

**INSTALLATION  
OPERATION &  
MAINTENANCE MANUAL**



PROVIDING **GLOBAL SYSTEM** SOLUTIONS

**COMPACTAIR  
KVCK / KVHK**

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## TABLE OF CONTENTS

POINTS TO KEEP IN MIND	PAGE 2
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DATA PAGE FOR UNIT COMMISSIONING	PAGE 3
----------------------------------	--------

### 1.- GENERAL CHARACTERISTICS PAGE

1.1.- PHYSICAL DATA	4
1.2.- FAN PERFORMANCES	5-6
1.3.- ELECTRICAL DATA	7-8
1.4.- OPERATING LIMITS	9
1.5.- UNIT DIMENSIONS	10-19
1.6.- AVAILABLE OPTIONS	20-21

### 2.- INSTALLATION PAGE

2.1.- INSTALLATION GUIDELINES	22
2.2.- UNIT INSTALLATION	22
2.3.- OPTIONAL TASK PRIOR TO UNIT INSTALLATION: FLOW REGULATION IN THE FANS	23
2.4.- UNIT LOCATION	24
2.5.- INSTALLATION CLEARANCES	25
2.6.- DRAINS	25
2.7.- REFRIGERANT CONNECTIONS	26-30
2.8.- ELECTRICAL CONNECTIONS	31-36

### 3.- COMMISSIONING AND OPERATION PAGE

3.1.- PRELIMINARY CHECKS	37
3.2.- STEPS TO FOLLOW FOR COMMISSIONING THE UNIT	38

### 4.- MAINTENANCE PAGE

4.1.- PREVENTIVE MAINTENANCE	39
4.2.- CORRECTIVE MAINTENANCE	40
4.3.- FAILURE DIAGNOSIS	41

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## POINTS TO KEEP IN MIND



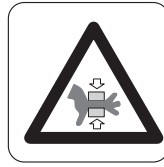
Abrasive surfaces



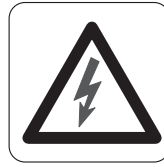
Low temperatures



High temperatures



Risk of injury with moving objects



Electrical voltage



Risk of injury with rotating objects

### Standard Guidelines to Lennox equipment

All technical data contained in these operating instructions including the diagrams and technical description remains the property of Lennox and may not be used (except for the purpose of familiarizing the user with the equipment), reproduced, photocopied, transferred or transmitted to third parties without prior written authorization from Lennox .

The data published in the operating instructions is based on the latest information available. We reserve the right to make modifications without notice.

We reserve the right to modify our products without notice without obligation to modify previously supplied goods.

These operating instructions contain useful and important information for the smooth operation and maintenance of your equipment.

The instructions also include guidelines on how to avoid accidents and serious damage before commissioning the equipment and during its operation and how to ensure smooth and fault-free operation. Read the operating instructions carefully before starting the equipment, familiarize yourself with the equipment and handling of the installation and carefully follow the instructions. It is very important to be properly trained in handling the equipment. These operating instructions must be kept in a safe place near the equipment.

Like most equipment, the unit requires regular maintenance. This section concerns the maintenance personnel and management.

If you have any queries or would like to receive further information on any aspect relating to your equipment, do not hesitate to contact us.

**DATA PAGE FOR UNIT COMMISSIONING**

UNIT: \_\_\_\_\_ SERIAL Nr.: \_\_\_\_\_

CONTROL PANEL IDENTIFICATION CODE \_\_\_\_\_

INSTALLATION ADDRESS: \_\_\_\_\_

INSTALLER: \_\_\_\_\_ INSTALLER TEL.: \_\_\_\_\_

INSTALLER ADDRESS: \_\_\_\_\_

DATE OF COMMISSIONING: \_\_\_\_\_

**CHECKS:**

SUPPLY VOLTAGE: \_\_\_\_\_ RATED VOLTAGE OF THE UNIT: \_\_\_\_\_

	<b>YES</b>	<b>NO</b>
UNIT ON SHOCK ABSORBERS	<input type="checkbox"/>	<input type="checkbox"/>
DRAINAGE WITH TRAP	<input type="checkbox"/>	<input type="checkbox"/>
GENERAL POWER SUPPLY CONNECTION	<input type="checkbox"/>	<input type="checkbox"/>
CONTROL PANEL CONNECTION	<input type="checkbox"/>	<input type="checkbox"/>
COMPRESSOR OIL LEVEL INDICATOR	<input type="checkbox"/>	<input type="checkbox"/>

**DATA INPUT:**

**COOLING CYCLE**

Air intake temperature to the outdoor coil: < 1 \_\_\_ °C  
 2 \_\_\_ °C

Air output temperature to the outdoor coil: < 1 \_\_\_ °C  
 2 \_\_\_ °C

High pressure: < **circuit 1** \_\_\_\_\_  
**circuit 2** \_\_\_\_\_

Low pressure: < **circuit 1** \_\_\_\_\_  
**circuit 2** \_\_\_\_\_

**HEATING CYCLE**

Air intake temperature to the outdoor coil: < 1 \_\_\_ °C  
 2 \_\_\_ °C

Air output temperature to the outdoor coil: < 1 \_\_\_ °C  
 2 \_\_\_ °C

High pressure: < **circuit 1** \_\_\_\_\_  
**circuit 2** \_\_\_\_\_

Low pressure: < **circuit 1** \_\_\_\_\_  
**circuit 2** \_\_\_\_\_

**ELECTRIC POWER CONSUMPTION (Amps)**

Compressor 1 \_\_\_/\_\_\_/\_\_\_ Compressor 2 \_\_\_/\_\_\_/\_\_\_

Fan outdoor section 1 \_\_\_/\_\_\_/\_\_\_

Fan outdoor section 2 \_\_\_/\_\_\_/\_\_\_

Compressor 1 \_\_\_/\_\_\_/\_\_\_ Compressor 2 \_\_\_/\_\_\_/\_\_\_

Fan outdoor section 1 \_\_\_/\_\_\_/\_\_\_

Fan outdoor section 2 \_\_\_/\_\_\_/\_\_\_

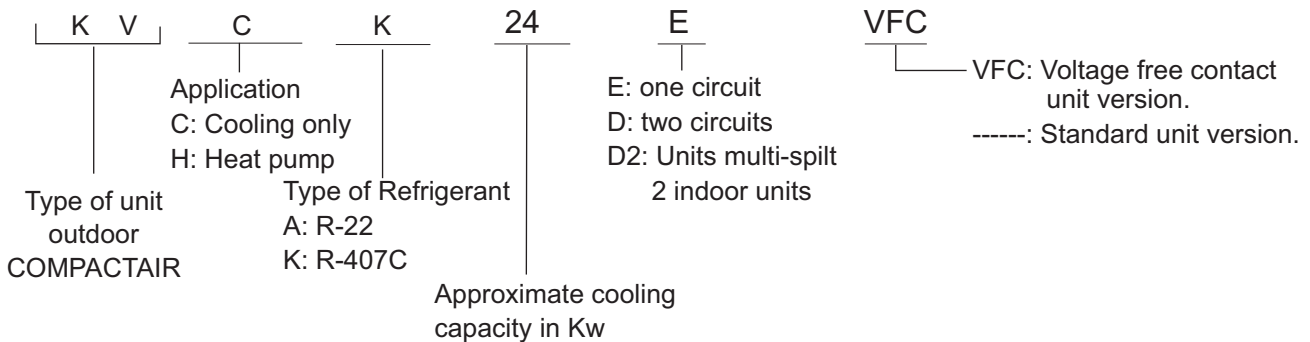
Options installed: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## 1.- GENERAL CHARACTERISTICS

### 1.1.- PHYSICAL DATA



KVHA: Heat pump unit R-22  
 KVCK: Cooling only unit R-407C  
 KVHK: Heat pump unit R-407C

UNIT MODEL		22E	24E	28E	32E	38E	44D/D2
<b>COMPRESSOR</b>	Nr. / Type	1 / Scroll	1 / Scroll	1 / Scroll	1 / Scroll	1 / Scroll	2 / Scroll
<b>NET WEIGHT</b>							
Cooling only units	KVC	<b>Kg</b> 205	265	275	280	360	400
Heat pump units	KVH	<b>Kg</b> 210	270	280	285	365	410
<b>REFRIGERANT CHARGE</b>	NITROGEN (*)						

UNIT MODEL		48D/D2	56D/D2	64D/D2	76D/D2	86D/D2	100D/D2
<b>COMPRESSOR</b>	No. / Type	2 / Scroll	2 / Scroll	2 / Scroll	2 / Scroll	2 / Scroll	4 / Scroll
<b>NET WEIGHT</b>							
Cooling only units	KVC	<b>Kg</b> 520	540	545	670	850	900
Heat pump units	KVH	<b>Kg</b> 530	550	555	680	860	910
<b>REFRIGERANT CHARGE</b>	NITROGEN (*)						

(\*) The units are supplied with nitrogen gas, this must be removed and charge the unit with refrigerant R-22 or R-407C, depends on unit model.

(See pages 29 and 30, to calculate model refrigerant charge)

## 1.- GENERAL CHARACTERISTICS

### 1.2.- STANDARD FAN PERFORMANCES.

#### 22E

	AIR FLOW M <sup>3</sup> /H	5600	6325	7050	7550
AVAILABLE STATIC PRESSURE Pa		170	120	50	0

#### 24E

	AIR FLOW M <sup>3</sup> /H	5600	6325	6800	7350
AVAILABLE STATIC PRESSURE Pa		160	110	50	0

#### 28E

	AIR FLOW M <sup>3</sup> /H	5600	6125	6650	7100
AVAILABLE STATIC PRESSURE Pa		140	90	50	0

#### 32E

PULLEY POSITION	AIR FLOW	R.P.M.	M <sup>3</sup> /H	6500	7000	7500	8000
	PULLEY CLOSED	1140	300*	275*	225*	●	
1 TURN	1070	230*	200*	140*	85*		
2 TURNS	995	175*	140*	75*	25*		
3 TURNS	920	115*	75*	20*	—		

#### 38E

PULLEY POSITION	AIR FLOW	R.P.M.	M <sup>3</sup> /H	9000	9600	10300	11000
	PULLEY CLOSED	1000	300*	270*	●	●	
1 TURN	930	250*	200*	165*	110*		
2 TURNS	870	160*	120*	70*	25*		
3 TURNS	800	90*	40*	0*	—		

#### 44D/D2

	AIR FLOW M <sup>3</sup> /H	11.200	12.650	14.100	15.100
AVAILABLE STATIC PRESSURE Pa		170	120	50	0

#### 48D/D2

	AIR FLOW M <sup>3</sup> /H	11.200	12.650	13.600	14.700
AVAILABLE STATIC PRESSURE Pa		160	110	50	0

#### 56D/D2

	AIR FLOW M <sup>3</sup> /H	11.200	12.250	13.300	14.200
AVAILABLE STATIC PRESSURE Pa		140	90	50	0

#### 64D/D2

PULLEY POSITION	AIR FLOW	R.P.M.	M <sup>3</sup> /H	13000	14000	15000	16000
	PULLEY CLOSED	1140	300*	275*	225*	●	
1 TURN	1070	230*	200*	140*	85*		
2 TURNS	995	175*	140*	75*	25*		
3 TURNS	920	115*	75*	20*	—		

#### 76D/D2

PULLEY POSITION	AIR FLOW	R.P.M.	M <sup>3</sup> /H	18000	19200	20600	22000
	PULLEY CLOSED	1000	300*	270*	●	●	
1 TURN	930	250*	200*	165*	110*		
2 TURNS	870	160*	120*	70*	25*		
3 TURNS	800	90*	40*	0*	—		

#### 86D/D2

PULLEY POSITION	AIR FLOW	R.P.M.	M <sup>3</sup> /H	21000	23000	25000	26000
	PULLEY CLOSED	1010	270*	205*	135*	●	
1 TURN	995	190*	125*	55*	25*		
2 TURNS	900	140*	70*	0*	—		
3 TURNS	845	85*	15*	—	—		

#### 100D/D2

PULLEY POSITION	AIR FLOW	R.P.M.	M <sup>3</sup> /H	23000	24600	26200	28000
	PULLEY CLOSED	1120	360*	305*	240*	165*	
1 TURN	1080	290*	245*	190*	100*		
2 TURNS	1030	230*	170*	110*	20*		
3 TURNS	980	180*	120*	60*	0*		



(\*) STATIC PRESSURE AVAILABLE Pa.

(●) WRONG STATUS ON ACCOUNT OF MOTOR POWER LIMIT

NOTE: The unit leaves factory with pulley two turns opened.

## 1.- GENERAL CHARACTERISTICS

### 1.2.- FAN PERFORMANCES WITH KIT HIGH STATIC PRESSURE TO 350Pa (OPTION)

		<b>22E</b>					<b>24E</b>						
<b>AIR FLOW</b>		R.P.M.	M <sup>3</sup> /H	5600	6325	7050	7550	R.P.M.	M <sup>3</sup> /H	5600	6325	6800	7350
PULLEY POSITION	PULLEY CLOSED	1140	365*	330*	290*	●		1140	365*	325*	290*	●	
	1 TURN	1070	290*	255*	210*	195*		1070	290*	250*	210*	195*	
	2 TURNS	995	240*	195*	165*	135*		995	240*	190*	165*	135*	
	3 TURNS	920	185*	145*	105*	70*		920	185*	140*	105*	70*	

		<b>28E</b>					<b>44D/D2</b>						
<b>AIR FLOW</b>		R.P.M.	M <sup>3</sup> /H	5600	6125	6650	7100	R.P.M.	M <sup>3</sup> /H	11200	12650	14100	15100
PULLEY POSITION	PULLEY CLOSED	1140	365*	325*	290*	270*		1140	365*	330*	●	●	
	1 TURN	1070	290*	250*	210*	195*		1070	290*	255*	210*	●	
	2 TURNS	995	240*	190*	165*	135*		995	240*	195*	165*	135*	
	3 TURNS	920	185*	140*	105*	70*		920	185*	145*	105*	70*	

		<b>48D/D2</b>					<b>56D/D2</b>						
<b>AIR FLOW</b>		R.P.M.	M <sup>3</sup> /H	11200	12650	13600	14700	R.P.M.	M <sup>3</sup> /H	11200	12250	13300	14200
PULLEY POSITION	PULLEY CLOSED	1140	365*	330*	290*	●		1140	365*	330*	290*	●	
	1 TURN	1070	290*	255*	210*	●		1070	290*	255*	210*	195*	
	2 TURNS	995	240*	195*	165*	135*		995	240*	195*	165*	135*	
	3 TURNS	920	185*	145*	105*	70*		920	185*	145*	105*	70*	

(\*) STATIC PRESSURE AVAILABLE Pa.

(●) WRONG STATUS ON ACCOUNT OF MOTOR POWER LIMIT

NOTE: The unit leaves factory with pulley two turns opened.

## 1.- GENERAL CHARACTERISTICS

### 1.3.- ELECTRICAL DATA

**R-407C  
R-22**

UNIT MODELS		KVCK 22E KVHK 22E KVHA 22E	KVCK 24E KVHK 24E KVHA 24E	KVCK 28E KVHK 28E KVHA 28E	KVCK 32E KVHK 32E KVHA 32E	KVCK 38E KVHK 38E KVHA 38E	KVCK 44D KVHK 44D KVHA 44D
Voltage	V/f (50 Hz)	230V-400V/ 3Ph					
<b>Maximum absorbed power</b>							
Compressor	Kw	7,6	8,62	11,15	12,9	15,55	15,2
Fan	Kw	2,2	2,2	2,2	2,5	2,8	4,4
Total power	Kw	9,8	10,8	13,4	15,4	18,4	19,6
<b>Maximum current</b>							
Compressor	A	22,4/12,9	24,3/14	28,5/16,4	36,5/21	46,1/25,6	44,8/25,8
Fan	A	6,4/3,7	6,4/3,7	6,4/3,7	8,8/5,1	12,5/7,2	12,8/7,4
Total current	A	28,8/16,6	30,7/17,7	34,9/20,1	45,3/26,1	58,6/32,8	57,6/33,2
<b>Start up current</b>	<b>A</b>	184,4/104,7	172,4/102,7	216,4/126,7	232,8/132,1	291,5/165,2	213,2/121,3

UNIT MODELS		KVCK 48D KVHK 48D KVHA 48D	KVCK 56D KVHK 56D KVHA 56D	KVCK 64D KVHK 64D KVHA 64D	KVCK 76D KVHK 76D KVHA 76D	KVCK 86D KVHK 86D KVHA 86D	KVCK 100D KVHK 100D KVHA 100D
Voltage	V/f (50 Hz)	230V-400V/ 3Ph					
<b>Maximum absorbed power</b>							
Compressor	Kw	17,24	22,3	25,8	31,1	38,14	44,6
Fan	Kw	4,4	4,4	5	5,6	8	10
Total power	Kw	21,6	26,7	30,8	36,7	46,1	54,6
<b>Maximum current</b>							
Compressor	A	48,6/28	57/32,8	73/42	92,2/51,2	106,6/60	114/65,6
Fan	A	12,8/7,4	12,8/7,4	17,6/10,2	24,9/14,4	31,5/18,2	41,2/23,8
Total current	A	61,4/35,4	69,8/40,2	90,6/52,2	117,1/65,6	138,1/78,2	155,2/89,4
<b>Start up current</b>	<b>A</b>	203,1/120,4	251,3/146,8	278,1/158,2	350,0/198,0	414,5/237,2	337,2/195,8



## 1.- GENERAL CHARACTERISTICS

### 1.3.- ELECTRICAL DATA

**R-407C  
R-22**

UNIT MODELS		KVCK KVHK KVHA 44D2	KVCK KVHK KVHA 48D2	KVCK KVHK KVHA 56D2	KVCK KVHK KVHA 64D2	KVCK KVHK KVHA 76D2	KVCK KVHK KVHA 86D2	KVCK KVHK KVHA 100D2
Voltage	V/f (50 Hz)	230V-400V/ 3Ph						
<b>Maximum absorbed power</b>								
Compressor	<b>Kw</b>	15,2	17,24	22,3	25,8	31,1	38,14	44,6
Fan	<b>Kw</b>	4,4	4,4	4,4	5	5,6	8	10
Total power	<b>Kw</b>	19,6	21,6	26,7	30,8	36,7	46,1	54,6
<b>Maximum current</b>								
Compressor	<b>A</b>	44,8/25,8	48,6/28	57/32,8	73/42	92,2/51,2	106,6/60	114/65,6
Fan	<b>A</b>	12,8/7,4	12,8/7,4	12,8/7,4	17,6/10,2	24,9/14,4	31,5/18,2	41,2/23,8
Total current	<b>A</b>	57,6/33,2	61,4/35,4	69,8/40,2	90,6/52,2	117,1/65,6	138,1/78,2	155,2/89,4
<b>Start up current</b>	<b>A</b>	213,2 121,3	203,1 120,4	251,3 146,8	278,1 158,2	350,0 198,0	414,5 237,2	337,2 195,8

## 1.- GENERAL CHARACTERISTICS

### 1.4.- OPERATING LIMITS

(To install with LECK - LEHA - LEHK units)

#### OPERATING LIMITS FOR (COOLING ONLY) UNITS

		MAXIMUM TEMPERATURES	MINIMUM TEMPERATURES
COOLING CYCLE OPERATION	INDOOR TEMPERATURE	32° C DB / 23° C WB	21° C DB / 15° C WB
	OUTDOOR TEMPERATURE	DEPENDING ON MODEL (TABLE 1)	+19° C STANDARD UNIT 0° C WITH OPTIONAL CPC ON/OFF -10° C (*)

(\*) With kit hot gas by pass or proportional winter control (options).

#### OPERATING LIMITS FOR (HEATING PUMP) UNITS

		MAXIMUM TEMPERATURES	MINIMUM TEMPERATURES
COOLING CYCLE OPERATION	INDOOR TEMPERATURE	32° C DB / 23° C WB	21° C DB / 15° C WB
	OUTDOOR TEMPERATURE	DEPENDING ON MODEL (TABLE 1)	+19° C STANDARD UNIT 0° C WITH OPTIONAL CPC ON/OFF -10° C (*)
HEATING CYCLE OPERATION	INDOOR TEMPERATURE	27° C DB	15° C DB
	OUTDOOR TEMPERATURE	24° C DB / 18° C WB	-10° C DB / -11° C WB

(\*) With kit hot gas by pass or proportional winter control (options).

DB.- Dry Bulb Temperature  
WB.- Wet Bulb Temperature

#### TABLE 1-COOLING CYCLE MAXIMUM OUTDOOR OPERATING TEMPERATURES

##### MODELS WITH REFRIGERANT R-407C

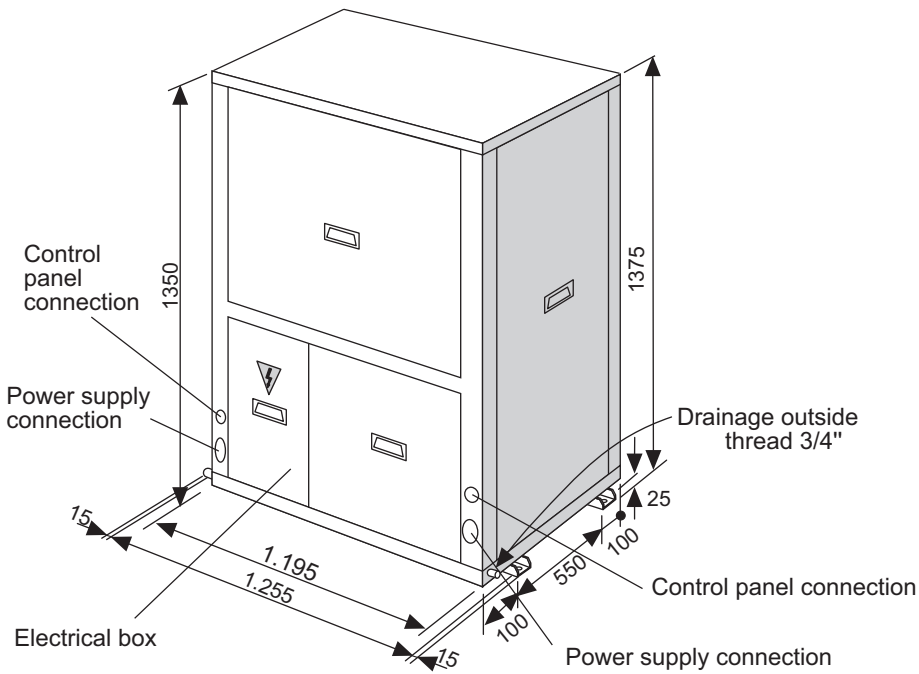
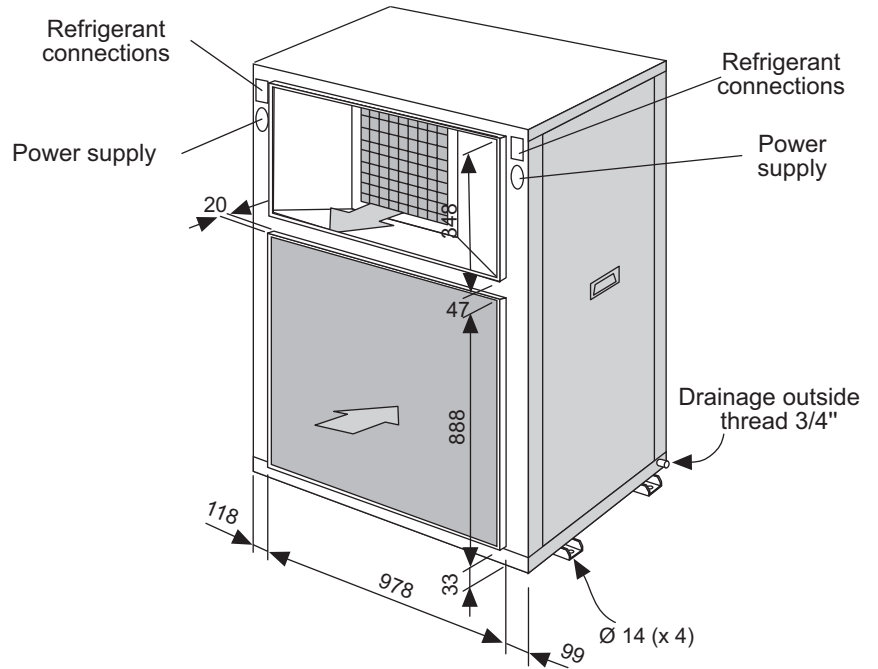
MODELS	22E	24E	28E	32E	38E	44D 44D2	48D 48D2	56D 56D2	64D 64D2	76D 76D2	86D 86D2	100D 100D2
With rated outdoor flow	45	45	43	43	42	45	45	43	43	42	42	41
With minimum outdoor flow	43	43	41	40	39	43	43	41	40	39	39	38

##### MODELS WITH REFRIGERANT R-22

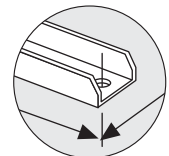
MODELS	22E	24E	28E	32E	38E	44D 44D2	48D 48D2	56D 56D2	64D 64D2	76D 76D2	86D 86D2	100D 100D2
With rated outdoor flow	48	48	46	46	45	48	48	46	46	45	45	44
With minimum outdoor flow	46	45	44	44	42	46	45	44	44	42	42	41

# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNITS DIMENSIONS MODELS 22E-24E-28E-32E

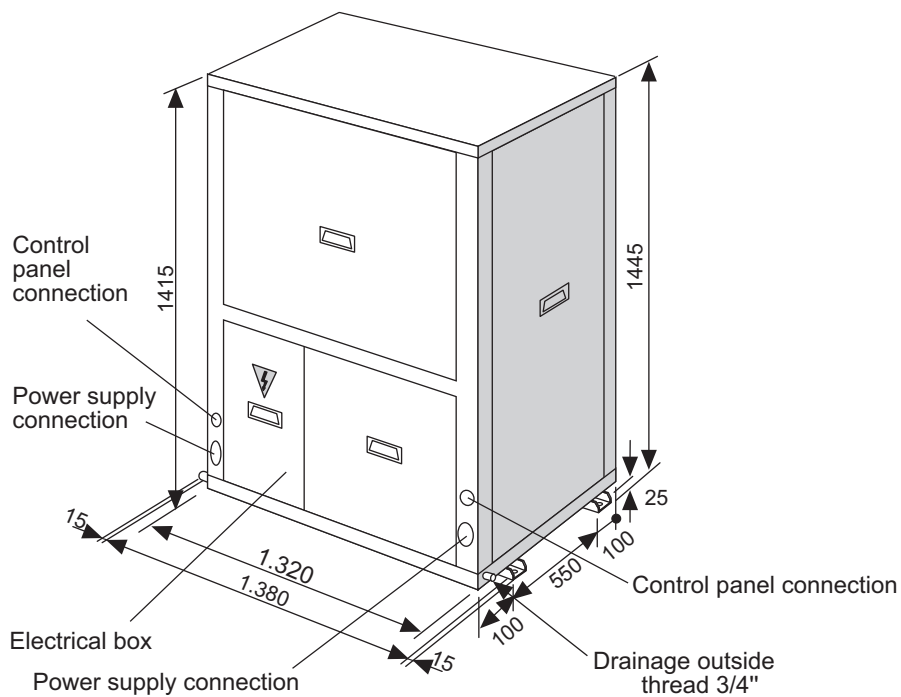
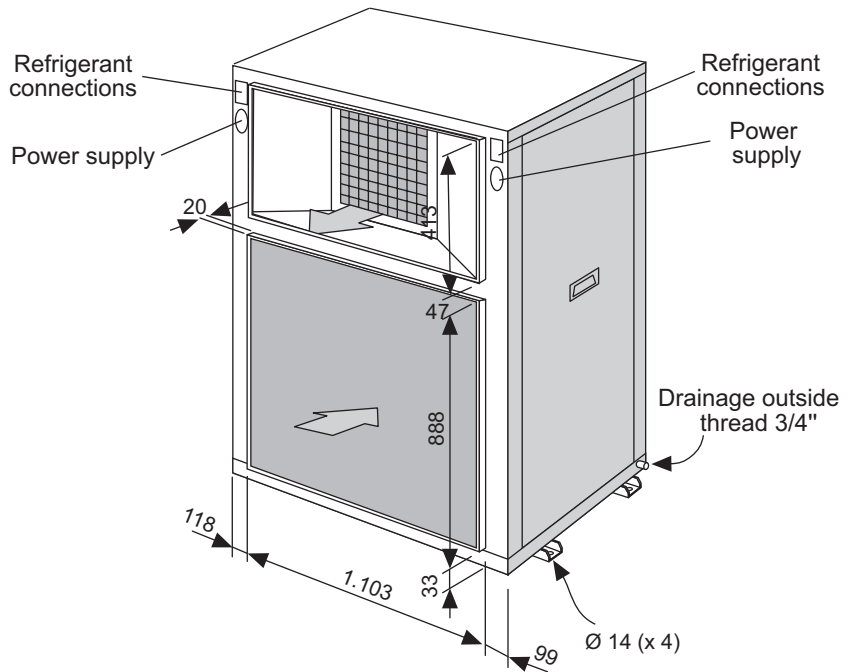


The dimensions referred to the center of the drill holes for the supports.

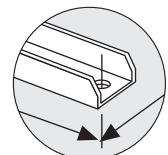


# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNIT DIMENSIONS MODEL 38E

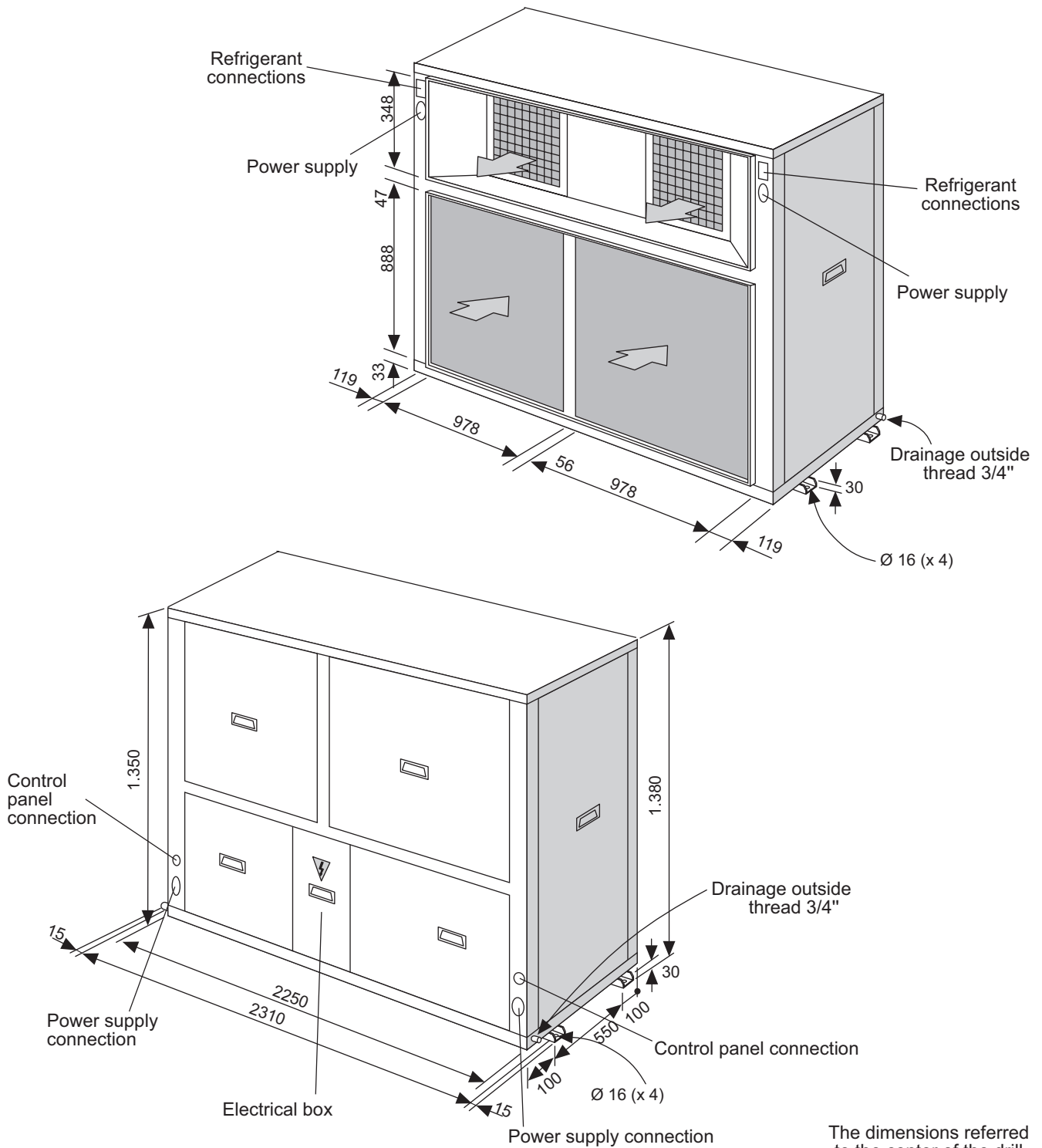


The dimensions referred to the center of the drill holes for the supports.

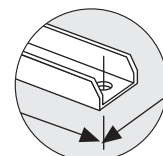


# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNITS DIMENSIONS MODELS 44D-48D-56D-64D 44D2-48D2-56D2-64D2

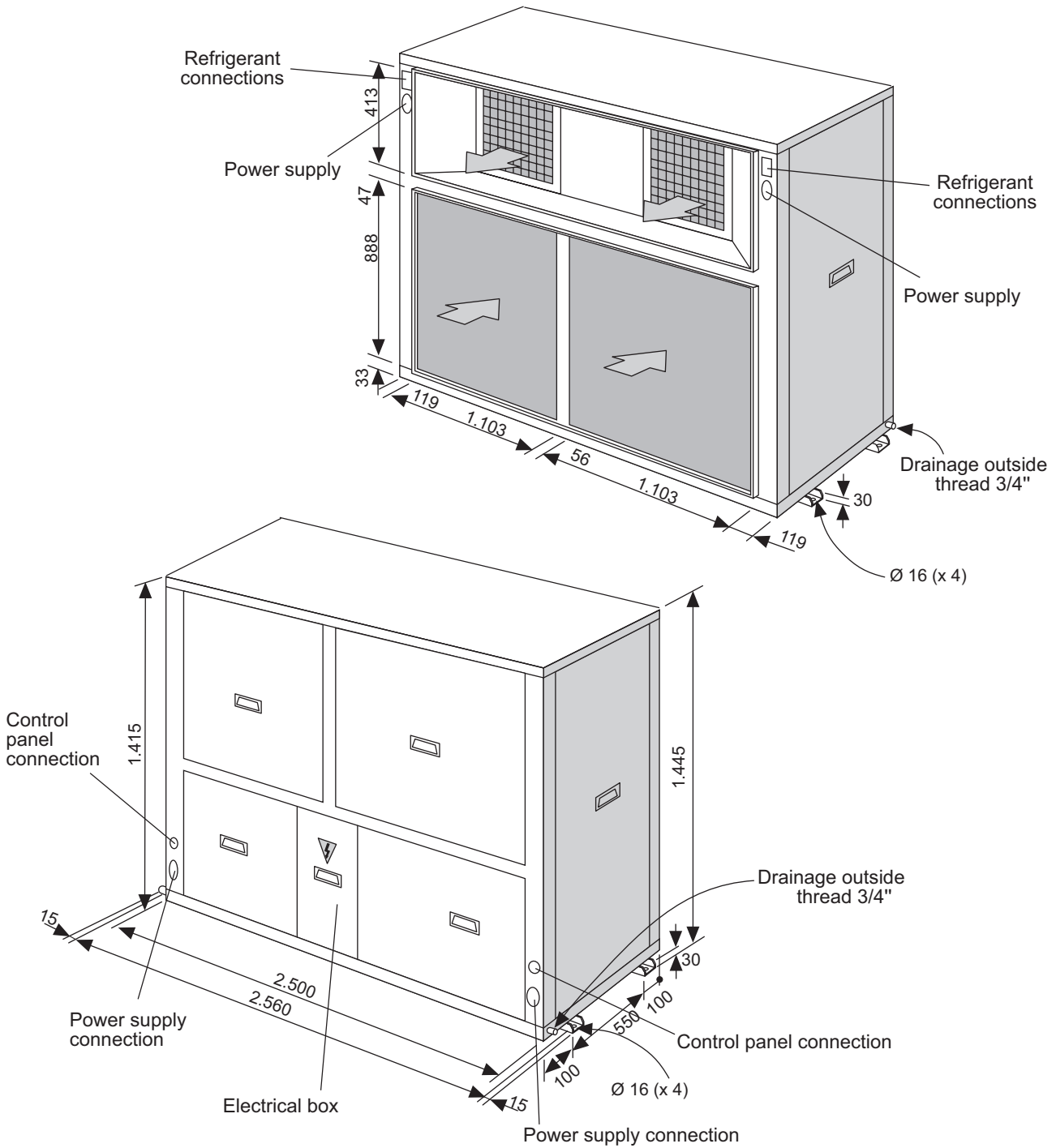


The dimensions referred to the center of the drill holes for the supports.

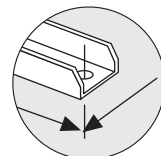


# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNITS DIMENSIONS MODELS 76D-76D2

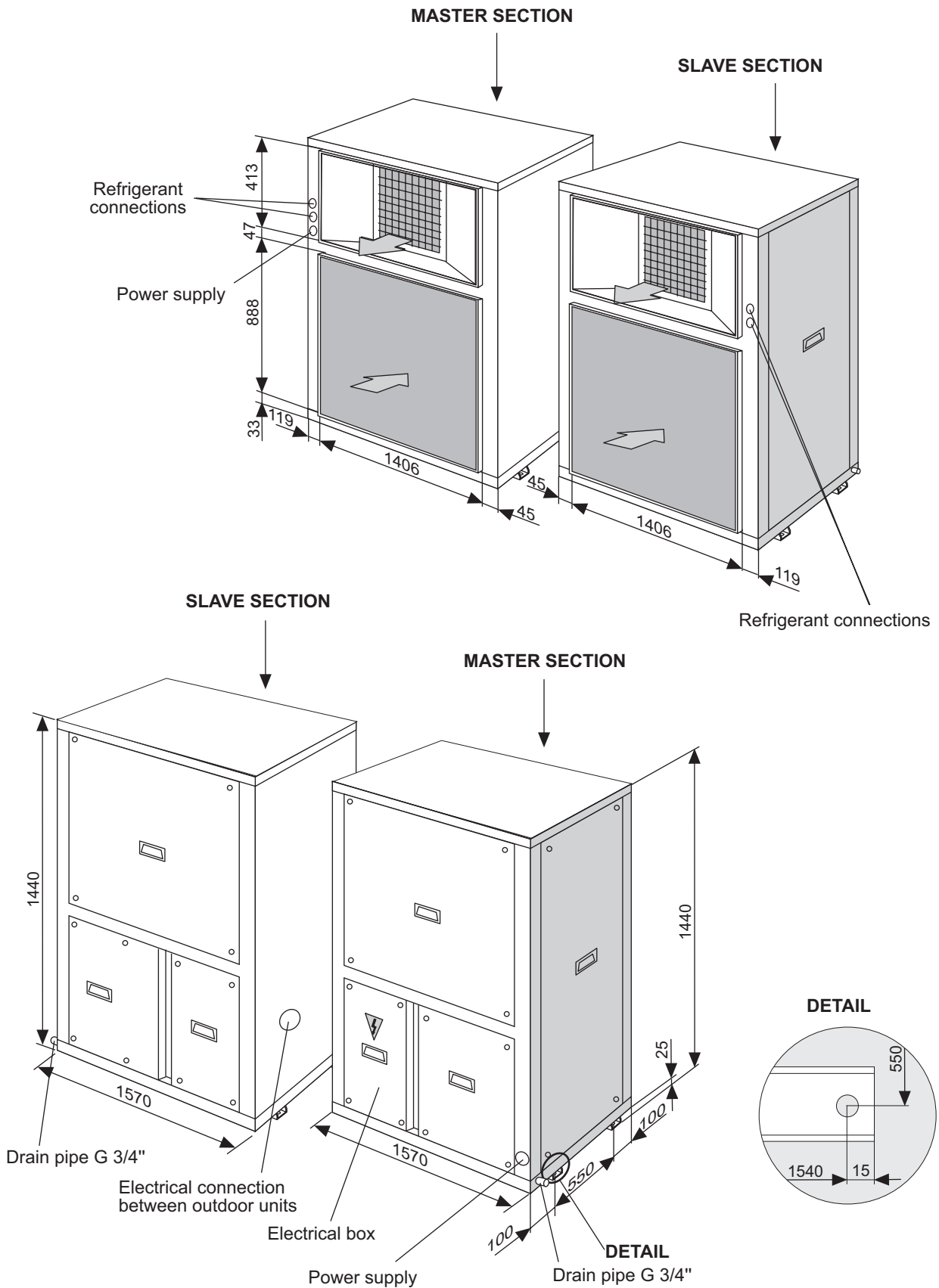


The dimensions referred to the center of the drill holes for the supports.



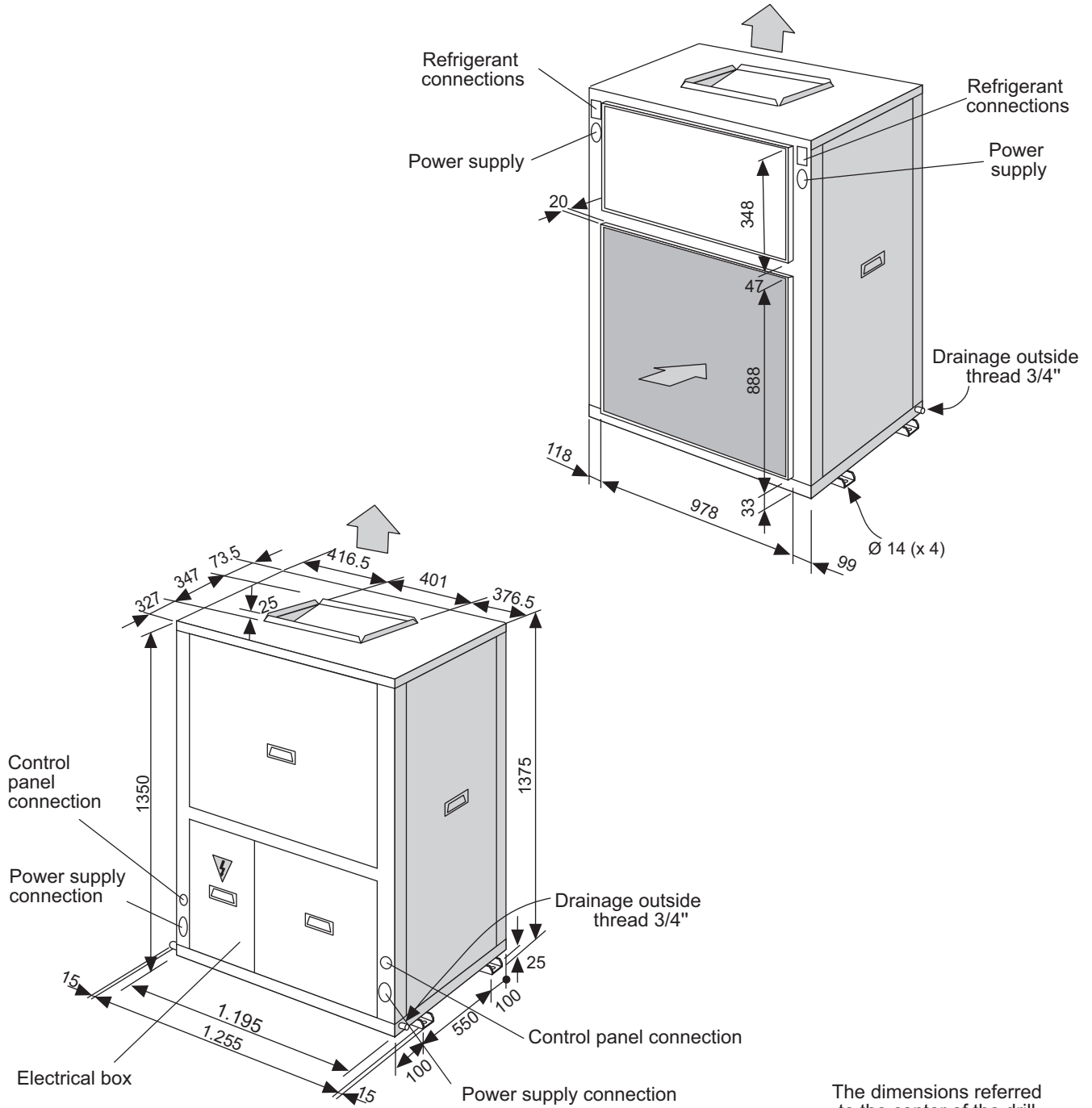
# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNITS DIMENSIONS MODELS 86D-100D-86D2-100D2

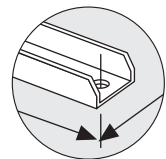


# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNITS DIMENSIONS MODELS 22E-24E-28E-32E WITH KIT VERTICAL DISCHARGE FOR OUTDOOR UNITS (OPTION)



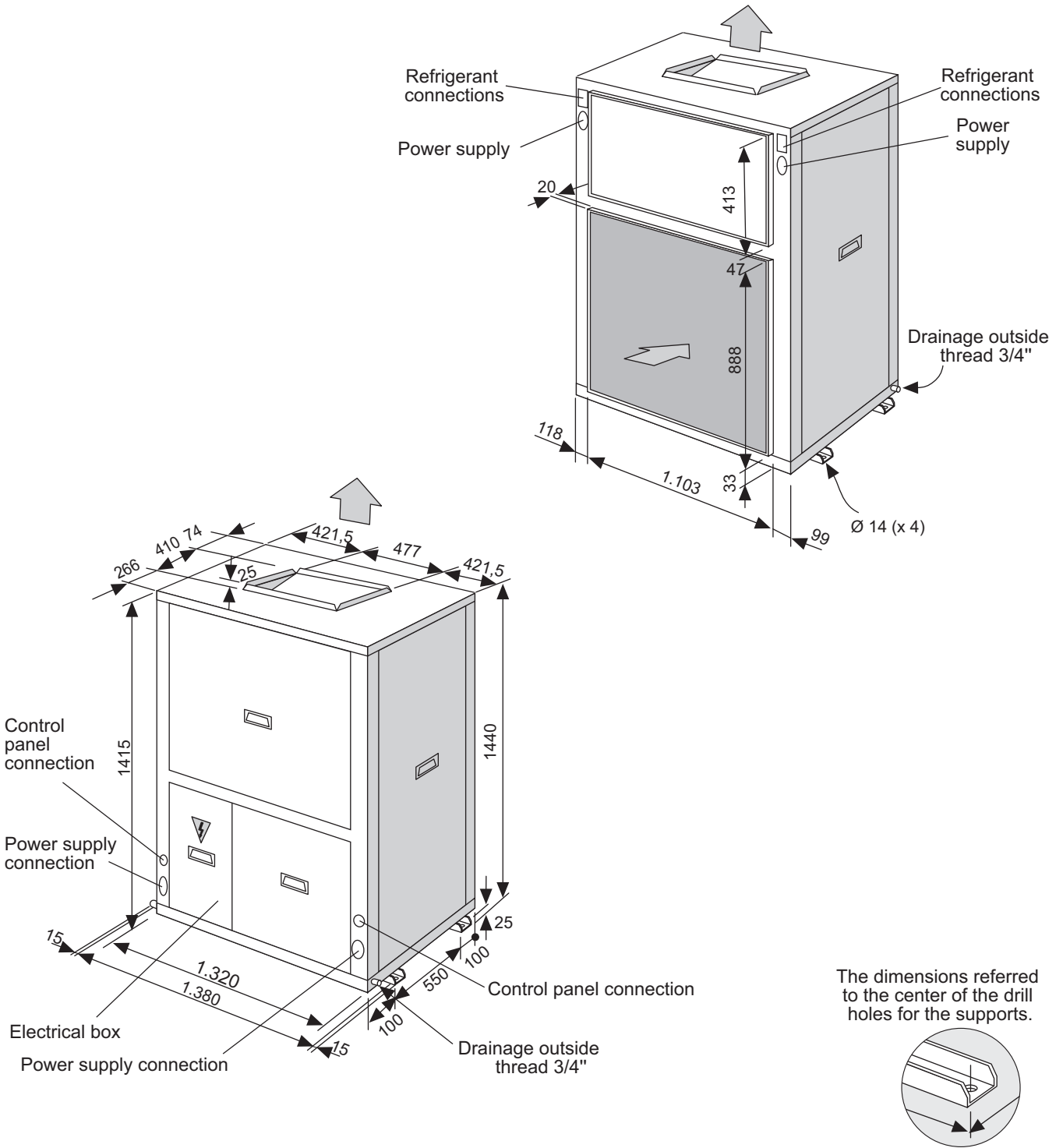
The dimensions referred to the center of the drill holes for the supports.





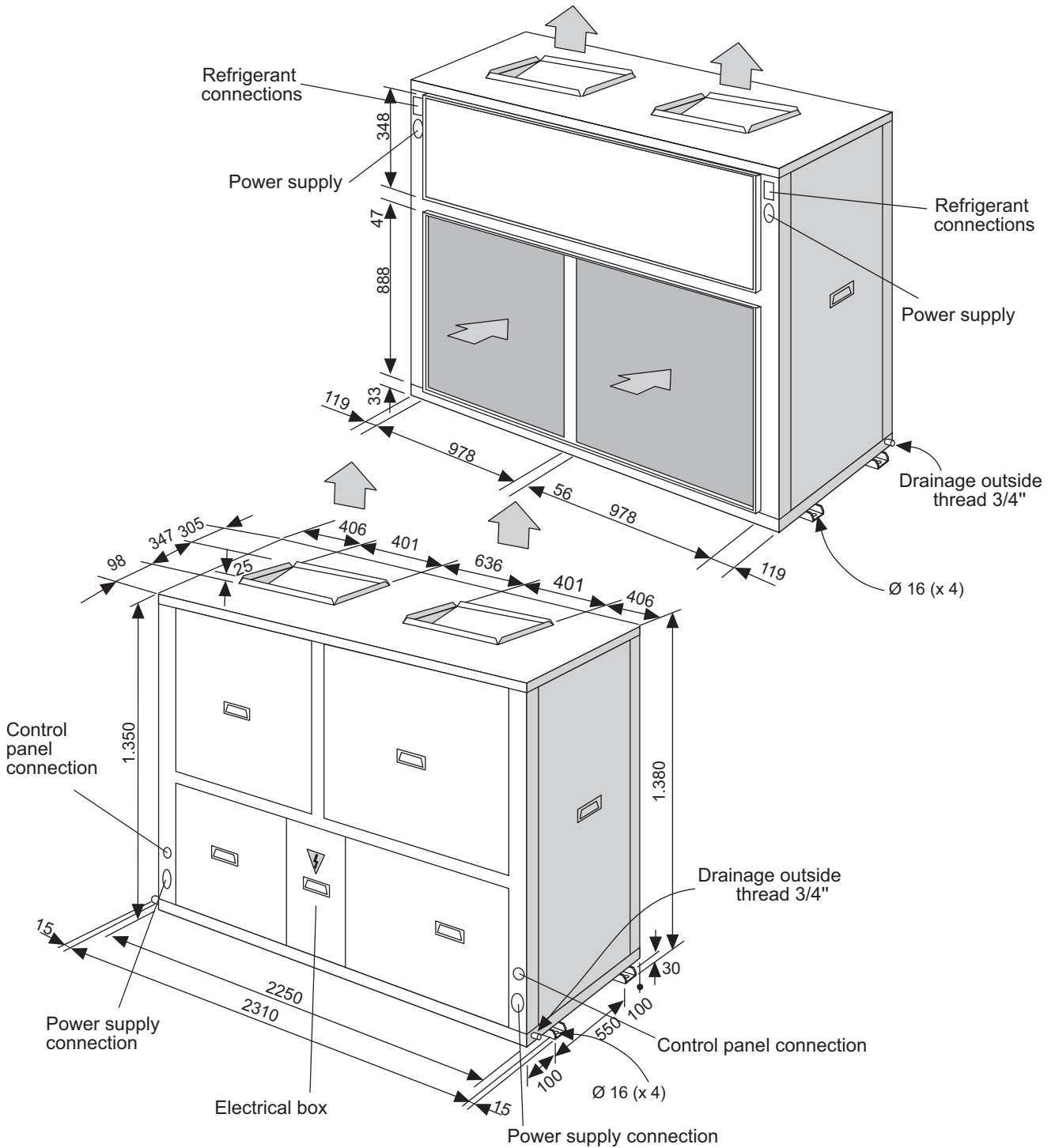
# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNIT DIMENSIONS MODEL 38E WITH KIT VERTICAL DISCHARGE FOR OUTDOOR UNITS (OPTION)

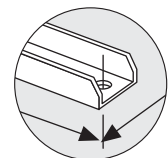


# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNITS DIMENSIONS MODELS 44D-48D-56D-64D-44D2-48D2-56D2-64D2 WITH KIT VERTICAL DISCHARGE FOR OUTDOOR UNITS (OPTION)



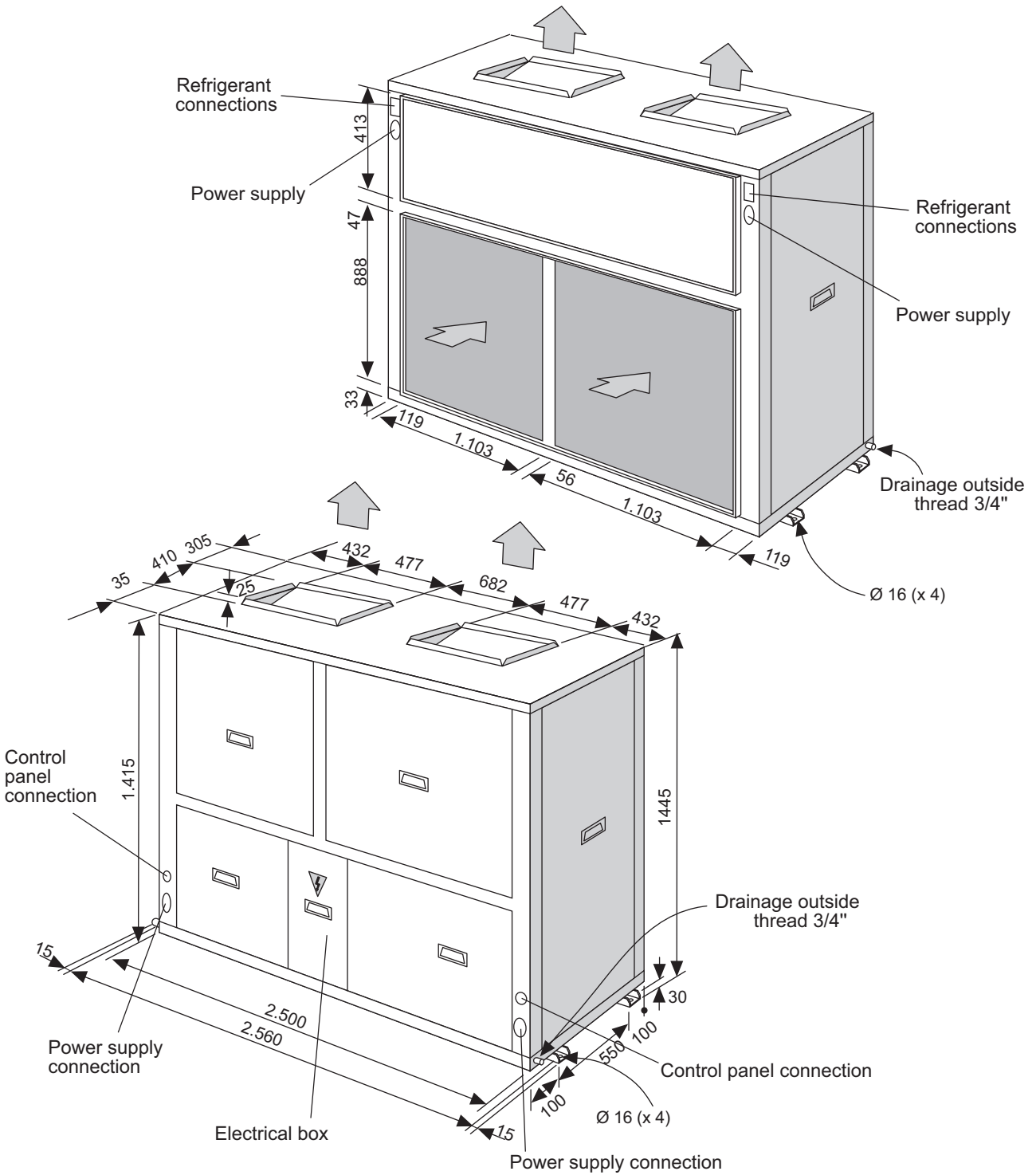
The dimensions referred to the center of the drill holes for the supports.



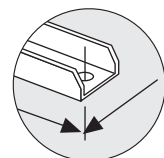
# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNIT DIMENSIONS MODEL 76D-76D2

WITH KIT VERTICAL DISCHARGE FOR OUTDOOR UNITS (OPTION)

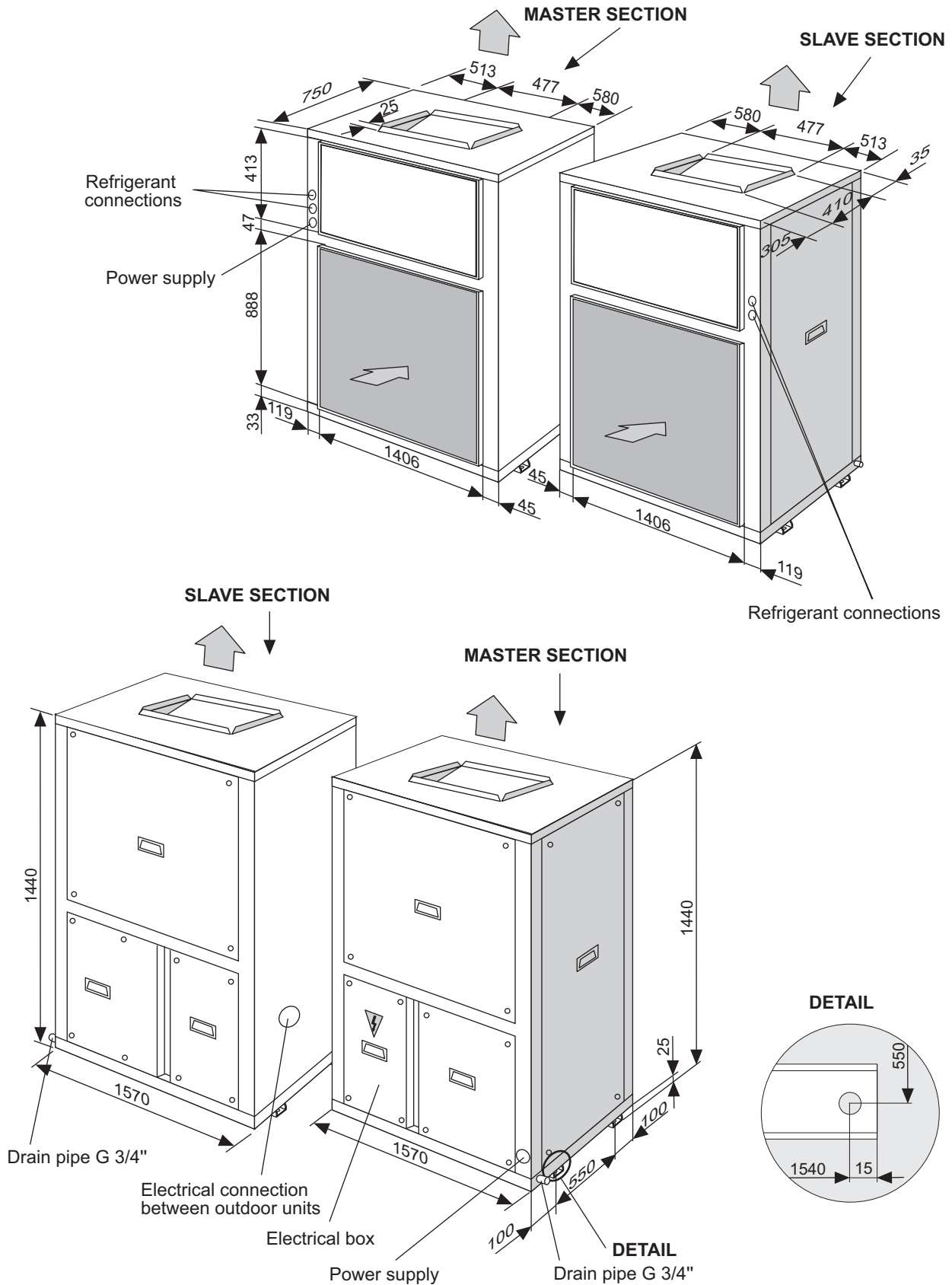


The dimensions referred to the center of the drill holes for the supports.



# 1.- GENERAL CHARACTERISTICS

## 1.5.- UNITS DIMENSIONS MODELS 86D-100D-86D2-100D2 WITH KIT VERTICAL DISCHARGE FOR OUTDOOR UNITS (OPTION)



## 1.- GENERAL CHARACTERISTICS

### 1.6.- AVAILABLE OPTIONS

#### MAIN SWITCH

The main switch is located on the access panel to the electrical box of the outdoor unit. (Except 86D-100D models)  
The main switch is endowed with a clutch gadget, which allows open the panel of the electrical box, when it is on OFF position.

**⚠ ATTENTION! WITH MAIN SWITCH ON. DO NOT REMOVE THE PANEL**

Check to make sure that the main switch is large enough to handle the current for the unit if electric heaters are installed.

#### PHASE SEQUENCER

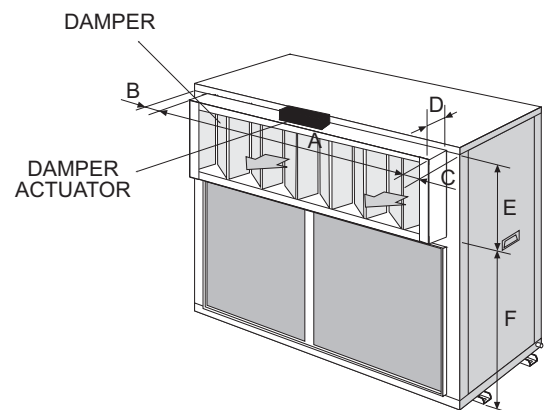
The phase sequencer is located in the electrical box in the outdoor section, thus assuring that the unit will not begin operation while the phase connection of the compressor is not correct. Should this occur, then just switch two phase connections.

#### ON/OFF CONDENSATION PRESSURE CONTROL

The condensation pressure control consists of one or two pressure switches, which starts and stops the outdoor fan regulating the condensation temperature, thus the unit will be able to operate in the cooling cycle when the outdoor temperature is below 19°C, (Until 0°C).

#### PROPORTIONAL CONDENSING PRESSURE CONTROL BY DAMPERS

Based on one or two dampers located on the outdoor unit discharge air, which lets you controls condensation temperature through the air flow. The damper is moving by a servomotor, which receives a proportional signal through a pressure detector.



**⚠** This kit is not available with kit vertical discharge outdoor unit at the same time.

Thus the unit will be able to operate in the cooling cycles when the outdoor temperature is until -10°C.

Dimensions of dampers for this kit:

MODELS		22E-24E-28E-32E	38E	44D-48D-56D-64D	76D	86D-100D
DIMENSIONS	A	970	1095	1949	2199	1339
	B	102,5	102,5	150,5	150,5	150,5
	C	122,5	122,5	150,5	150,5	80,5
	D	165	165	165	165	165
	E	342	407	342	407	407
	F	996,5	996,5	996,5	996,5	996,5
WEIGHTS kg (*)		15	20	30	40	50

(\*) Add to the unit's weight.

#### CRANK CASE HEATER (COOLING-ONLY UNITS)

The purpose of the heater is to keep the oil in the compressor at the correct temperature while the compressor is stopped so that it can be properly lubricated when started again.

When the unit is operating at low outdoor temperatures ( below 19°C), it is advisable to fit a crank case heater.

#### HOT GAS BYPASS VALVE

The purpose of the BYPASS valve is to make it possible for the unit to operate at low outdoor temperatures (until -10°C), to be used in cooling-only and head-pump units.

It regulates the capacity of the compressor by injecting hot gas from the compressor discharge side to the coil.

## 1.- GENERAL CHARACTERISTICS

### 1.6.- AVAILABLE OPTIONS

#### COMPRESSOR STARTING CURRENT CONSTRAINED (“SOFT STARTER”) 400V-III

Is an electronic element, which reduce the pick compressor starting current up to 40%

(see pages of electrical data without soft starter)

Not available for 100D units.

Only available for 400V-III units.

MODELS	WEIGHTS (*)
22E-24E-28E-32E-38E	3
44D-48D-56D-64D-76D-86D	6

(\*) Add to the unit's weight.

#### KIT MORE STATIC PRESSURE OF AIR DISCHARGE

It is a specific fan to obtain mores static available pressure up to 350Pa.

See air flow data section for optional fan performances.

Electrical data for these optional fans:

MODELS KVC / H	22E	24E	28E	32E	38E	44D	48D	56D	64D	76D	86D	100D
POWER Kw	0,4	0,6	0,8	—	—	0,8	1,2	1,6	—	—	—	—
MAXIMUM CURRENT (A)	230 / III	1,0	1,5	2,0	—	—	2,0	3,0	4,0	—	—	—
	400/ III	0,6	0,9	1,2	—	—	1,2	1,7	2,3	—	—	—
WEIGHTS Kg (*)	15	15	15	—	—	30	30	30	—	—	—	—

(\*) Add to the unit data.

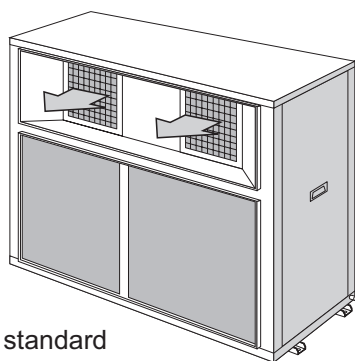
#### KIT VERTICAL DISCHARGE FOR OUTDOORS UNITS, (only for split and multi-split systems)

It is a set of accessories to adapt casing, making the outdoor air discharge become vertical

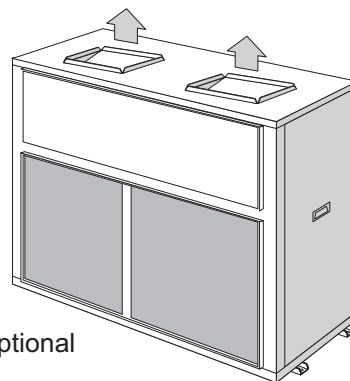
See dimensions section for performances.



This kit is not available with kit proportional condensing pressure control at the same time.



Placement standard



Placement optional

#### CONTROL USING A PROGRAMMABLE CONTROLLER

With the programmable controller option, the desired temperature can be programmed in the area 24 hours a day, 7 days a week.

#### REMOTE AMBIENT SENSOR AND REMOTE DUCT SENSOR

This sensors may be used in conjunction with remote controller or allowing the controller to be mounted in a room away from the conditioned space.

- **REMOTE DUCT SENSOR:** The sensor will be located in the return-air duct, detecting the air temperature of the air being air-conditioned.
- **REMOTE AMBIENT SENSOR:** The sensor will be placed in the area to be air-conditioned.

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## 2.- INSTALLATION

### 2.1.- PRELIMINARY PREPARATIONS



**All INSTALLATION, SERVICE and MAINTENANCE operations must be carried out by QUALIFIED PERSONNEL.**

The unit must be transported in a VERTICAL POSITION on its metal bedplate profiles. Any other position may cause serious damage to the machine. When the unit is received, it should be checked to assure that there are no bumps or other damage, following the instructions on the packaging. If there is damage, the unit may be rejected by notifying the LENNOX Distribution Department and reporting why the machine is unacceptable on the transport agent's delivery notice. Any later complaint or claim made to the LENNOX Distribution Department, for this type of anomaly, cannot be considered under the Guarantee.

Sufficient space must be allowed to facilitate placement of the unit.

The unit may be mounted outdoors. There should be NO possibility of flooding if floor mounted.



**When positioning the unit, be sure that the Rating Plate will always be visible since this data will be necessary to assure proper maintenance.**

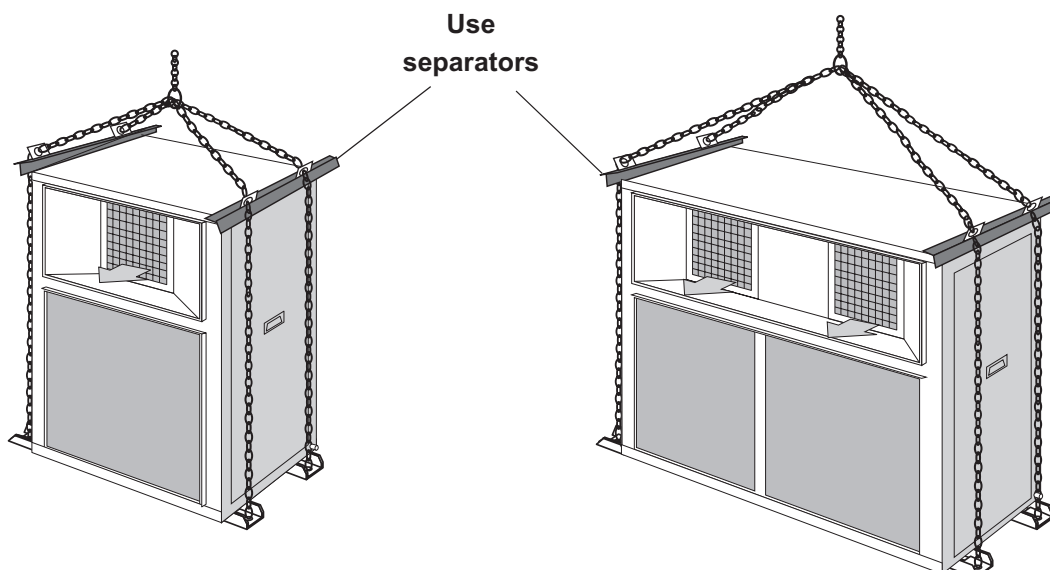
The units are designed to be installed with ducts, calculated by qualified technical staff. The joints to be used between ducts and the openings to the unit should be Elastic Joints. Avoid the use of BYPASS joints between the extraction air and input air in both the outdoor and indoor sections. The structure where the unit is placed must be able to support the weight of the unit during operation.

### 2.2.- UNIT RECEPTION

All the units have Metal Bedplate Profiles.

If unloading and placement require the use of a crane, then secure the suspension cables as shown in the figure.

#### How to hoist the unit

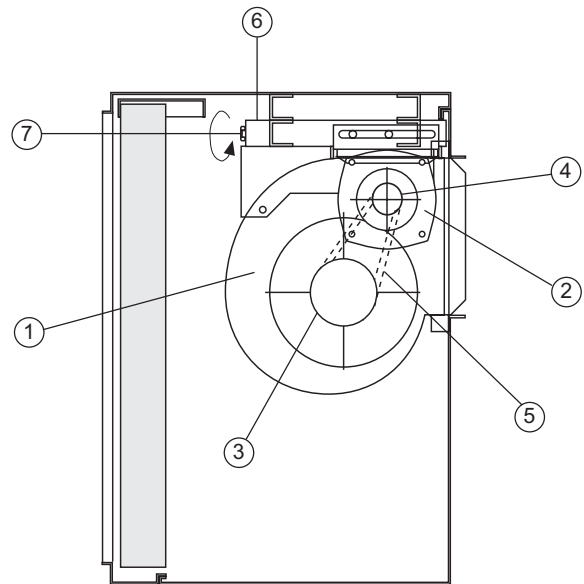


## 2.- INSTALLATION

### 2.3.- OPTIONAL OPERATIONS PRIOR TO UNIT INSTALLATION:

THE VENTILATION FOR KVCK- KVHA- KVHK 32E-38E-64D-76D-86D-100D UNITS IS FORMED BY:

- 1.- Centrifugal fan ( single or double).
- 2.- Activating motor.
- 3.- Fixed pulley at the fan.
- 4.- Adjustable pulley at the motor fan.
- 5.- transmission pulley or pulleys.
- 6.- Base of the motor with displacement system for tensioning of belts.
- 7.- Tensing screw.



### FLOW REGULATION IN THE FANS

The fan in the outdoors units KVCK/ KVHK/ KVHA 32E- 38E- 64D- 76D- 86D- 100D have a variable pulley incorporated into the activating motor, by which it is possible to vary, when the fan is off its diameter to modify the air flow of the unit, as required.

1. Fixed part
2. Mobil part
3. Fixing screw

#### CLOSE PULLEY:

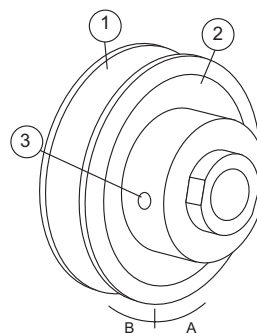
To increase the fan flow, turn the mobil part in direction "B" (Clock wise).

#### OPEN PULLEY:

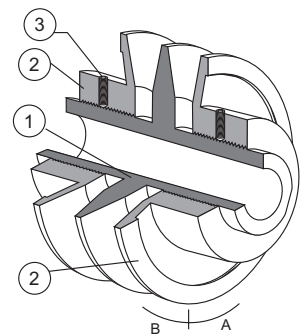
To reduce the flow, turn in direction "A" (Unclock wise).

### VARIABLE PULLEYS

#### SIMPLE PULLEY



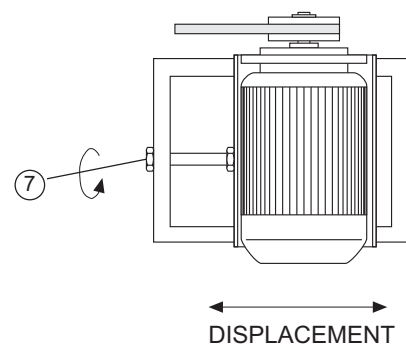
#### DOUBLE PULLEY



### TENSION OF BELTS

The belts can be easily tensioned through the tensing screw incorporated into the bases of the motor of the transmitting units which also enables a good servicing to be carried out.

When the tensing screw is moved, the motor fan is moved to the sides in order to tension the pulley.





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## 2.- INSTALLATION

### 2.4.- UNIT LOCATION

- The bedplate is made up of two metal channels, capable of with standing the weight of the units whether hung from the ceiling or mounted on the floor.

- If the unit is floor mounted, then the profiles should be isolated with shock absorbing material such as anti-vibration or pads. Keep in mind that fans rotate at approximately 850 rpm.

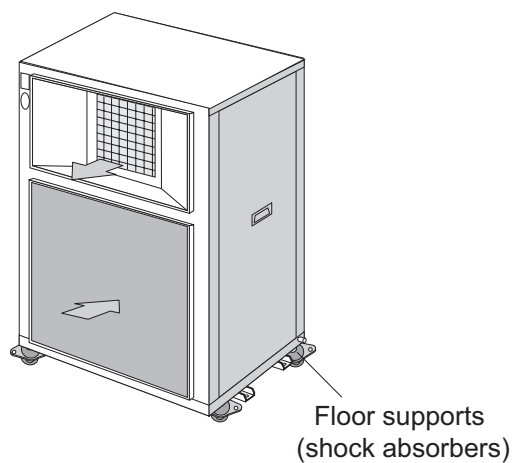
For the ones with variable pulley belts, see performances tables.

- The unit is able to work in normal radioelectronics conditions for commercials and residential installations. For any other conditions please consult.

- If the outside temperature in the area where the heat pump unit is to be installed is low or the cycle functioning are too long, it may necessary to install a electrical heater, below the likely coils on the drip tray, which avoid the causing of ice in the coil during defrost cycle.

- If the outdoor unit is going to be installed outside. It may be recommended to install isolation around the panel of electrical box, to make sure it became hermetic.

#### UNIT INSTALLED ON SHOCK ABSORBERS



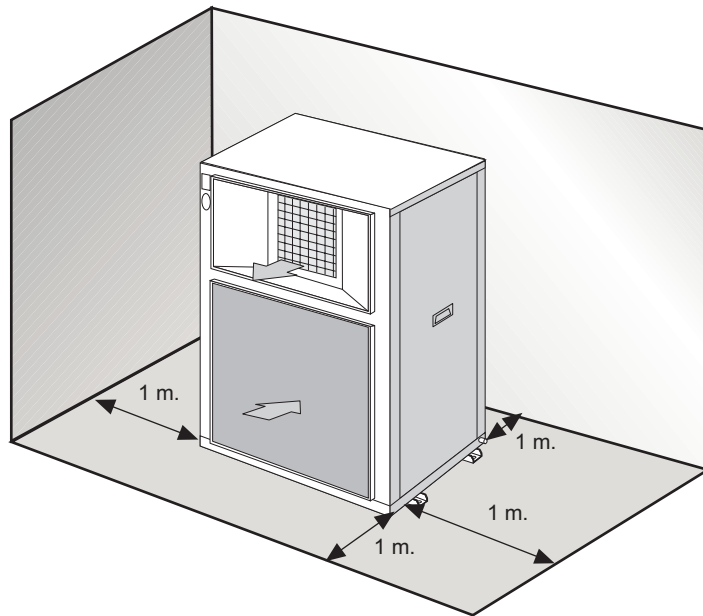
## 2.- INSTALLATION

### 2.5.- INSTALLATION CLEARANCE

Clearance around the unit for service and maintenance

#### SERVICE SPACE

Space should be left free for access or servicing, to ease the installation of cables, drainage connections, electric installation and cleaning filters, as well as easy access to the unit.



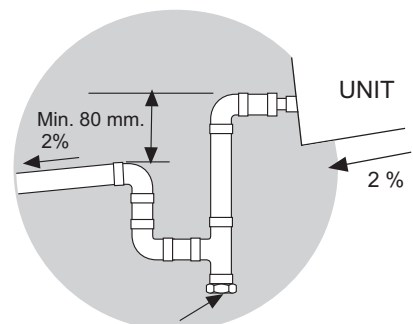
#### LOCATION

The unit can be installed outside. If it is installed, air entry and exit ducts should be fitted. Both the interior and exterior unit should be assembled on bases previously made and stood on absorbent and antivibrating material to avoid the vibrations being transmitted to the structure of the building.

### 2.6.- DRAINS

All the indoor and outdoor sections of these units have a 3/4" steel threaded drain pipe welded to the condensation tray.

Drainage pipes will be fitted for each tray through a siphon with a height difference of 80 mm. to avoid drainage problems from the depression formed by the fans. The pipes should have an inclination of 2% to ease drainage of condensation.



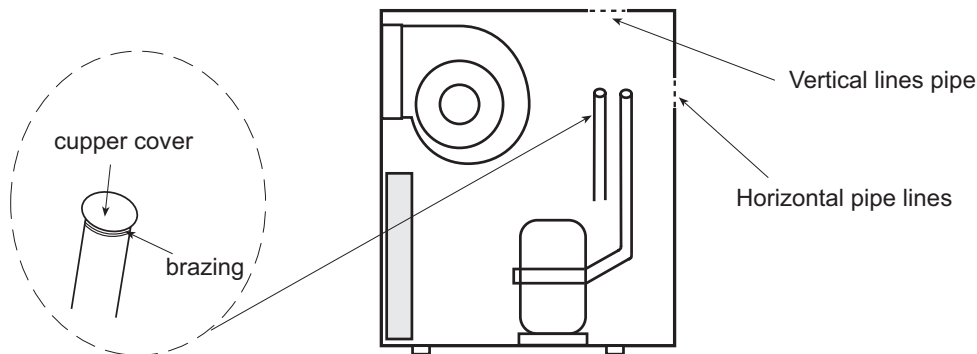
Inspection and cleaning stopper.

Also slightly tip the unit (2%) toward the drainage side. Check that the condensation trays are clean and free from dirt and other debris from the works and that water drains correctly.

## 2.- INSTALLATION

### 2.7- REFRIGERANT CONNECTIONS

The unit is supplied with gas and liquid lines sealed with copper covers inside the casing with possibility to install pipe lines horizontal or vertical.



THE UNITS ARE SUPPLIED WITH NITROGEN GAS, THIS MUST BE REMOVED AND THEN PROCEED AS FOLLOW:

1° Remove the nitrogen gas, through the high and low 1/4" service ports locate inside, from both indoor and outdoor units.

2<sup>a</sup> Remove the covers from connecting lines.

3<sup>a</sup> Braze the piping connection lines. Refer to installation manual to select the diameter of the lines. (When brazing refrigerant pipes, is necessary to supply nitrogen gas through the service ports into the pipes to remove the air)

4° Leak test:

- Add nitrogen gas and check 5 kg/cm<sup>2</sup> pressure has been reached, and verify there are not leaks in the circuit or brazing, applying soapy water on pipes, because the leaks cause soapy water to form bubbles. To detect small leaks proceed as follow:

Add nitrogen gas and check 32 kg/cm<sup>2</sup> pressure has been reached, there is not leak if pressure remains the same at least during 24 hours and final pressure is not less than 10% from the initial pressure.

5° Be sure gas line is isolated.

6° Vacuuming.

Remove the nitrogen gas, connect the gauge manifold and vacuum pump to both liquid and gas lines, fully open the valve of the gauge manifold and switch on the vacuum pump. Check to make sure the gauge shows a pressure level of -750mm Hg, after a level of -750mm Hg is reached, keep on the vacuum pump at least during an hour.

7° Refrigerant charge:

- Refer to installation manual to verify amount and type of refrigerant which must be charged, and the total amount to be added must be calculated considering the refrigerant charge of the unit, and also the length and sizes of the refrigerant piping.

- Disconnect the vacuum pump and connect to the refrigerant-charging cylinder. Open the charging cylinder and purge the air from the hose at the gauge manifold.

- Set up the amount of additional refrigerant on the weighing scale, open the high pressure (liquid) and low pressure side (suction) of the gauge valve to start the process of refrigerant from outdoor unit. If the total amount of refrigerant charge has not been reached, because balance pressure, turn off the high side of the gauge manifold, turn on the unit, and add slowly through low side of the gauge the remain amount of the refrigerant charge needed.

**(With R-407C refrigerant, the charging cylinder must be on horizontal position and it is important to charge in liquid state).**

Close the sides of gauge valve from service port of the unit, put the covers on service ports. Then the unit is ready to work.



During installation operations, keep gas and liquid pipes covered, in order to prevent humidity and dirt, get into them.

Take special concern about refrigerant pipes are isolated.

Avoid collapse on pipe lines installation.

## 2.- INSTALLATION

### 2.7- REFRIGERANT CONNECTIONS

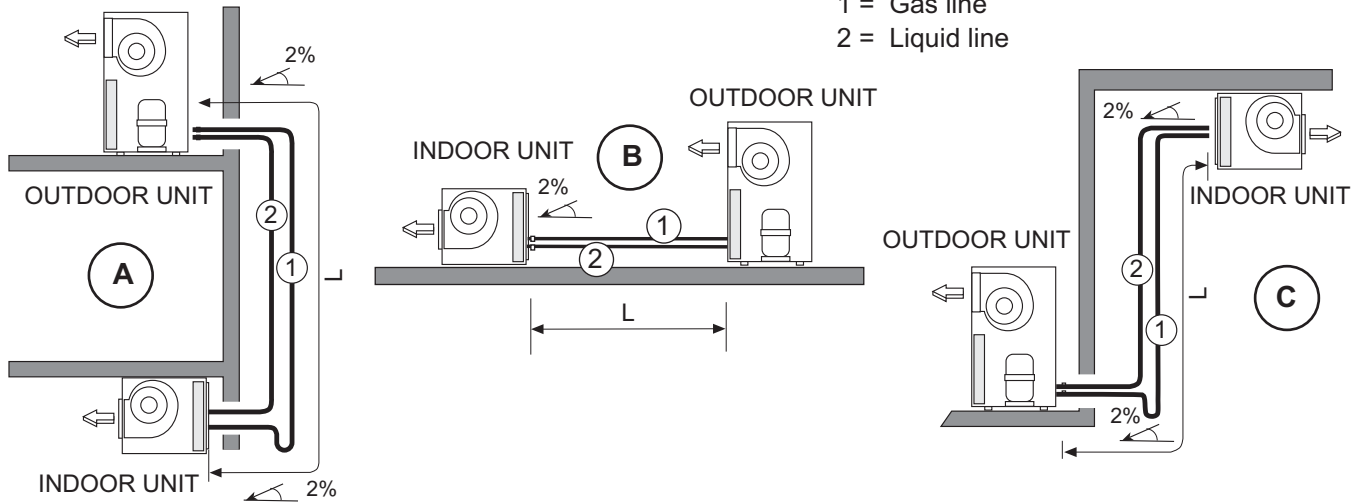
To locate the outdoor and the indoor units, refer to the following information:

#### A,B,C : Unit positions

L : Total length

1 = Gas line

2 = Liquid line




**POSITION A :** A syphon suction must be installed on the vertical line of the gas line ①, and syphons must be installed every 8 meters upward. The minimum speed suction must not be below 6m/s.

**POSITION B :** Tip the lines toward the outdoor unit. Make special attention to line length longer than 10m and avoid collapse on pipe lines installation.

**POSITION C :** Install a syphon at the base of the vertical of the gas line; no more syphons are necessary.

TABLE 1: REFRIGERANT LINES SELECTION

REFRIGERANT LINES			UNIT - MODEL											
			22E	24E	28E	32E	38E	44D 44D2	48D 48D2	56D 56D2	64D 64D2	76D 76D2	86D 86D2	100D 100D2
Total line length	0 to 10 m.	∅ Liquid	5/8"	5/8"	5/8"	5/8"	3/4"	2x5/8"	2x5/8"	2x5/8"	2x5/8"	2x3/4"	2x7/8"	2x7/8"
		∅ Gas	7/8"	1-1/8"	1-1/8"	1-1/8"	1-3/8"	2x7/8"	2x1-1/8"	2x1-1/8"	2x1-1/8"	2x1-3/8"	2x1-5/8"	2x1-5/8"
	0 to 30 m.	∅ Liquid	5/8"	5/8"	5/8"	3/4"	7/8"	2x5/8"	2x5/8"	2x5/8"	2x3/4"	2x7/8"	2x7/8"	2x7/8"
		∅ Gas	1-1/8"	1-1/8"	1-1/8"	1-3/8"	1-5/8"	2x1-1/8"	2x1-1/8"	2x1-1/8"	2x1-3/8"	2x1-5/8"	2x1-5/8"	2x1-5/8"
	30 to 50 m. 	∅ Liquid	5/8"	3/4"	3/4"	3/4"	7/8"	2x5/8"	2x3/4"	2x3/4"	2x3/4"	2x7/8"	2x7/8"	2x1-1/8"
		∅ Gas	1-1/8"	1-3/8"	1-3/8"	1-3/8"	1-5/8"	2x1-1/8"	2x1-3/8"	2x1-3/8"	2x1-3/8"	2x1-5/8"	2x2-1/8"	2x2-1/8"
Unit connections	∅ Liquid	5/8"	5/8"	5/8"	5/8"	3/4"	2x5/8"	2x5/8"	2x5/8"	2x5/8"	2x3/4"	2x7/8"	2x7/8"	
	∅ Gas	7/8"	1-1/8"	1-1/8"	1-1/8"	1-3/8"	2x7/8"	2x1-1/8"	2x1-1/8"	2x1-1/8"	2x1-3/8"	2x1-5/8"	2x1-5/8"	
Maximum vertical line length (m)			16	16	16	16	16	16	16	16	16	16	16	
Maximum number of bends			12	12	12	12	12	12	12	12	12	12	12	

- THE GAS LINE MUST BE ALWAYS INSULATED.

- THE HORIZONTAL LINES MUST BE TYPED AT LEAST 2% TOWARD THE OUTDOOR UNIT.

- THE MAXIMUM SPEED INSIDE LINES SHOULD NOT BE MORE THAN 15 m/sec.



Between length of 30 and 50 m superior you have to make a recalculation according to our technical commercial department or distribution itself to maintain determinated aspects how to make the installation (additional charge of oil, solenoid valves, etc).

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## 2.- INSTALLATION

### 2.7.-REFRIGERANT CONNECTIONS



#### PRECAUTIONS TO BE TAKEN IN THE USE OF R-407C Refrigerant

If R-407C Refrigerant is used in the unit, the following precautions characteristic of this gas should be taken:

- The Vacuum Pump must have a Check Valve or Solenoid Valve.
- Pressure Gauges and Hoses for the exclusive use with R-407C Refrigerant should be used.
- The charge should be carried out in the Liquid Phase.
- Always use scales to weight-in charge- Use the Leak Detector exclusive for R-407C Refrigerant.
- Do not use mineral oil, only synthetic oil to ream, expand or make connections.
- Keep pipes wrapped before using them and be very thorough about any possible dirt (dust, filings, burrs, etc.).
- When there is a leak, gather what is left of the charge, create a vacuum in the unit and completely recharge with new R-407C Refrigerant.
- Brazing should always be carried out in a nitrogen atmosphere.
- Reamers should always be well sharpened.

## 2.- INSTALLATION

### 2.7.- REFRIGERANT CONNECTIONS

TABLE 2: CHARGE OF REFRIGERANT FOR OUTDOOR UNIT + INDOOR UNIT LE

Indoor and outdoor units are factory pre-charged with **Nitrogen (N<sub>2</sub>)**. The installer should remove this gas and charge the units with the refrigerant R-22 or R-407C shown on the following table and also the charge per meter line on table 4.

Charge of refrigerant (gr) R-22 for 0 meters of line KVHA + LEHA											
22E	24E	28E	32E	38E	44D	48D	56D	64D	76D	86D	100D
6000	6800	7900	9100	11300	12000	13600	15800	18200	22600	24400	27000

Charge of refrigerant (gr) R-407C for 0 meters of line KVCK + LECK											
22E	24E	28E	32E	38E	44D	48D	56D	64D	76D	86D	100D
5000	5700	6650	7600	9450	10000	11400	13300	15200	18900	21000	23400

Charge of refrigerant (gr) R-407C for 0 meters of line KVHK + LEHK											
22E	24E	28E	32E	38E	44D	48D	56D	64D	76D	86D	100D
5500	6300	7400	8500	10500	11000	12600	14800	17000	21000	23400	26000

TABLE 3: CHARGE OF REFRIGERANT FOR MULTI-SPLIT SYSTEM

Indoor and outdoor units are factory pre-charged with **Nitrogen (N<sub>2</sub>)**. The installer should remove this gas and charge the units with the refrigerant R-22 or R-407C shown on the following table and also the charge per meter line on table 4.

Charge of refrigerant (gr) R-22 KVHA + 2 x LEHA						
44D2	48D2	56D2	64D2	76D2	86D2	100D2
2 x 6000	2 x 6800	2 x 7900	2 x 9100	2 x 11300	2 x 12200	2 x 13500

Charge of refrigerant (gr) R-407C KVCK + 2 x LECK						
44D2	48D2	56D2	64D2	76D2	86D2	100D2
2 x 5000	2 x 5700	2 x 6650	2 x 7600	2 x 9450	2 x 10500	2 x 11700

Charge of refrigerant (gr) R-407C KVHK + 2 x LEHK						
44D2	48D2	56D2	64D2	76D2	86D2	100D2
2 x 5500	2 x 6300	2 x 7400	2 x 8500	2 x 10500	2 x 11700	2 x 13000

## 2.- INSTALLATION

### 2.7.-REFRIGERANT CONNECTIONS

TABLE 4: WEIGHT OF REFRIGERANT R-22 R-407C PER METER LINE OF LINE

	FROM 0 TO 10M			FROM 10 TO 30M			FROM 30 TO 50M		
	Suction	Liquid	gr/m	Suction	Liquid	gr/m	Suction	Liquid	gr/m
MODEL 22E	7/8"	5/8"	151	1-1/8"	5/8"	155	1-1/8"	5/8"	155
MODEL 24E	1-1/8"	5/8"	155	1-1/8"	5/8"	155	1-3/8"	3/4"	232
MODEL 28E	1-1/8"	5/8"	155	1-1/8"	5/8"	155	1-3/8"	3/4"	232
MODEL 32E	1-1/8"	5/8"	155	1-3/8"	3/4"	232	1-3/8"	3/4"	232
MODEL 38E	1-3/8"	3/4"	232	1-5/8"	7/8"	327	1-5/8"	7/8"	327
MODEL 44D / D2	2x7/8"	2x5/8"	151	2x1-1/8"	2x5/8"	155	2x1-1/8"	2x5/8"	155
MODEL 48D / D2	2x1-1/8"	2x5/8"	155	2x1-1/8"	2x5/8"	155	2x1-3/8"	2x3/4"	232
MODEL 56D / D2	2x1-1/8"	2x5/8"	155	2x1-1/8"	2x5/8"	155	2x1-3/8"	2x3/4"	232
MODEL 64D / D2	2x1-1/8"	2x5/8"	155	2x1-3/8"	2x3/4"	232	2x1-3/8"	2x3/4"	232
MODEL 76D / D2	2x1-3/8"	2x3/4"	232	2x1-5/8"	2x7/8"	327	2x1-5/8"	2x7/8"	327
MODEL 86D / D2	2x1-5/8"	2x7/8"	327	2x1-5/8"	2x7/8"	327	2x2-1/8"	2x7/8"	340
MODEL 100D / D2	2x1-5/8"	2x7/8"	327	2x1-5/8"	2x7/8"	327	2x2-1/8"	2x1-1/8"	581

CHARGE OF REFRIGERANT FOR THE SET:

EXAMPLE:

To install a KVHK 38E + LEHK 38E set, with a 22m refrigerant line length between outdoor and indoor unit, then the refrigerant charge must be calculated as follow:

1° Type of refrigerant R-22 or R-407C, in this case, R-407C .

2° The TABLE 4 shows, that for 22m of line length between indoor unit and outdoor unit, the line sizes are, liquid 7/8", and gas 1-5/8".

3° TABLE 4 shows, for line sizes of 7/8"- 1-5/8", the charge per meter line is: 327 gr/m.

4° TABLE 2 shows, charge of refrigerant for the set with 0m of line length is 10.500gr.

5° To determine the charge of the set:

Add charge of the refrigerant lines + charge of refrigerant indoor unit and outdoor unit.

$$\text{Total charge for the set: } (327 \text{ gr/m}) \times 22\text{m} + 10.500 \text{ gr} = 17.694 \text{ gr}$$

## 2.- INSTALLATION

### 2.8.- ELECTRICAL CONNECTION

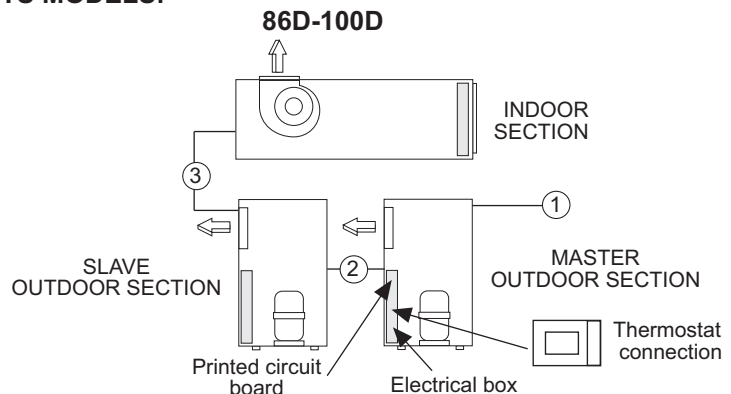
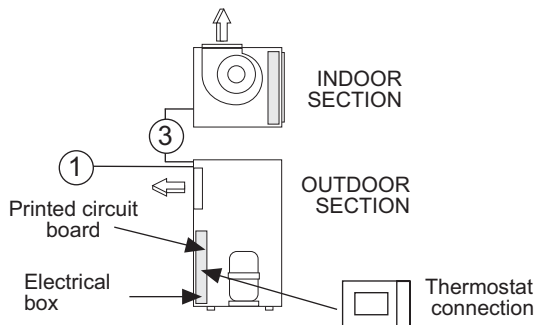


- BEFORE MAKING ANY ELECTRICAL CONNECTIONS, BE SURE THAT ALL CIRCUIT BREAKERS ARE OPEN.  
- IN ORDER TO CARRY OUT THE ELECTRICAL CONNECTIONS, FOLLOW THE ELECTRICAL DIAGRAM SUPPLIED WITH THE UNIT.

- ① Power supply.
- ② Electrical connection between outdoor units.
- ③ Indoor motor fan electrical connection.

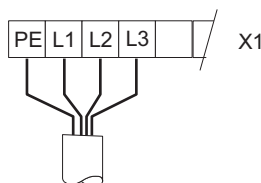
**22E-24E-28E-32E-38E  
44D-48D-56D-64D-76D**

**FOR UNITS MODELS:**



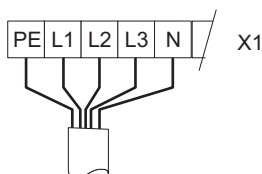
UNIT MODEL	Nr. OF CABLES x SECTION (mm <sup>2</sup> )				
	① Power supply WITHOUT electrical heater.	① Power supply WITH electrical heater.	② Electrical connection between outdoor units.		③ Indoor motor fan electrical connection.
			COOLING	HEATING	
22E	4 x 10	4 x 25	—	—	4 x 1,5
24E	4 x 10	4 x 25	—	—	4 x 1,5
28E	4 x 10	4 x 25	—	—	4 x 1,5
32E	4 x 16	4 x 35	—	—	4 x 1,5
38E	4 x 16	4 x 35	—	—	4 x 1,5
44D	4 x 25	4 x 70	—	—	4 x 2,5
48D	4 x 25	4 x 70	—	—	4 x 2,5
56D	4 x 35	4 x 70	—	—	4 x 2,5
64D	4 x 50	4 x 95	—	—	4 x 2,5
76D	4 x 50	4 x 95	—	—	4 x 2,5
86D	4 x 95	4 x 120	4 x 2,5 4 x 16 10 x 1	4 x 2,5 4 x 16 14 x 1	4 x 2,5
100D	4 x 95	4 x 150	4 x 2,5 8 x 6 16 x 1	4 x 2,5 8 x 6 20 x 1	4 x 2,5

#### POWER SUPPLY 230V THREE-PHASE UNITS



3 ~ 230V - 50 Hz + PE

#### POWER SUPPLY 400V THREE-PHASE UNITS



3N ~ 400V - 50 Hz + PE

- Connect the power supply cables to the terminals in the electric box through the grommet.
- The sections have been calculated for a length no longer than 50m and a voltage drop of 10V. Do not start the unit if the drop is greater than this.
- The wiring and circuit breakers to be mounted in the installation must comply with the Regulations in force.
- Ground wires must be properly connected and have a greater length than the phase wires.



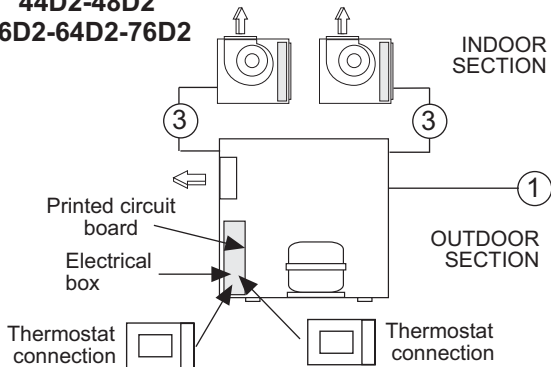
## 2.- INSTALLATION

### 2.8.- ELECTRICAL CONNECTION

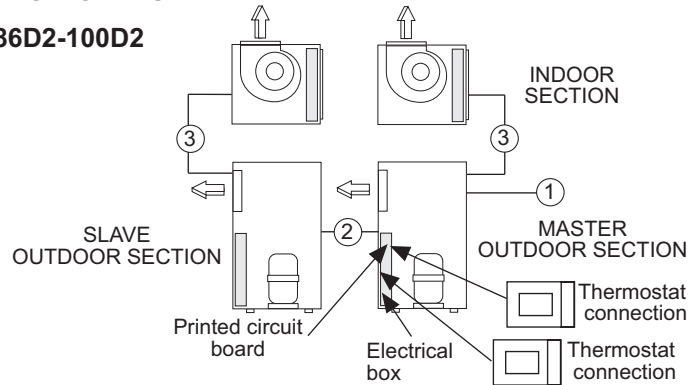
- ① Power supply.
- ② Electrical connection between outdoor units.
- ③ Indoor motor fan electrical connection.

#### FOR UNITS MODELS:

**44D2-48D2  
56D2-64D2-76D2**



**86D2-100D2**



POWER SUPPLY 230V THREE-PHASE UNITS	UNIT MODEL	Nr. OF CABLES x SECTION (mm <sup>2</sup> )				
		① Power supply WITHOUT electrical heater.	① Power supply WITH electrical heater.	② Electrical connection between outdoor units.		③ Indoor motor fan electrical connection.
				COOLING	HEATING	
<p>3 ~ 230V - 50 Hz + PE</p>	<b>44D2</b>	4 x 25	4 x 70	—	—	4 x 1,5
	<b>48D2</b>	4 x 25	4 x 70	—	—	4 x 1,5
	<b>56D2</b>	4 x 35	4 x 70	—	—	4 x 1,5
	<b>64D2</b>	4 x 50	4 x 95	—	—	4 x 1,5
	<b>76D2</b>	4 x 50	4 x 95	—	—	4 x 1,5
	<b>86D2</b>	4 x 95	4 x 120	4 x 2,5 4 x 16 10 x 1	4 x 2,5 4 x 16 14 x 1	4 x 2,5
	<b>100D2</b>	4 x 95	4 x 150	4 x 2,5 8 x 6 16 x 1	4 x 2,5 8 x 6 20 x 1	4 x 2,5

POWER SUPPLY 400V THREE-PHASE UNITS	UNIT MODEL	Nr. OF CABLES x SECTION (mm <sup>2</sup> )				
		① Power supply WITHOUT electrical heater.	① Power supply WITH electrical heater.	② Electrical connection between outdoor units.		③ Indoor motor fan electrical connection.
				COOLING	HEATING	
<p>3N ~ 400V - 50 Hz + PE</p>	<b>44D2</b>	5 x 10	5 x 25	—	—	4 x 1,5
	<b>48D2</b>	5 x 10	5 x 25	—	—	4 x 1,5
	<b>56D2</b>	5 x 16	5 x 35	—	—	4 x 1,5
	<b>64D2</b>	5 x 25	5 x 35	—	—	4 x 1,5
	<b>76D2</b>	5 x 25	5 x 50	—	—	4 x 1,5
	<b>86D2</b>	5 x 35	5 x 50	4 x 2,5 4 x 6 10 x 1	4 x 2,5 4 x 6 14 x 1	4 x 2,5
	<b>100D2</b>	5 x 50	5 x 70	4 x 2,5 8 x 4 16 x 1	4 x 2,5 8 x 4 20 x 1	4 x 2,5

- Connect the power supply cables to the terminals in the electric box through the grommet.
- The sections have been calculated for a length no longer than 50m and a voltage drop of 10V.  
Do not start the unit if the drop is greater than this.
- The wiring and circuit breakers to be mounted in the installation must comply with the Regulations in force.
- Ground wires must be properly connected and have a greater length than the phase wires.

#### VOLTAGE OPERATING LIMITS

MODELS	VOLTAGE	LIMIT
<b>22E/44D</b>	230 V-3Ph-50Hz	198-264 V -3Ph- 50Hz
<b>24E/48D</b>	230 V-3Ph-50Hz	180-242 V -3Ph- 50Hz
<b>28E/56D</b>	400 V-3Ph-50Hz	342-462 V -3Ph- 50Hz
<b>32E/64D</b>	230 V-3Ph-50Hz	198-264 V -3Ph- 50Hz
<b>38E/76D</b>	400 V-3Ph-50Hz	342-462 V -3Ph- 50Hz
<b>86D</b>	230 V-3Ph-50Hz	198-264 V -3Ph- 50Hz
<b>86D</b>	400 V-3Ph-50Hz	342-462 V -3Ph- 50Hz
<b>100D</b>	230 V-3Ph-50Hz	180-242 V -3Ph- 50Hz
<b>100D</b>	400 V-3Ph-50Hz	342-457 V -3Ph- 50Hz

## 2.- INSTALLATION

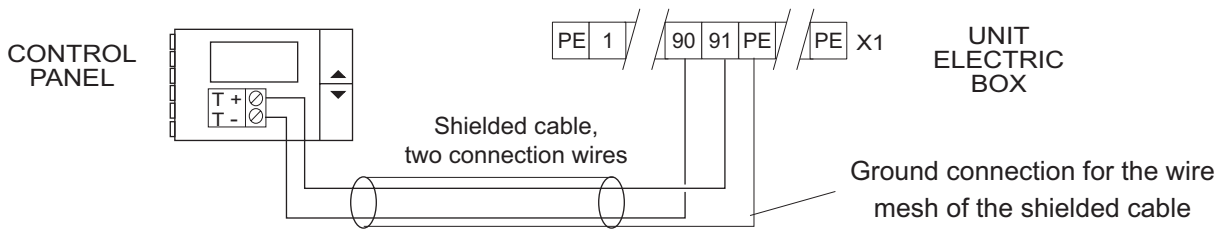
### 2.8.- ELECTRICAL CONNECTION

#### CONTROL PANEL

#### ELECTRICAL CONNECTION DIGITAL THERMOSTAT, FOR STANDARD UNIT VERSION



**IMPORTANT**  
 THE SHIELDED CONNECTION CABLE BETWEEN THE CONTROL PANEL AND THE UNIT MUST BE SEPARATE FROM ANY OTHER TYPE OF ELECTRICAL WIRING. CONNECT IT TO THE ELECTRIC BOX LOCATED IN THE OUTDOOR UNIT.

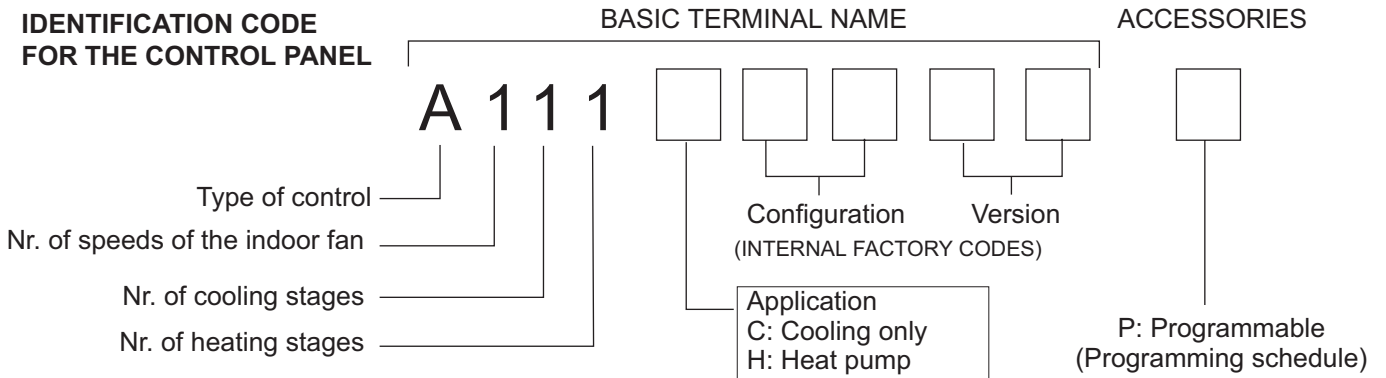


- For securing and connecting the Control Panel, consult the control Panel Manual supplied with the unit.
- Keep in mind that the Control Panel cable is a SHIELDED CABLE and the wire mesh is only grounded through the electric box.
- The T+ and T- polarity must strictly agree with the electrical diagram supplied with the unit.



Since this type of control panel is factory-configured for each application, an identification code located on the control panel of the terminal itself has been given to each panel.

Any query or request for a replacement of the control panel must be accompanied by this identification code.



## 2.- INSTALLATION

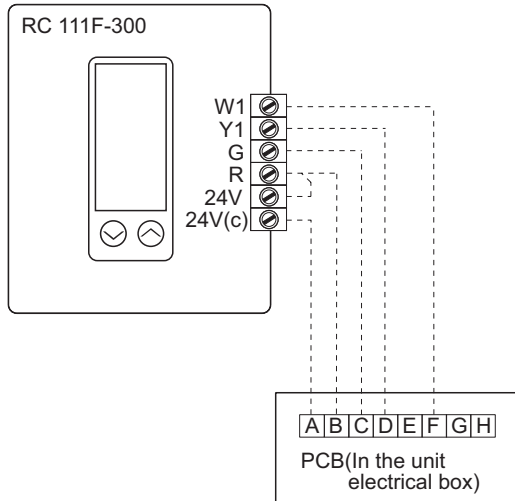
### 2.8.- ELECTRICAL CONNECTION

#### CONTROL PANEL

#### ELECTRICAL CONNECTION DIGITAL THERMOSTAT, FOR VFC UNIT VERSION

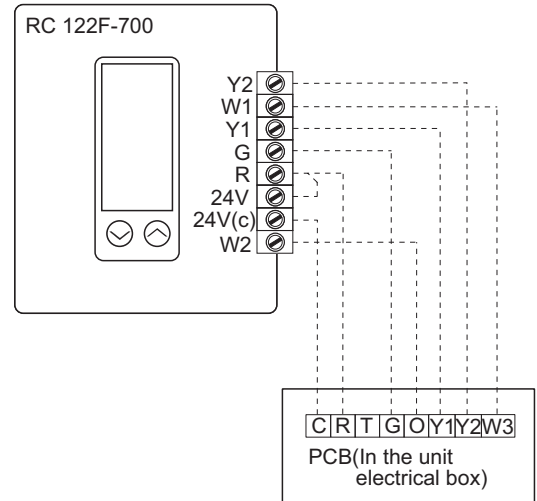
MODELS: COOLING ONLY UNITS

22E-24E-28E-32E-38E



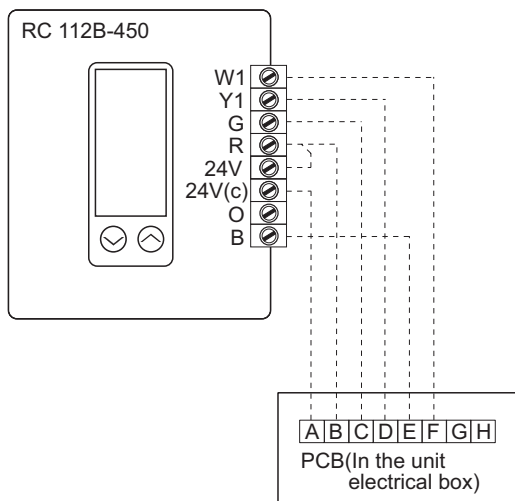
MODELS: COOLING ONLY UNITS

44D-48D-56D-64D-76D-86D-100D



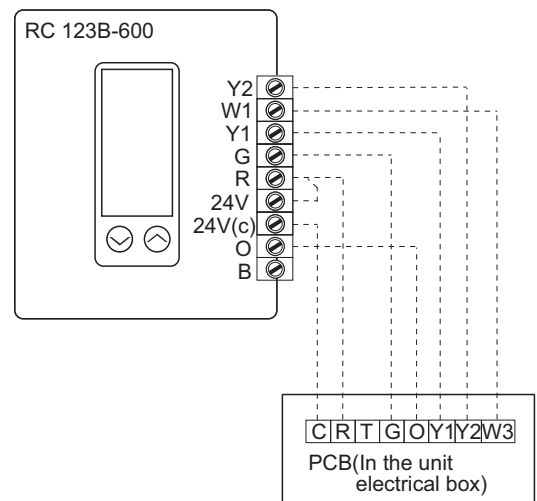
MODELS: HEAT PUMP UNITS

22E-24E-28E-32E-38E



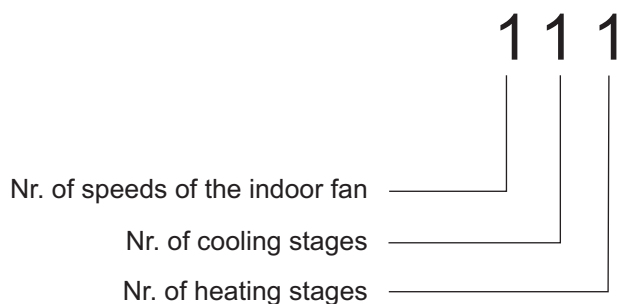
MODELS: HEAT PUMP UNITS

44D-48D-56D-64D-76D-86D-100D

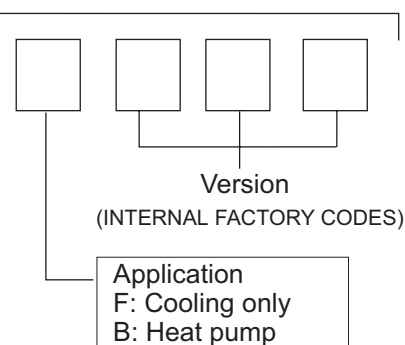


- For securing and connecting the Control Panel, consult the control Panel Manual supplied with the unit.

#### IDENTIFICATION CODE FOR THE CONTROL PANEL



#### BASIC TERMINAL NAME



## 2.- INSTALLATION

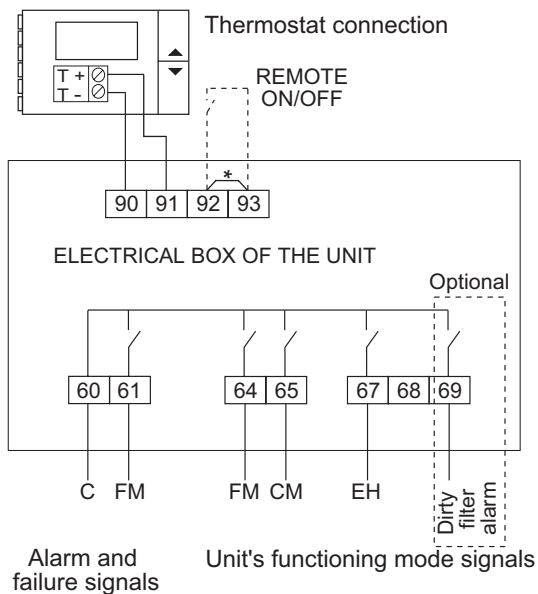
### 2.9.- ELECTRICAL CONNECTION

#### ELECTRICAL CONNECTION " REMOTE SIGNALS"

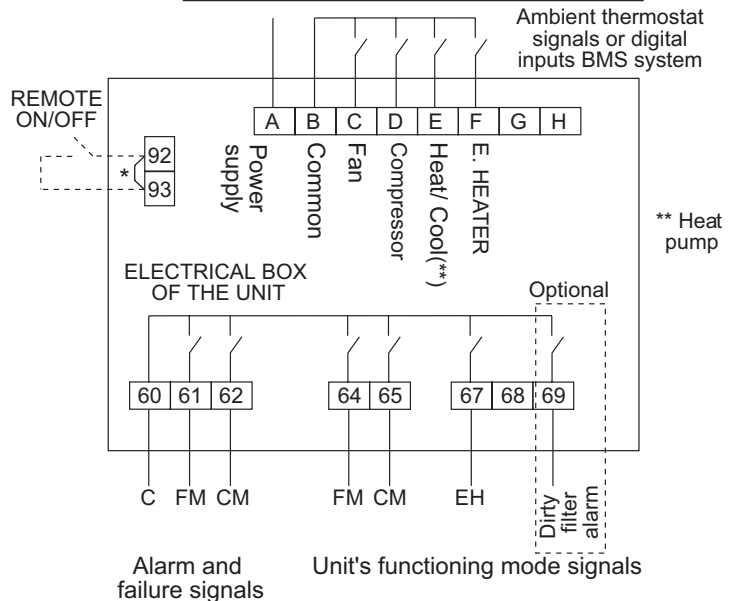
The electrical box of all the range, lets you obtain the following functions:

- Remote ON / OFF.
- Alarm and failure signals for the unit's components: FM, CM.
- The unit's functioning mode signals: FM,CM, EH.
- Dirty air filter indication (option).
- Manage the unit operation, through the supplied thermostat or through the digital inputs for a BMS system (Only for VFC unit version).

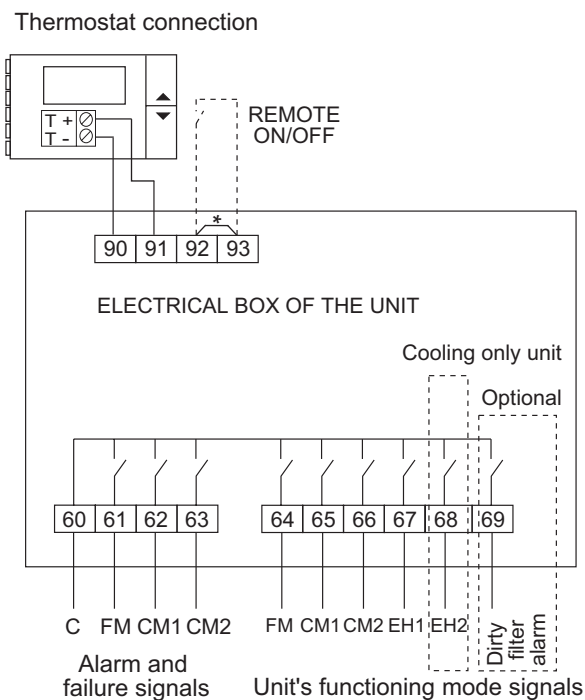
SINGLE CIRCUIT UNIT, STANDARD VERSION



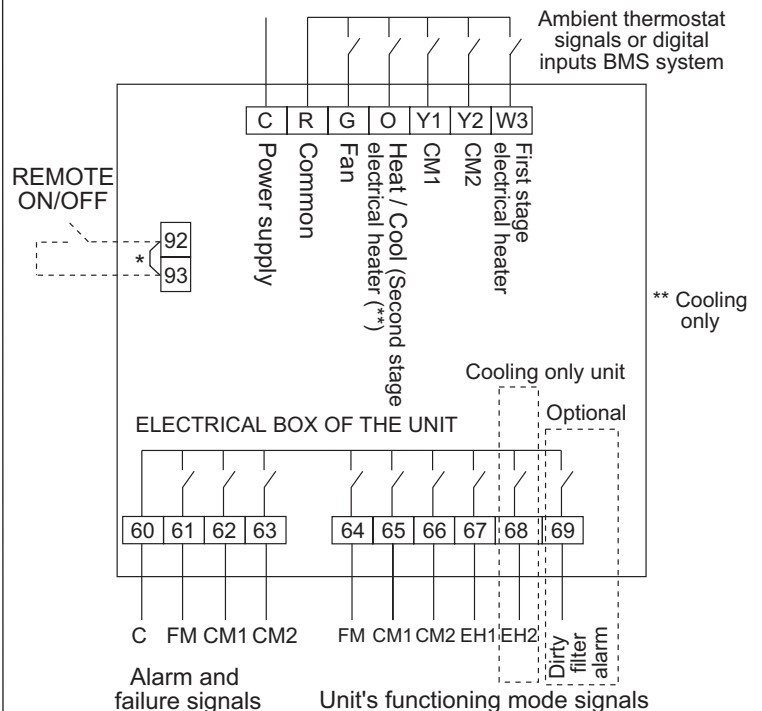
SINGLE CIRCUIT UNIT, VFC VERSION



DOUBLE CIRCUIT UNIT, STANDARD VERSION



DOUBLE CIRCUIT UNIT, VFC VERSION



C: Common  
 FM: Indoor fan  
 CM: Compressor  
 CM1: Compressor 1  
 CM2: Compressor 2  
 EH1: Electrical heater 1  
 EH2: Electrical heater 2

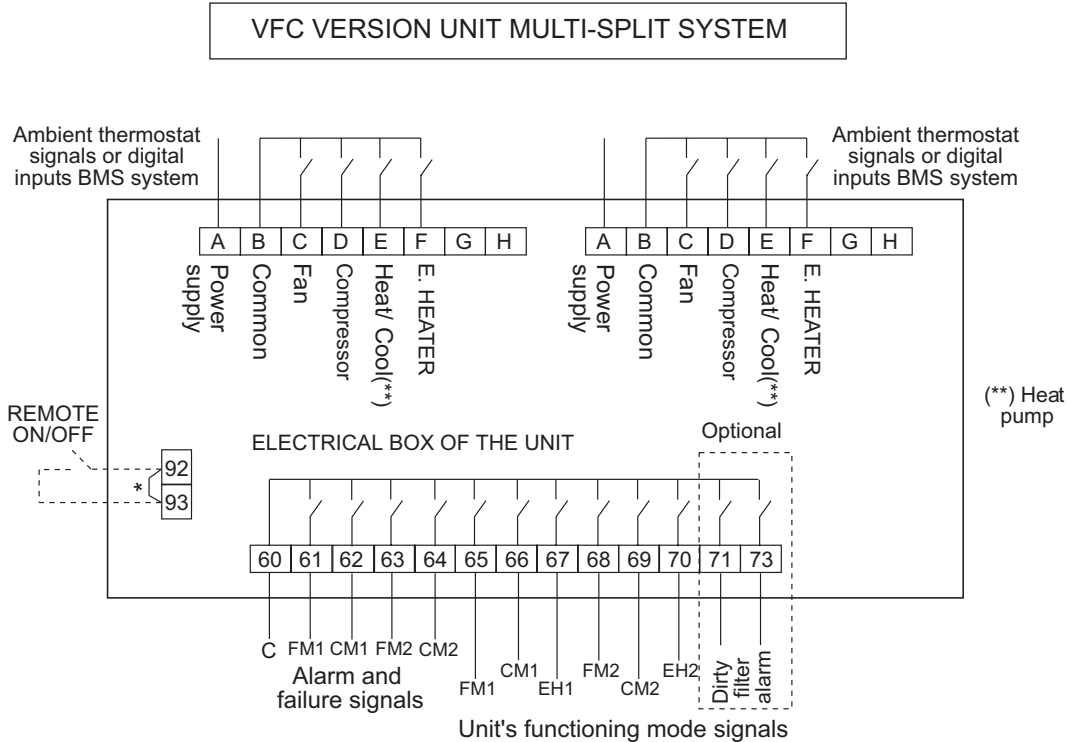
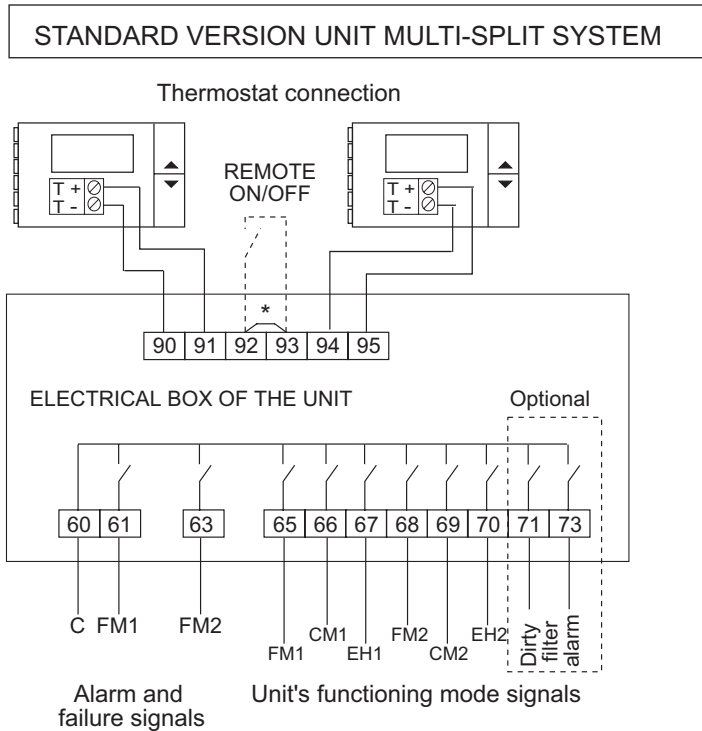
When unit switch off, the system will show CM, CM1 Y CM2 failure signal.

\* Remove wire, if ON/OFF remote is used.

## 2.- INSTALLATION

### 2.9.- ELECTRICAL CONNECTION

#### ELECTRICAL CONNECTION " REMOTE SIGNALS" MULTI-SPLIT SYSTEMS



C: Common  
 FM: Indoor fan  
 CM1: Compressor 1  
 CM2: Compressor 2  
 EH1: Electrical heater 1  
 EH2: Electrical heater 2

When unit switch off, the system will show, CM1 Y CM2 failure signal.

\* Remove wire, if ON/OFF remote is used.

---

## 3.- COMMISSIONING AND OPERATION

### 3.1.- PRELIMINARY CHECKS

- ① Check that drain pipe connections and their fixtures are secure and that the level of the unit is tipped toward the drain.
- ② Inspect the state of the ducts and grilles (clean and open grilles, no breaks in the duct, etc.).
- ③ Check that the power supply is the same as stated on the Rating Plate which is in agreement with the electrical diagram for the unit and that cable sizes are correct.  
Check that tightness of the electrical connections to their terminals and to ground.
- ④ Check the control panel connections.  
(If the connection is wrong, the unit will not operate and the control panel display will not light).
- ⑤ Check **with your hand** that the fans turn freely.

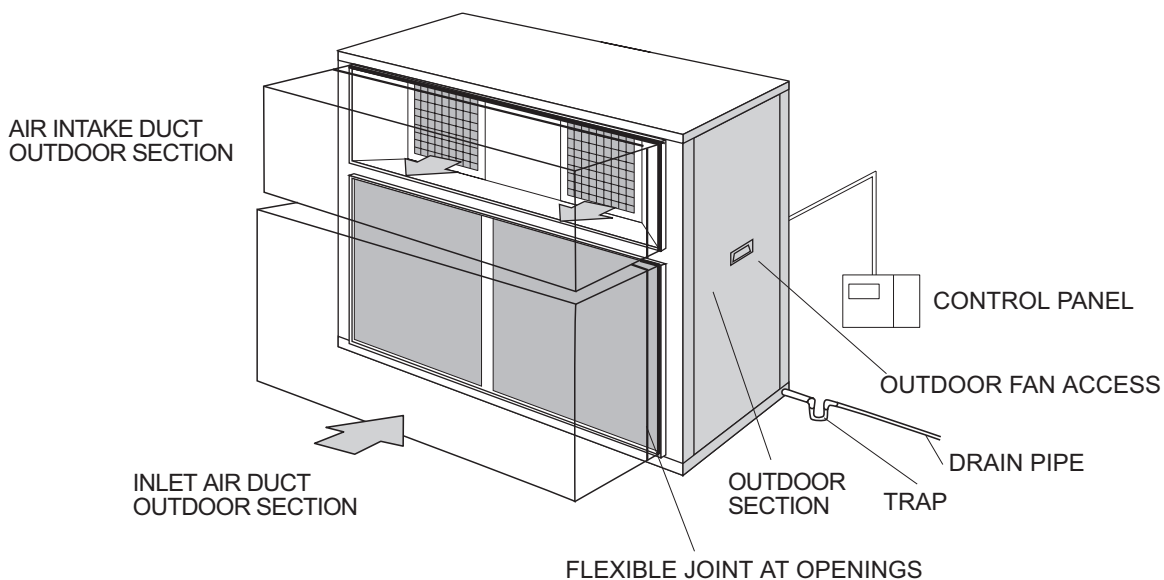
FIGURE FOR THE STANDARD UNIT CONFIGURATION FOR MODELS  
**44D-48D-56D-64D-76D**

#### LOCATION

The unit can be installed outside. If it is installed, air entry and exit ducts should be fitted. The outdoor unit should be assembled on bases previously made and stood on absorbent and antivibrating material to avoid the vibrations being transmitted to the structure of the building.

#### DISCHARGE IN THE DOUBLE CIRCUIT UNITS

Always to be done through a common duct or plenum.



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### 3.- COMMISSIONING AND OPERATION

#### 3.2.- STEPS TO FOLLOW FOR COMMISSIONING THE UNITS

- On the heat pump units, the compressor has a single phase electric heating element to assure a separation between the Refrigerant and the oil in the housing. This heater is activated when the compressor is off and stops working when the compressor is on.  
About eight hours before start up or after a long shutdown period, voltage should be supplied to the unit so that this heater will be activated.
- To start the unit, follow the instructions given in the Control Panel Manual supplied with the unit (requesting operation in any of the modes, cooling, heating, or automatic).  
After a time lapse, the unit will start.
- With unit operating, check that the fans are turning freely and in the proper direction.



REMEMBER THAT THE COMPRESSOR IS A SCROLL TYPE COMPRESSOR:

**Scroll type compressors only compress in one direction of the rotation. Single phase models are always started up in the proper direction; however, the three phase models, turn in either direction depending on the order of the power supply phases. Therefore, it is essential that the phase connection for scroll-type three-phase compressors be carried out correctly (the correct direction of rotation can be checked when the pressure on the suction side decreases and the pressure on the discharge side increases when the compressor is activated). If the connection is wrong, the rotation will be reversed causing a high noise level and a reduction in the amount of current consumed. If this occurs, the compressor's internal protection system will kick in shutting down the unit. The solution is to disconnect, switch the wires between two of the phases and connect again).**

- Check compressor oil level, sight glass included (on the sides of the compressor, the level should be between 1/4 and 3/4 in the sight glass, while during operation the level should be between 3/4 and full).
- Connect high and low pressure gauges and check that operating pressure values are normal.
- Measure electrical consumption for the unit and check that it is near what is indicated on the Rating Plate.
- Check the electrical consumption of the compressor and the fans with what is specified in the physical data sheets.
- In the case of a Heat Pump unit, make a cycle change on the Control Panel checking that the 4-way valves make the change correctly. Check the pressure values in the new cycle.
- **Remember the low pressure switch is reset automatically and the high pressure switch is reset electronically.**
- Check that pressure switches stop the unit:  
FOR THE COOLING CYCLE UNIT:  
Stop the outdoor fan by disconnecting it. The high pressure should rise and the high pressure switch should stop the compressor at  $27.5 \text{ kg/cm}^2$ . Reconnect the fan and electrically reset the pressure switch by pressing the "RESUME" button on the Control Panel for 5 seconds for standard unit version, and press "OFF" for VFC version units and wait for the anti-cycle time (5 minutes), afterwards, the unit will start-up again.  
Stop the indoor fan by disconnecting it. The low pressure should drop and the unit should stop when the pressure gauge reaches  $1 \text{ kg/cm}^2$ . The unit will start up again when the pressure rises and the pressure gauge indicates  $2 \text{ kg/cm}^2$ . Once this has been carried out, stop the unit and reconnect the fan.
- Start the unit again and when everything is operating normally, take a reading of all the data and **fill out the Commissioning Sheet.**

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## 4.- MAINTENANCE

### 4.1.- PREVENTIVE MAINTENANCE



PREVENTIVE MAINTENANCE PREVENTS COSTLY REPAIRS.  
BECAUSE OF THIS PERIODIC INSPECTIONS ARE REQUIRED.

#### -GENERAL STATE OF THE CASING :

Furniture, paint, deterioration due to bumps, rust spots, leveling and supporting, state of the shock absorbers, if installed, screwed panels, etc.

#### - ELECTRICAL CONNECTIONS :

State of hoses, tightness of screws, grounding, current draw of the compressor and fans and checking that the unit is receiving the correct voltage.

#### - COOLING CIRCUIT :

Check that pressure values are correct and that there are no leaks. Check that there is no damage to the pipe insulation, that the state of the batteries is correct and that there are no chips or clogs retained by the air flow, etc.

#### - COMPRESSOR :

Inspect the oil level, if sight glass is present.

Inspect the state of the silent block fixtures.

#### - DRAINS :

Check that water drains correctly and that the drain trays are clean.

#### - FANS :

Check that fans turn freely and in the correct direction without excessive noises.

#### - CONTROL :

Check Set Points and normal operation.



## 4.- MAINTENANCE

### 4.2.- CORRECTIVE MAINTENANCE

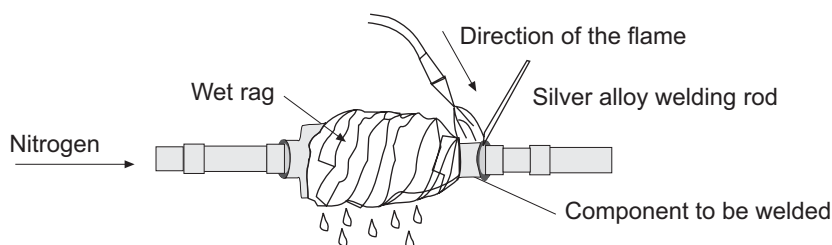


#### IMPORTANT

MAKE SURE THAT THE UNIT IS COMPLETELY DISCONNECTED FROM THE POWER SUPPLY WHEN CARRYING OUT ANY TYPE OF WORK ON THE MACHINE

If some component in the cooling circuit must be replaced, follow these recommendations:

- Always use original replacement parts.
- Remove the entire refrigerant charge from the unit through the schrader valves located in the outdoor section. Create a slight vacuum as a safety measure.
- Regulation prohibits the release on the refrigerant into the atmosphere.
- If cuts must be made in the pipe work, use pipe cutters. Do not use saws or any other tools that produce filings.
- All brazing must be carried out in a nitrogen atmosphere to prevent corrosion from forming.
- Use silver alloy brazing rod.
- Take special care that the flame from the torch is aimed in the opposite direction from the component to be welded and is covered with a wet rag in order to avoid overheating.



- Take very special care if 4-way check valves are to be replaced since these have internal components that are very heat-sensitive such as plastic, teflon, etc.
- If a compressor must be replaced, disconnect it electrically and un-braze the suction and discharge lines. Remove the securing screws and replace the old compressor with the new one. Check that the new compressor has the correct oil charge, screw it to the base and connect the lines and electrical connections.
- Carry out the vacuum above and below through the schrader valves of the outdoor unit until -750 mm Hg is reached. Once this level of vacuum has been reached, keep the pump in operation for at least one hour. **DO NOT USE THE COMPRESSOR AS A VACUUM PUMP.**
- Charge the unit with refrigerant according to the data on the Rating Plate for the unit and **check that there are no leaks.**



#### PRECAUTIONS TO BE TAKEN IN THE USE OF R-407C Refrigerant

If R-407C Refrigerant is used in the unit, the following precautions characteristic of this gas should be taken:

- The Vacuum Pump must have a Check Valve or Solenoid Valve.
- Pressure Gauges and Hoses for the exclusive use with R-407C Refrigerant should be used.
- The charge should be carried out in the Liquid Phase.
- Always use scales to weight-in charge.
- Use the Leak Detector exclusive for R-407C Refrigerant.
- Do not use mineral oil, only synthetic oil to ream, expand or make connections.
- Keep pipes wrapped before using them and be very thorough about any possible dirt (dust, filings, burrs, etc.).
- When there is a leak, gather what is left of the charge, create a vacuum in the unit and completely recharge with new R-407C Refrigerant.
- Brazing should always be carried out in a nitrogen atmosphere.
- Reamers should always be well sharpened.

## 4.- MAINTENANCE

### 4.3.- FAILURE DIAGNOSIS

In case of failure or malfunction of the unit, the Display on the Control Panel will show an Error or Alarm warning explained in the Control Panel Manual. Nevertheless, whenever there is a unit failure, the unit should be shut down and our Service Technicians consulted.

FAILURE	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
UNIT DOES NOT START	Failure in the power supply, or insufficient voltage.	Connect the power supply or check the voltage.
	Circuit breakers have opened.	Reset.
	Power cable or Control Panel cable is defective.	Inspect and Correct.
UNIT STOPS DUE TO HIGH PRESSURE DURING THE COOLING CYCLE	High Pressure switch is defective.	Check Cut-off Pressure or change Pressure Switch if necessary.
	Outdoor fan is not working.	Check for voltage, inspect the motor and turbine or replace if necessary.
	Outdoor Fan turns in the wrong direction.	Switch the power phases.
	Outdoor Coil is dirty or clogged for passing air	Inspect and Clean.
	Excess charge of the Refrigerant.	Remove the charge and charge according to the data on the Rating Plate.
UNIT STOPS DUE TO HIGH PRESSURE DURING THE HEATING CYCLE	The same causes and solutions as the Cold Cycle but with reference to the batteries and Indoor Fan.	
UNIT STOPS DUE TO LOW PRESSURE	Low pressure switch defective.	Check the Cut-off Pressure with a pressure gauge and change the Pressure switch if necessary.
	Indoor Fan is not working.	Check for voltage and inspect the motor, turbine and replace if necessary.
	Indoor Fan turns in the wrong direction.	Switch the power phases.
	Lack of refrigerant. Leak.	Correct leak, create vacuum and charge.
	Dirty Air Filter	Inspect and Clean.
	Clogged Cooling Circuit. Dirty filter drier.	Inspect and Correct or Change the Filter drier.
UNIT STARTS AND STOPS IN SHORT CYCLES	Compressor overcharged.	Inspect suction and discharge pressure values and correct.
	Compressor cuts off due to Klixon.	Inspect input voltage and voltage drop.
	Lack of Refrigerant.	Correct leak and replace.
LOAD AND ABNORMAL NOISE IN THE COMPRESSOR (SCROLL)	Power supply phases inverted (three-phase compressor).	Inspect and switch power phases.
WATER LEAKS	Clogged drainage.	Inspect and Clean.
	Loose drainage pipe connections.	Correct connection.
	Dirty and overflowing trays.	Inspect and Clean.



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