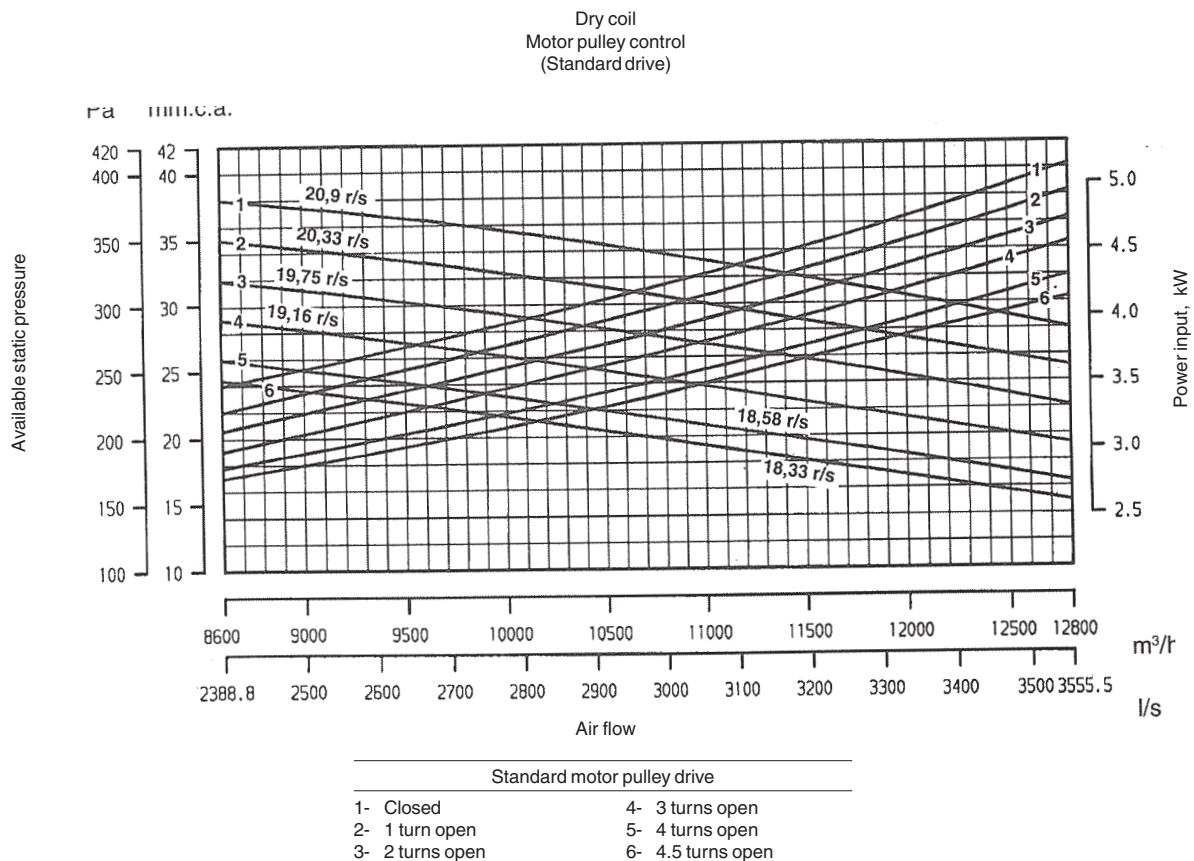
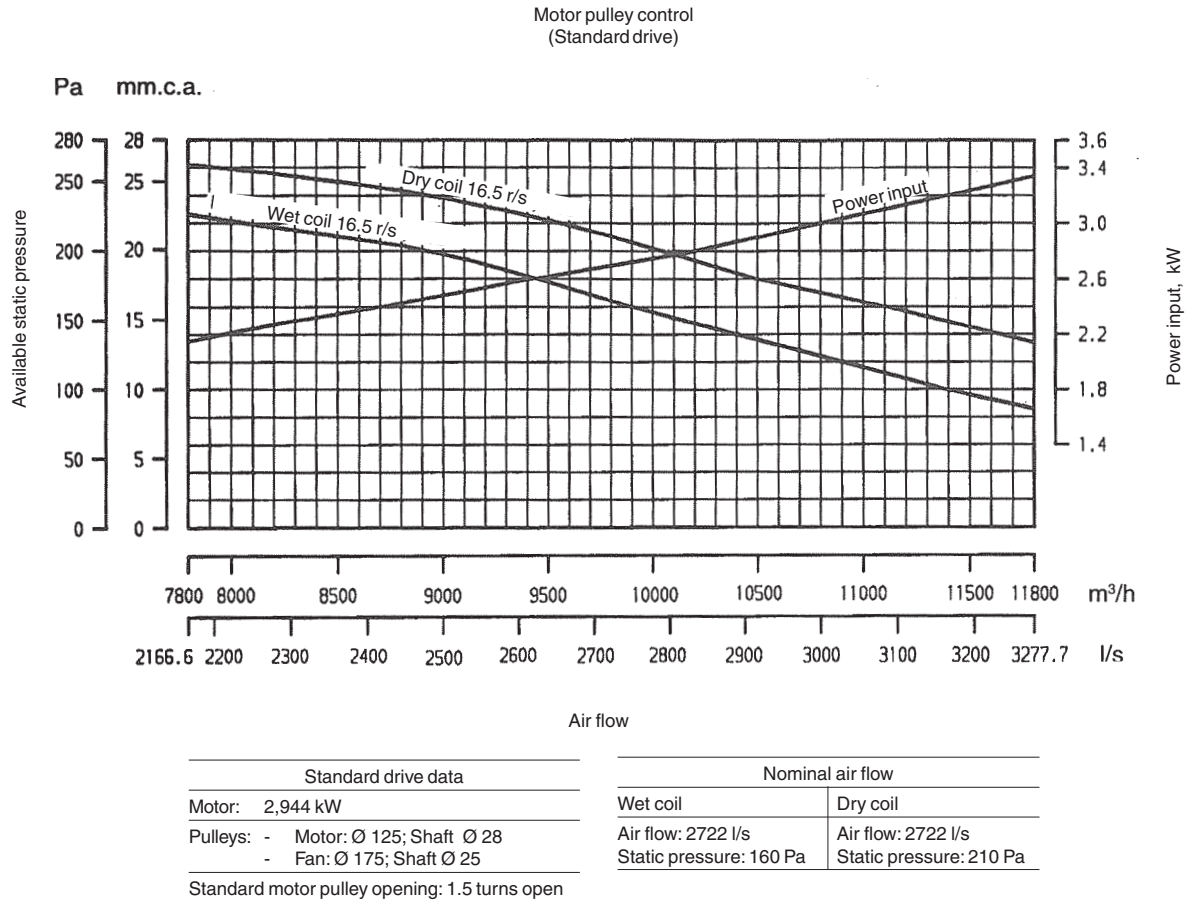
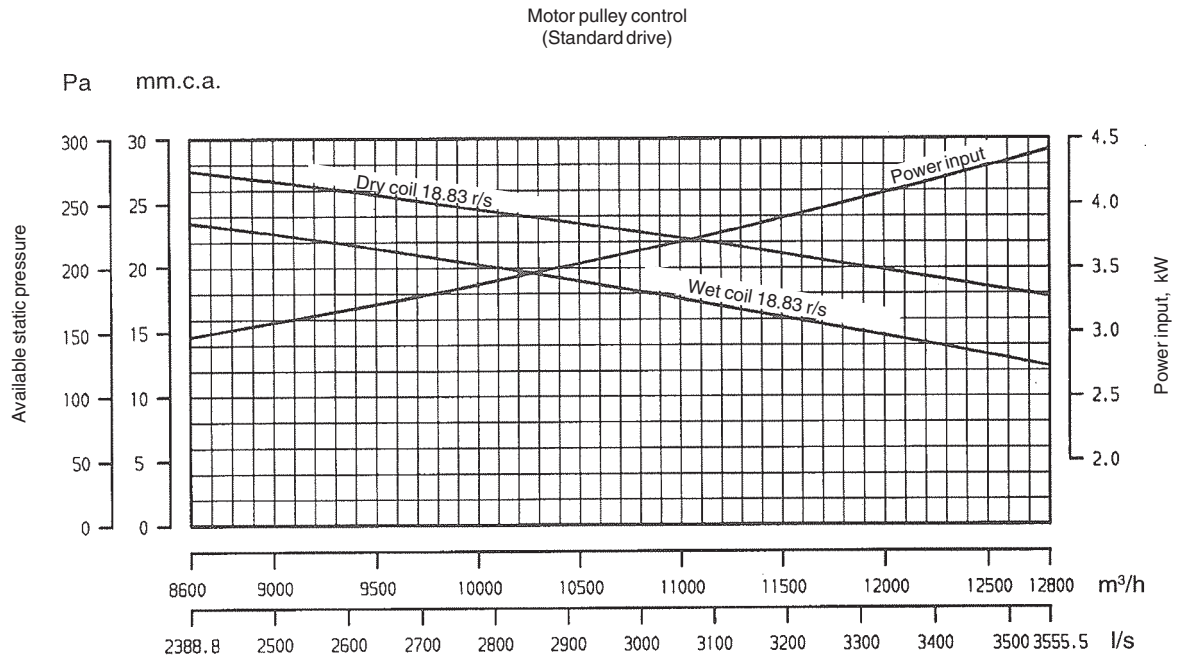


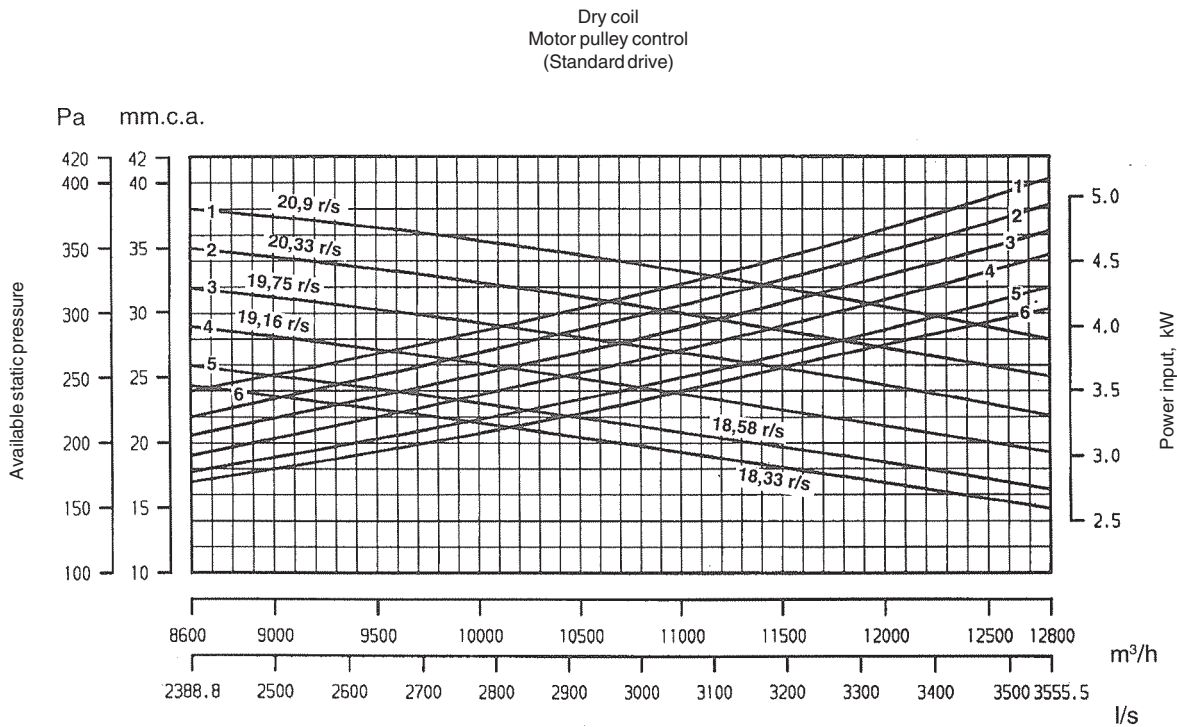
Fig. 15 - Fan curves (standard)

40ABZ 020



Standard drive data	
Motor:	4,048 kW
Pulleys:	- Motor: Ø 150; Shaft Ø 28 - Fan: Ø 175; Shaft Ø 25
Standard motor pulley opening: 3.5 turns open	

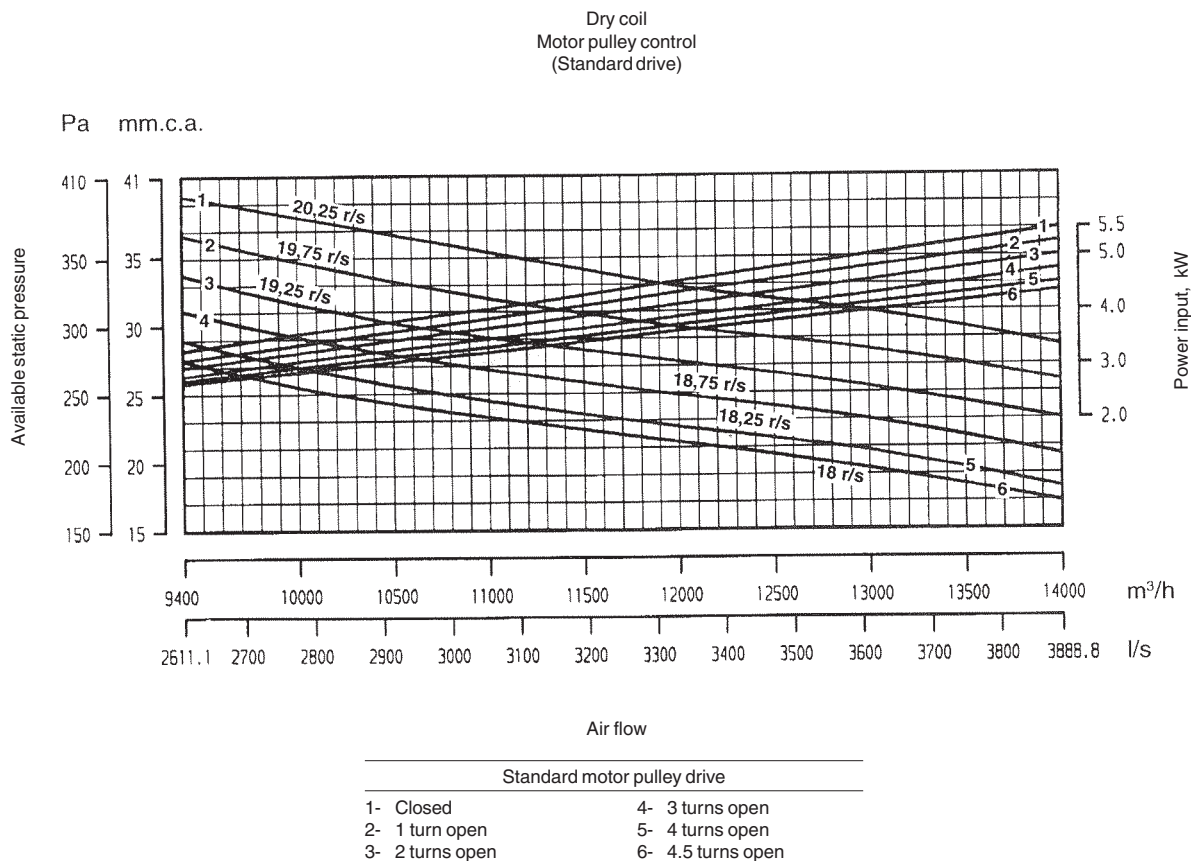
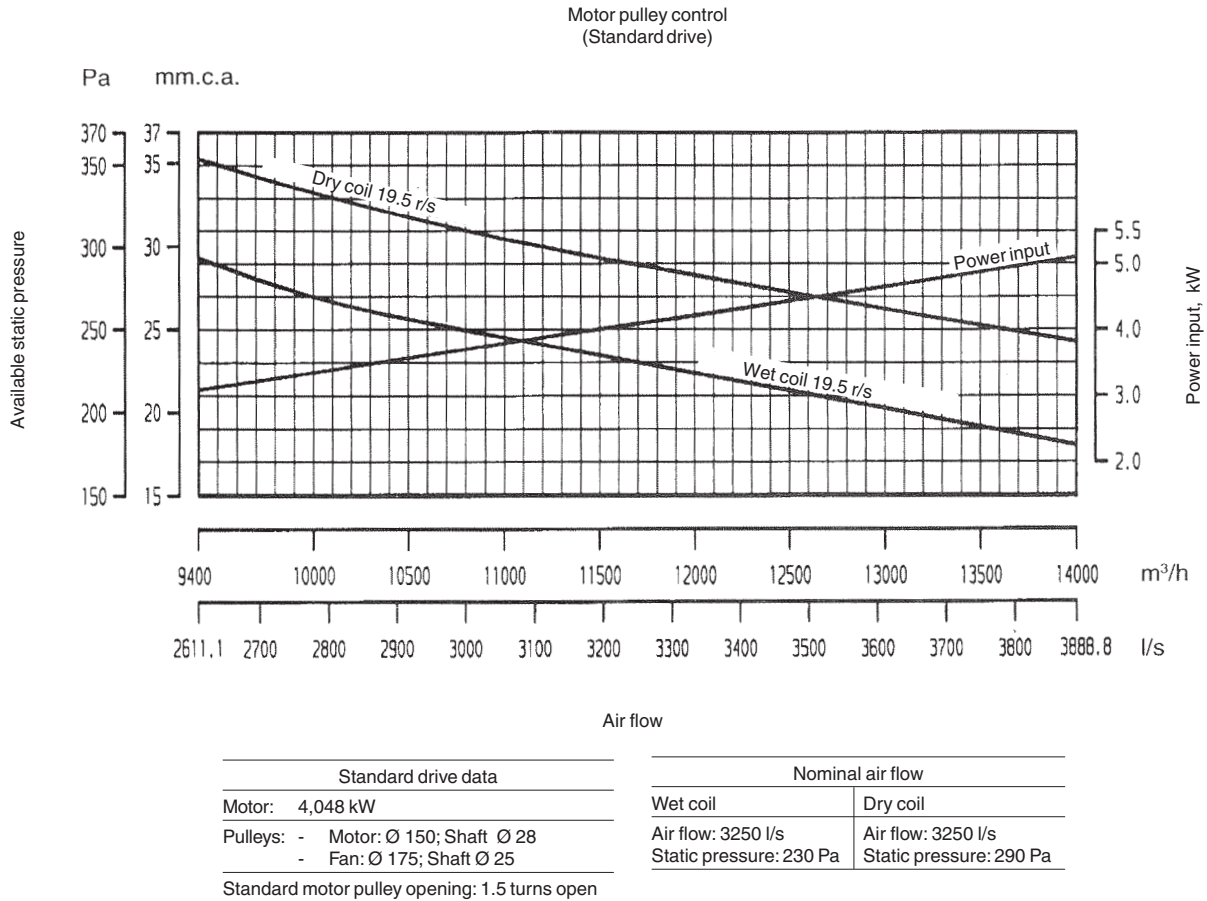
Nominal air flow	
Wet coil	Dry coil
Air flow: 2972 l/s	Air flow: 2972 l/s
Static pressure: 185 Pa	Static pressure: 230 Pa



Standard motor pulley drive	
1- Closed	4- 3 turns open
2- 1 turn open	5- 4 turns open
3- 2 turns open	6- 4.5 turns open

Fig. 16 - Fan curves (standard)

40ABZ 024



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 38XTZ. 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 40ABZ/ALZ 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 38XTZ outdoor units are installed must be able to support the operating weight of these units.***
The system used to fix or support the 40ABZ/ALZ 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 38XTZ and 40ABZ/ALZ 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 UNITS FOR R-407C, E.G. DO NOT CONNECT A 38XT OUTDOOR UNIT WITH A 40ABZ/ALZ INDOOR UNIT OR A 38XTZ WITH A 40AB/AL.***

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. 17, 18 and 19).

40ABZ/ALZ models

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

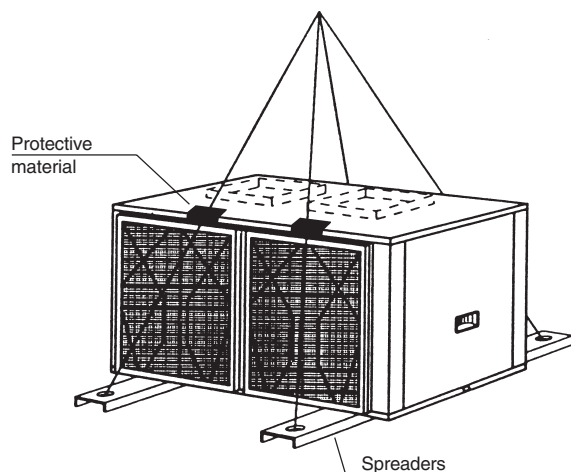


Fig. 17

38XTZ 007 and 008

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

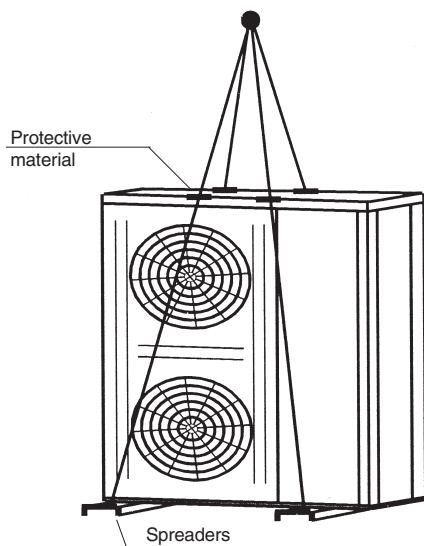


Fig. 18

38XTZ 011 to 024

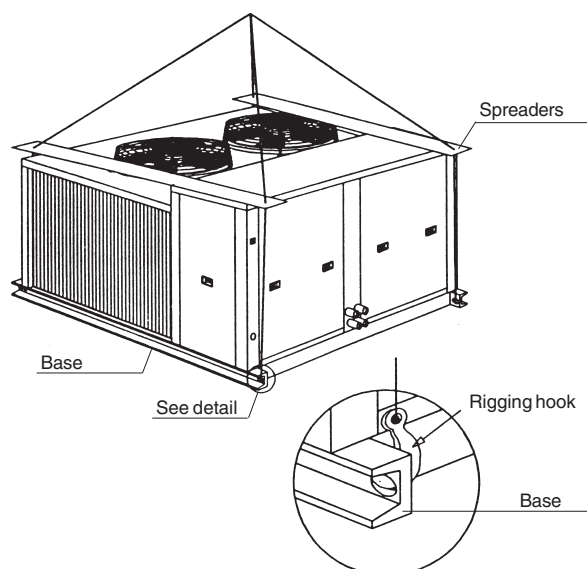


Fig. 19

- 38XTZ 011 to 024 units have four 17 mm \varnothing holes in all four corners of the base, where the rigging hooks for the lifting slings can be inserted (see Figs. 2 to 4).

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 38XTZ units until they have reached their final location. This protects the units from dust in the atmosphere.*
- *The 40ABZ/ALZ 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

38XTZ 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 38XTZ 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. 7).

- 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 Fig. 20:

38XTZ 007 and 008

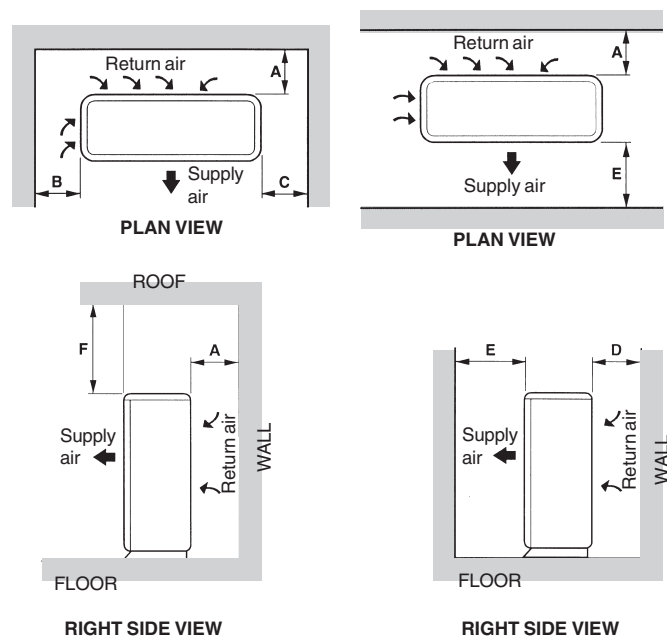


Table 5 - Minimum clearances (mm)

A	B	C	D	E	F(*)
200	200	500	200	2000	5000 (*)

(*) Leave a minimum of 1 m clearance around the unit.

38XTZ 011, 016, 020 and 024

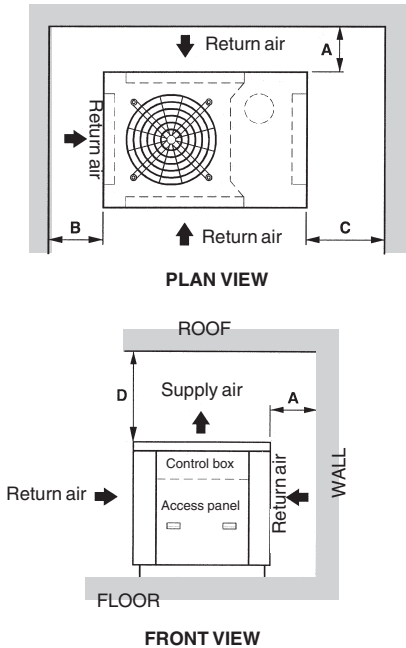


Table 6 - Minimum clearances (mm)

A	B	C	D(*)
500	500	1000	Free (*)

(*) Leave a minimum of 1 m clearance around the unit.

38XTZ 014

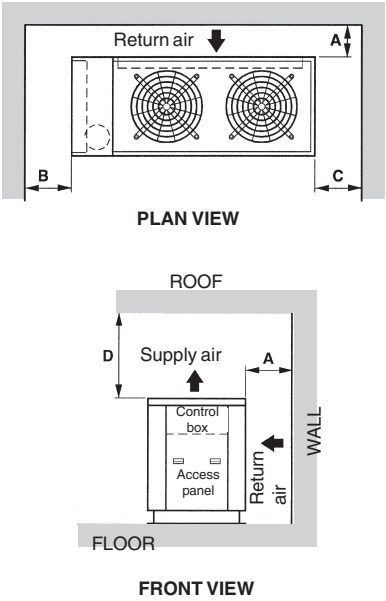


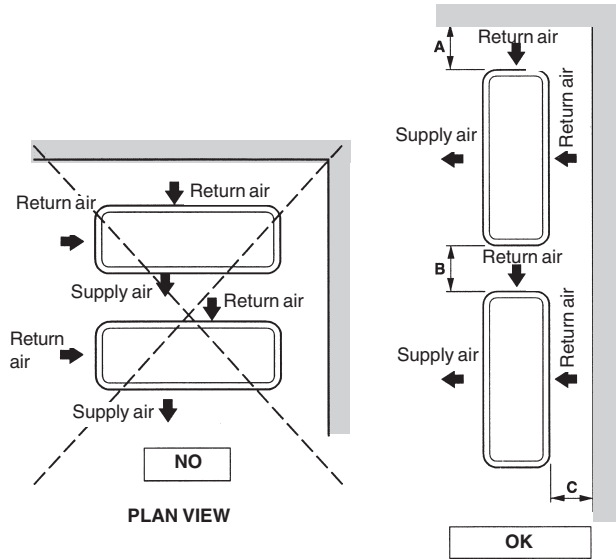
Table 7 - Minimum clearances (mm)

A	B	C	D(*)
500	1000	500	Free (*)

(*) Leave a minimum of 1 m clearance around 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.

38XTZ 007 and 008



- 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.

38XTZ 014

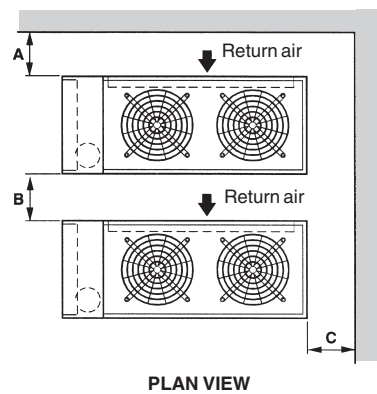


Fig. 24

- If the air enters through the units on one side only and is discharged through the top, the clearances can be reduced.

38XTZ 011, 016, 020 and 024

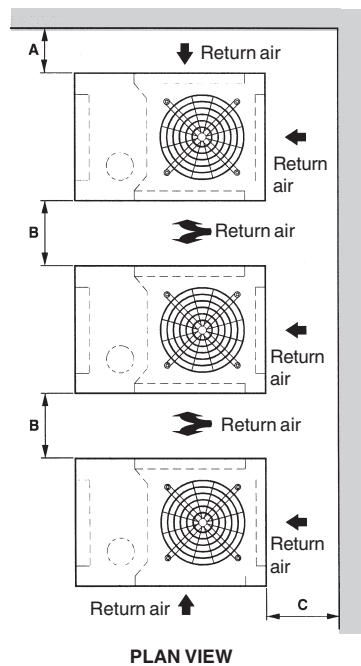


Fig. 25

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

Table 8 - Minimum clearances between units (mm)

38XTZ	A	B	C
007 and 008	200	500	400
014	500	700	500
011, 016, 020 and 024	500	700	500

Installation on the ground

- 38XTZ 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.

38XTZ 007 and 008

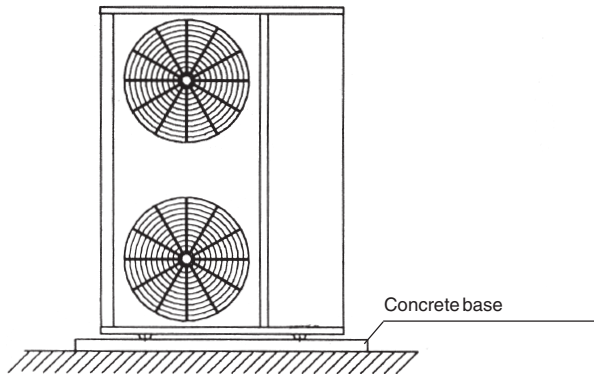


Fig. 26

38XTZ 011 to 024

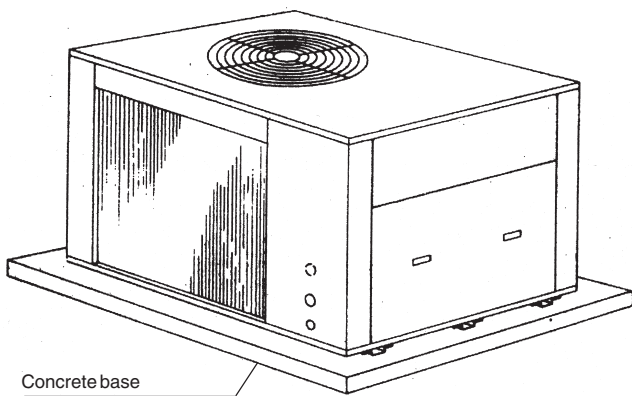


Fig. 27

- 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 is drained through the unit base. For this reason the units must be elevated above the concrete base to allow correct drainage.

- **Rainwater drainage**
38XTZ units incorporate drillholes in the base in order to correctly drain any condensate or rainwater which may enter the unit in the fan area. Ensure correct drainage.

- It is recommended to use flexible connections which absorb vibrations, prevent noise inside the ductwork and allow access to the unit.

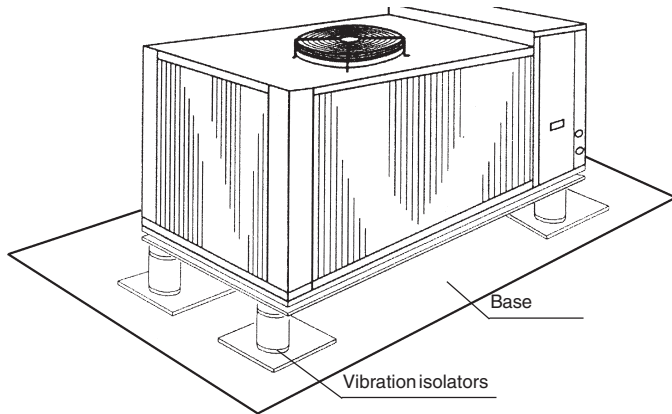


Fig. 28

- 38XTZ 007 and 008 units incorporate two feet in the base (See Fig. 1 - unit base), with two holes to fix the unit to the floor (see Figs. 8 and 9, Centre of gravity and Weight distribution).

Models 38XTZ 011 to 024 incorporate fixing holes in the base profile to attach the units to the floor (See Figs. 2, 3 and 4 and Figs. 8 and 9, Centre of gravity and Weight distribution).

- 38XTZ 011 to 024 can have several types of vibration isolator, as shown below:

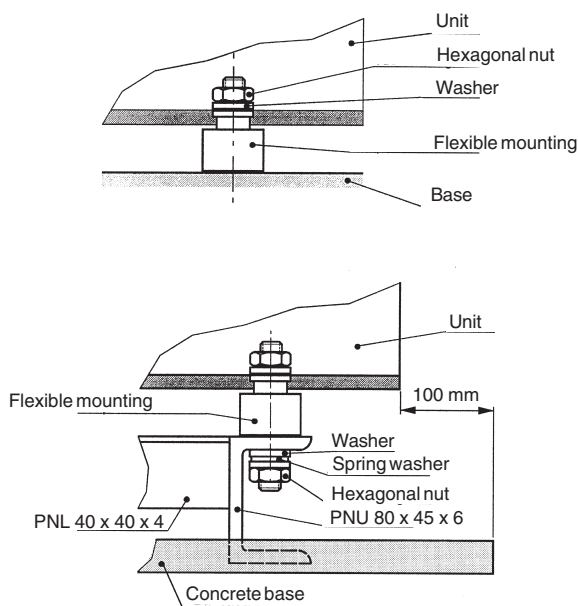


Fig. 29

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

40ABZ/ALZ 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. 7 - 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. 30).

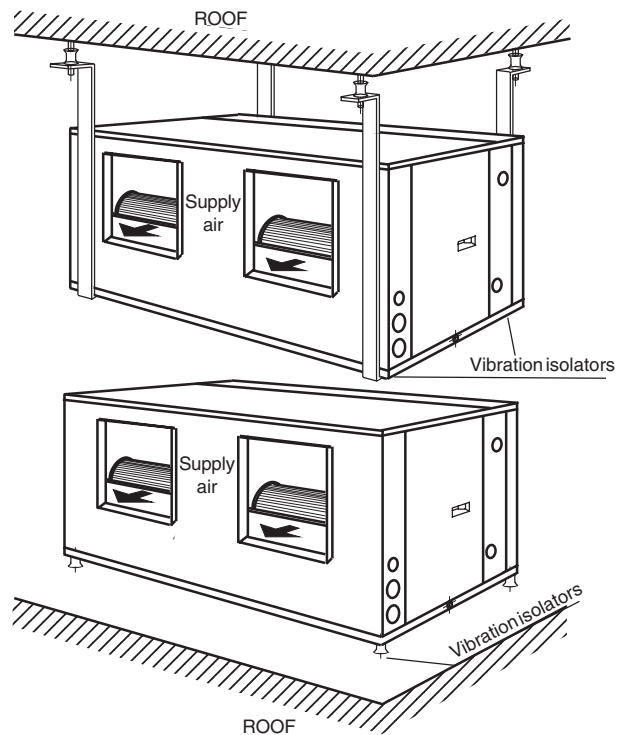


Fig. 30

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 Figs. 31 and 32, 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) For units 40ABZ 007, 008, 40ALZ 011, 014 change the motor to the other fan.
 - f) For units 40ABZ 016, 020, 024 detach the drive base together with the motor ⑨ and reposition it on the opposite side.
 - g) Remove the fan pulley ⑧ and reposition it on the other side.

- h) Interchange the position of panels ② and ③, fastening them correctly to the unit.
- i) Bolt the U-bracket ⑤ to each fan.
- j) Bolt the U-bracket ⑤ to the angle iron ④ holding the fans to the base.
- k) Replace the drive belt(s) and ensure that the tension is correct.
- l) Replace the access panels ①.

Repositioning unit air discharge 40ABZ 007, 008/40ALZ 011, 014

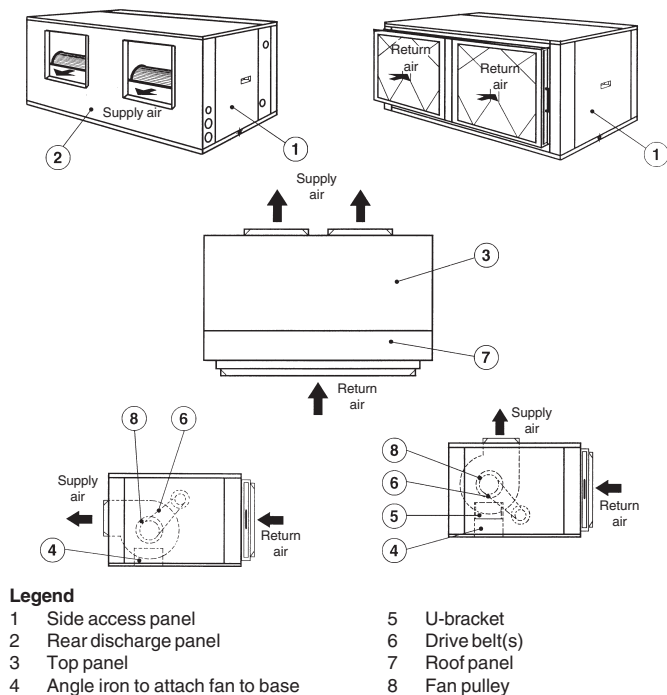


Fig. 31

Repositioning unit air discharge 40ABZ 016, 020, 024

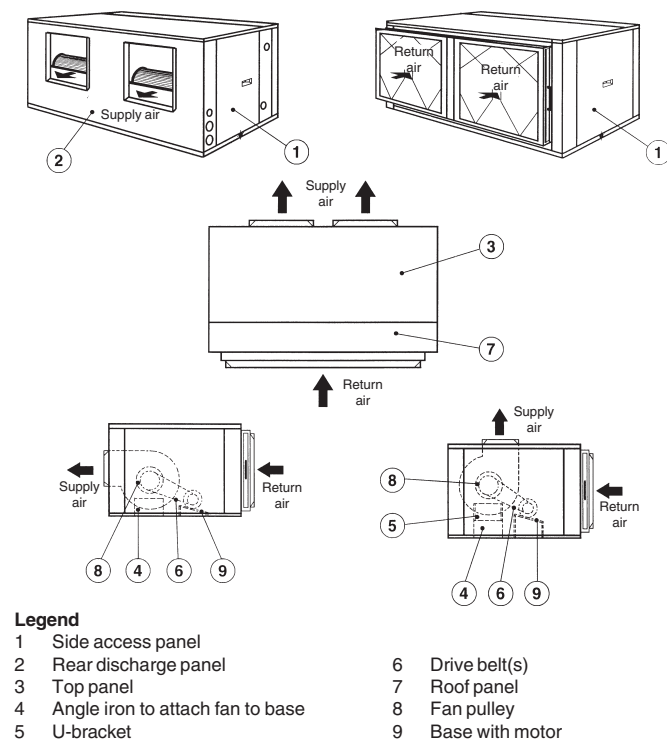


Fig. 32

Condensate drainage

40ABZ o 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. 33) or horizontal (see Fig. 34).

- 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.

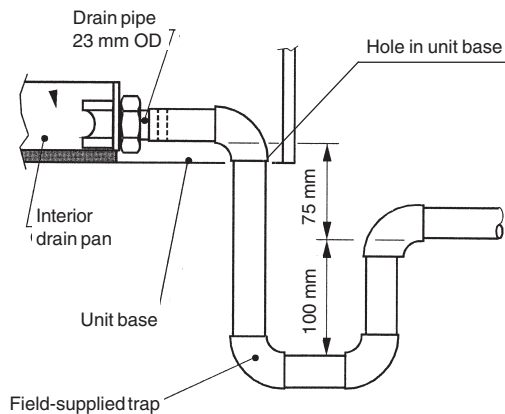


Fig. 33 - Vertical drain

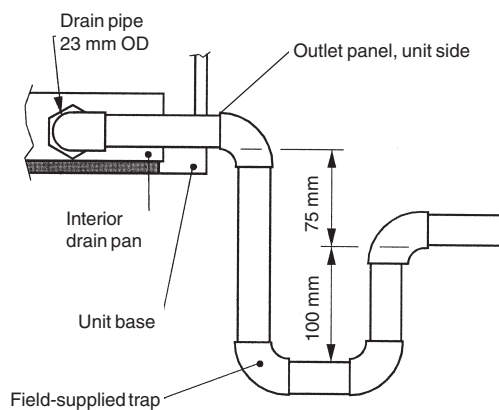


Fig. 34 - Horizontal drain

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

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

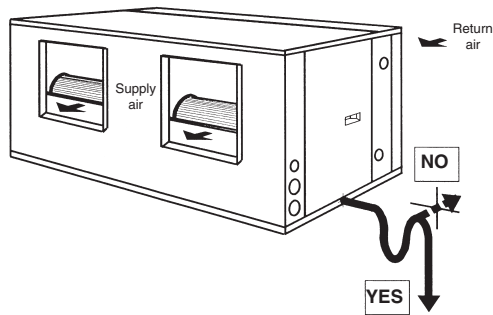


Fig. 35

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:

- 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.
- 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. 36).
- 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.
- The installation of baffles in the supply air outlet ducts significantly dampens the noise created by the air flow.
- The ratio between the duct sides should not exceed 1:3 (rectangular ducts).

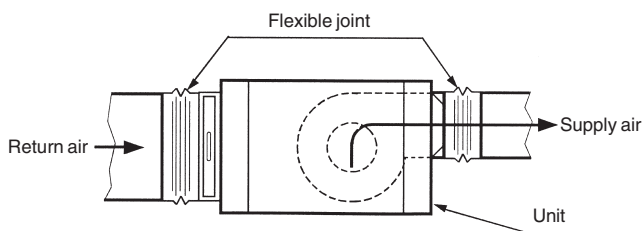


Fig. 36 - Side view

- 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 Figs. 10 to 16.

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

- Move the motor along its track in order to remove the belt (ver Fig. 37).
- Loosen the pulley setscrews ② and rotate as necessary.
- Tighten the setscrews ②.
- Replace the belt(s) in the channel of the pulley.
- Tighten the belt(s), using the tension screw nut and washer ⑥ (see Fig. 38).
- Check the new fan speeds with a tachometer.
- After the first operating hours, check the belt tension and if necessary retighten the belts (see Fig. 38).

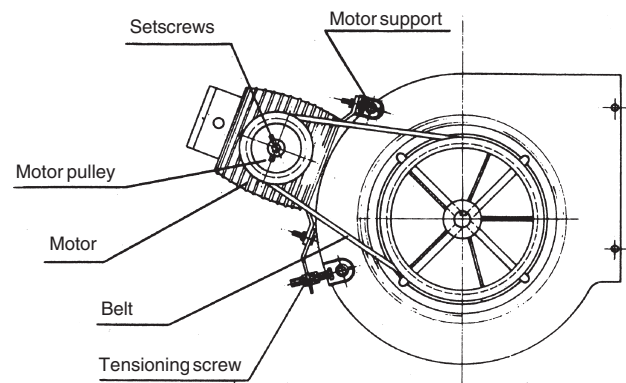


Fig. 37

Align the pulleys using a ruler.

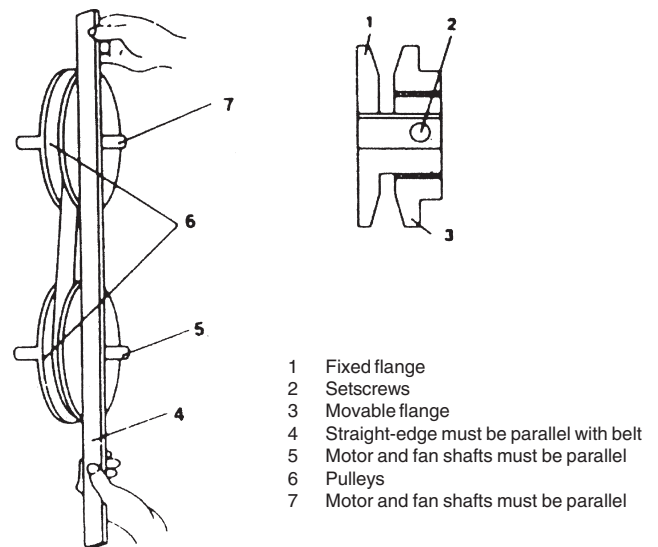


Fig. 38

To align fan and motor pulleys:

- 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.
 - 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. 39)
The minimum belt deflection is 10 mm when the force shown in Fig. 39 is applied.

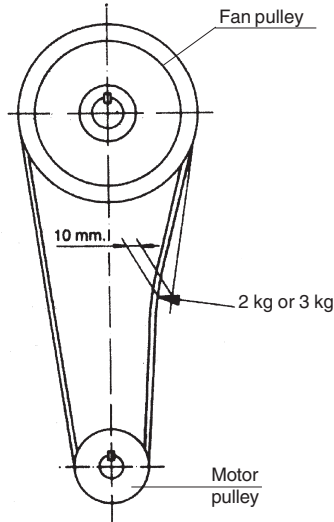


Fig. 39

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 38XTZ outdoor unit (see Fig. 40).
- Consult the wiring diagram supplied with the unit, that shows all power connections between the 38XTZ outdoor unit and the 40ABZ/ALZ 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 40ABZ unit.
- The power of the optional electric heater of the indoor unit is supplied via the main disconnect switch of the 38XTZ unit (see Fig. 42).

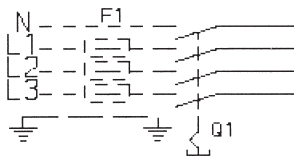


Fig. 40 - General unit power supply

Legend

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

- Route all cables through the conduits in the 38XTZ units to the terminals of the main disconnect switch (see unit wiring diagram).
- Voltage to the unit must be within 2% of the voltage and 10% of the current indicated on the nameplate. 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 (maximum 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 (38XTZ-40ABZ/ALZ) and the isolator switch and fuses.

- Never operate a unit if the voltage imbalance exceeds 2%. 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

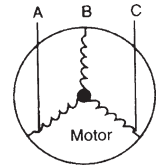


Fig. 41

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

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 40ABZ/ALZ indoor units are run to the 38XTZ outdoor unit control box for connection to the fan motor, and in the case of the optional electric heater also cables marked 2.

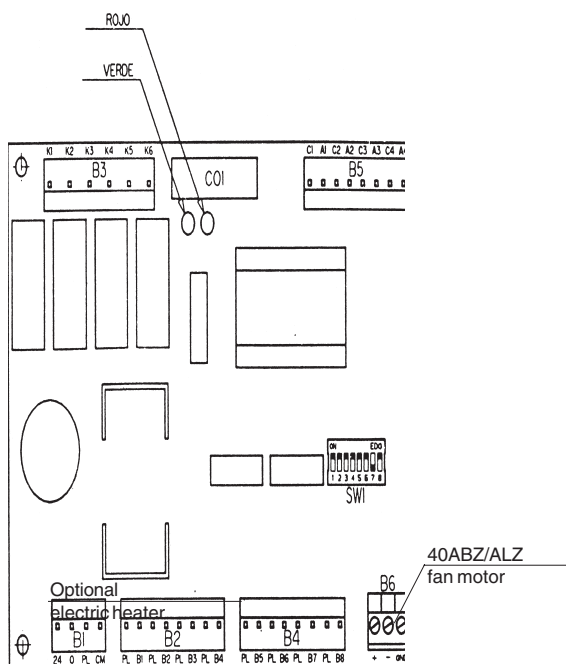


Fig. 42

Legend

- F3: Thermomagnetic indoor fan switch (included in the control box).
 K2: 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 38XTZ panel).
 F18: Thermomagnetic switch of the optional electric heater.
 K6: Optional electric heater contactor.
 R3: Optional crankcase heater.
 F6: Thermomagnetic switch of the optional crankcase heater.
 M: 40ABZ/ALZ indoor fan motor.
 —: Connection cables between the 40ABZ/ALZ indoor unit fan motor and the 38XTZ control box.
 ✱: Cables from the 40ABZ/ALZ 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:
 - a) Compressor crankcase heater (230 V/1 ph) - this must be permanently connected, and the power supply must be separate from the rest of the unit power. It must be protected by a fuse.
 - b) Heating coils for electric heater - connect in accordance with the wiring diagram downstream of the 38XTZ 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 electric heater power input plus the power input of the indoor fan is higher than the total power input given in Table 2, Electrical Data.

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. Remember that for:

- Models 38XTZ 007 and 008 with 40ABZ 007 and 008 the thermostat is 220 V/1 ph/50 Hz (*).
- Models 38XTZ 011 and 014 with 40ALZ 011 y 014 the thermostat is 24 V with connection to the programmable or non-programmable versions (*).
- Models 38XTZ 016 to 024 with 40ABZ 016 to 024, units with Master Link I, the thermostat is 24 V with connection to the programmable or non-programmable versions (*).

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

MASTER LINK I ELECTRONIC CONTROL (38XTZ 016-024)

General description

An electronic control system which operates these units is incorporated in the electrical box. This simplifies and improves service operations and improves the performance.

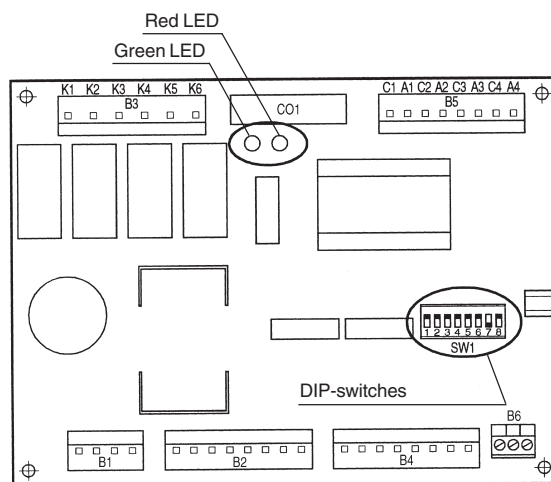
This new Master Link I electronic control system allows communication with specific servicing tools, basic or advanced (PC).

In addition, the information stored in the unit can be used as a history record, facilitating service operations.

The system is composed of the following elements:

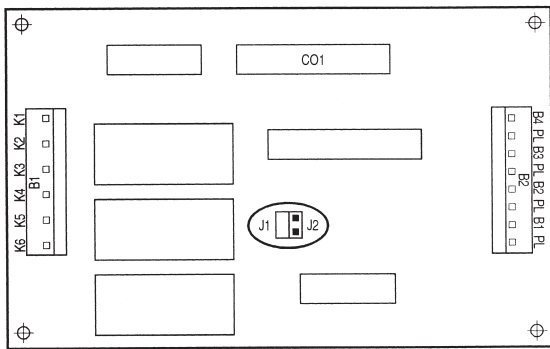
- Basic or main board
- Extension board
- Temperature probe
- Safety transformer

The main board, or basic unit, is factory-configured for each model. Nevertheless, please find below the components which the installer or maintenance technician (**never the user**) can initialize, together with an illustration of the board.



Main electronic board - Master Link I

Fig. 43



Extension board (PA1, PA2)

Fig. 44

DIP-switches

The board incorporates 8 DIP-switches numbered from 1 to 8, with two positions each (ON/OFF), located as indicated in Fig. 43 (SW1).

No. 1: Do not modify the factory-set position.

No. 2 and 3: Inform the control of characteristics during defrosts (heat pump units only).

Possible positions in other heat pump models:

- No. 2 ON, No. 3 ON: Indoor fan stopped during defrost operation (if no other stage is activated).
- No. 2 ON, No. 3 OFF: Indoor fan functioning during defrost operation.
- No. 2 OFF, No. 3 ON: Supplementary electric heating stage is activated during defrost.
- No. 2 OFF, No. 3 OFF: Defrost in TEST mode. Significantly reduces the settings associated with the defrost.

Remote reset

The RESET operation indicated in the previous sections can be initiated in two ways:

1. On the remote thermostat, move the thermostat controls to the OFF and AUTO positions.
2. Disconnect the voltage to the unit.
If the unit incorporates the extension board necessary for the electric heating and a protection trips, the protection LED incorporated in the thermostat will flash until the unit is reset.

Stage sequence switch

The electronic control incorporates a stage sequence switch, which prevents simultaneous energizing of all compressors and fans when the unit starts up and does not allow all the components to stop together when the unit is shutdown.

The time between start-up or shutdown for each component is an internal parameter in the electronic control and can only be changed using the servicing tools, basic or advanced (accessory).

Remote reset (38XTZ 011, 014)

IMPORTANT: The unit is supplied with a remote electric reset which does not allow start-up of the compressor until the protection devices have been activated. During unit start-up in cooling as well as after shut-down caused by a trip protection device, the equipment is reset by placing the ambient thermostat controls in the position 'OFF'.

CAUTION: Once the operations needing the TEST mode have been finalized the original configuration should be reset. Never leave the test configuration on for normal operation.

No. 4: Informs the control of the setting to be observed during defrost (heat pump units only).

Possible positions:

ON: 30 minutes

OFF: 60 minutes

These values can be changed using the servicing tools (basic or advanced).

If a change in position is effected with the unit in operation, the RESET order must be given so that the control can take into account the new setting when initiating the subsequent defrost. If RESET is not ordered, the control will continue the current defrost at the old setting. The new setting will be used for the next defrost.

ATTENTION: DIP-switches No. 2, 3 and 4 can only be varied in heat pump models. For cooling only units, the position of the DIP-switches does not affect the operation.

No. 5: Informs the control of the behaviour to be adopted when a protection trips.

Possible positions:

ON: Blocked. After a protection has tripped, even though the protection itself resets, the unit is blocked until the RESET is effected from the thermostat.

OFF: Automatic reset. It is not necessary to RESET after a protection has tripped.

NOTE: The RESET operation must be initiated from the thermostat.

No. 6: Do not modify the factory-set position.

No. 7: Do not modify the factory-set position.

No. 8: Do not modify the factory-set position.

ATTENTION: The DIP-switches must be handled with the utmost care so that the electronic board is not damaged. Tools of the appropriate size for these switches must be used.

LEDs

There are two LEDs (red and green) on the electronic board which indicate its status (see Fig. 43).

Intermittent green LED: The board status is correct.

Green LED off: The following steps should be taken:

1. Check whether there is 24 V AC running through the B1 connections on the board (see Fig. 43).
2. If there is, replace the board with a new one.
3. If there is none, look for the fault in the unit electrical system and repair it.
4. Recheck the B1 connections.







Green LED on: Replace the board.

Red LED off: The status is correct.

Red LED on: Three possibilities:

1. Defective connection between the main board and the secondary board. Check CO1 (Figs. 43 and 44) connection. Check the status of the connecting cable.
2. Remote control incorrectly connected.
3. The secondary board jumpers J1 and J2 (Fig. 44) are incorrectly connected. In order to correct this, use the table below.

Table 9 - Secondary board jumpers

Model	Correct connection	Board
A	J1  J2	PA1
B	J1  J2	PA1
C	J1  J2	PA1
D	J1  J2	PA1
E	J1  J2	PA1
	J1  J2	PA2

- A:** Cooling only models with 1 compressor + electric heater in indoor unit.
- B:** Cooling only models with 2 compressors + electric heater in indoor unit.
- C:** Heat pump models with 1 compressor + electric heater in indoor unit.
- D:** Heat pump models with 2 compressors + electric heater in indoor unit.

Intermittent red LED: DIP-switch No. 1 in OFF position (see Fig. 43).

CAUTION: When the red LED is illuminated intermittently do not try to start up the unit. To correct this status, DIP-switch No.1 must be in the ON position after having been RESET.

REFRIGERANT LINE CONNECTIONS

Connection between units

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

For each compressor in the 38XTZ 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 line along its complete length, and the liquid line when it passes through any support, wall, etc.

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 ingress 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:

- Outdoor unit above the indoor unit.

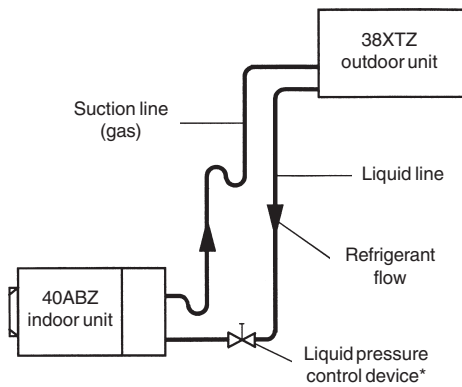


Fig. 45

NOTE:

- * Install when the liquid column height exceeds 10 m.

- Indoor unit above the outdoor unit.

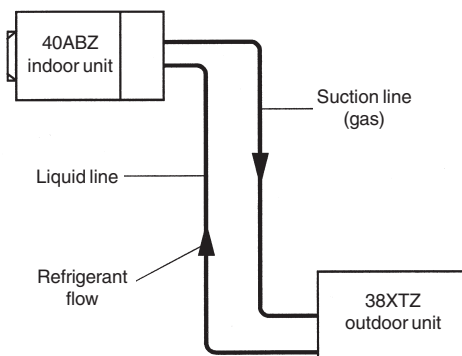


Fig. 46

- Both units on the same level.

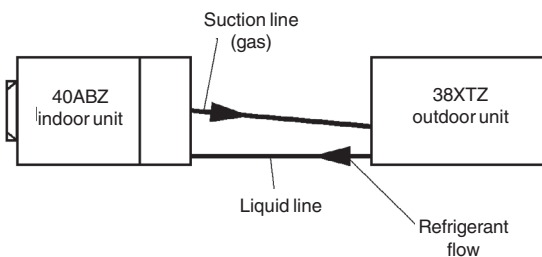


Fig. 47

Depending on the unit installation

- Outdoor unit above the indoor unit (Fig. 45). The suction line is unfavourable in cooling mode, the suction of the refrigerant gas corresponds to refrigerant flow direction, and is ascending.

The liquid line refrigerant flow direction is descending in cooling mode and is calculated as explained later.

- Outdoor unit below the indoor unit (Fig. 46). The suction line flow is descending in cooling mode, so that the oil flow is not so problematic.

The liquid line flow direction is ascending in cooling mode, and is calculated as explained later.

- The outdoor and indoor units are on the same level (Fig. 47). 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. 48).

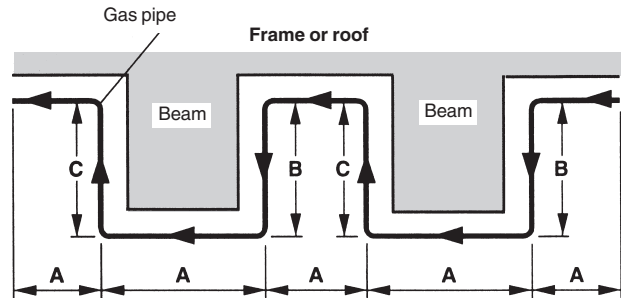


Fig. 48

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

The calculation of the suction 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.

Pipe diameter calculation procedure

Once the refrigerant piping outline has been exactly defined we can proceed with the size selection.

Suction 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.

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 38XTZ and 40ABZ units are supplied with an R-407C 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 refrigerant 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 followed, if necessary, by a gas tightness test using compressed nitrogen. 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 38XTZ and 40ABZ/ALZ 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:

Table 12 - 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.

Compressor oil:

Type: 160PZ Maneurop-Danfoss (depends on the compressor manufacturer).

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 40ABZ/ALZ 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 pressurestats work properly. To do so, proceed as follows:

- **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 38XTZ and 40ABZ/ALZ units incorporate the following components:

- Three-phase hermetic reciprocating compressors with internal thermal protection in the 38XTZ 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 40ABZ/ALZ indoor units using thermostatic expansion valves or throttle valves depending on the model.
- High and low pressure switch and filter drier (38XTZ).
- Fan high pressure switch (38XTZ 014).
- Soldered copper refrigerant connection lines at the unit outlets.
- Complete internal wiring. Main on/off disconnect switch in the 38XTZ outdoor units. These units also include the complete electrical boxes with compressor and indoor fan motor contactors, transformers (depending on the model) and other components. Thermomagnetic disconnect switches for compressors and fan motors.
- Master Link I electronic control board for sizes 38XTZ 016 to 024.
- Fans:
The 40ABZ/ALZ indoor units have centrifugal fans driven by three-phase motors with adjustable belt-pulley drives. The 38XTZ outdoor units have direct-drive propeller fans.
- Thermal and acoustical insulation. Flexible shock absorbers in all moving components.
- Air filters in the 40ABZ/ALZ indoor units.
- Pre-painted galvanised sheet steel casings.

DESCRIPTION OF UNIT PROTECTION DEVICES

The unit includes the following compressor protection devices:

- **Internal compressor protection device** for all 38XTZ units to avoid superheat.
- **Short-cycle protection** standard for units 38XTZ 007-014.
- **Short-cycle protection** included on the Master Link I main electronic board for units 38XTZ 016-024
- **Indoor fan motor thermomagnetic switch in the 38XTZ unit control box.**
- **Thermomagnetic compressor and indoor fan motor disconnect switch, in the 38XTZ 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.

- **Fan high pressure switch (38XTZ 014).**
- **Low pressurestat:** This protects the 40ABZ/ALZ units against excessive low pressure in the evaporator or in the refrigerant lines.

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

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.

Table 13 - Pressure switch settings

38XTZ 007, 008, 011, 016, 020 and 024

	Cut-out	Cut-in	Reset
High pressurestat	*2844 kPa	*1863 kPa	Manual
Low pressurestat	*265 kPa	*363 kPa	Automatic

* Factory-calibrated

38XTZ 014

	Cut-out	Cut-in	Reset
High pressurestat	*2844 kPa	*1863 kPa-	Manual
Low pressurestat	*265 kPa	*363 kPa	Automatic
High pressurestat, fan	*2354 kPa	*1863 kPa	Automatic

* Factory-calibrated

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

Table 14 - Operating limits

Zone	Air temperature °C	
	Min.	Max.
Cooling operation:		
Indoor		
Maximum	+35	+21
Minimum	+19	+14
Outdoor		
Maximum	+40/44*	-
Minimum	19**	-
Indoor air flow		
Maximum	+20% of nominal value	
Minimum	-20% of nominal value	
Hot water coil (accessory/option)		
Maximum water temperature	80°C	

* Sizes 007, 011, 014, 020 and 024: 40°C
 Sizes 008 and 016: 44°C

** With optional/accessory 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.

GENERAL MAINTENANCE

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.

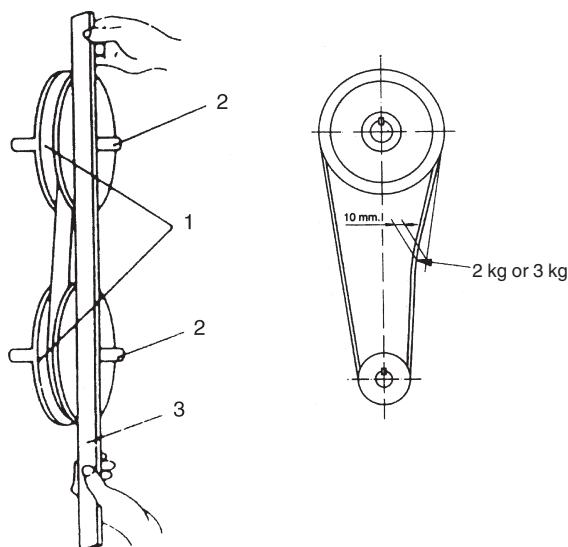
In order to obtain maximum performance from the unit special attention should be paid to the following points:

- **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 40ABZ/ALZ unit is perfectly clean and does not contain sludge or other foreign substances, corrosion, etc. and is level.
- **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.
- **Controls:** Check the operation of all electric controls, high and low pressurestats, etc.
- **Fans:** The fan of the 38XTZ unit must rotate freely. There must not be any foreign elements in the fans of the 40ABZ/ALZ 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.



Legend

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

Fig. 50

- 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.
- Unbrazed 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.

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 filters several times until no acidity exists.
- e) **Remove the filter from the liquid line in the 38XTZ 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.
 - Install a new filter in the liquid line of the 38XTZ units.
 - 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 15 - Options/accessories

38XTZ-40ABZ/ALZ	Option	Accessory
Heating coils for 40ABZ/ALZ indoor units:		
A - electric resistance heaters	X	X
B - hot-water coils	X	X
Thermal-magnetic crankcase heaters for 38XTZ outdoor units	X	X
Low refrigerant pressure switch for 38XTZ outdoor units*	X	-
Head pressure control for cooling operation at outdoor air temperatures below +19°C (38XTZ)	X	X
Special drives for higher indoor unit fan static pressure (40ABZ/ALZ - installed in the units on request)	X	-
Room thermostat, wired remote control - versions:		
A - 220 V for sizes 38XTZ 007 and 008 with 40ABZ 007 and 008 (one stage cooling, one stage heating)	-	X
B - 24 V for sizes 38XTZ 011 to 024 with 40ABZ/ALZ 011 to 024 (two stages cooling, three stages heating)		
B1 - Programmable, with remote sensor option for return air duct or room air	-	X
B2 - Non programmable	-	X
From the Master Link I control, for sizes 38XTZ 016-024/40ABZ 016-024		
A - Advanced service tool (via PC software)**	-	X
B - Interface converter, for control of up to 15 x 15 units via PC software**	-	X
C - Basic tool**	-	X
D - Communication board**	-	X

Accessories are not factory-installed.

Options can be ordered for factory-installation in the units, or they can be installed later.

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

** - With the basic service tool the communication board must also be ordered.
- With the advanced service tool (via PC software) the communication board and the communication interface converter must also be ordered.
- If an installation includes various units connected to a communication bus, all units on the bus must include the communication board.

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 38XTZ and 40ABZ/ALZ units, or from an incorrect installation and the damage caused by this.

Table 16 - Troubleshooting chart

Symptoms	Cause	Remedy
Unit does not start	No power supply Main switch open Low line voltage A protection has tripped Contactor stuck open Seized compressor	Connect power supply Close switch Check voltage and remedy the deficiency Reset Replace contactor Replace compressor
Unit starts and stops frequently	Defective compressor contactor Defective compressor Refrigerant losses	Replace contactor Replace compressor Check. Remove the charge. Repair leaks. Evacuate. Recharge with refrigerant
Unit continuously cuts out at low pressure	Defective low pressurestat Refrigerant losses Indoor fan does not operate	Replace pressurestat Check and add the necessary quantity Check fan motor
Unit continuously cuts out at high pressure	Defective high pressurestat Refrigerant losses Outdoor fan does not operate	Replace pressurestat Check and correct Check fan motor
Abnormal system noise	Piping vibration Noisy compressor Badly fitting panels	Support piping and check drainage Check and change if necessary Install correctly
Water loss	Defective drainage connections	Check and tighten if necessary
Compressor loses oil	Leak in system	Repair leak
Green and red Master Link I LEDs on	See pages 29 to 31	See pages 29 to 31



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