
**Air-air split heat pump
AHO-B / BCVI, CHI**



Ref.: N-26640 0996

Technical information:



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General description

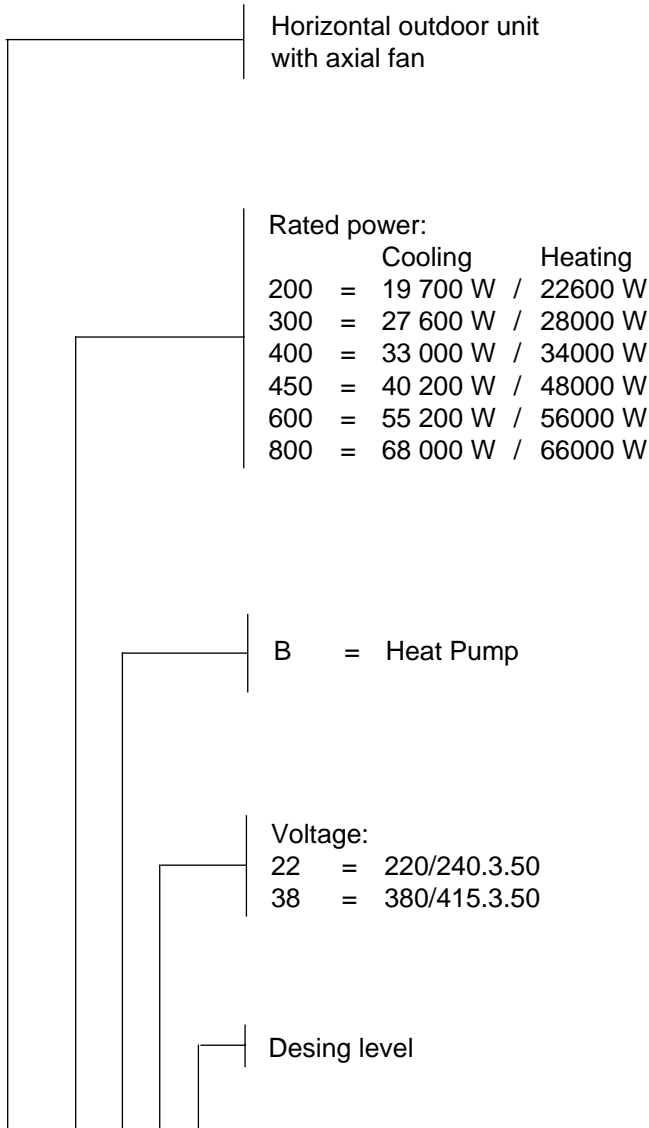
The units in the AHO-B range are the outdoor units of a split-type heat pump; they are fitted with a vertical discharge axial fan and have been designed for installation outdoors.

Units AHO-200 to 600 B are compatible with indoor units BCVI-20 to 60.

The outdoor unit AHO-800 B is compatible with the indoor unit, common for cooling only and heat pump CHI-800.

To be used, they need only to be connected, electric and frigorifically, to the corresponding indoor unit.

Nomenclature



AHO 200 B 38 A

Technical specifications

Mechanical specifications of outdoor units AHO-B

Compressor

Vertical hermetic type, mounted on vibration isolators, specially designed for heat pump equipment, with oversized mechanical components and a low-consumption motor.

It is delivered with a charge of special oil which prevents the formation of foam, and with an oil heater element.

Models AHO-300 and AHO-600 incorporate Scroll rotary compressors. Remaining models incorporate reciprocating compressors.

Compressor heater

Keeps the crankcase oil hot to ease start-ups and prevent oil from being carried away from the compressor.

Suction accumulator

Connected to the compressor suction tube, it protects it against liquid strokes, thus preventing oil from coming out of the compressor.

Coils

Large heat transfer area coils, made of copper tubes and 'slit' aluminium fins.

Fans

Axial fans with free air discharge, without ductwork. Quiet operation and three speeds available.

Casing

Made of aluminium-zinc galvanized steel sheet, finished with baked-on polymerized powder paint.

Refrigerant circuit

Made of brazed copper tubes.

Units are delivered dehydrated and after having passed the relevant pressure and leak detection tests.

Refrigerant control

Refrigerant is introduced into the coils through calibrated orifices.

Electrical and control wiring system

Highly reliable integrated circuits. Their compact size permit easy and fast servicing. It complies with the European regulations currently in force.

Mechanical specifications of indoor unit CHI-800

Indoor unit CHI-800 is compatible with either of the cool only outdoor units AHO-800 F or heat pump AHO-800 B.

The main features of this unit are as follows:

Fan

Double fan type with common shaft, pulley and belt drive. The fan pulley is of the removable tapered core type.

The motor is mounted on a tensioner base which makes maintenance operations easier.

The fan motor assembly is resiliently mounted on spring isolators to avoid transmission of vibration and noise.

Coil

Made of copper tubes and aluminium 'slit' fins.

Control box

Fully accessible from outside.

Casing

Made of aluminium-zinc galvanized steel sheet highly resistant to corrosion, painted with baked-on epoxy-polyester powder enamel.

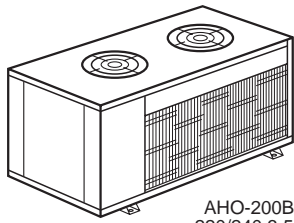
It features a shape framework which allows for all its components to be easily accessible.

It can take up an electric heater (optional accessory). With integral filter rack and air filter.

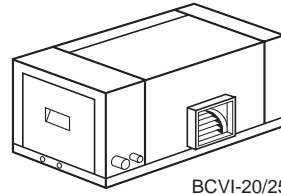
Refrigerant circuit

Double circuit with directional connections and calibrated orifice type refrigerant expansion.

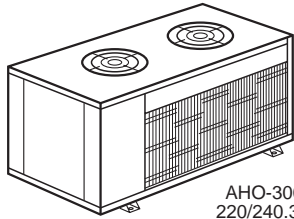
Table of variations



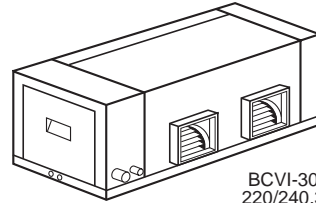
AHO-200B
220/240.3.50
380/415.3.50



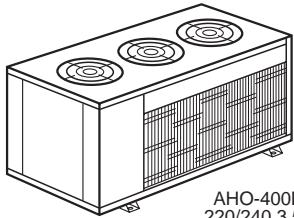
BCVI-20/25
220/240.3.50
380/415.3.50



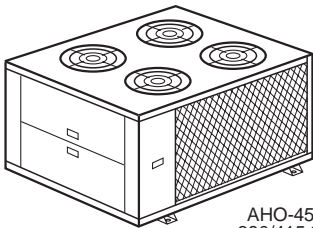
AHO-300B
220/240.3.50
380/415.3.50



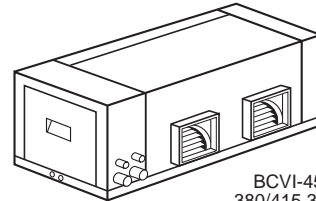
BCVI-30/40
220/240.3.50
380/415.3.50



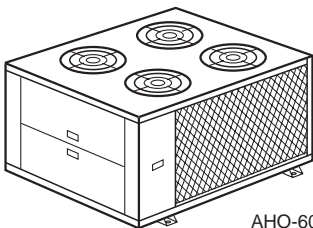
AHO-400B
220/240.3.50
380/415.3.50



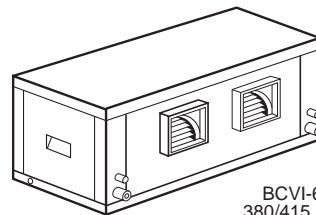
AHO-450B
380/415.3.50



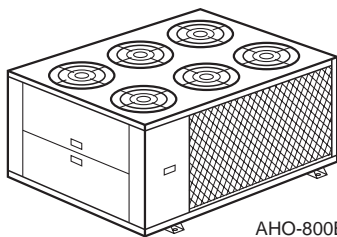
BCVI-45
380/415.3.50



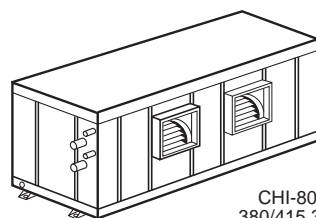
AHO-600B
380/415.3.50



BCVI-60
380/415.3.50



AHO-800B
380/415.3.50



CHI-800
380/415.3.50

Physical data

Outdoor units

Model		AHO-200B	AHO-300B	AHO-400B	AHO-450B	AHO-600B	AHO-800B	
Compressor	Quantity	1	1	1	2	2	2	
	Type	Reciprocating	Scroll	Reciprocating	Reciprocating	Scroll	Reciprocating	
	Nominal power	kW	8.4	10.2	12.2	2 x 8.4	2 x 10.2	2 x 12.2
	Power supply	V.ph.Hz	220/240.3.50 or 380/415.3.50			380/415.3.50		
Outdoor fan	Nominal power	W	216	216	216	216	216	
	Number of fans		2	2	3	4	4	6
	Power supply	V.ph.Hz.	220/240.1.50					
	Propeller width		510	510	510	510	510	510
Indoor coil	Quantity		2	2	2	2	2	
	Rows deep x high		4 x 28	4 x 28	4 x 28	4 x 56	4 x 56	4 x 56
	Tube O.D.		3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
Shipping dimensions of outdoor unit	High	mm	1 030	1 030	1 030	1 495	1 495	1 495
	Wide	mm	1 580	1 860	2 230	1 690	1 975	2 150
	Deep	mm	950	950	950	1 547	1 547	1 547
Net weight	kg	265	314	347	622	748	782	
Gross weight	kg	295	346	380	651	780	814	

Indoor units

Model		CHI-800	
Fan	*Number of blower wheels	2	
	Wheel width	mm	380
	Long	mm	380
	*Motor power rating	W	3 000
	Nominal flow rate	m ³ /h	14 240
		m ³ /s	3.95
	Available pressure	mm WG	10
Pa		98	
Coil	Rows deep x high	4 x 33	
	Tube O.D.	3/8"	
Net weight	kg	337	
Gross weight	kg	427	

*A single motor drives the fan wheels

Rated performance data

Outdoor unit	Indoor unit	Summer		Winter		Available pressure indoor blower Pa
		Cooling capacity W	Consumption W	Heating capacity W	Consumption W	
AHO-200B	BCVI-20/25	19 700	8 700	22 600	7 620	62
AHO-300B	BCVI-30/40	27 600	11 200	28 000	9 180	75
AHO-400B	BCVI-30/40	33 000	13 800	34 000	12 400	75
AHO-450B	BCVI-45	40 200	17 400	48 000	14 400	75
AHO-600B	BCVI-60	55 200	22 400	56 000	18 360	80
AHO-800B	CHI-800	68 000	28 000	66 000	22 300	80

Note: BCVI units have their own information available.

Testing conditions

Voltage V.	Length of interconnection lines	Summer				Winter			
		Outdoor temp. °C		Indoor temp. °C		Outdoor temp. °C		Indoor temp. °C	
		DB	WB	DB	WB	DB	WB	DB	WB
380	7.5 metros	35	24	27	19	7	6	20	12

Note: DB = Dry Bulb, WB = Wet bulb.

Correction factors

Correction factors for cooling capacities

Cooling capacity correction factors according to indoor and outdoor temperatures.

% Flow rate	80	90	100	110	120	130
Total capacity	0.960	0.980	1	1.016	1.032	1.046
Sensible capacity	0.945	0.973	1	1.038	1.075	1.118
Comp. power input	0.980	0.990	1	1.009	1.017	1.025

Correction of the real entering outdoor coil air temperature for flow rates other than nominal.

% Flow rate	70	80	90	100	110	120	130
Correction in °C over the real entering outdoor coil air temperature	5	3	1.5	0	-1	-2	-2.5

Correction factors for heating capacities

Entering air DB temperature °C indoor unit	Outdoor unit air intake temperature °C WB				
	14	10	6	0	-8
23	1.20	1.04	0.96	0.77	0.58
20	1.25	1.10	1.00	0.80	0.69
17	1.30	1.13	1.04	0.83	0.63

Correction of the real entering outdoor coil air temperature for flow rates other than nominal.

% Flowrate	70	80	90	100	110	120	130
Correction in °C over the real entering outdoor coil air temperature	-2	-1.5	-0.5	0	0.5	1	1.2

Cooling capacities sensitives

Model	Outdoor air dry temperature °C (DB)	Air intake humid temperature °C (WB)	Total capacity	Sensitive capacity (W/h)				Compressor absorbed power
				Temperature air going to indoor unit °C (DB)				
				22	24	27	29	
			W/h	W/h	W/h	W/h	kW	
AHO-200/ BCVI-25	25	22	23 640	7 077	10 212	14 915	18 054	5.72
		19.5	21 276	11 006	14 141	18 844	21 276	5.99
		17	19 700	15 157	18 292	19 700	19 700	6.27
	35	22	21 867	6 490	9 625	14 328	17 463	6.47
		19.5	19 700	10 435	13 570	18 273	19 700	6.81
		17	18 124	13 687	16 823	18 124	18 124	7.15
	45	22	19 700	5 835	8 971	13 674	16 809	7.49
		19.5	17 730	9 782	12 918	17 621	17 730	7.83
		17	16 154	13 756	16 154	16 154	16 154	8.17

Cooling capacities sensitives

Model	Outdoor air dry temperature °C (DB)	Air intake humid temperature °C (WB)	Total capacity	Sensitive capacity (W/h)				Compressor absorbed power
				Temperatura air goind to indoor unit °C (DB)				
				22	24	27	29	
			W/h	W/h	W/h	W/h	W/h	kW
AHO-300/ BCVI-30	25	22	34 800	10 426	15 008	21 879	26 466	6.24
		19.5	31 320	16 167	20 748	27 619	31 320	6.54
		17	29 000	22 233	26 814	29 000	29 000	6.84
	35	22	32 190	9 561	14 142	21 014	25 595	7.06
		19.5	29 000	15 325	19 906	26 777	29 000	7.43
		17	26 680	20 062	24 643	26 680	26 680	7.80
	45	22	29 000	8 597	13 178	20 050	24 631	8.17
		19.5	26 100	14 363	18 944	25 816	26 100	8.54
		17	23 780	20 168	23 780	23 780	23 780	8.92
AHO-400/ BCVI-40	25	22	39 600	12 050	16 631	23 503	28 091	9.63
		19.5	35 640	17 763	22 344	29 215	33 804	10.08
		17	33 000	23 855	28 436	33 000	33 000	10.54
	35	22	36 630	11 041	15 622	22 493	27 074	10.89
		19.5	33 000	16 783	21 364	28 236	32 817	11.46
		17	30 360	21 363	25 944	30 360	30 360	12.03
	45	22	33 000	9 917	14 499	21 370	25 951	12.61
		19.5	29 700	15 665	20 246	27 118	29 700	13.18
		17	27 060	21 459	26 040	27 060	27 060	13.75
AHO-450/ BCVI-45	25	22	48 240	14 518	20 628	29 793	35 911	12.14
		19.5	43 416	22 164	28 274	37 438	43 416	12.72
		17	40 200	30 264	36 374	40 200	40 200	13.29
	35	22	44 622	13 310	19 420	28 584	34 694	13.73
		19.5	40 200	20 989	27 099	36 264	40 200	14.45
		17	36 984	27 253	33 363	36 984	36 984	15.17
	45	22	40 200	11 964	18 074	27 239	33 349	15.90
		19.5	36 180	19 648	25 758	34 922	36 180	16.62
		17	32 964	27 386	32 964	32 964	32 964	17.34

Cooling capacities sensitives

Model	Outdoor air dry temperature °C (DB)	Air intake humid temperature °C (WB)	Total capacity	Sensitive capacity (W/h)				Compressor absorbed power
				Temperatura air going to indoor unit °C DB				
				22	24	27	29	
			W/h	W/h	W/h	W/h	W/h	kW
AHO-600/ BCVI-60	25	22	64 800	19 662	27 333	38 841	46 524	12.60
		19.5	58 320	29 237	36 909	48 417	56 102	13.20
		17	54 000	39 432	47 104	54 000	54 000	13.80
	35	22	59 940	18 017	25 689	37 197	44 869	14.25
		19.5	54 000	27 641	35 313	46 820	54 000	15.00
		17	49 680	35 362	43 034	49 680	49 680	15.75
	45	22	54 000	16 187	23 859	35 367	43 039	16.50
		19.5	48 600	25 819	33 491	44 999	48 600	17.25
		17	44 280	35 525	43 197	44 280	44 280	18.00
AHO-800B/ CHI-800	25	22	81 600	24 781	34 373	48 762	58 368	19.65
		19.5	73 440	36 750	46 343	60 732	70 340	20.58
		17	68 000	49 500	59 092	68 000	68 000	21.52
	35	22	75 480	22 707	32 300	46 688	56 281	22.22
		19.5	68 000	34 737	44 330	58 718	68 000	23.39
		17	62 560	47 088	56 681	62 560	62 560	24.56
	45	22	68 000	20 400	29 992	44 381	53 973	25.73
		19.5	61 200	32 441	42 033	56 422	61 200	26.90
		17	55 760	44 575	54 168	55 760	55 760	28.07

CHI-800 fan performance

Model	Available static pressure		Air flow rate		Power input
	mm WG	Pa	m³/h	m³/s	W
CHI-800	19.9	195	10 000	2.78	1 395
	18	176	11 000	3.05	1 550
	16.1	158	12 000	3.33	1 565
	13.4	131	13 000	3.61	1 905
	10.7	105	14 000	3.89	2 050
	7.4	73	15 000	4.16	2 240
	3.9	38	16 000	4.44	2 430
	0	0	17 000	4.72	2 675

Installation instructions

General comments

The AHO-B series units are outdoor units of a split type heat pump which are equipped with an axial and vertical discharge fan, and are to be installed directly outdoors.

To be used, they need only to be connected, electric and frigorifically, to the corresponding indoor unit.

Protection of the environment

Packing

The packing material is recyclable. It should be disposed of in accordance with the residual collection regulations established.

Disposal of the unit

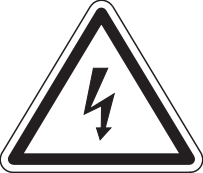


After a long service life, and upon disassembling the unit, its components should be recuperated ecologically. The cooling circuit is full of HCFC-22 refrigerant that should be salvaged and, finally, returned to the gas manufacturer for recycling. Oil will remain in the airtight compressor and, therefore, it will be returned along with the sealed circuit.

The air conditioning unit will be deposited wherever established by the local authorities for its selective disposal.

Warning signals

The following signs indicate the presence of potentially dangerous conditions for users or service personnel.

Whenever found on the unit itself, keep in mind the warning indicated by each one.

	This sign indicates an electrical risk or danger.
	Attention: The unit has a remote control system and can start automatically. Two minutes prior to having access to the interior, the power supply should be disconnected so as to avoid any contact with the fan turbine.
	Attention: It is compulsory to read the instructions prior to any handling.

	Attention: Fan in operation.
	Attention: No to touch hot surfaces.
	Attention: Possible gas leakage due to inadequate handling.
	Attention: Transmission by belt and pulley.

Transportation

The outdoor units should always be transported in vertical position so as to avoid oil leakage from the compressor. If, for any reason, this position has to be changed, it should be done only for the time strictly necessary.

Location

The location chosen should allow permanent access for service maintenance, either through the side panels or the rear panel.

The outdoor unit should be installed directly outdoors. If placed on the floor, it should be on supports so as to avoid a possible accumulation of snow obstructing the air intake.

Empty spaces

Empty space should be left in the installation of each unit for the following:

- Outdoor unit air intake and discharge.
- Connection of the drainage tubing and wiring.
- Air ducts.
- Maintenance service.
- Electrical supply.

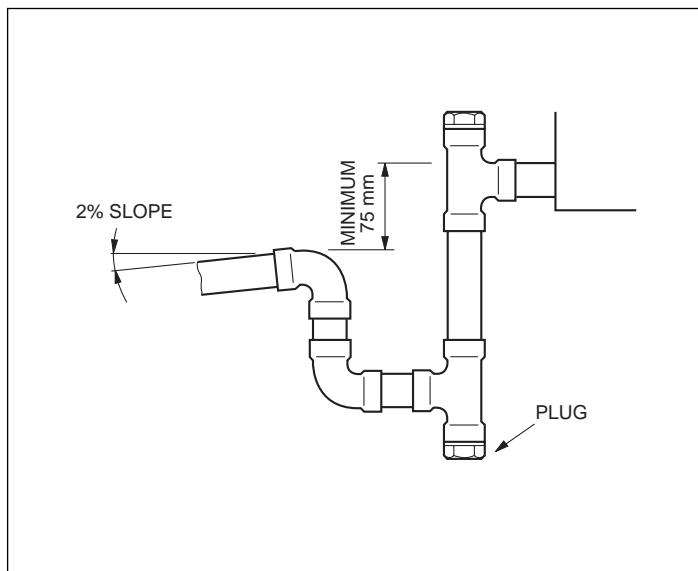
For proper operation, the minimum distances indicated in the general dimension drawings should always be respected with regard to obstacles that could obstruct the free circulation of air, or any service work.

Air ducts (indoor unit)

- 1.- Connect the ducts, isolating from the unit by means of a flexible hose, preferably of a non-combustible material, so as to avoid transmitting the vibration of the unit itself. If the ducts are made of flexible material they do not transmit vibrations.
- 2.- It is advisable to place a damper at each discharge duct derivation so as to be able to carry out a correct balance of the system.
- 3.- Make sure there is easy access for cleaning and changing the air filters.

Drainage connections

Install the drainage tubing of each tray through a siphon. Leave a minimum height difference of 75 mm. between the height of the connection to the unit and the line after the siphon (see figure). This is to avoid that the pressure drop produced by the fan may not interfere with the emptying of the tray. There should be an access so that, at the beginning of each season, the siphon may be filled with water. The drainage line should have a minimum inclination of 2 cms. per meter of total length.



Valves and refrigerant load

The AHO-200 B unit has only one circuit and is supplied with two valves. The AHO-450 B unit has two circuits and is supplied with four valves. These valves are supplied closed and with an entire refrigerant load in the outdoor unit (pump-down). Before starting the unit, make sure the valves are completely open.

The AHO-300 B and AHO-400 B units have only one circuit while the AHO-600 B and AHO-800 B units have two circuits. These units are supplied without valves, but with connections ready for welding. The refrigerant load must be carried out completely on site. See refrigerant load in the corresponding section, and follow the recommendations made in the Refrigerant Interconnections and Refrigerant Load Process sections.

Emptying and dehydrating

Air does not act as a refrigerant as it cannot be liquified by the compressor. The air and humidity remaining in the cooling system should be completely eliminated, as these have undesirable effects, as indicated in the list below.

- High pressure increase.

- Power consumption increase.
- Equipment performance decrease.
- The water contained in the air may freeze and block the capillaries.
- The water may corrode certain parts of the circuit and deteriorate the compressor.

Emptying and dehydration should be carried out by means of a vacuum pump.

The vacuum needed is 200 microns (0.2 mm. Hg.).

Connection of the vacuum pump to the cooling circuit should be made at the 1/4" SAE connections furnished for this purpose, and with the valves closed.

This will allow emptying and dehydrating the units and interconnecting tubing.

The AHO-200 B and AHO-450 B units are supplied preloaded with refrigerant and does not need to be emptied.

Leakage detection

Leakage detection in the circuit that joins the two units will be carried out by using R-22 refrigerant and the aid of a detector.

Refrigerant load

The nominal refrigerant load is calculated for a tubing length of 7.5 meters.

Model	Nominal load R-22 kg	Number of circuits	Diameter liquid line	Additional load grs. (per meter)
AHO-200B/BCVI-20/25	7.3	1	1/2" (12.7 mm)	104
AHO-300B/BCVI-30/40	9.95	1	5/8" (15.87 mm)	170
AHO-400B/BCVI-30/40	12.9	1	5/8" (15.87 mm)	170
AHO-450B/BCVI-45	8.5	2	1/2" (12.7 mm)	104
AHO-600B/BCVI-60	10.5	2	5/8" (15.87 mm)	170
AHO-800B/CHI-800	11.1	2	5/8" (15.87 mm)	170

Adjusting the refrigerant load

For lengths of tubing of over or under 7.5 m., the nominal refrigerant load should be increased or decreased by the grammes indicated above, in accordance to as to whether the length of the liquid tubing has been increased or decreased.

Refrigerant interconnections

When installing the tubing that interconnect both units, take special care in keeping the tubing to be used clean and dry prior to installation. The following recommendations are advisable:

- 1- Use only refrigerant quality copper tubing.
- 2- Do not work outdoors in the rain.
- 3- The ends of the tubing should remain closed during installation.
- 4- Do not leave neither the drying filters nor the compressor out in the open for more than one or two minutes.
- 5- For welding use low-solidus point rods with a minimum 5% silver content.
- 6- When welding, and while the tubing is still hot, a flow of dry

nitrogen should be maintained so as to avoid the forming of oxides and scales in the interior which could cause contamination and obstructions.

7- For copper-copper joints do not use strippers.


Diameter of the interconnecting tubing

Model	Diameter gas line (wide tubing)	Diameter liquid line (narrow tubing)
AHO-200 & 450 B	1 1/8" (28.5 mm)	1/2" (12.7 mm)
AHO-300, 400, 600 & 800 B		5/8" (15.87 mm)

Insulation of tubing

The gas tubing should be isolated from the refrigerant. The insulation should have specific characteristics: be easy to install, resistant to aging, waterproof, fireproof and have a thickness of at least 12 mm.

So as to avoid deterioration due to the sun, it is convenient to paint same with water-based enamel.



CAUTION

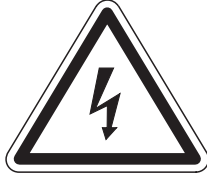
After having insulated the tubing, do not attempt to bend it excessively as it could crack or break.

Wiring installation


Each heat pump is supplied with a control box to which the power supply is to be connected through a main switch with fuses, or an automatic switch.

The electric resistance, if any, should be connected to independent power supplies and switches, and not to the ones that feed the unit.

In all cases, the **national regulations should be complied with.**



Loose cables can cause overheating of the terminals, or incorrect operation of the unit. A fire hazard may also exist. Therefore, make sure that all cables are connected tightly.



Do not supply power to the unit and do not start up operations until the tubing and electrical connections with the outdoor unit have been completed.
Make sure that the electrical supply is correctly connected to the units, as shown in the wiring diagrams.

Electrical characteristics Outdoor units

Model	Power supply V.ph.Hz.		Consumption A					Power supply cable section mm ²	Automatic switch A
	Compressor	Fan	Compressor			Fan			
			Start	Nominal	Maximum	Start	Nominal		
AHO-200B	220/240.3.50	220/240.1.50	183	20.2	24	7	2.2	10	50
	380/415.3.50	220/240.1.50	91	11.7	13.9	7	2.2	6	32
AHO-300B	220/240.3.50	220/240.1.50	170	27.1	33.7	7	2.3	16	63
	380/415.3.50	220/240.1.50	105	15.7	19.5	7	2.3	10	40
AHO-400B	220/240.3.50	220/240.1.50	267	33	38	12	3.8	25	80
	380/415.3.50	220/240.1.50	135	19.1	22	12	3.8	10	50
AHO-450B	380/415.3.50	220/240.1.50	2 x 91	2 x 11.7	2 x 13.9	2 x 7	2 x 2.2	16	63
AHO-600B	380/415.3.50	220/240.1.50	2 x 105	2 x 15.7	2 x 19.5	2 x 7	2 x 2.3	25	100
AHO-800B	380/415.3.50	220/240.1.50	2 x 135	2 x 19.1	2 x 22	2 x 12	2 x 3.4	25	100

Indoor units

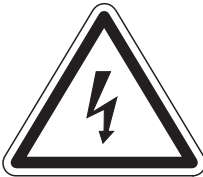




Model	Power supply V.ph.Hz.		Consumption A		Power supply cable section mm ²	Automatic switch A
	Fan	Fan	Fan			
			Start	Nominal		
BCVI-20/25	220/240.3.50		14	5.2	4 x 2.5	-
	380/415.3.50		7	2	4 x 2.5	-
BCVI-30	220/240.3.50		23	5.7	4 x 2.5	-
	380/415.3.50		10	3.3	4 x 2.5	-
BCVI-40	220/240.3.50		23	5.8	4 x 2.5	-
	380/415.3.50		10	3.4	4 x 2.5	-
BCVI-45	380/415.3.50		10	3.5	4 x 2.5	-
BCVI-60	380/415.3.50		27	7.1	4 x 2.5	15
CHI-800	380/415.3.50		30	6.4	4 x 2.5	15

Limits of use

Voltage limits				Air intake temperature to the DB outdoor unit				Air intake temperature to the indoor unit			
Nom. 220/240 V		Nom. 380/415 V		Operating cycle				Operating cycle			
				Minimum °C		Maximum °C		Minimum °C		Maximum °C	
Minimum	Maximum	Minimum	Maximum	Cooling	Heating	Cooling	Heating	Cooling WB	Heating DB	Cooling WB	Heating DB
198	254	342	436	19	-20 ⁽¹⁾	46	24	14	10 ⁽²⁾	22	25

Notes: WB - Wet bulb. DB - Dry bulb.
 (1) Below 20°C, only the emergency electric heater (optional) remains operative.
 (2) The unit can operate at short intervals at a temperature below 10°C so as to raise the temperature of the room being conditioned to 10°C.

Before final approval of the installation

	<p>Verify:</p> <ul style="list-style-type: none"> - Voltage is always between 198-254 V., or 342-436 V. - The section of the power supply cable is, at least, that recommended in the corresponding wiring diagrams. 		- The need to clean the air filter periodically has been notified.
	- Condensation drainage is carried out perfectly and there are no leaks in the water circuit.		
	- Operating instructions have been given to the user.		<ul style="list-style-type: none"> - The guarantee card has been filled out. - Maintenance instructions have been given, or a regular servicing contract has been signed.

Instructions for use

General information

The heat pump is a unit that allows air conditioning, both in Winter as well as in Summer, by reversal of its operating cycle.

The start up and automatic temperature setting is carried out by means of the ambient thermostat, at 24 volts, specially designed for these units.

Ambient thermostat, 1 & 2 cycle units

This thermostat is designed to give precise ambient temperature control and graphic information with regard to heat pump operation. This control has a Proportional-Differential-Integral response and, depending upon the difference between the programmed temperature and the ambient temperature, it reacts varying the on-off cycles, between 3 and 7.5 cycles per hour.

The LCD screen normally indicates the ambient temperature, operating mode and whether the cooling or heating system is operative.

It allows selecting different temperature settings for cooling and heating, as well as their indication in °C or °F. The fan may operate in a continuous or automatic mode, turning off and operating jointly with the compressor.

The controls are located beneath a cover that avoids handling by unauthorized personnel.

Operation and start up

Start up is carried out by means of the thermostat controls.

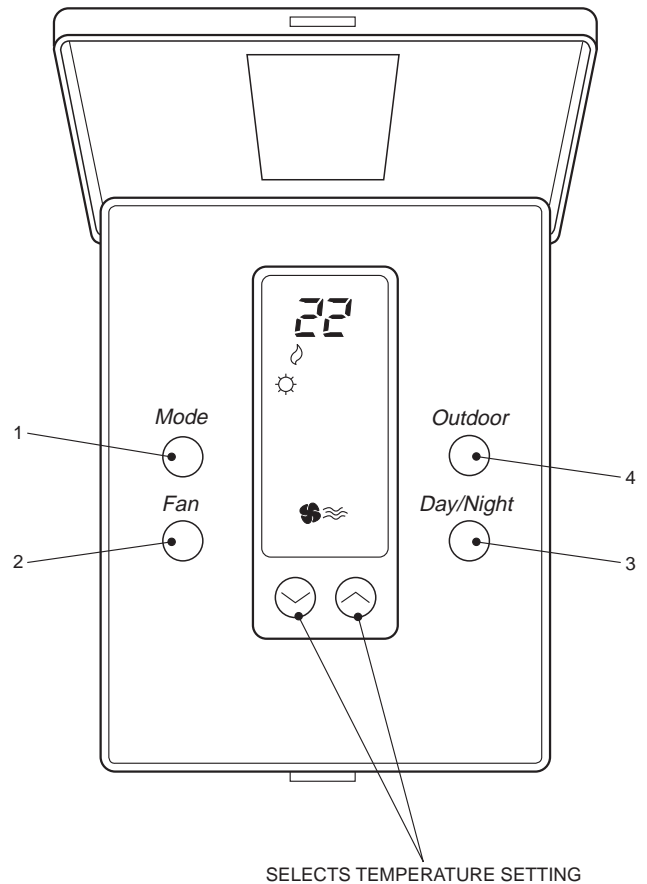
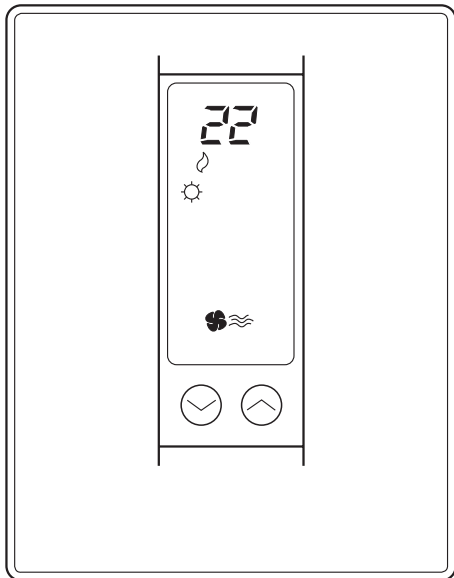
1.- MODE

Pressing this button sets the heat pump operating mode. When pressed alternatively, the LCD screen shows the following operating modes:

- COOL** ❄️ - Controls the system in the cooling mode. (The word **COOL** appears on screen during 5 seconds.)
- HEAT** 🔥 - Controls the system in the heating mode. (The word **HEAT** appears on screen during 5 seconds.)
- Auto** ❄️ 🔥 - Controls the system in either the cooling or heating modes, as needed. (The word **Auto** appears on screen during 5 seconds.)
- EM** - Controls the system in the emergency heating mode (operates only if an electric heater, optional accessory, is installed).
- OFF** - Disconnects the system.

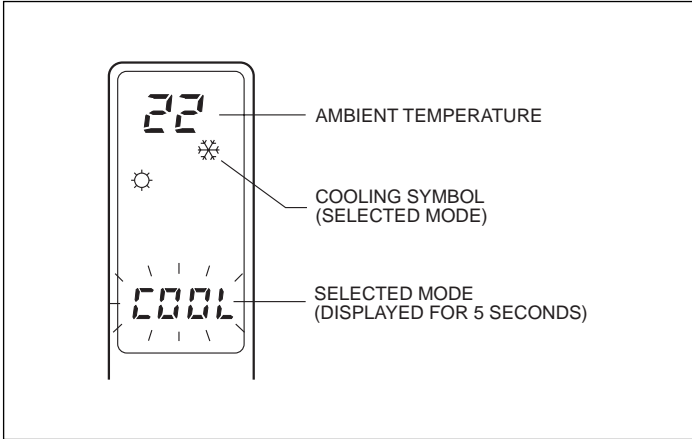
Controls and indicators

- 1.- Sets the operating mode.
- 2.- Starts the fan.
- 3.- Sets the day/night mode.
- 4.- Option of reading the outdoor temperature (2-circuit units).

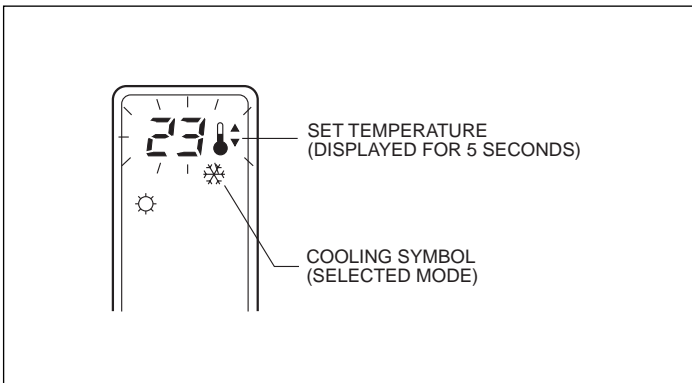


a) **Cooling**

Press the MODE button repeatedly until the cooling symbol ❄️ appears on screen (along with the word **COOL** during 5 seconds). This symbol remains visible on screen.



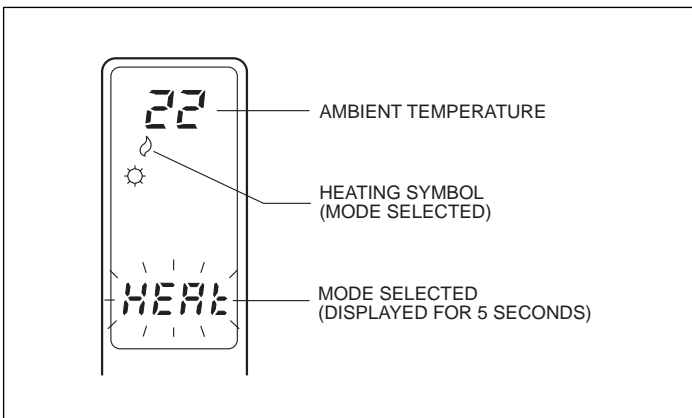
Once the operating mode is set, select the temperature setting by pressing button ⬆️ or ⬇️, so as to set a higher or lower temperature. The temperature setting appears along with a small symbol that represents a thermometer, and remains on screen during 5 seconds. As soon as the temperature setting disappears, the ambient temperature appears once again.



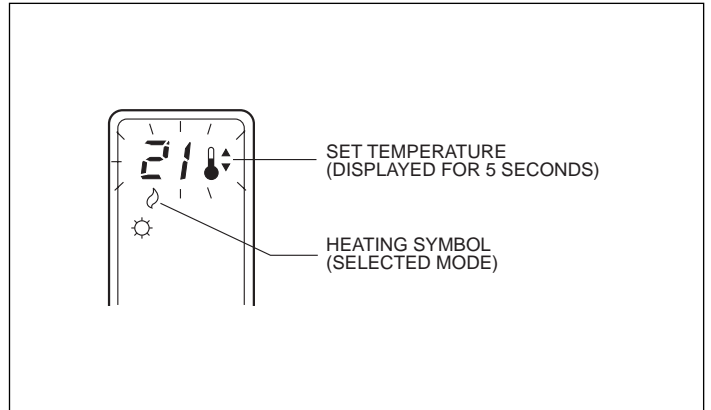
After a few minutes, the cooling system will begin to operate and the cooling symbol on screen will start to flash.

b) **Heating**

Press the MODE button repeatedly until the heating symbol 🔥 appears on screen (along with the word **HEAT** during 5 seconds). This symbol remains visible on screen.



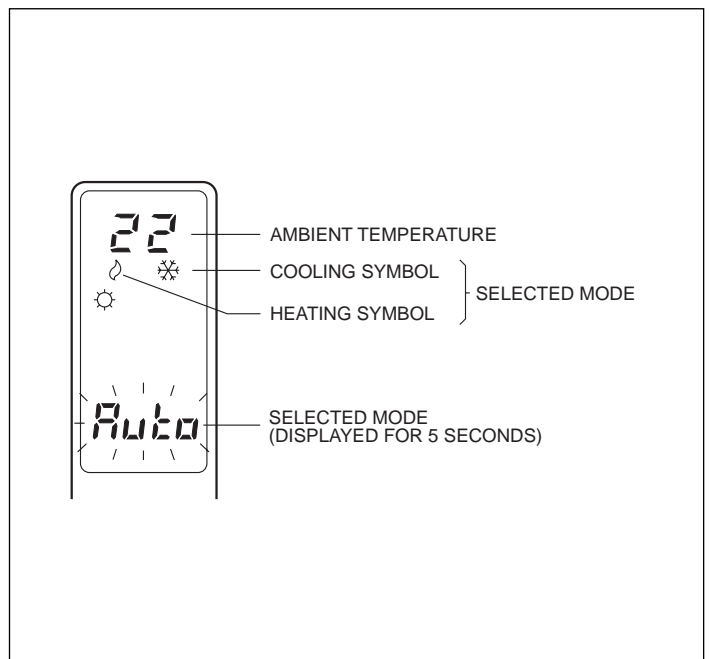
Once the operating mode is set, select the temperature setting by pressing button ⬆️ or ⬇️, so as to set a higher or lower temperature. The temperature setting appears along with a small symbol that represents a thermometer, and remains on screen during 5 seconds. As soon as the temperature setting disappears, the ambient temperature appears once again.



After a few minutes, the heating system will begin to operate and the heating symbol on screen will start to flash.

c) **Automatic**

Select a temperature setting for the cooling mode and another for the heating mode, as described in paragraphs a and b. In this operating mode, the **COOL** temperature setting should be at least 1°C above the **HEAT** temperature setting, which is the minimum differential allowed by the thermostat. Press the MODE button repeatedly until the heating 🔥 and cooling ❄️ symbols appear on screen (along with the word **Auto** during 5 seconds). These signals remain visible on screen.



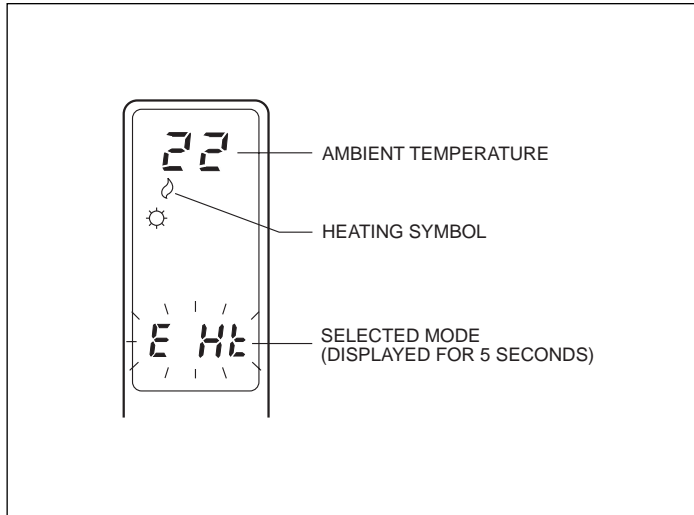
After a few minutes, the system will begin to operate, switching automatically between the heating and cooling modes so as to keep the ambient temperature between the two settings. When either the heating or cooling mode are in operation, the corresponding symbol starts to flash.

d) Emergency heating

Press the MODE button repeatedly until the word **E HL** appears on screen (visible during 5 seconds), along with the heating symbol ☀. After a few minutes, the emergency heating system will begin to operate and the heating symbol ☀ on screen will start to flash.

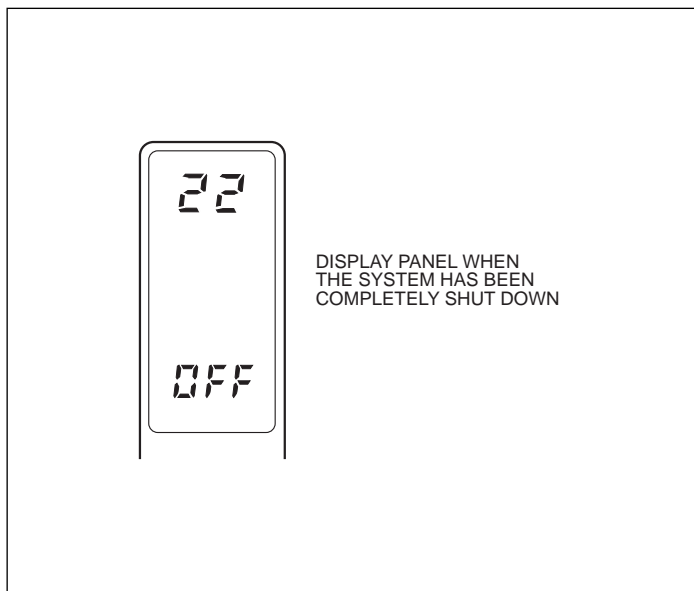
In this operating mode, the compressor is always inoperative and the auxiliary and emergency heaters, if any (optional accessories) are used for heating.

This operating mode can be used for heating when there is any problem with the compressor.



e) Off

Press the MODE button repeatedly until the word **OFF** appears on screen. The heat pump is turned off and the word **OFF**, along with the ambient temperature, remain permanently visible on screen.



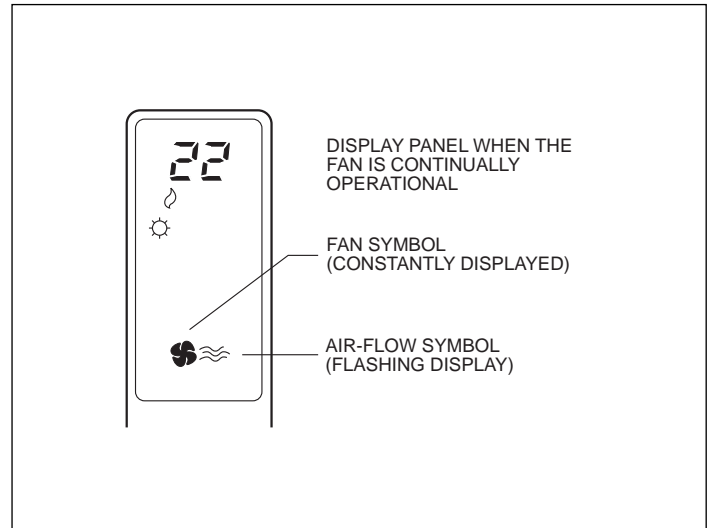
f) °C/°F scale

To change the temperature scale, press buttons ☺ and ☻ simultaneously.

2.- Fan

Pressing the FAN button puts the fan in continuous operation (independent of the unit's operating mode), and the thermostat screen shows the fan and air flow symbols, that of the continuous fan and the flow, intermittently.

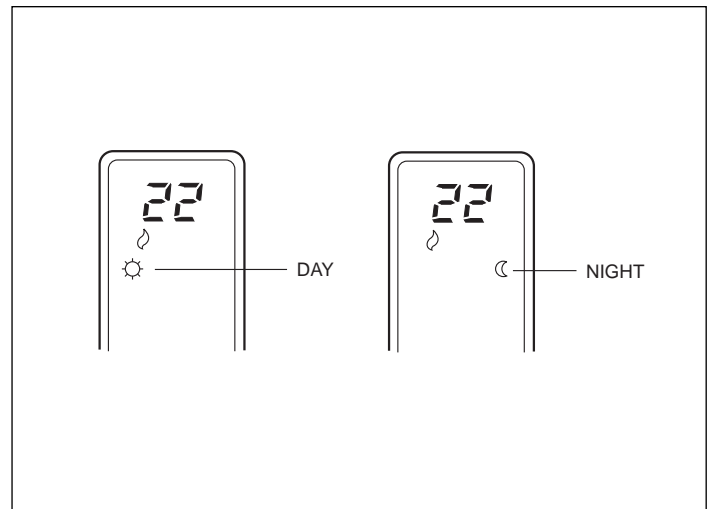
By pressing the FAN button once again, the 🌀 symbol disappears and the fan operates automatically in accordance with the compressor or the electric heater (if installed).



3.- Day/Night setting

By pressing the DAY/NIGHT button you can select different temperature settings, for the day or night periods (in each one of the operating modes). Upon installing the thermostat, the ☀ symbol appears on screen, indicating that the temperature setting is for the daytime. Upon pressing the DAY/NIGHT button or closing the contact of the internal thermostat CLK1 and CLK2 with an auxiliary external timer, the symbol ☾ appears on screen, indicating that the temperature setting is for the night-time.

Whenever this button is pressed, the established temperature settings, whether they be for day ☀ or night ☾, will be altered.



4.- Option of outdoor temperature reading (2-circuit units)

Optionally, the thermostat allows installing a sensor that reads the outdoor temperature. This temperature may be read by pressing the OUTDOOR button.

Option of a remote ambient temperature sensor (2-circuit units)

The DSL thermostat is designed to accept a remote sensor that allows controlling the ambient temperature of the room apart from wherever the DSL thermostat is located. The remote sensor is connected to the inner connecting strip of the thermostat, at terminals RS1 - RS2 - RS + V.

LED option 1 (2-circuit units)

The thermostat is equipped with an LED that, if supplied with 24 V (by means of an external signal from the timer or pressure gauge) can notify the need to change the filters.

LED option 2 (2-circuit units)

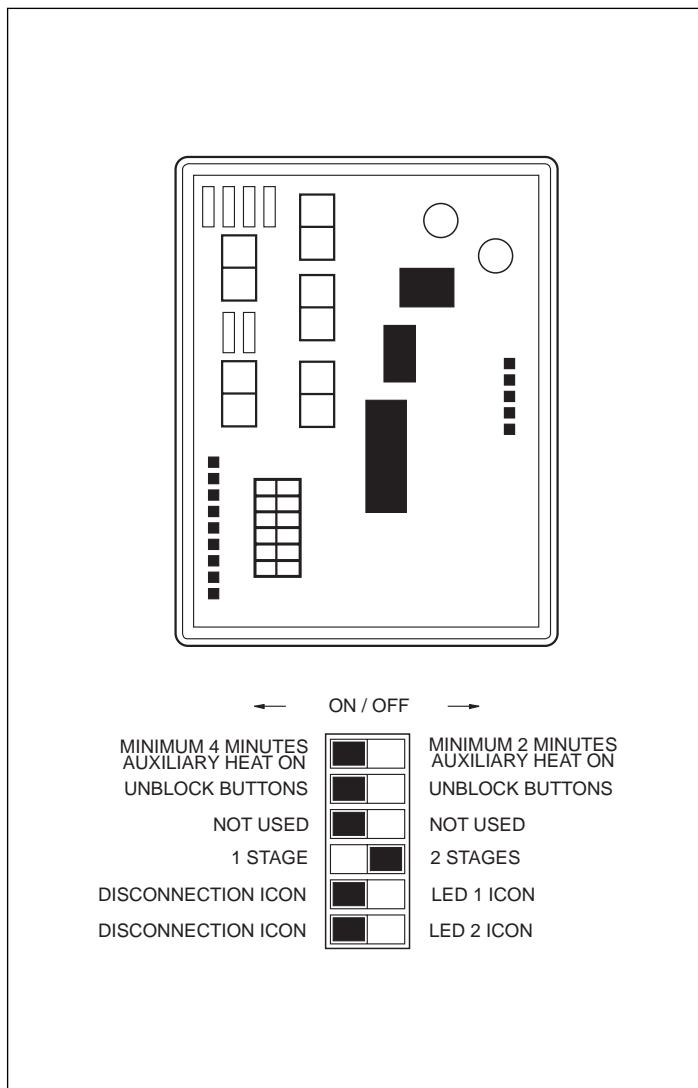
The thermostat is equipped with a second LED that, if supplied with 24 V, can be used as a service call.

Internal configuration of the thermostat (2-circuit units)

The thermostat is equipped with a configuration system (options) by means of micro-switches located in the base plate.

The standard configuration of the thermostat must be the configuration described in the following section.

Adjustment of the micro-switches (2-circuit units)



Graphic information

The screen is continuously giving us information on: the ambient temperature, operating mode, day/night period and fan operation. To have access to information on the temperature settings press, just once, one of the temperature setting buttons. This will give us, on screen and for 5 seconds, the temperature setting established for the operating mode that is visible on screen at that moment.

Logic module

This is the central protection and control point of the heat

pump. It is equipped with operating and connecting elements that control the outdoor unit. The logic module responds to the signals of the thermostat, the high pressure gauge and the outdoor temperature and discharge and liquid sensors, determining the functions of the heat pump, electric heaters, defrosting cycles, timers, outdoor fan speed, etc.

"Outdoor" sensor

This is a thermistor placed at the air intake of the outdoor unit and registers the air temperature. It controls pump operation, turning same off when the outdoor temperature reaches approximately -15°C. This avoids the operation of the compressor when excessive fatigue can cause a high compression ratio. It allows activating the electric heater (optional) controlled by the 2nd phase of the ambient thermostat if the outdoor temperature is below -15°C.

By means of the "balance point", it allows setting the temperature to that which activates the optional electrical heater, if installed.

The signal given off by the outdoor probe is also used by the logic module to set the outdoor fan speed in accordance with the ambient temperature. In the Summer cycle, the plate sets high speed when the outdoor temperature is over 33°C while, in the Winter cycle, the high speed begins to operate at ambient temperatures of less than 9°C.

"Discharge" sensor

It is fitted to the compressor discharge tubing. It protects the compressor against high operational temperatures and pressures, turning the compressor off when the discharge temperature is excessive. Protects the compressor against loss of refrigerant and against air flow reduction in the indoor and outdoor batteries. Allows restarting the compressor circuit after a lockout.

"Liquid" sensor

Located at outdoor battery liquid line. Sets off the defrosting cycle after 30, 60 or 90 minutes (depending upon the setting) after the start up or the last defrosting cycle, if the temperature detected is equal to or lower than -5°C. Indicates the end of the defrosting cycle when the fluid temperature reaches 13°C, or is held at a minimum of 7°C during 5 minutes.

Avoids setting the defrosting cycle off in mild climates, as it does not detect a sufficiently low fluid temperature.

These defrosting time values of 30. 60 and 90 minutes constitute the real calculating basis used by the micro-processor of the electronic module, which compares said values with the reading of the ambient temperature detected by the outdoor sensor. In this way, the defrosting time the unit will actually be subject to will increase or decrease depending upon the ambient temperature. At low ambient temperatures, which normally have a low humidity value, the time period between defrosting will increase. On the other hand, if the ambient temperature is high, with a normally high humidity value, this time period is reduced. In very extreme cases, these values can be reduced to a third, or triplicated.

Balance point

Avoids operation of the backup system when the outdoor temperature is above the set balance point. This represents a saving in the operation of the resistance, as long as the heat pump can satisfy the needs of the building. The balance point can be set to between 14 and 0°C. This avoids the need to install an additional outdoor thermostat.

Timer

Delays start up either 5 or 2 minutes, so as to avoid repeated start up cycles. This balances operational pressures before each start up of the compressor. If the thermostat, or manual operation, cause false contacts, the heat pump is not affected. It delays start up after an electric supply interruption, which allows line voltage to go back to normal values.

Miscellaneous

12-pin connector that allows the use of the service analyser. Push button or pin to eliminate the timer during testing. Possibility of reducing the timer to 2 minutes. Forced defrost-

ing button, for testing. LED for selfdiagnosis.

Operation

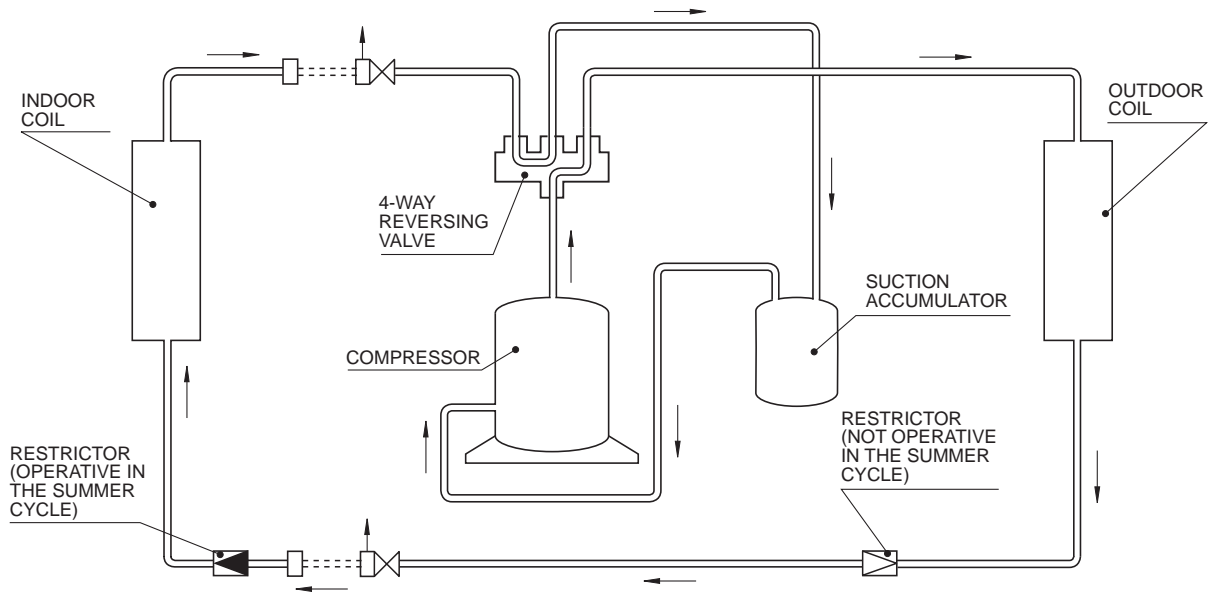
Summer cycle

Operation in Summer is similar to that of any conventional air conditioner. The 4-way valve is activated. The corresponding figure indicates the circuit followed by the refrigerant.

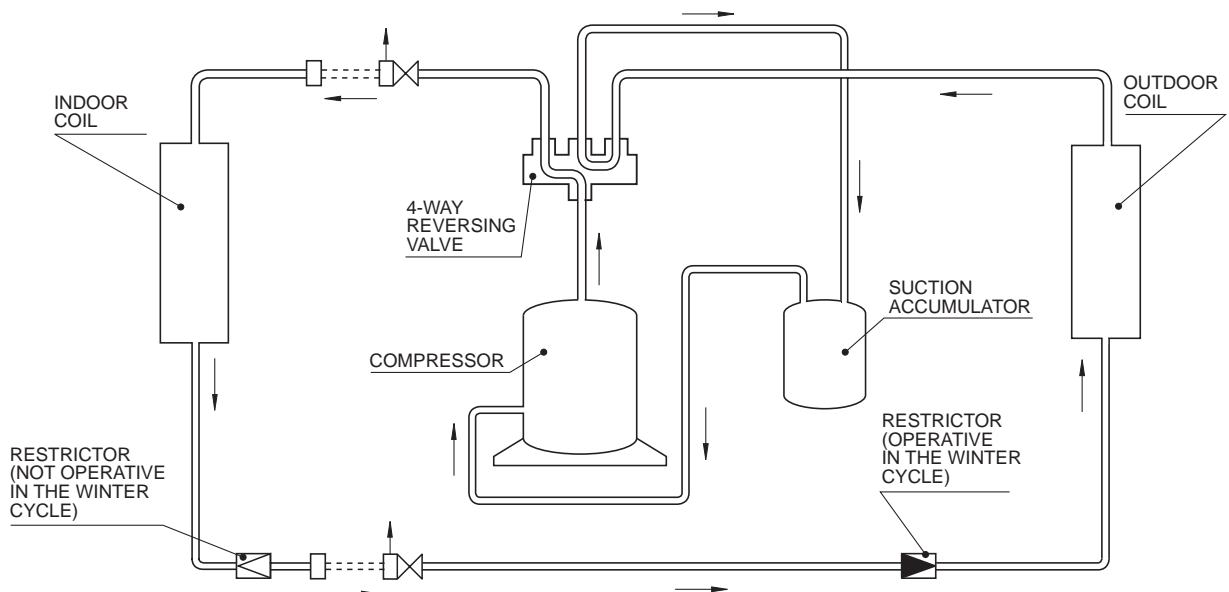
Winter cycle

In the Winter cycle the discharge gas goes to the indoor battery, which acts as a condenser. The 4-way valve is inoperative. The corresponding figure indicates the circuit followed by the refrigerant.

Summer cycle (Type diagram)



Winter cycle (Type diagram)



Operation sequence

See the corresponding electrical diagrams.

Summer cycle: Thermostat set to "AUTO".

- 1) The 4-way valve is fed through the thermostat, which allows the refrigerant to circulate through the summer cycle.
- 2) If the ambient temperature thermostat fan operating mode is set to "FAN", the contactor is fed and the fan operates continuously.
- 3) The logic mode times and, 5 minutes later, the unit may be turned on.
- 4) When the thermostat is connected, the contactor is connected and the compressor is turned on. If the operating mode of the fan is at its normal setting, the contactor is fed through the cooling circuit of the thermostat, and the fan begins to operate.
- 5) The unit will operate at intervals, in response to the corresponding signal from the ambient thermostat, so as to satisfy the required cooling level.
- 6) When the unit turns off, after an operational cycle or a supply voltage interruption, the logic module does not allow a new start up until after 5 minutes (this protects the compressor, allowing the operational pressures to be balanced).
- 7) If the discharge pressure is greater than 28 kg/cm², or the discharge temperature surpasses 130°C, the logic module turns the unit off, leaving the system in lockout.
- 8) To reset after a lockout, interrupt the power supply to the unit, or press the "RESET" button.
This resets the system and the unit turns on after 5 minutes.

Winter cycle: Thermostat set to "AUTO".

- 1) The 4-way valve does not receive voltage, allowing a setting for the heating circuit; that is to say, the indoor battery acts as a condenser, and the outdoor battery as an evaporator.
- 2) If the ambient temperature thermostat fan operating mode is set to "FAN", the contactor is fed and the fan operates continuously.
- 3) The logic mode times and, 5 minutes later, the unit may be turned on.
- 4) When the first phase of the thermostat is connected, the contactor is connected and the compressor is turned on. If the operating mode of the fan is at its normal setting, the contactor is fed through the heating circuit of the thermostat, and the fan begins to operate.
- 5) The unit will operate at intervals, in response to the corresponding signal from the ambient thermostat, so as to satisfy the required heating level.
- 6) When the unit turns off, after an operational cycle or a supply voltage interruption, the logic module does not allow a new start up until after 5 minutes (this protects the compressor, allowing the operational pressures to be balanced).
- 7) If the discharge pressure is greater than 28 kg/cm², or the discharge temperature surpasses 130°C, the logic module turns the unit off, leaving the system in lockout.
- 8) To reset after a lockout, interrupt the power supply to the unit, or press the "RESET" button.
This resets the system and the unit turns on after 5 minutes.

Indoor fan operation

The logic module is equipped with two jumpers, JP19 and JP20, that allow configuring the indoor fan operation:

- JP19 "closed" = The fan is turned off during the defrosting cycle.
JP19 "open" = The fan is operative during the defrosting cycle.
JP20 "closed" = The fan stops 1 minute after the compressor.
JP20 "open" = The fan stops simultaneously with the compressor.

25-pin connector

The plate is equipped with a 25-pin connector to:

- Connect the service analyser that corresponds to this plate.
- Connect a PC network for the control of various units.

Micro-switches SW1

The purpose of these micro-switches is to identify the plate with a number (from 1 to 32) within the above mentioned network.

Their position does not affect the operation of the plate.

Indicating LEDS

STANDBY: Activated when the plate is in its starting process during the initial timing operation.

INPUT O, G, Y, W: Activated when a signal is received from the thermostat.

Service push buttons:

TEST (Green): Upon being pressed, timing is reduced to 10 seconds. The defrosting interval is reduced to 1 minute.

RESET (Red): When pressed, the normal activation of the plate is allowed after any failure or system lockout.

Connecting strip of the economizer: With jumper JP-23 and terminals R, B, RF, Y and Y1 of the FREE COOLING connecting strip, the compressor/economizer system is activated automatically.

Defrosting cycle (with timer)

The frost produced on the outdoor battery during the heating cycle should be eliminated when it starts to block the battery.

The defrosting cycle will begin after the 30, 60 or 90 minutes, depending upon the setting, of start up or the last defrosting, and the evaporating temperature is equal to or less than -5°C.

The logic module:

- Activates the 4-way valve so as to pass on to the cooling cycle.
- Turns the outdoor fan off.

The defrosting cycle is over when the liquid temperature, controlled by the thermistor, is sufficiently high (13°C) or, if not heated, it remains at a minimum of 7°C during 5 minutes, or after a maximum of 12 minutes after the beginning of the defrosting process.

Upon ending the defrosting cycle, the logic module re-establishes the normal operating conditions of the heating cycle.

Operation at -15°C (optionally -5, -10, -20)

When the outdoor temperature is below -15°C, operation of the compressor is not justified due to the low level of heating it generates. The logic module detects, through a thermistor located at the outdoor air intake, whether the temperature is below -15°C, and acts:

- Disconnecting the compressor.
- Connecting the electric heater (optional accessory), which is controlled by the first phase of the thermostat.
- Turns the indoor fan on, controlled by the first heating phase of the thermostat.

Operation of emergency heating

When the operating mode of the thermostat is set to emergency heating ("EHT" on screen):

- The compressor goes into lockout.
- The auxiliary and emergency heaters, if installed, are controlled by the first phase of the thermostat.

Other electric circuit safety features

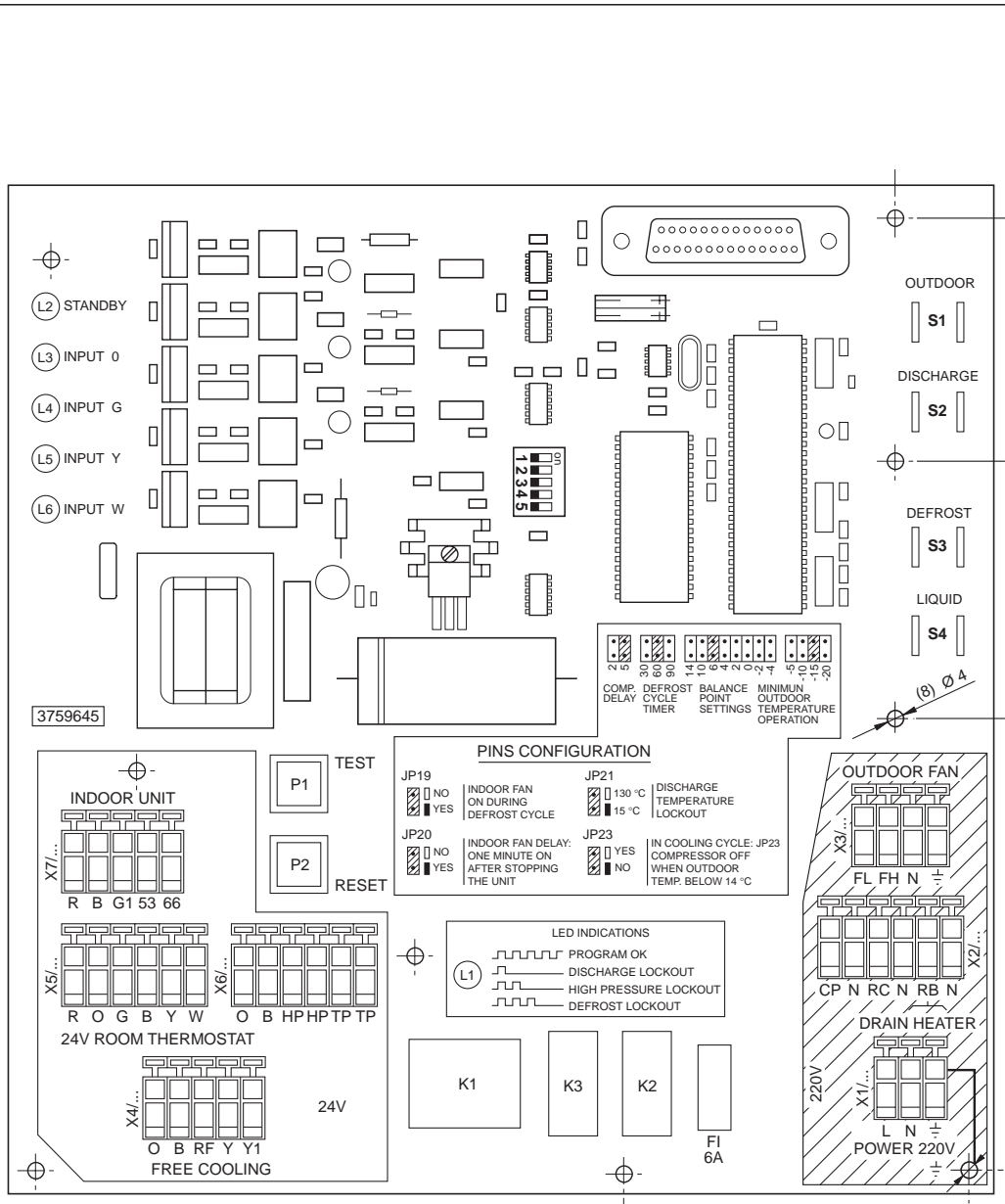
- The compressor is protected against overloads and against failure of a phase by a solid state protector, with three sensors embedded in the coils.
- The control circuit is protected by a fuse.
- In general, the entire unit and components are protected by a grounding circuit.

Compressor sump heater





The compressor is equipped with a heater in its sump that heats the oil so as to avoid an excessive concentration of refrigerant in same while the compressor is turned off.

Should the main switch be turned off for a certain period of time, before starting the heat pump you should connect this switch at least 8 hours before, minimum. This is to remove the accumulated refrigerant from the compressor during that period of time.





Module model AHO-B



Operation in accordance with the probes

OUTSIDE PROBE		OPEN	- CONNECTS THE EMERGENCY RESISTANCE - STOP THE COMPRESSOR
DISCHARGE PROBE		CLOSED	- STOPS THE COMPRESSOR (LOCK OUT)
DEFROST PROBE		CLOSED	- (DURING 12 SECONDS WITH FLUID TEMPERATURE < 4 °C) - STARTS DEFROST
FLUID PROBE		OPEN	- REPEATS DEFROSTING CYCLES ACCORDING TO THE SET TIME

Operation of the jumpers (pins)

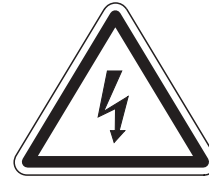
JP19		NO / YES	INDOOR FAN OPERATING DURING DEFROST
JP20		NO / YES	INDOOR FAN STOPS 1 MINUTE AFTER COMPRESSOR WITH DISCONNECTION TERMINAL G OF THERMOSTAT
JP21		130°C / 115°C	LOCK-OUT DISCHARGE TEMPERATURE
JP23		YES / NO	THE COMPRESSOR IS HALTED IN COLD CYCLE WHEN THE OUTDOOR TEMPERATURE IS LESS THAN 14°C (IT IS OPERATIVE WHEN THE ECONOMIZER IS INSTALLED (FREE COOLING))

- SCALE OF BALANCE POINTS: 14,10,6,4,2,0,-2 & -4°C.
 - START-UP DELAY TIME: 2',5'.
 - TIME BETWEEN 2 DEFROSTS: 60',30',90'.
 - LOW TEMPERATURE DISCONNECTION SCALE: -5,-10,-15,-20°C.

THIS PLAQUE IS DELIVERED WITH 7 BRIDGES (PIN) IN:
 CLOSING CIRCUIT: 5',60',6°C,-15°C, **JP19 & JP20**.
 WITHOUT CLOSING CIRCUIT: **JP21**.

Maintenance

Clean the casing with a rag soaked in a soft liquid detergent.



Do not spill water on the unit for cleaning. Water could damage internal components and cause electrical discharges.
 Never use solvents nor strong chemical products on the indoor units. Do not rub the casing with very hot water.

Discharge of the indoor units with ducts

The discharge of the indoor units equipped for ducts are supplied without a protecting grill. When carrying out maintenance services, keep this in mind.



In the case of installing an indoor unit with free discharge and equipped for ducts, the outlet opening should be protected with a grill. The lack of this protection could provoke damage caused by the fan turbine.

Cleaning the filters

Keep the battery filters in good condition, checking them at least once a month. If the filters are dirty, air flow and equipment performance are reduced.

Cleaning the outdoor unit

Dirt should not be allowed to accumulate in the outdoor battery. It should be cleaned as frequently as needed, with a brush, vacuum cleaner or detergent.



For safety reasons, make sure to turn the air conditioner off, and unplug the power supply, prior to cleaning.



CAUTION

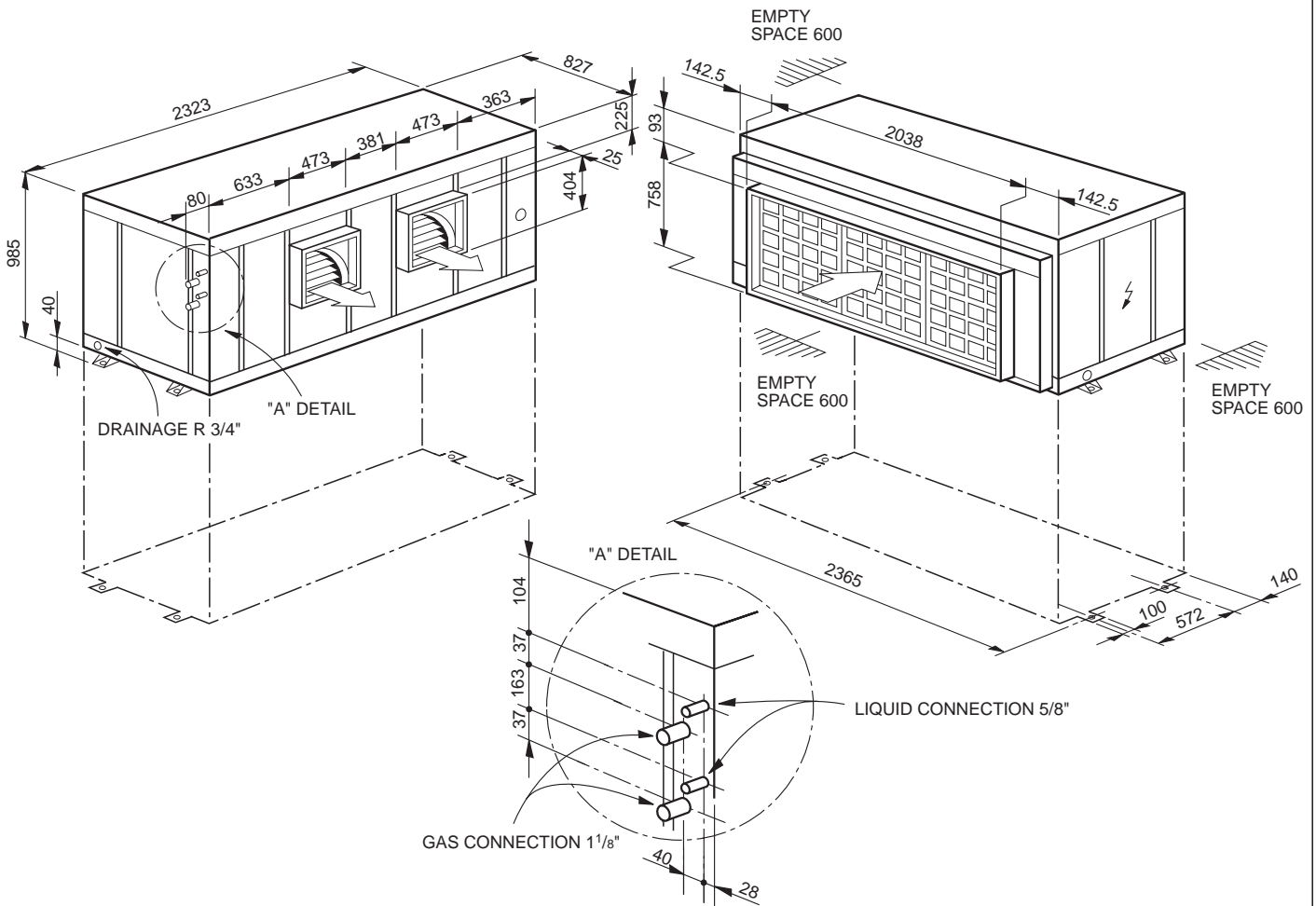
Check the outdoor unit periodically to see if the air inlet or outlet are clogged by dirt or leaves, etc.
The internal coil, and other components of the outdoor unit, should also be cleaned periodically. Please contact your dealer or maintenance service.

Filling the drainage siphon

So as to avoid having problems with the condensed water, we recommend that, prior to start up and before the beginning of each season, the drainage siphon be filled with water so as to avoid air being sucked in through this tubing.

General dimensions mm.

CHI-800



Checking the tension of the belts

The tension and wear of the belts of the motors should be checked yearly, and the belts changed if necessary. Before carrying this operation out, disconnect the main supply switch.

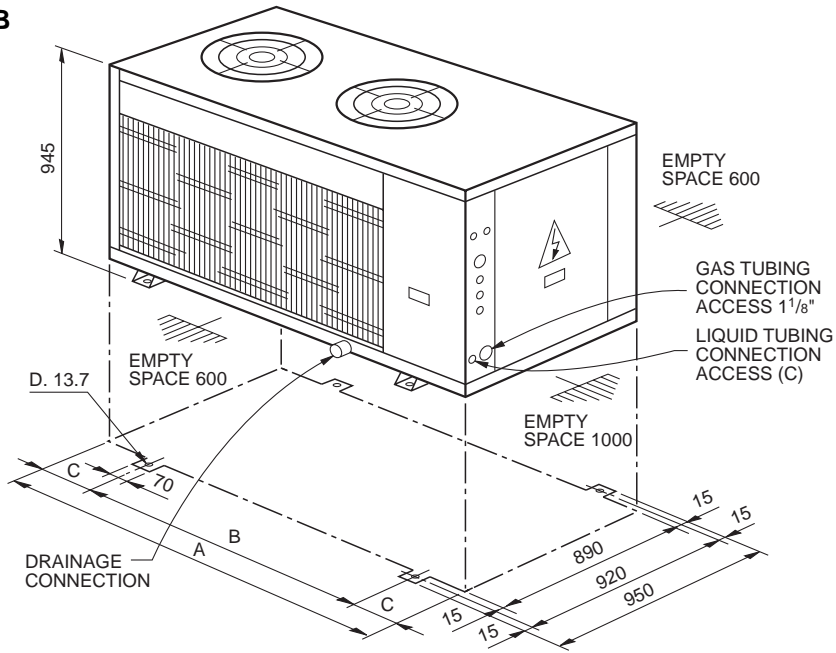


CAUTION

For safety reasons, make sure to turn the air conditioner off, and unplug the power supply, prior to checking the fan motor belts.

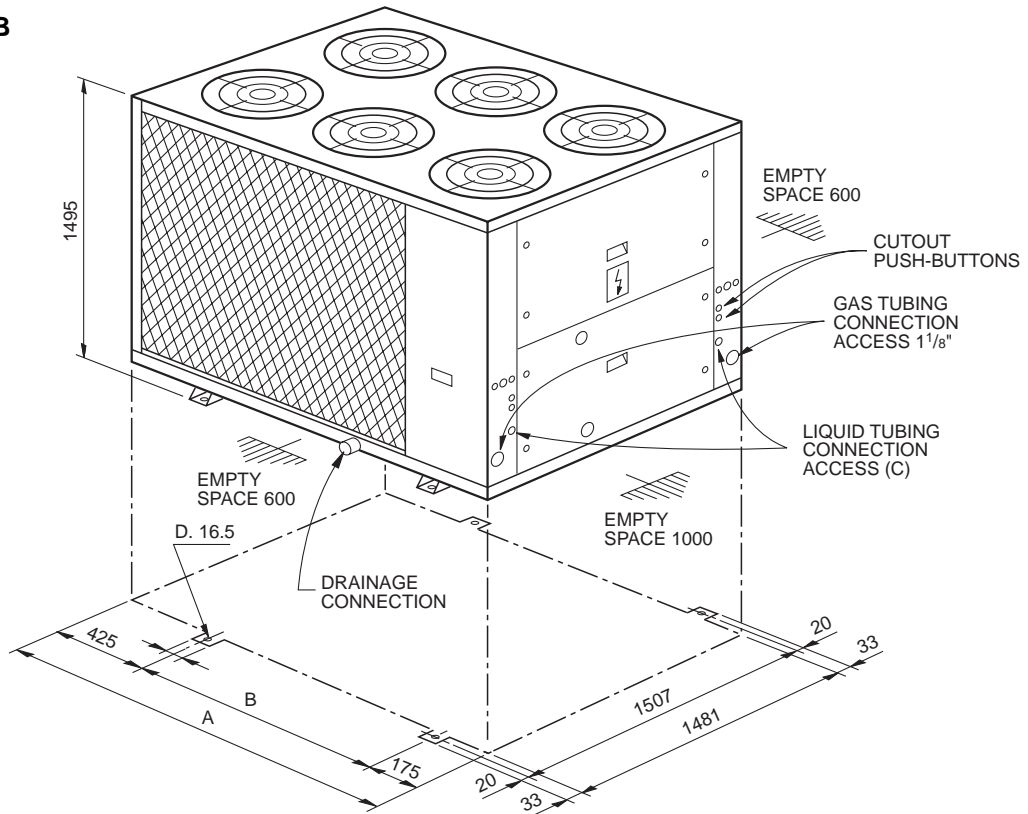
General dimensions mm.

AHO-200, 300 & 400 B



Models	A	B	C	D
AHO-200B	1 490	970	260	1/2"
AHO-300B	1 775	1 255	260	5/8"
AHO-400B	2 150	1 580	285	5/8"

AHO-450, 600 & 800 B



Models	A	B	C
AHO-450B	1 690	1 090	1/2"
AHO-600B	1 975	1 375	5/8"
AHO-800B	2 150	1 550	5/8"

All data subject to change without notice.

AIR CONDITIONING
HEATING
TILES
BATHROOMS

Clima Roca York, S.L.

Paseo Espronceda, 278
08204 Sabadell (Barcelona) - Spain
Telephone (34) 937 102 700
Telefax (34) 937 117 285

