

INSTALLATION, OPERATING AND MAINTENANCE



VERTICAL PACKAGED AIR CONDITIONER

COMPACTAIR2

ADVANCED
ULTRA HIGH EFFICIENCY & COMFORT

8 - 85 kW

COMPACTAIR ADV2 IOM-
MIL162E-0920-09/2020




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Due to LENNOX EMEA ongoing commitment to quality, the specifications, ratings and dimensions are subject to change without notice and without incurring liability. Improper installation, adjustment, alteration, service or maintenance can cause property damage or personal injury. Installation and service must be performed by a qualified installer and servicing agency.



Read this manual before installation, reparation o maintenance works.

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Lennox have been providing environmental solutions since 1895, our COMPACTAIR ADVANCED 2 range continues to meet the standards that have made LENNOX a household name. Flexible design solutions to meet your needs and uncompromising attention to detail. Engineered to last, simple to maintain and Quality that comes as standard. For information on local contacts at www.lennox europe.com.

The manufacturing of these units is made under the requirements of the ISO 9001 and ISO 14001.

The English version is the original version. Existing versions in other languages are translations of the original version. In the event of a conflict of interpretation between the translated versions and the original version, the original version shall prevail.

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LENNOX, in its commitment to preserve the environment, has an Environmental Management System based on ISO 14001, through which all environmental aspects generated during its activity are managed and continuously improved, taking into account the life cycle of the products we manufacture and market.

For this reason, you: customer, user and / or maintainer of the equipment, are invited to join our commitment to conserve our environment, and follow the indications that we expose throughout this manual.

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: _____

	YES	NO
UNIT ON SHOCK ABSORBERS	<input type="checkbox"/>	<input type="checkbox"/>
DRAINAGE WITH TRAP	<input type="checkbox"/>	<input type="checkbox"/>
MAIN 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: < $\begin{matrix} 1 \text{ } ^\circ\text{C} \\ 2 \text{ } ^\circ\text{C} \end{matrix}$ _____

Air output temperature to the outdoor coil: < $\begin{matrix} 1 \text{ } ^\circ\text{C} \\ 2 \text{ } ^\circ\text{C} \end{matrix}$ _____

High pressure: < **circuit 1** _____
circuit 2 _____

Low pressure: < **circuit 1** _____
circuit 2 _____

HEATING CYCLE

Air intake temperature to the outdoor coil: < $\begin{matrix} 1 \text{ } ^\circ\text{C} \\ 2 \text{ } ^\circ\text{C} \end{matrix}$ _____

Air output temperature to the outdoor coil: < $\begin{matrix} 1 \text{ } ^\circ\text{C} \\ 2 \text{ } ^\circ\text{C} \end{matrix}$ _____

High pressure: < **circuit 1** _____
circuit 2 _____

Low pressure: < **circuit 1** _____
circuit 2 _____

ELECTRIC POWER CONSUMPTION (Amps)

Compressor 1 ___/___/___ Compressor 2 ___/___/___

Compressor 3 ___/___/___

Outdoor fan section 1 _____/_____/_____

Outdoor fan section 2 _____/_____/_____

Compressor 1 ___/___/___ Compressor 2 ___/___/___

Compressor 3 ___/___/___

Outdoor fan section 1 _____/_____/_____

Outdoor fan section 2 _____/_____/_____

Options installed: _____

Comments: _____

DANGER AND WARNING SIGNS



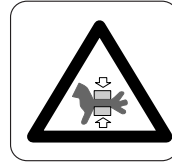
Abrasive surfaces



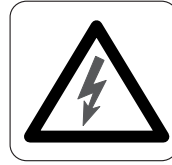
Low temperatures



High temperatures



Risk of injury by moving objects



Electrical voltage



Risk of injury by rotating objects

ELECTRICAL CONNECTIONS



Make sure to switch off the power before installing, repairing or carrying out maintenance on the unit, in order to prevent serious electrical injury.

Keep local and national legislation in mind when installing the unit.

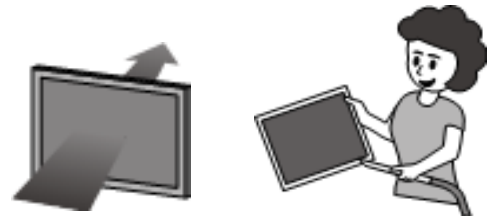
WARNING - REMEMBER

Switch off the general power switch of the air conditioning unit on the electrical panel of the location. The cleaning of filters does not require specialized personnel, for other types of interventions like electrical or mechanical advise the specialized technician.

FILTER CLEANING

Ensure to open the electrical disconnect switch to the network before accessing the unit for its installation, repair or maintenance to avoid possible deaths or injuries from electric shock.

If the filter is too dirty, wash it in a container with water and neutral soap, drying it in the shade before inserting it back into the unit.



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 maintenance and management personnel.

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.

THE UNIT MUST BE INSTALLED IN ACCORDANCE WITH LOCAL SAFETY CODES AND REGULATIONS AND CAN ONLY BE USED IN WELL VENTILLATED AREA.

PLEASE READ CAREFULLY THE MANUFACTURER'S INSTRUCTIONS BEFORE STARTING THIS UNIT.

INSPECTIONS AND REQUALIFICATION ACCORDING PRESSURE EQUIPMENT DIRECTIVE MUST FOLLOW THE LOCAL REGULATIONS WHERE THE UNIT IS INSTALLED.

EMC DIRECTIVE COMPLIANCE

WARNING:

The units COMPACTAIR ADVANCED 2 range are designed to heat or cool buildings in industrial, commercial and residential environments. What differentiates these environments is the position of the HT / LV transformer in the power supply to the buildings. In the case of the industrial environment, the HT / LV transformer is dedicated and installed in the industry itself. On the other hand, for the residential, commercial and light industry, the HT / LV transformer is common to a zone and supplies both commercial, light industrial buildings and houses (individual houses and buildings) in parallel.

So to meet all of these environments, the units have been tested according to the most stringent standards of the 2 environments that are:

- EN61000-6-3: emission for residential, commercial and light industry environments:
- EN61000-6-2: immunity for industrial environment.

As regards immunity, all the tests carried out were in conformity.

As regards emissions:

Units 025 to 045

- Meets the EN61000-6-3 (emission for residential, commercial and light industry environments)
- The short-circuit ratio $R_{sce} > 350$ corresponding to the standard EN 61000-3-12 concerning the measurement of harmonics on the network.
- No maximum permissible impedance of the network Z_{max} is necessary to declare from standard EN 61000-3-11 because the equipments tested are in conformity with the standard. The connection to the main is not a conditional connection (the connection is possible to all the mains without restriction on the impedance value).

Units 060 to 085

- Meets the EN61000-6-4 (emission for industrial environments) and can meet the EN61000-6-3 (emission for residential, commercial and light industry environments) by adding an EMC filter (like FN3258 for 55A unit) in the unit power supply.
- The short-circuit ratio $R_{sce} > 350$ corresponding to the standard EN 61000-3-12 concerning the measurement of harmonics on the network.
- The maximum permissible impedance of the network $Z_{max} = 0.119\Omega$ resulting from standard EN 61000-3-11.

All units are compliant with the PED directive.



1. Attention: The high-pressure safety switches are essential elements which guarantee the system remains within the admissible operating limits. Before switching on the installation, always ensure all electrical connections are correct on these elements which are used to isolate the electrical power supply to the compressor(s) they protect. Carry out a test to ensure the electrical power supply is effectively isolated when the pressure switch attains its set value.
2. In case of installation in a seismic zone or in a zone which may be effected by violent natural occurrences such as storms, tornados, floods, tidal waves, etc..., the installer and/or operator will refer to valid standards and regulations in order to ensure the devices required are available as our units are not designed to operate under such conditions without prior precautions.
3. The equipment is not designed to resist fire. The installation site will therefore have to respect valid standards with regard to protection against fire (emergency instructions, map...).
4. In case of exposure to corrosive external atmospheres or products, the installer and/or operator shall take the necessary precautions to avoid damage to the equipment and will make sure the equipment provided has the necessary and sufficient anti-corrosion protection.
5. To respect a sufficient number of supports for the piping according to their size and weight under operating conditions and to design the piping to avoid a water hammer phenomenon
6. For technical reasons, it is not possible to carry out hydrostatic tests on all our units so leak tests are carried out as a compensatory measure. (The entire circuit is checked using leak detectors). For machines charged with refrigerant, at the end of the test, an HP test is carried out in the factory to make sure the pressure switch is working properly.
7. Before any work is carried out on the refrigeration circuit, the dry air or nitrogen pressure our units are supplied with must be released (For units not charged with refrigerant in the factory.)
8. The emissions of refrigerant via the safety relief valves must be channeled to the exterior of the machine room. The outlet relief valve will have to be sized in compliance with EN13136.
9. Installation and maintenance of these machines must be carried out by personnel qualified to work on refrigeration equipment.
10. All interventions must be carried out in conformity with valid safety regulations (e. g.: NF EN 378), as well as the recommendations indicated on the labels and handbooks provided with the machine. All actions shall be taken to avoid access of unauthorized persons.
11. It is essential that any pipework or other components of the refrigeration circuit hazardous to people because of their surface temperature are insulated or identified.
12. Ensure that the installation zone (room or area) of the machine has restricted access and ensure the good condition of the covering.

F-Gas REGULATION

Operators of refrigeration equipment's must comply with the obligations defined in:

- EU Regulation No 517/2014 on fluorinated greenhouse gases
- EC 1005/2009 on substances that deplete the ozone layer



Non-compliance with these requirements is an offence and liable of financial penalties.

Moreover, in case of problem it is mandatory to prove to the insurance company that the equipment complies with the F gas Regulation.

WARRANTY

The warranty of the unit is subject to the warranty definitions as agreed upon in the order. It is expected that the design and installation of the unit utilise good working practices. The warranty will be legally null and void if:

- Service and maintenance have not been executed in accordance with the regulations; repairs have not been carried out by LENNOX personnel or have been implemented without prior written permission by LENNOX.
- Modifications have been made to the equipment without prior written permission by LENNOX.
- Settings and protections have been modified without prior written permission by LENNOX.
- Non-original or other than the prescribed refrigerants or lubricants are used.
- The equipment has not been installed and/or connected in accordance with the installation instructions.
- The equipment is being used improperly, incorrectly, negligently or not in accordance with its nature and/or purpose.
- A flow protection device is not fitted.

In these circumstances LENNOX is indemnified from any product liability claims from third parties.

In the event of a warranty claim the machine serial number and LENNOX order number must be quoted.

WARNING - All the technical and technological information contained in this manual, including any drawing and technical descriptions provided by us, remain the property of LENNOX and must not be utilised (except in operation of this product), reproduced, issued to or made available to third parties without the prior written agreement of LENNOX. The technical information and specifications contained in this manual are for reference only. The manufacturer reserves the right to modify these without warning and without obligation to modify equipment already sold.

SAFETY

It is essential to follow non exhaustive recommendations hereunder:

- Never work on a unit that is still energized.
- Any manipulation (opening or closing) of a shut-off valve must be carried out by a qualified and authorised engineer. These procedures must be carried out with the unit shut-down.
- Never work on any of the electrical components, until the general power supply to the unit has been cut. During any maintenance operations on the unit, lock the power supply circuit in the open position ahead of the machine. If the work is interrupted, check the lock before resuming the work.
- **WARNING:** Even if the unit has been switched off, the power circuit remains energized, unless the unit or circuit disconnect switch is open. Refer to the wiring diagram for further details.
- For some units, a separate 220V power supply may exist, check the electrical wiring for more information's
- In case of maintenance operations on fans (grills replacement ...) ensure that the power is shut off to avoid automatic restart.
- Before the opening of the refrigerant circuit, check the pressure with manometers or pressure sensors, and purge the circuit.
- Never leave a unit stopped with valves closed on the liquid line, refrigerant could be trapped and the pressure would rise.
- All installation parts must be maintained by the personnel in charge, in order to avoid material deterioration and injuries to people. Faults and leaks must be repaired immediately. The authorized technician must have the responsibility to repair the fault immediately. Each time repairs have been carried out to the unit, the operation of the safety devices must be re-checked.
- Follow guidance and recommendations given in safety and machine standards such as EN378, ISO5149, etc.
- Do not use oxygen to purge lines or to pressurize a machine for any purpose. Oxygen gas reacts violently with oil, grease, and other common substances.
- Never exceed the specified maximum operating pressures. Verify the allowable maximum high- and low-side test pressures by
- Checking the instructions in this manual and the pressures given on the unit name plate.
- Do not use air for leak testing. Use only refrigerant or dry nitrogen.
- Do not unweld or flame cut the refrigerant lines or any refrigerant circuit component until all refrigerant (liquid and vapour) has been removed from rooftop. Traces of vapour should be displaced with dry air nitrogen. Refrigerant in contact with an open flame produces toxic gases.
- Do not siphon refrigerant
- Avoid spilling liquid refrigerant on skin or splashing it into the eyes. Use safety goggles. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, immediately and abundantly flush the eyes with water and consult a doctor.

MAIN SAFETY RECOMMENDATIONS

All work on the unit must be carried out by a qualified and authorised employee.

Non-compliance with the following instructions may result in injury or serious accidents.

Work on the unit:

- The unit shall be isolated from the electrical supply by disconnection and locking using the main isolating switch.
- Workers shall wear the appropriate personal protective equipment (helmet, gloves, glasses, etc.).

Work on the electrical system:

- Work on electric components shall be performed with the power off (see below) by employees having valid electrical qualification and authorisation.

Work on the refrigerating circuit(s):

- Monitoring of the pressures, draining and filling of the system under pressure shall be carried out using connections provided for this purpose and suitable equipment.
- To prevent the risk of explosion due to spraying of coolant and oil, the relevant circuit shall be drained and at zero pressure before any disassembly or unbrazing of the refrigerating parts takes place.
- There is a residual risk of pressure build-up by degassing the oil or by heating the exchangers after the circuit has been drained. Zero pressure shall be maintained by venting the drain connection to the atmosphere on the low pressure side.
- The brazing shall be carried out by a qualified brazier. The brazing shall comply with standard NF EN1044 AG107 (minimum 30% silver).

Replacing components:

- Replacement of components shall be carried out using spare parts, or using parts approved by LENNOX.
- Only the refrigerant shown on the manufacturer's nameplate shall be used, to the exclusion of all other products (refrigerant blends, hydrocarbons, etc.).

Transport – Handling- Access:

- Installation of the unit and accessibility must be compliant with the local regulations. Ensure that all access equipments allow maintenance operation in safety (electrical cabinet, main switch, panels, filter, refrigerant circuit...)
- It is strictly forbidden to walk or store equipment or material on top of the rooftop unit

Filters:

- Do the filters fire classification's choice according to local regulations.

Fan compartment:

- Stop the power before accessing the fan compartment.

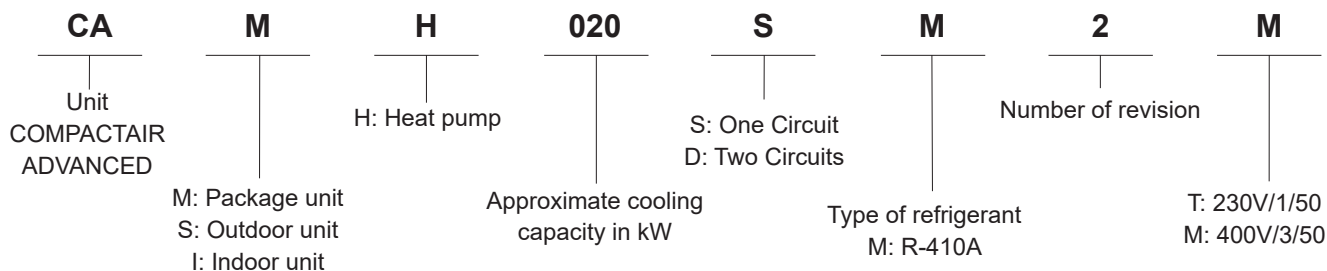


The unit is working under pressure. Never open the panels when the unit is working. Even after shutting down the unit, wait for 2 minutes until the fans are completely stopped before opening any panel.

- The units are not designed to resist to a fire. The installation site must comply with the standards relating to fire protection.
- In case of installation of the units in an area recognized as being potentially at risk for natural phenomena (tornado, earthquake, tidal wave, lightning...), please follow the standards and regulations, and provide the necessary devices to prevent from these risks.

CAUTION :

In the event of fire, refrigerating circuits can cause an explosion and spray coolant gas and oil.

1.1.- PRODUCT RANGE.

UNIT HEAT PUMP.

UNITS		V/Ph/50 Hz	Cooling capacity (kW)			Heating capacity (kW)		
			min	nom	max	min	nom	max
PACKAGE								
CAMH020SM2M		400 V 3 Ph	7,7	17,6	22,1	5,9	15,7	20,1
CAMH035SM2M		400 V 3 Ph	10,9	26,3	31,5	9,6	23,7	29,6
CAMH045SM2M		400 V 3 Ph	15,1	38,3	45,0	14,0	30,8	43,3
CAMH060DM2M		400 V 3 Ph	46,8	53,1	58,5	35,3	46,4	47,4
CAMH075DM2M		400 V 3 Ph	41,8	64,5	69,7	44,2	57,0	64,6
CAMH085DM2M		400 V 3 Ph	74,0	79,6	85,1	49,8	66,8	79,7
OUTDOOR UNIT	INDOOR UNIT							
CASH020SM2M	CAIH020SM2M	400 V 3 Ph	7,7	17,6	22,1	5,9	15,7	20,1
CASH035SM2M	CAIH035SM2M	400 V 3 Ph	10,9	26,3	31,5	9,6	23,7	29,6
CASH045SM2M	CAIH045SM2M	400 V 3 Ph	15,1	38,3	45,0	14,0	30,8	43,3
CASH060DM2M	CAIH060SD2M	400 V 3 Ph	46,8	53,1	58,5	35,3	46,4	47,4
CASH075DM2M	CAIH075DM2M	400 V 3 Ph	41,8	64,5	69,7	44,2	57,0	64,6
CASH085DM2M	CAIH085DM2M	400 V 3 Ph	74,0	79,6	85,1	49,8	66,8	79,7

UNITS		V/Ph/50 Hz	EER cold (Kw/Kw)			COP heat (Kw/Kw)		
			min	nom	max	min	nom	max
PACKAGE								
CAMH020SM2M		400 V 3 Ph	4,57	3,19	2,92	4,77	4,09	2,44
CAMH035SM2M		400 V 3 Ph	3,84	3,02	2,60	4,95	3,49	2,34
CAMH045SM2M		400 V 3 Ph	3,37	2,90	2,41	4,89	3,41	2,36
CAMH060DM2M		400 V 3 Ph	4,27	2,92	2,67	3,31	3,39	3,50
CAMH075DM2M		400 V 3 Ph	3,67	2,83	2,66	2,77	3,02	2,47
CAMH085DM2M		400 V 3 Ph	3,98	2,88	2,57	3,15	3,05	2,54
OUTDOOR UNIT	INDOOR UNIT							
CASH020SM2M	CAIH020SM2M	400 V 3 Ph	4,57	3,19	2,92	4,77	4,09	2,44
CASH035SM2M	CAIH035SM2M	400 V 3 Ph	3,84	3,02	2,60	4,95	3,49	2,34
CASH045SM2M	CAIH045SM2M	400 V 3 Ph	3,37	2,90	2,41	4,89	3,41	2,36
CASH060DM2M	CAIH060SD2M	400 V 3 Ph	4,27	2,92	2,67	3,31	3,39	3,50
CASH075DM2M	CAIH075DM2M	400 V 3 Ph	3,67	2,83	2,66	2,77	3,02	2,47
CASH085DM2M	CAIH085DM2M	400 V 3 Ph	3,98	2,88	2,57	3,15	3,05	2,54

 Cooling: Indoor T^a: 27°C DB / 19°C WB. Outdoor T^a: 35°C DB.

 Heating: Indoor T^a: 20°C DB / 12°C WB. Outdoor T^a: 7°C DB / 6°C WB.

1.2.- GENERAL DESCRIPTION.

The vertical self-contained conditioners, Compactair Advanced range, in the heat pump version are air condensed units that have been designed for small commercial and residential installations. The units consist of two sections, an indoor section and an outdoor section, are units that by their design can be supplied in package and split version. They are designed for operation coupled to a network of air distribution ducts in indoor and outdoor sections. With the option of incorporating a wide range of accessories and options. The manufacturing of these units is made under the strict quality requirements of the standard **ISO 9001**.

CASING.

Galvanized and painted sheetmetal casing. The units incorporate metal supports attached to the base, for its correct hoisting. These supports allow to install the unit on the floor, providing great rigidity to the installation of the unit. The panels are easily interchangeable allowing several alternatives of impulsion and return air. The outdoor and indoor sections are insulated thermally and acoustically. In the indoor units, an insulation with aluminum mesh protection with M1 and F1 classification is used, certifying that this material is self-extinguishing in case of fire, avoiding the formation of fumes that could enter the premises to be conditioned. In the outdoor units, insulation with M1 classification is used.

GENERAL SWITCH.

Located in the access panel to the electrical board and equipped with a mechanism which only allows the opening of the panel of the electrical board when the switch is OFF position.

INDOOR- OUTDOOR UNIT INTERCONNECT CABLE.

The connection between indoor and outdoor units, must be carried out using a shielded hose of 3x0.5mm².

COMPRESSORS.

All the models incorporate a Inverter compressor type Scroll with "brushless" motor (BLDC), which by means of an electronic system regulates the engine revolutions and through the frequency variation adapts to the needs of the installation and modulates the gasflow of the refrigerant in all moment.

Two circuit units incorporate also tandem compressor, scroll type.

The compressors are mounted on silentblocks.

AIR FILTER.

Washable air filter, self-extinguishing material in case of fire with M1 classification, high filtering efficiency, with G4 classification. With the possibility of extracting it from the lateral side.

Option: High Efficiency Filter M5+F7.

FANS.

The fans of the indoor and outdoor sections are of EC Plug Fan type. The fans are regulated automatically to obtain a variable air volume in indoor and outdoor unit.

COOLING CIRCUIT.

Made with dehydrated copper tubes welded with pressure sockets with a shutter valve on the suction and unloading lines, in outdoor and indoor section. The unit incorporates a high-pressure minipresostat and high-pressure and low-pressure transducers. It incorporates dehydrator filter, expansion system with electronic valves, one in the package units and two in the split units. The units in heat pump incorporate suction accumulator to avoid the migration of liquid to the compressor, reversible valve for inversion cycle and unidirectional valves. The split units also include an oil separator.

EXCHANGERS.

Manufactured with copper tubes and corrugated or louvered aluminum fins, designed to get high heat transfer. Their dimensions and design of the circuits have been specially studied to obtain the maximum performance of the exchangers, increasing the capacity of the unit and reducing the consumption.

ELECTRICAL CIRCUIT.

Designed according to standard EN-60204-1. With thermal protection magnets for compressors and fans. All compressor and fan motors incorporate internal thermal protectors. An electronic control governs the operation of the unit, manages the "driver" of the compressor, the fans EC Plug Fan and the electronic expansion valves.

1.2.- GENERAL DESCRIPTION.

OPTIONS.

Fresh air:

- Kit Freecooling.
- Return fan module.

Filtration:

- High efficiency filter: M5+F7.

Auxiliary Heat :

- Electrical resistance mounted inside the standard, medium or high capacity unit.

Security and electricity :

- Air quality sensor (CO₂).
- Smoke detector.
- Analog dirty filter sensor.
- Energy counting.
- Three phases relay for unit electrical protection.

Coils Treatment:

- Anticorrosion protection condensor & evaporator coils.

Refrigerant circuit:

- Service valves.
- Refrigerant precharged.

Control and communication:

- Remote display DC for user.
- Service display DS.
- Multi Unit Display DM.
- Remote probe in environment.
- Modbus RS485 communication interface.
- LonWorks FTT10 communication interface.
- BACnet MSTP communication interface.
- Modbus/BACnet/Ethernet TCP/IP communication interface.

- Expansion board

Others:

- A1 Insulation air treatment unit.
- Low noise: compressor acoustic insulation.



DC



DM



DS

1.3.- PHYSICAL DATA.

SET		CAMH020SM2M	CAMH035SM2M	CAMH045SM2M
Cooling capacity (*)	Kw	22,1	31,5	45,0
Heating capacity (**)		20,1	29,6	43,3
Nominal absorbed power (Cold) (*)		7,6	12,1	18,7
Nominal absorbed power (Heating) (**)		8,2	12,6	18,3
DIMENSIONS				
Height	mm	2145	2145	2145
Width		1445	1445	1445
Depth		895	895	895
NET WEIGHT	Kg	460	485	488
OUTDOOR UNIT				
COMPRESSOR	N° / type	CASH020SM2M	CASH035SM2M	CASH045SM2M
FAN		1 / Scroll BLDC	1 / Scroll BLDC	1 / Scroll BLDC
Nominal airflow	m³/h	7200	9700	13900
Available preassure	Pa	30	30	30
DIMENSIONS				
Height	mm	1410	1410	1410
Width		1445	1445	1445
Depth		895	895	895
NET WEIGHT	Kg	288	286	306
PIPING CONNECTIONS				
Liquid	inches	1/2"	5/8"	5/8"
Gas		7/8"	1 1/8"	1 13/8"
INDOOR UNIT				
FAN	N° / type	CAIH020SM2M	CAIH035SM2M	CAIH045SM2M
Airflow (Min / Max)	m³/h	1 / EC Plug Fan	1 / EC Plug Fan	1 / EC Plug Fan
Available preassure (***)	Pa	1800 / 4500	2800 / 6200	3700 / 7500
Available preassure (***)	Pa	50 / 650	75 / 700	90 / 750
DIMENSIONS				
Height	mm	836	836	836
Width		1445	1445	1445
Depth		895	895	895
NET WEIGHT	Kg	172	204	186
PIPING CONNECTIONS				
Liquid	inches	1/2"	5/8"	5/8"
Gas		7/8"	1 1/8"	1 3/8"
NET WEIGHT OF OPTIONALS				
Free-cooling	Kg	75	75	75
Electrical Heater		15	15	15
Filter M5+F7		40	40	40
Return fan		85	85	101

(*) At 120 rps, air intake temperature in indoor exchanger: 27°C BS / 19°C BH.

(*) At 120 rps, air intake temperature in outdoor exchanger: 35°C BS.

(**) At 120 rps, air intake temperature in indoor exchanger: 20°C BS / 12°C BH.

(**) At 120 rps, air intake temperature in outdoor exchanger: 7°C BS / 6°C BH.

(***) Adjustable by DS terminal.

BS - Dry bulb temperature.

BH - Wet bulb temperature.

1.3.- PHYSICAL DATA.

SET		CAMH060DM2M	CAMH075DM2M	CAMH085DM2M
Cooling capacity (*)	Kw	58,5	69,7	85,1
Heating capacity (**)		47,4	64,6	79,7
Nominal absorbed power (Cold) (*)		21,9	26,2	33,1
Nominal absorbed power (Heating) (**)		13,5	26,2	31,4
DIMENSIONS				
Height	mm	2261	2261	2261
Width		2813	2813	2813
Depth		895	895	895
NET WEIGHT	Kg	995	1040	1060
OUTDOOR UNIT		CASH060DM2M	CASH075DM2M	CASH085DM2M
COMPRESSOR	N° / type	1 / Scroll BLDC + 2 / Scroll Tamdem	1 / Scroll BLDC + 2 / Scroll Tamdem	1 / Scroll BLDC + 2 / Scroll Tamdem
FAN		2 / EC Plug Fan	2 / EC Plug Fan	2 / EC Plug Fan
Nominal airflow	m³/h	19200	23800	28400
Available preassure	Pa	30	30	30
DIMENSIONS				
Height	mm	1526	1526	1526
Width		2813	2813	2813
Depth		895	895	895
NET WEIGHT	Kg	622	642	662
PIPING CONNECTIONS				
Liquid	inches	5/8" + 5/8"	5/8" + 5/8"	5/8" + 5/8"
Gas		1 1/8" + 1 1/8"	1 1/8" + 1 3/8"	1 3/8" + 1 3/8"
INDOOR UNIT		CAIH060DM2M	CAIH075DM2M	CAIH085DM2M
FAN	N° / type	2 / EC Plug Fan	2 / EC Plug Fan	2 / EC Plug Fan
Airflow (Min / Max)	m³/h	6200 / 12500	6700 / 13500	7500 / 15000
Available preassure (***)	Pa	100 / 700	100 / 700	100 / 750
DIMENSIONS				
Height	mm	836	836	836
Width		2813	2813	2813
Depth		895	895	895
NET WEIGHT	Kg	378	398	408
PIPING CONNECTIONS				
Liquid	inches	5/8" + 5/8"	5/8" + 5/8"	5/8" + 5/8"
Gas		1 1/8" + 1 1/8"	1 1/8" + 1 3/8"	1 3/8" + 1 3/8"
NET WEIGHT OF OPTIONALS				
Free-cooling	Kg	150	150	150
Electrical Heater		25	25	25
Filter M5+F7		80	80	80
Return fan		170	202	202

(*) At 120 rps, air intake temperature in indoor exchanger: 27°C BS / 19°C BH.

(*) At 120 rps, air intake temperature in outdoor exchanger: 35°C BS.

(**) At 120 rps, air intake temperature in indoor exchanger: 20°C BS / 12°C BH.

(**) At 120 rps, air intake temperature in outdoor exchanger: 7°C BS / 6°C BH.

(***) Adjustable by DS terminal.

BS - Dry bulb temperature.

BH - Wet bulb temperature.

1.4.- ELECTRICAL DATA.

ELECTRICAL CONSUMPTIONS.

SET		CAMH020SM2M	CAMH035SM2M	CAMH045SM2M
Voltage	V/f (50 Hz)	400V / 3Ph ± 10%	400V / 3Ph ± 10%	400V / 3Ph ± 10%
Total maximum power	kW	15,07	20,82	28,96
Total maximum current	A	27,32	36,83	50,06
OUTDOOR UNIT		CASH020SM2M	CASH035SM2M	CASH045SM2M
Voltage	V/f (50 Hz)	400V / 3Ph ± 10%	400V / 3Ph ± 10%	400V / 3Ph ± 10%
MAXIMUM POWER CONSUMED				
Maximum compressor power	kW	9,64	14,24	21,23
Outdoor fan power		2,65	2,65	3,8
Total maximum power		12,42	18,17	25,16
MAXIMUM CURRENT				
Maximum compressor current	A	18,79	26,5	37,93
Outdoor fan current		4,1	4,1	5,9
Total maximum current		23,21	32,73	44,16
INDOOR UNIT		CAIH020SM2M	CAIH035SM2M	CAIH045SM2M
Voltage	V/f (50 Hz)	400V / 3Ph ± 10%	400V / 3Ph ± 10%	400V / 3Ph ± 10%
Total maximum power	kW	2,73	2,73	3,88
Total maximum current	A	4,3	4,3	6,1
OPTIONAL ELECTRICAL COIL		CAMH020SM2M	CAMH035SM2M	CAMH045SM2M
POWER				
Standard	kW	10	10	10
Medium		15	15	15
High		20	20	20
CURRENT				
Standard	A	14,43	14,43	14,43
Medium		21,65	21,65	21,65
High		28,87	28,87	28,87

1.4.- ELECTRICAL DATA.

ELECTRICAL CONSUMPTIONS.

SET		CAMH060DM2M	CAMH075DM2M	CAMH085DM2M
Voltage	V/f (50 Hz)	400V / 3Ph ± 10%	400V / 3Ph ± 10%	400V / 3Ph ± 10%
Total maximum power	kW	50,11	57,53	64,52
Total maximum current	A	81,71	96,71	108,14
OUTDOOR UNIT		CASH060DM2M	CASH075DM2M	CASH085DM2M
Voltage	V/f (50 Hz)	400V / 3Ph ± 10%	400V / 3Ph ± 10%	400V / 3Ph ± 10%
MAXIMUM POWER CONSUMED				
Maximum compressor power	kW	25,68	30,8	37,79
Outdoor fan power		5,3	7,6	7,6
Total maximum power		44,81	49,93	56,92
MAXIMUM CURRENT				
Maximum compressor current	A	43,68	55,08	66,51
Outdoor fan current		8,2	11,8	11,8
Total maximum current		73,51	84,91	96,34
INDOOR UNIT		CAIH060DM2M	CAIH075DM2M	CAIH085DM2M
Voltage	V/f (50 Hz)	400V / 3Ph ± 10%	400V / 3Ph ± 10%	400V / 3Ph ± 10%
Total maximum power	kW	5,38	7,68	7,68
Total maximum current	A	8,4	12	12
OPTIONAL ELECTRICAL COIL		CAMH060DM2M	CAMH075DM2M	CAMH085DM2M
POWER				
Standard	kW	15	15	15
Medium		20	20	20
High		40	40	40
CURRENT				
Standard	A	21,65	21,65	21,65
Medium		28,87	28,87	28,87
High		57,74	57,74	57,74

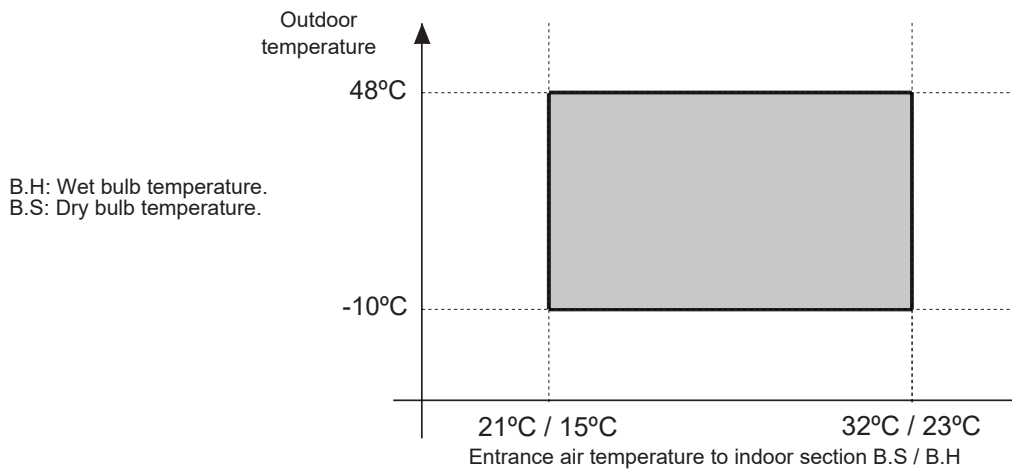
1.5.- OPERATING LIMITS.

Operating Limits		Maximum temperatures	Minimum temperatures
Cooling Cycle Operation	Indoor temperature	32°C BS / 23°C BH	21°C BS / 15°C BH
	Outdoor temperature	48°C	-10°C
Heating Cycle Operation	Indoor temperature	24°C BS	15°C BS
	Outdoor Temperature	25°C	-12°C

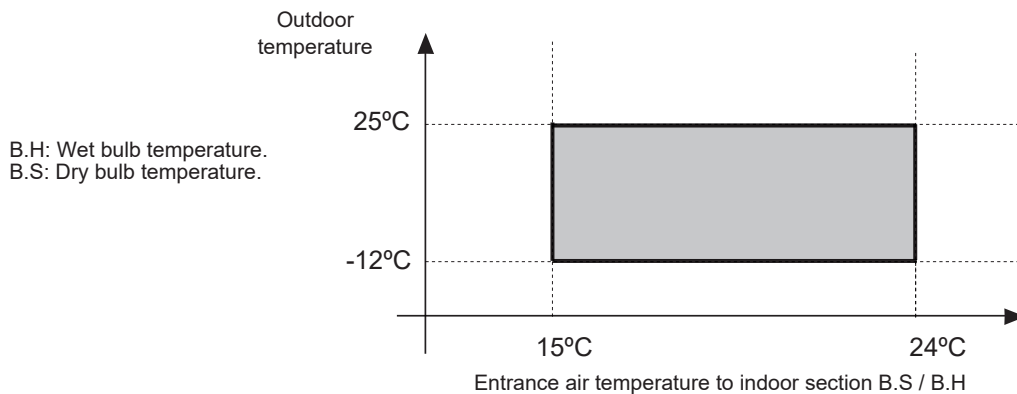
BS: Dry Bulb Temperature.

BH: Wet bulb temperature.

COLD MODE



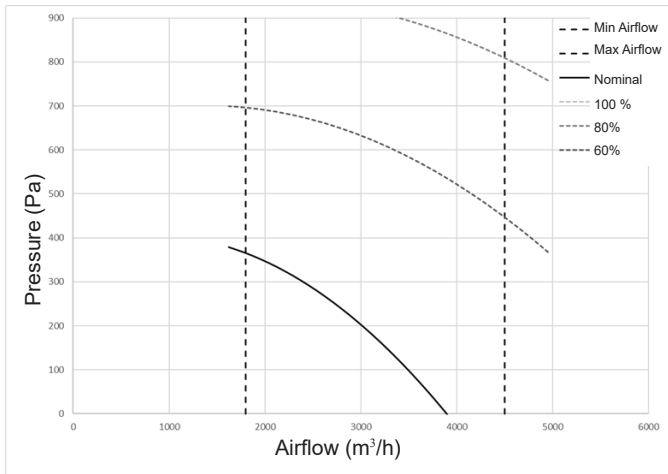
HEAT MODE



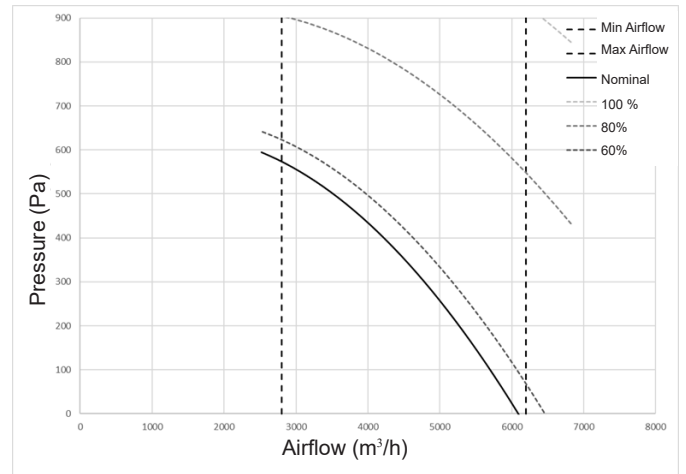
1.6.- FAN PERFORMANCES.

INDOOR FANS (Nominal speed).

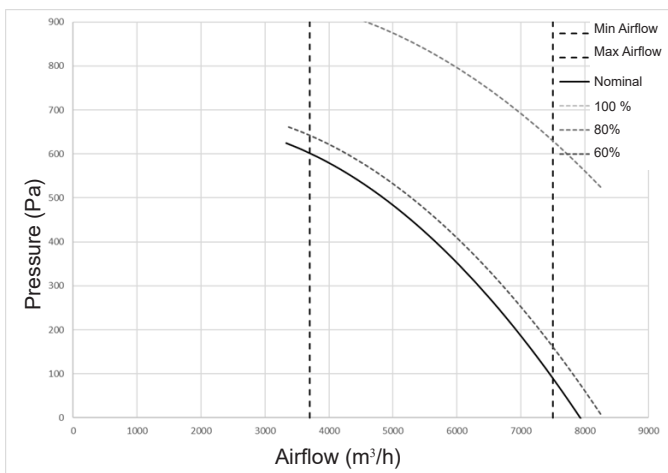
**CAMH020SM2M
CAIH020SM2M**



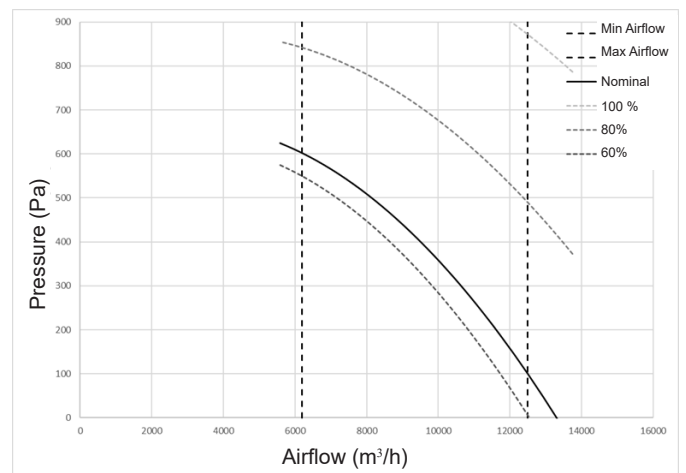
**CAMH035SM2M
CAIH035SM2M**



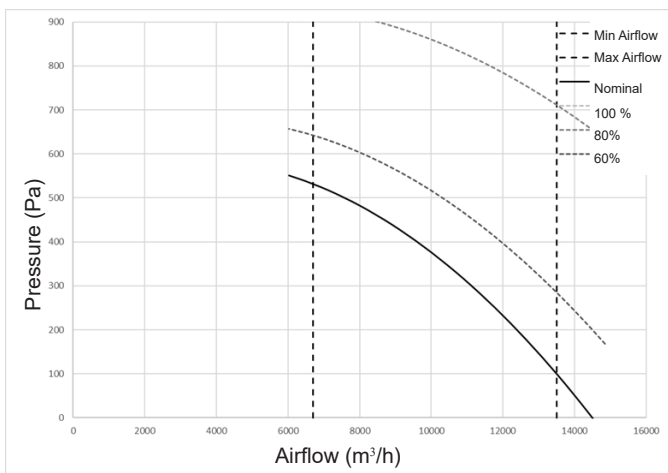
**CAMH045SM2M
CAIH045SM2M**



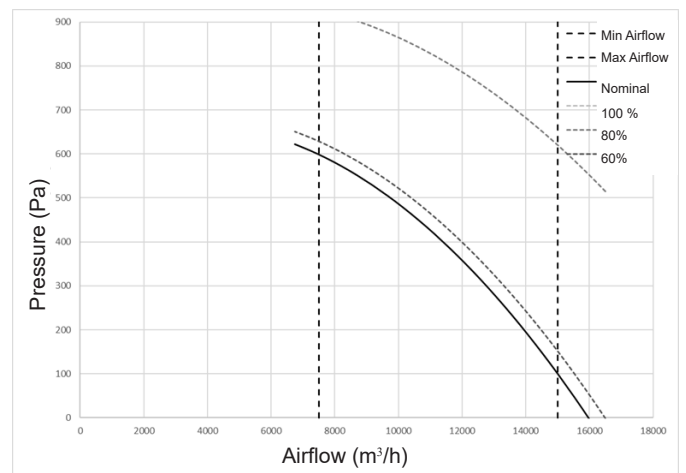
**CAMH060DM2M
CAIH060DM2M**



**CAMH075DM2M
CAIH07520DM2M**

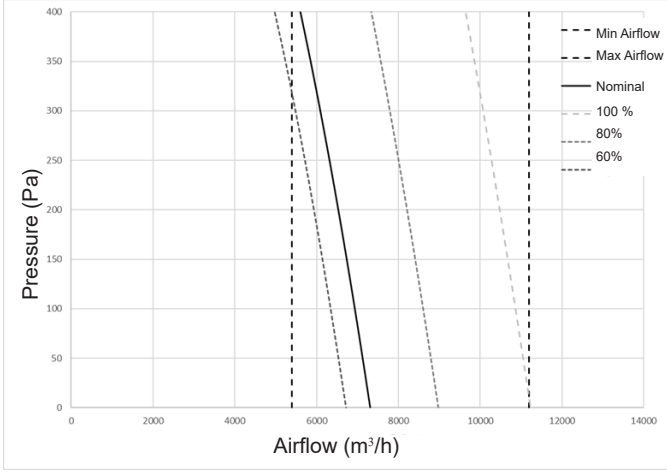


**CAMH085DM2M
CAIH085DM2M**

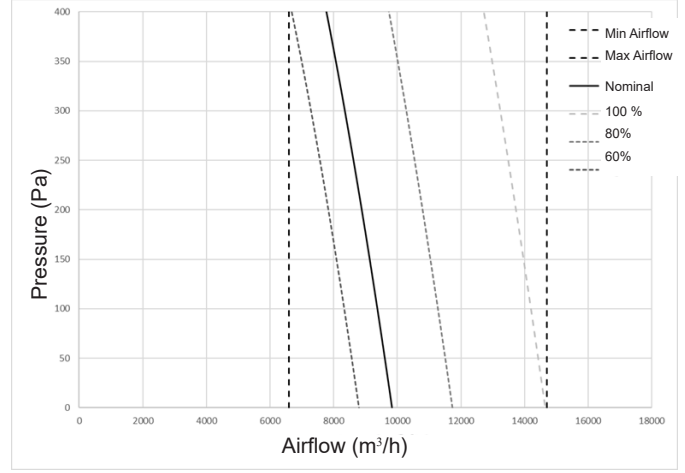


1.6.- FAN PERFORMANCES.
OUTDOOR FANS.

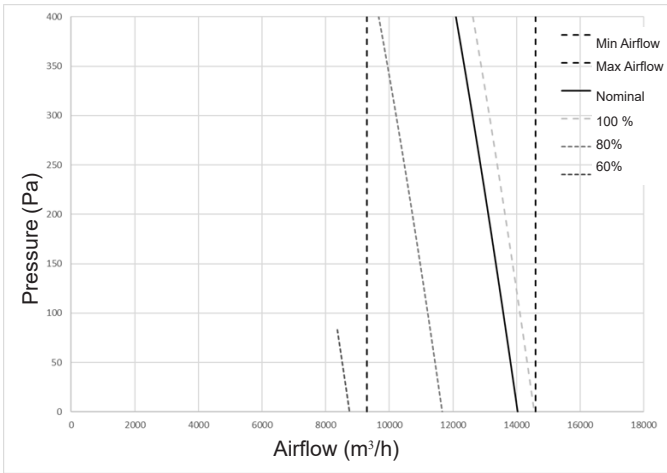
CAMH020SM2M
CASH020SM2M



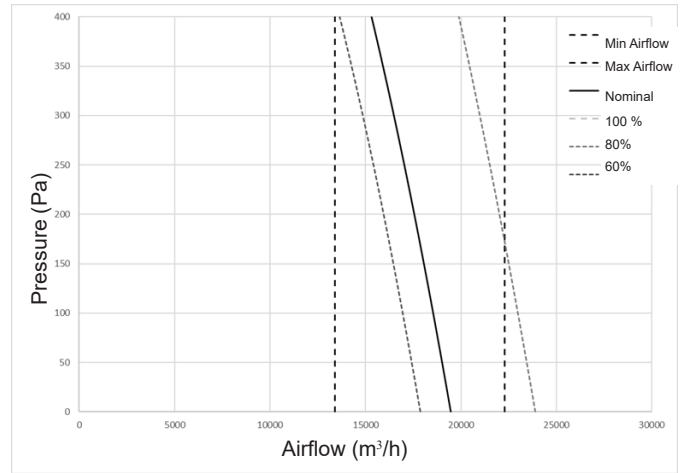
CAMH035SM2M
CASH035SM2M



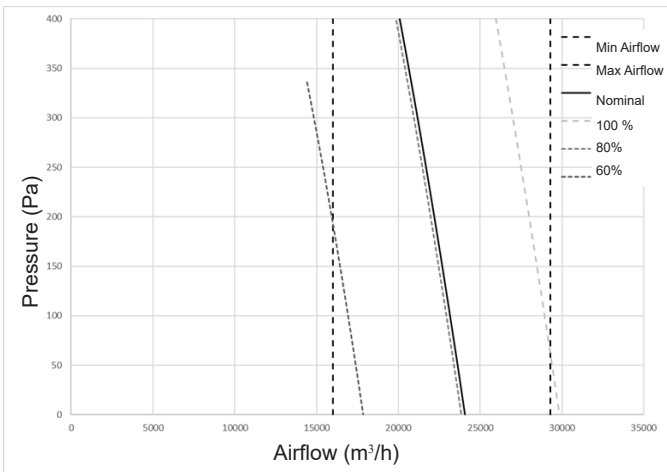
CAMH045SM2M
CASH045SM2M



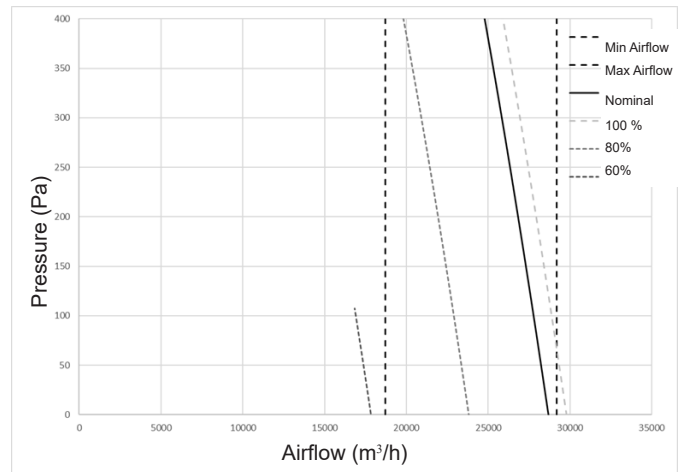
CAMH060DM2M
CASH060DM2M



CAMH075DM2M
CASH075DM2M

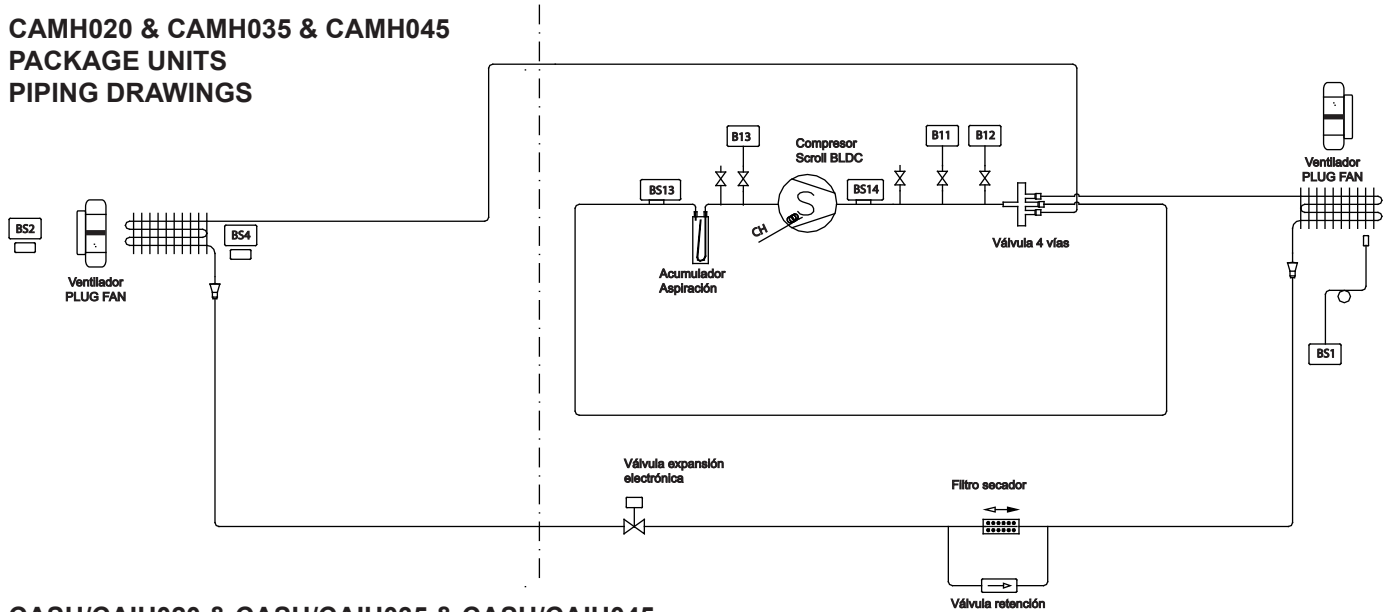


CAMH085DM2M
CASH085DM2M

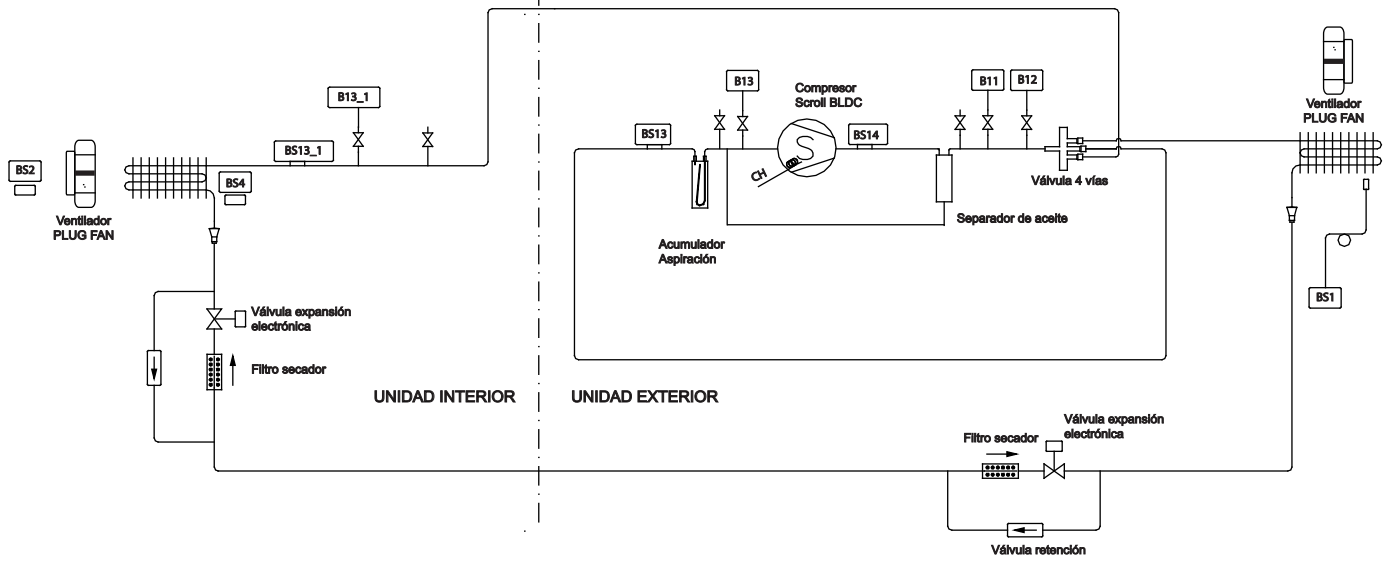


1.7.- HEAT PUMP PIPING DRAWINGS.

**CAMH020 & CAMH035 & CAMH045
PACKAGE UNITS
PIPING DRAWINGS**



**CASH/CAIH020 & CASH/CAIH035 & CASH/CAIH045
SPLIT UNITS
PIPING DRAWINGS**



Pressure gauge. (5/16" to be fitted by the installer).

High pressure switch.

High pressure transducer.

Low pressure transducer.

Crank case heater.

Outdoor temperature sensor.

Unloading sensor.

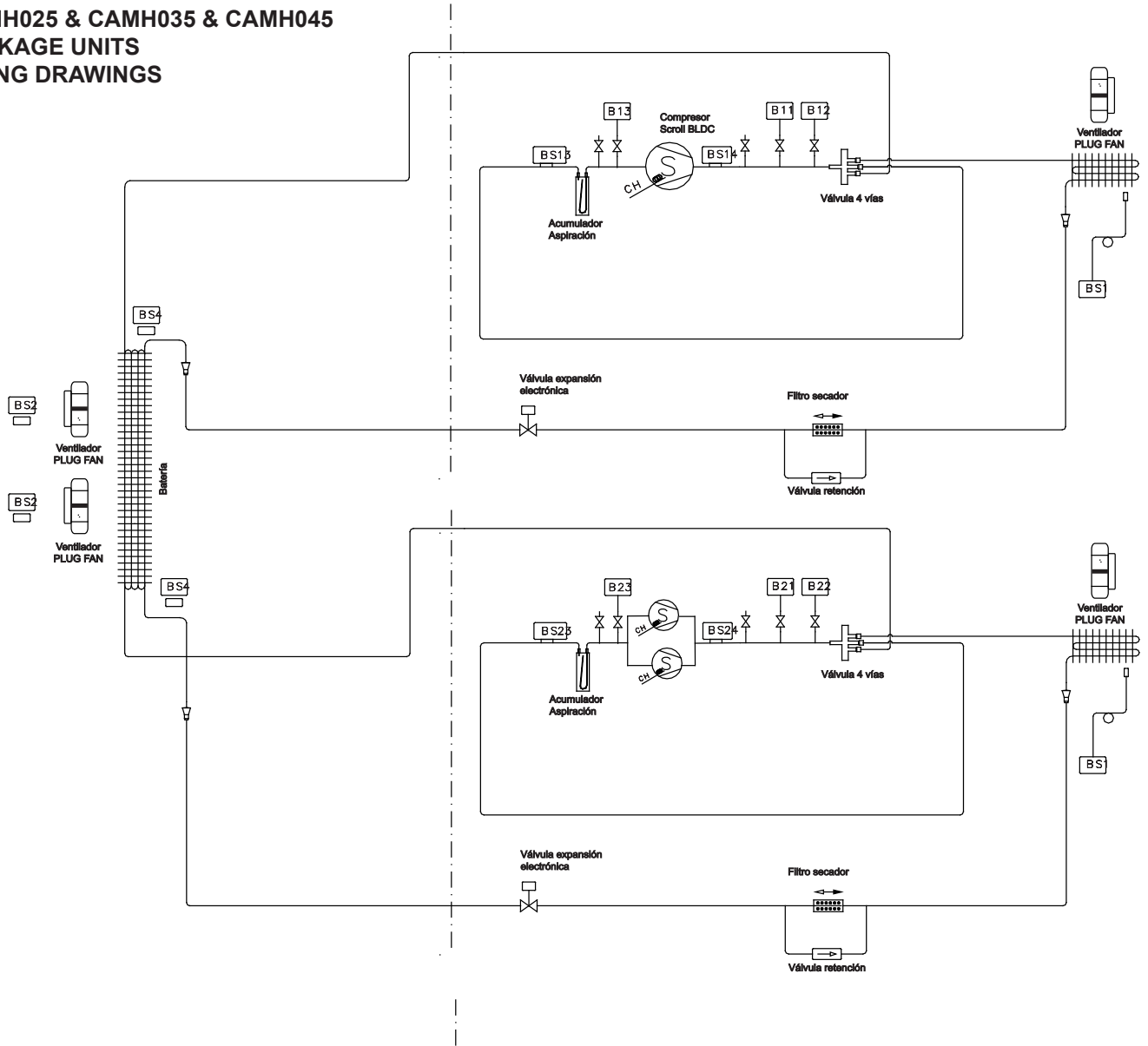
Suction sensor.











Air return sensor.

Impulsion air sensor.

1.7.- HEAT PUMP PIPING DRAWINGS.

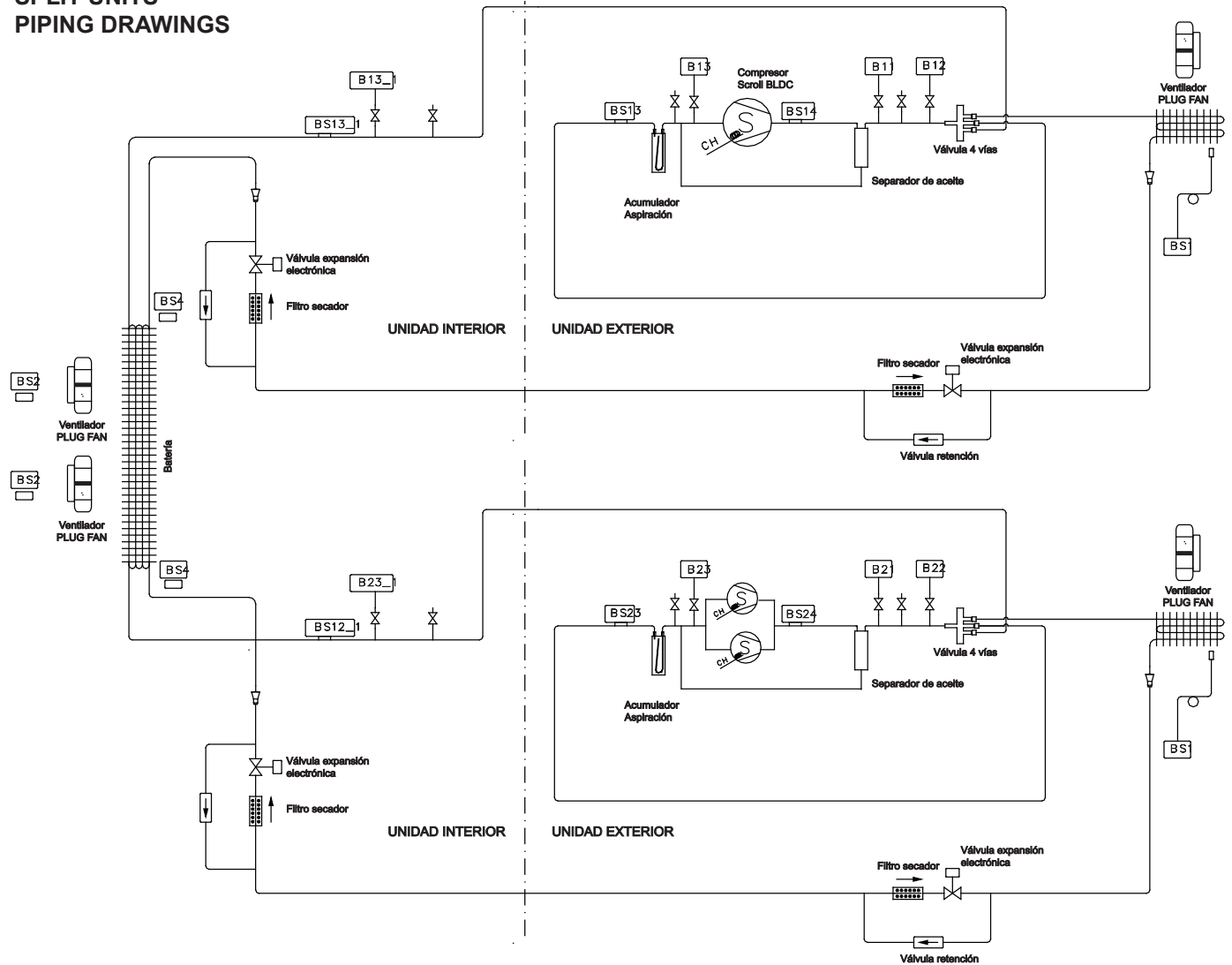
CAMH025 & CAMH035 & CAMH045
PACKAGE UNITS
PIPING DRAWINGS



-  Pressure gauge. (5/16" to be fitted by the installer).
-  High pressure switch.
-  High pressure transducer.
-  Low pressure transducer.
-  Crank case heater.
-  Outdoor temperature sensor.
-  Unloading sensor.
-  Suction sensor.
-  Air return sensor.
-  Impulsion air sensor.

1.7.- HEAT PUMP PIPING DRAWINGS.

CASH/CAIH025 & CASH/CAIH035 & CASH/CAIH045
SPLIT UNITS
PIPING DRAWINGS



Pressure gauge. (5/16" to be fitted by the installer).

High pressure switch.

High pressure transducer.

Low pressure transducer.

Crank case heater.

Outdoor temperature sensor.

Unloading sensor.

Suction sensor.

Air return sensor.

Impulsion air sensor.

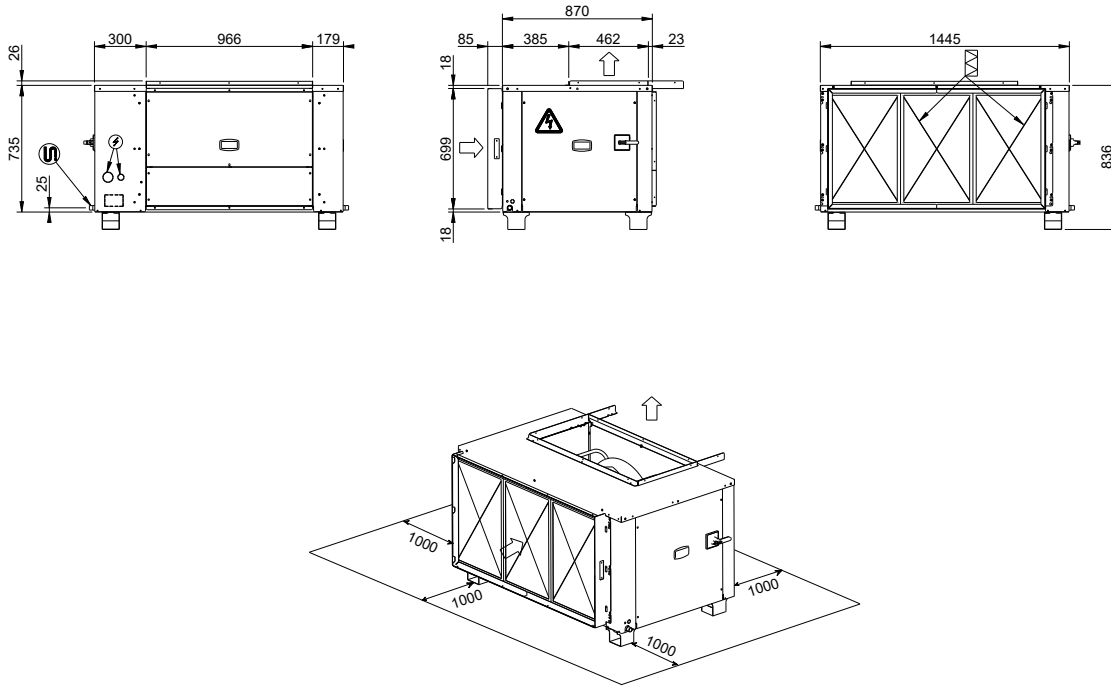
1.8.- SOUND LEVELS.

		020								
	Hz	63	125	250	500	1000	2000	4000	8000	Lwa dB(A)
Standard unit	Indoor side in duct	55,7	56,8	60	61,6	62,5	60,1	58,6	64,7	69
	Outdoor side in duct	68,7	70,3	73	74,9	77,2	77,5	74,4	78,8	84
	Outdoor side radiated	58,7	61,6	63,2	65,8	70,5	72,6	68,7	71,4	78
Low noise option	Indoor side in duct	55,7	56,8	60	61,6	62,5	60,1	58,6	64,7	69
	Outdoor side in duct	68,7	69,9	73	74,7	76,1	74,4	72,2	77,9	82
	Outdoor side radiated	58,7	60,3	63,1	65	67,6	67,2	63,9	68,5	74
		035								
	Hz	63	125	250	500	1000	2000	4000	8000	Lwa dB(A)
Standard unit	Indoor side in duct	65,3	66,4	69,6	71,2	72,1	69,7	68,2	74,3	78
	Outdoor side in duct	66,8	77,5	73,5	76,2	77,7	77,5	85,2	76	88
	Outdoor side radiated	57,3	68,9	64,4	67	70,2	71,6	75,9	71,3	80
Low noise option	Indoor side in duct	65,3	66,4	69,6	71,2	72,1	69,7	68,2	74,3	78
	Outdoor side in duct	66,7	77,1	73,3	76,1	77	75,5	85	72,4	87
	Outdoor side radiated	56,8	67,5	63,5	66,3	68	67,3	75,2	65	78
		045								
	Hz	63	125	250	500	1000	2000	4000	8000	Lwa dB(A)
Standard unit	Indoor side in duct	63	73,3	69,5	72,3	73	71,1	81,3	67,5	83
	Outdoor side in duct	74,4	84,8	81	83,7	84,6	84,2	92,8	79,6	95
	Outdoor side radiated	64,5	75,1	71,4	73,9	75,4	77,5	83,1	71,4	86
Low noise option	Indoor side in duct	63	73,3	69,5	72,3	73	71,1	81,3	67,5	83
	Outdoor side in duct	74,4	84,7	80,9	83,7	84,5	82,9	92,7	79	95
	Outdoor side radiated	64,4	74,8	71	73,7	74,7	74,1	82,8	69,4	85
		060								
	Hz	63	125	250	500	1000	2000	4000	8000	Lwa dB(A)
Standard unit	Indoor side in duct	70,6	71,7	74,9	76,5	77,4	75	73,5	79,6	83
	Outdoor side in duct	69,4	79,9	76	78,8	80,1	79,4	87,8	77,7	90
	Outdoor side radiated	59,6	70,7	66,6	69,5	72,2	73	78,3	72,5	82
Low noise option	Indoor side in duct	70,6	71,7	74,9	76,5	77,4	75	73,5	79,6	83
	Outdoor side in duct	69,3	79,7	75,8	78,7	79,6	78	87,6	75	90
	Outdoor side radiated	59,4	69,9	66	68,9	70,5	69,7	77,8	67,7	80
		075								
	Hz	63	125	250	500	1000	2000	4000	8000	Lwa dB(A)
Standard unit	Indoor side in duct	64,1	74,4	70,6	73,4	74,1	72,2	82,4	68,6	85
	Outdoor side in duct	73,9	84,2	80,4	83,2	84,1	82,8	92,2	80,2	95
	Outdoor side radiated	64	74,6	70,6	73,4	74,8	74,9	82,4	73,7	85
Low noise option	Indoor side in duct	64,1	74,4	70,6	73,4	74,1	72,2	82,4	68,6	85
	Outdoor side in duct	73,8	84,2	80,4	83,2	83,9	82,2	92,2	78,9	94
	Outdoor side radiated	63,9	74,3	70,4	73,2	74,2	72,9	82,2	70,4	85
		085								
	Hz	63	125	250	500	1000	2000	4000	8000	Lwa dB(A)
Standard unit	Indoor side in duct	66,2	76,5	72,7	75,5	76,2	74,3	84,5	70,7	87
	Outdoor side in duct	77,6	87,9	84,2	86,9	87,7	86,7	96	82,7	98
	Outdoor side radiated	67,7	78,1	74,4	77	78,1	79	86,2	74,3	89
Low noise option	Indoor side in duct	66,2	76,5	72,7	75,5	76,2	74,3	84,5	70,7	87
	Outdoor side in duct	77,6	87,9	84,1	86,9	87,6	85,9	95,9	82,3	98
	Outdoor side radiated	67,6	77,9	74,2	76,9	77,8	76,7	86	72,9	88

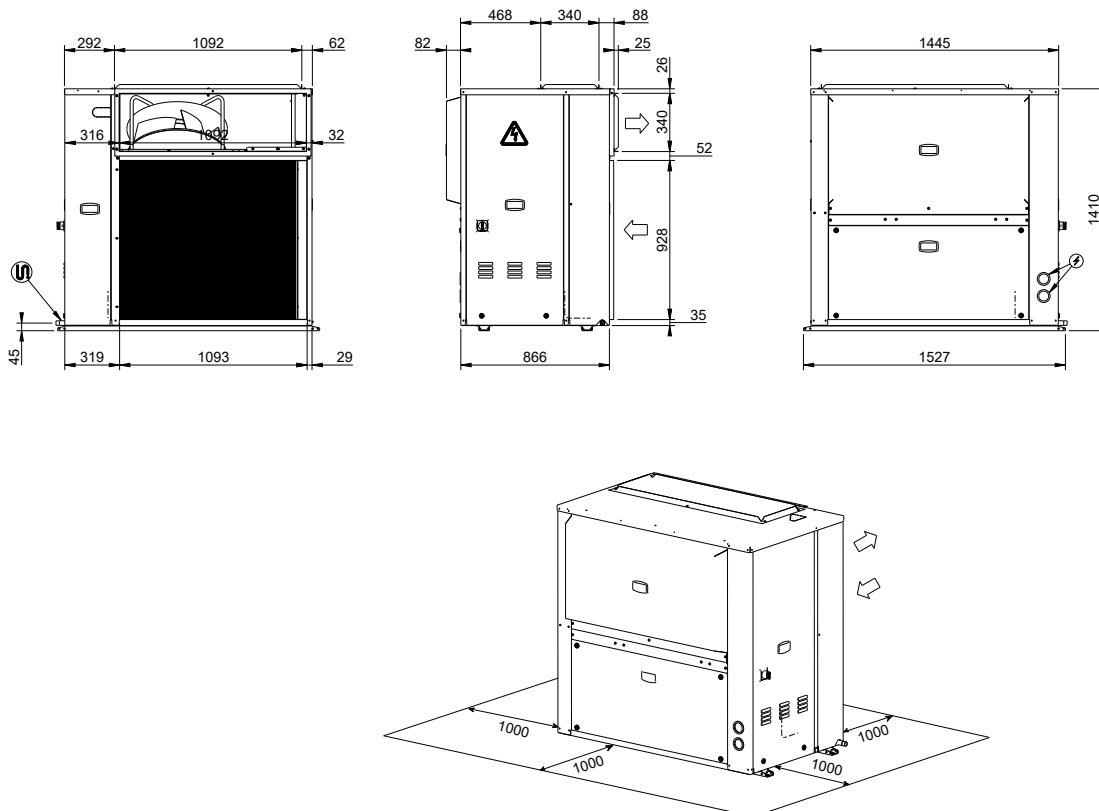
Values for the nominal conditions

1.9.- SPLIT UNITS DIMENSIONS.

CAIH 020-035-045

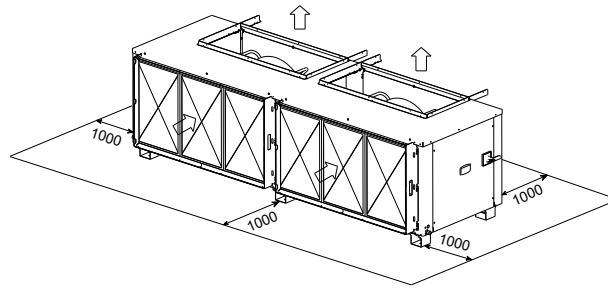
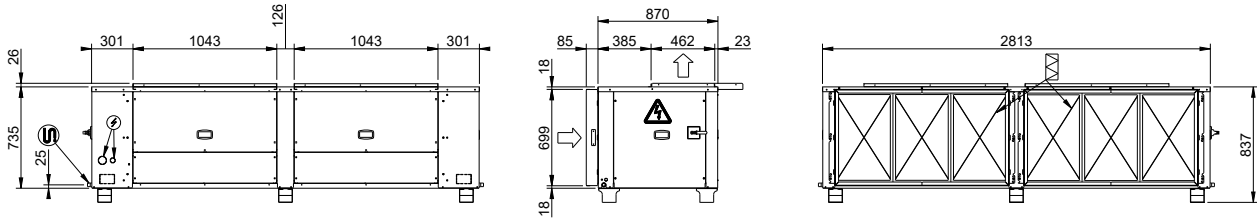


CASH 020-035-045

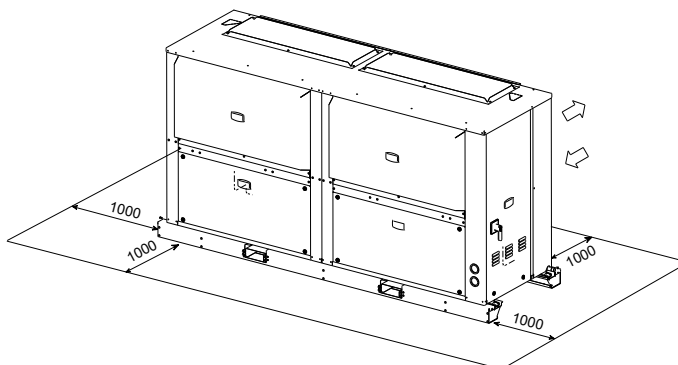
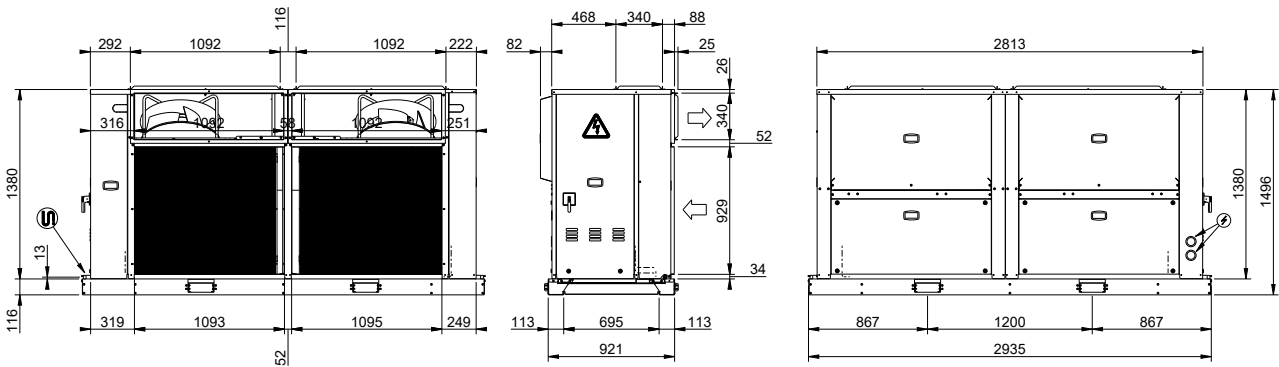


1.9.- SPLIT UNITS DIMENSIONS.

CAIH 060-075- 085

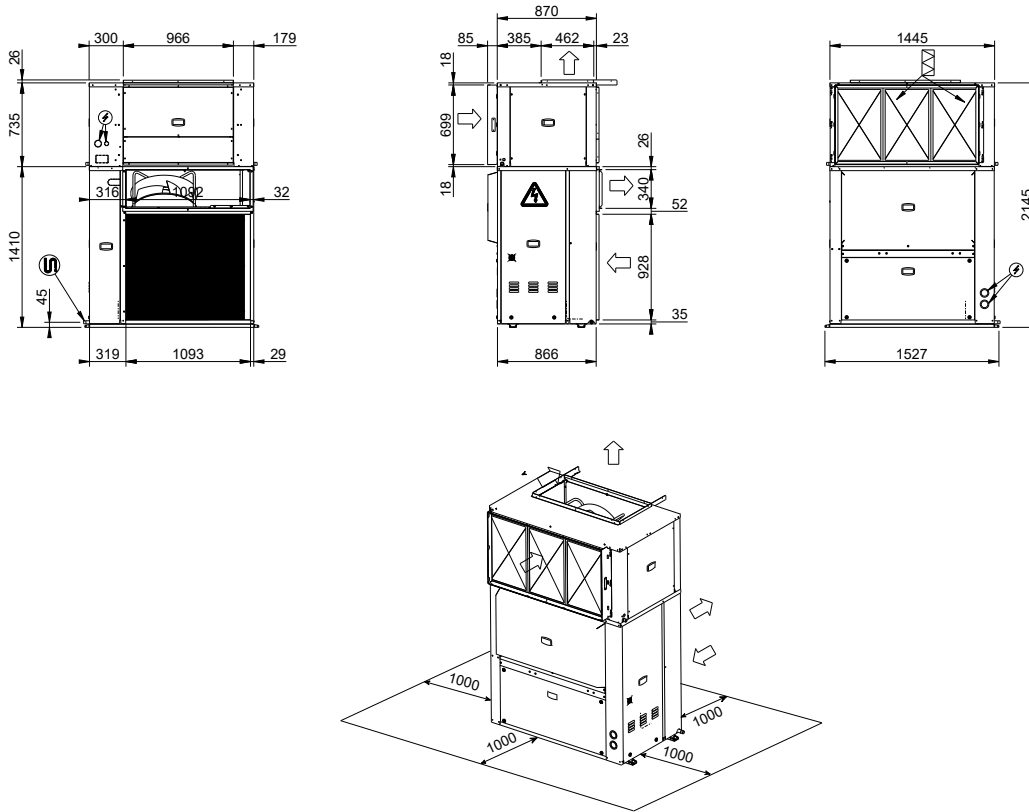


CASH 060-075-085

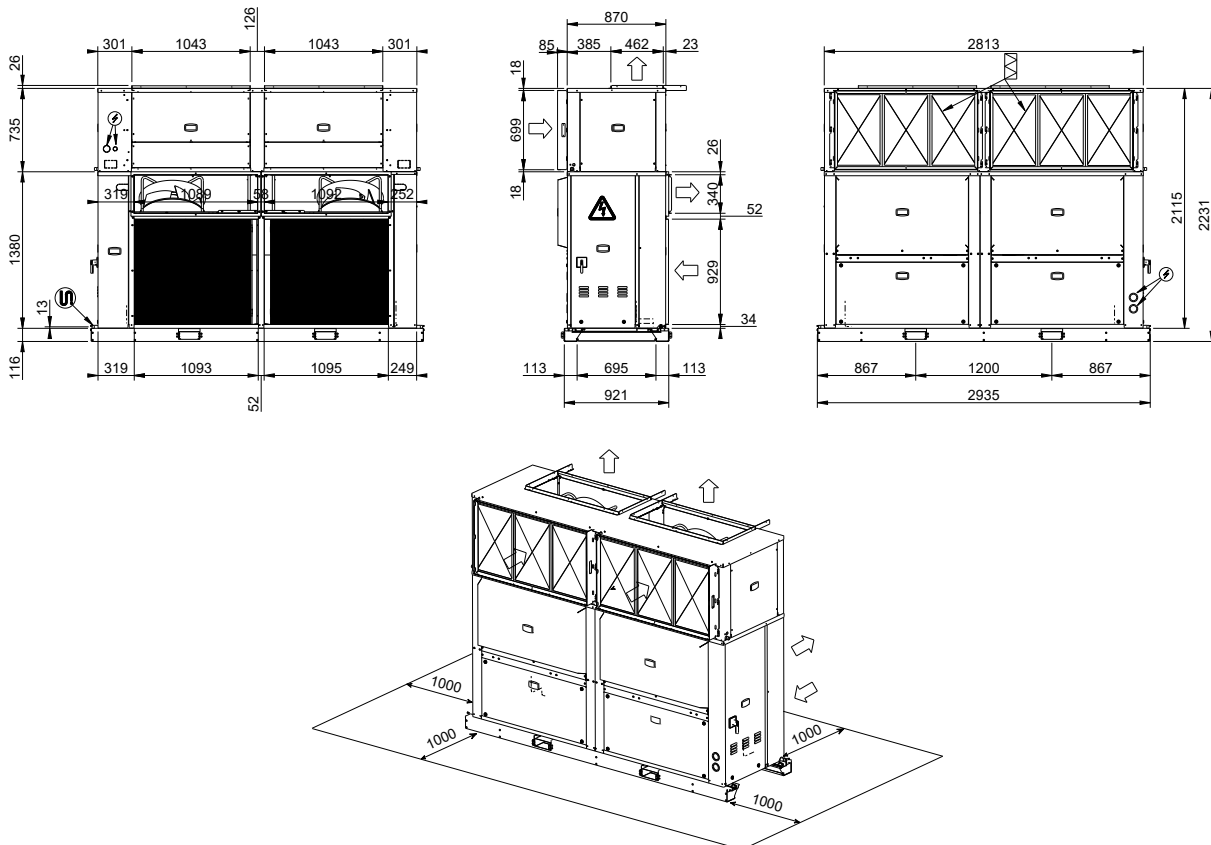


1.10.- PACKAGE UNITS DIMENSIONS.

CAMH 020-035-045

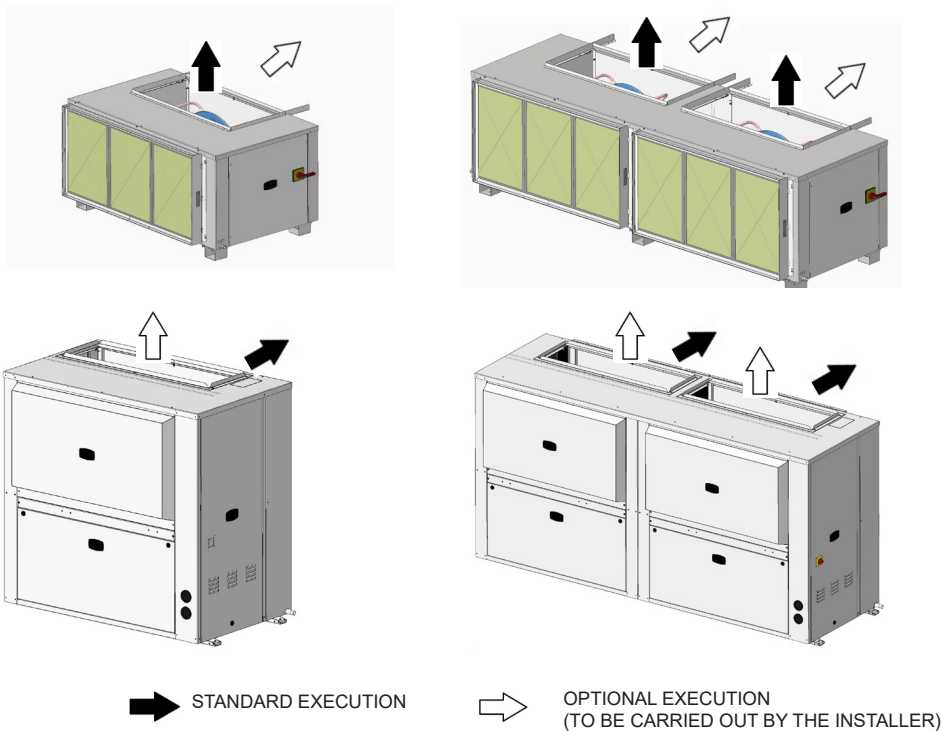


CAMH 060-075-085



All dimensions in millimeters

1.11.- AIR SUPPLY CONFIGURATIONS.



1.12.- OPTIONS.

FRESH AIR OPTIONS.

Free-cooling.

1.- OPERATION.

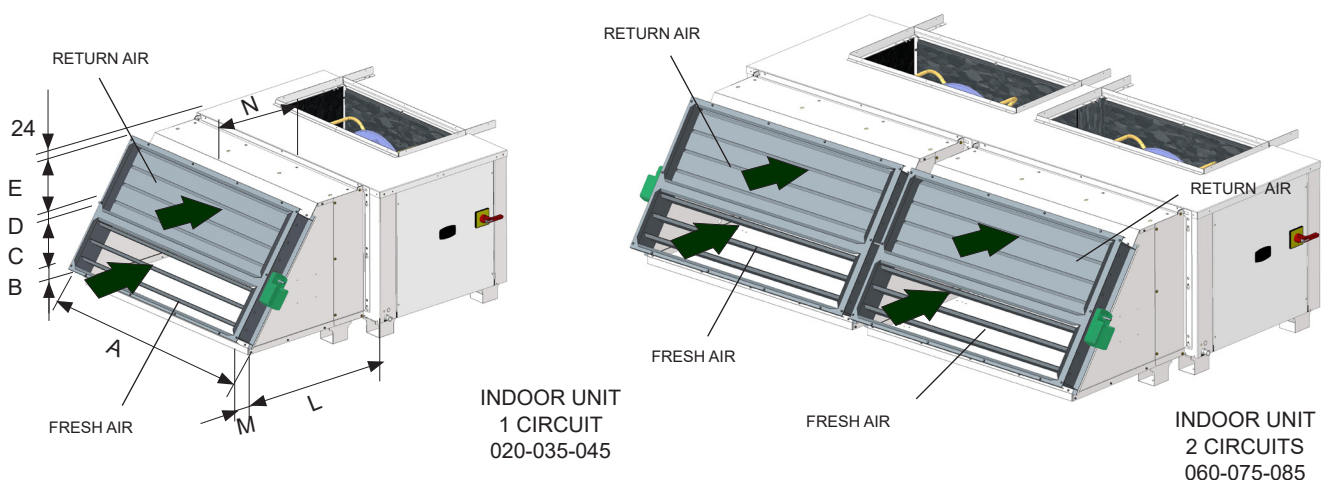
The control compares the values of temperature between outside air and room air by means of the probes; if there is a negative difference and the safety elements allow (discharge temperature probes) then the control acts on the servomotor, which opens the outside damper and closes the return damper, allowing cool outside air to enter the room.

The damper is proportionally regulated. If there is not a great demand for air indoors, it may be enough just to have free cooling to condition the room. If there is a greater demand for air, the free cooling and the unit may need to be working in different cooling mode stages.

2.- SUPPLY AND INSTALLATION.

The free cooling option will be supplied loose.

The return probe must be installed in the return air intake duct.



The position of the dampers can be different as the one indicated in the drawings, by interchanging fresh and return air.

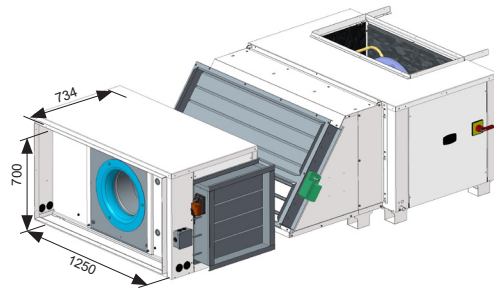
UNITS	A	B	C	D	E	L	M	N
1 CIRCUIT 2 CIRCUITS	1000	148,5	291	38,5	138	789,5	100	307

1.12.- OPTIONS.

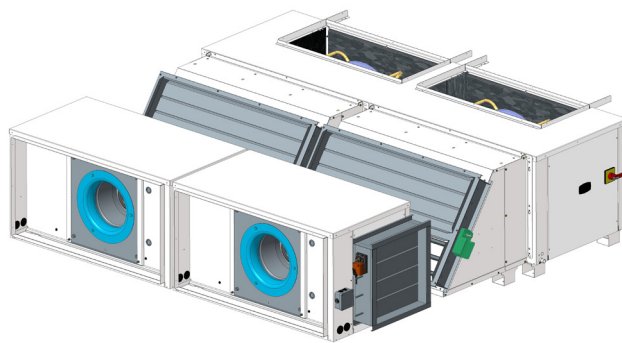
FRESH AIR OPTIONS.

Return fan.

Fan return cabinet is supplied loose.



INDOOR UNIT
1 CIRCUIT
020-035-045

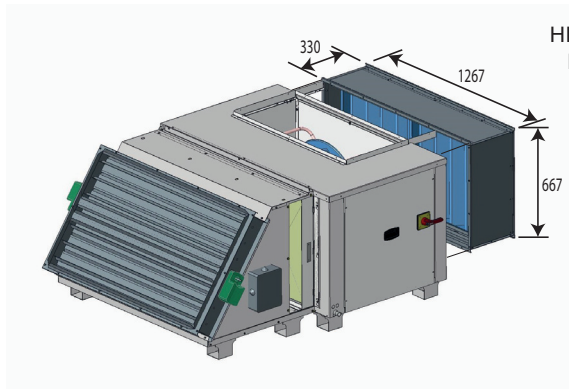


INDOOR UNIT
2 CIRCUITS
060-075-085

FILTRATION OPTIONS.

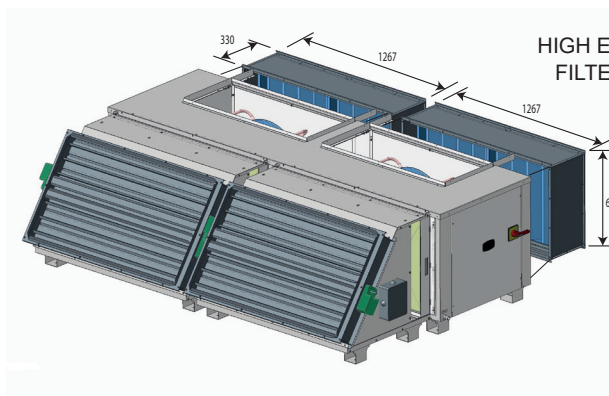
High Efficiency Filter: M5+F7.

The filter is supplied loose and must be placed in the fan exit.



HIGH EFFICIENCY
FILTER: M5+F7

INDOOR UNIT
1 CIRCUIT
020-035-045



HIGH EFFICIENCY
FILTER: M5+F7

INDOOR UNIT
2 CIRCUITS
060-075-085

1.12.- OPTIONS.

CONTROL OPTIONS.

DC - User terminal.

Remote controller very easy to use, with the following features:

- o Switched on/switched off.
- o Operation selection mode: (Cold/Heat/Auto).
- o Airflow manual adjustment (3 speeds).
- o Environment temperature selection.
- o Airflow settings (Mini/Nominal/Max/Auto).
- o Time setting.
- o Environment temperature display.
- o Alarm codes display.
- o Connected units supervision (until 10).

A control DS is required to activate this function (Expert mode) and it must be adjusted by a Lennox technician.



DC

DS - Service terminal.

Terminal which allows the access to the control menu and adjustment all parameters. 24V customer display situated to a maximum distance of 30 meters to the unit. Remote reading and modification of the customer parameters.



DS

DM - Terminal to view time and zone settings.

It is possible to configure until 7 time zones each day with 4 operating modes per zone. It can be configured with the DM or during installation by a Lennox technician.



DM

Communications: MODBUS / BACNET / LONWORKS.

The control board is equipped with a RS485 serial communications port which allows remote management through a communications bus. Depending on the desired communication protocol, the board can be equipped with the ModBUS®, LonWorks® or BacNET® communications interface.

Expansion Band.

In the package units, the expansion board is located in its electrical board and in the split units, the expansion board is situated in the electrical board of the outdoor unit.

AUXILIARY HEATING OPTIONS.

Electric resistance.

It is supplied mounted on the unit. The electrical heater must be supplied from the unit's electrical box..

Units	025	035	045	060	075	085
ELHS2 (Kw)	10	10	10	15	15	15
ELHM2 (Kw)	15	15	15	20	20	20
ELHH2 (kW)	20	20	20	40	40	40

DIRTY FILTER ANALOGICAL INDICATION.

A differential pressure controller measures the charge loss through the evaporator coil and the pre-filters. The set point between dirty and clean can be checked by the installer.

With dirty filter alarm, check coils and other filters if selected in option.

1.12- OPTIONS.

ELECTRIC AND SECURING OPTIONS.

Indoor air quality sensor.

The indoor air quality is controlled with the CLIMATIC™ main controller through a COV (volatile organic compound) sensor which detects the amount of CO2 in the air between 0 and 2000 ppm. (This value varies depending on the occupancy levels of the space). The sensor sends a signal (0-20 mA) to the controller to modulate the outside air.

Environment remote sensor.

It can be used when you want to regulate through the temperature where the sensor is situated and not through the return temperature, which is how the standard unit comes out.

Freecooling.

It is a energy saving system through a regulation of dampers, through which outside air is introduced to the local when the outside temperature is lower than the local. This option is composed of regulating gate or gates and a servomotor. Available in two versions with an external air damper, or adding a second damper for the return of the local.

Smoke detector.

Three phases relay for unit electrical protection.

COILS TREATMENT.

Anticorrosion protection condenser & evaporator coils.

REFRIGERANT CIRCUIT.

Service valves.

Refrigerant precharged.

OTHER OPTIONS.


Compressor acoustic insulation.

Attenuates the sound level produced by the unit through an insulation that covers the compressor.

Insulation air treatment unit.

This insulation, which covers the indoor unit, provides a fire propagation rating A1.

2.1.- PRELIMINARY PREPARATIONS.

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


When unpacking the machine, have a correct segregation of non-hazardous waste coming from packaging: Plastic film or other plastic elements, metal strips, wood and pallets, through authorized dealers, or segregate them in the containers destined for this purpose

Follow the installation instructions established in this manual to avoid disturbing noise caused by movement or shocks due to deficient installation of the unit.

The unit must be transported in a VERTICAL POSITION on its metal mounting frame. Any other position may cause serious damage to the machine.

When the unit is received, it should be checked to assure that it has received no shocks 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 stating why the machine is unacceptable on the transport agent's delivery note. Any later complaint or claim made to the LENNOX Distribution Department for this type of damage cannot be considered under the Guarantee. The modifications that the customer makes in the units will be under his responsibility and in this case, the declaration of conformity certificate of Lennox manufacturer will not be valid.

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


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

The units are designed to be installed with ducts designed by qualified technical staff.

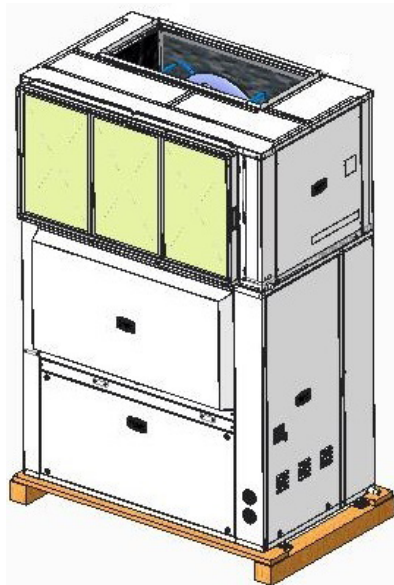
The joints to be used between ducts and openings in the unit should be Elastic Joints.

Avoid the use of BYPASS joints between the extraction air and input air.

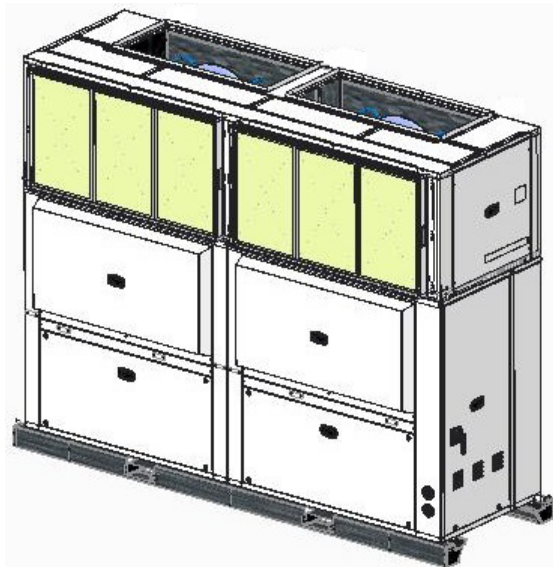
The structure where the unit is placed must be able to support the weight of the unit during operation.

 **Defrosting: To avoid ice accumulation in the driptray, it may be necessary to install an electrical heater and inside the drainage connection, to drain correctly the water. The drainage must be always accessible through the indoor part, in order to remove easily the dirty than may be accumulated.**

2.2.- UNIT ACCEPTANCE.

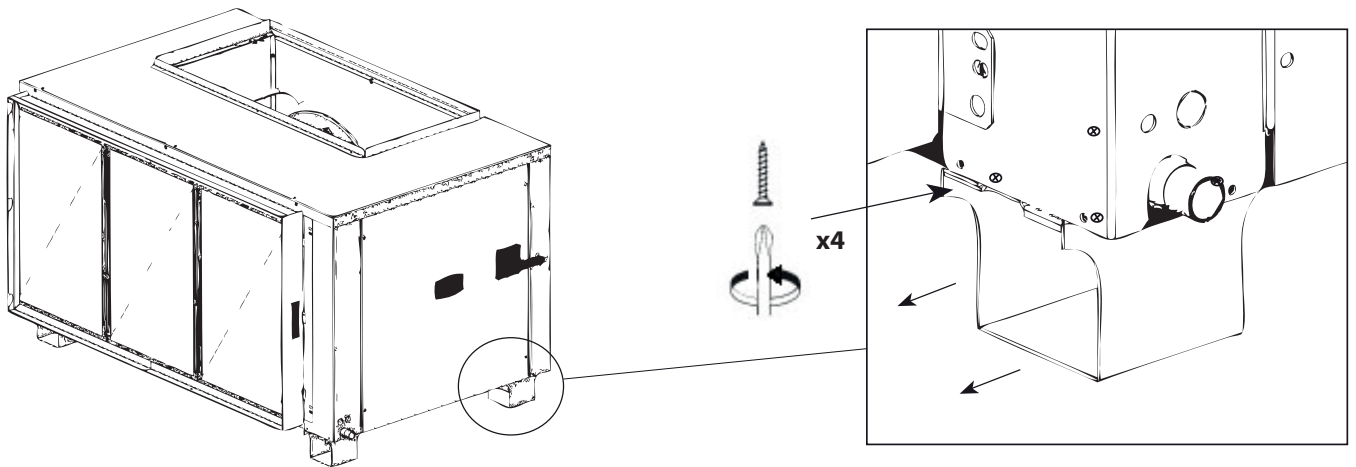


PACKAGE / OUTDOOR UNIT B-BOX WITH REMOVABLE WOODEN PALLET



PACKAGE / OUTDOOR UNIT C-BOX WITH A STRUCTURE MADE OF METAL WITH POSSIBILITY TO REMOVE IT

2.2.- UNIT ACCEPTANCE.



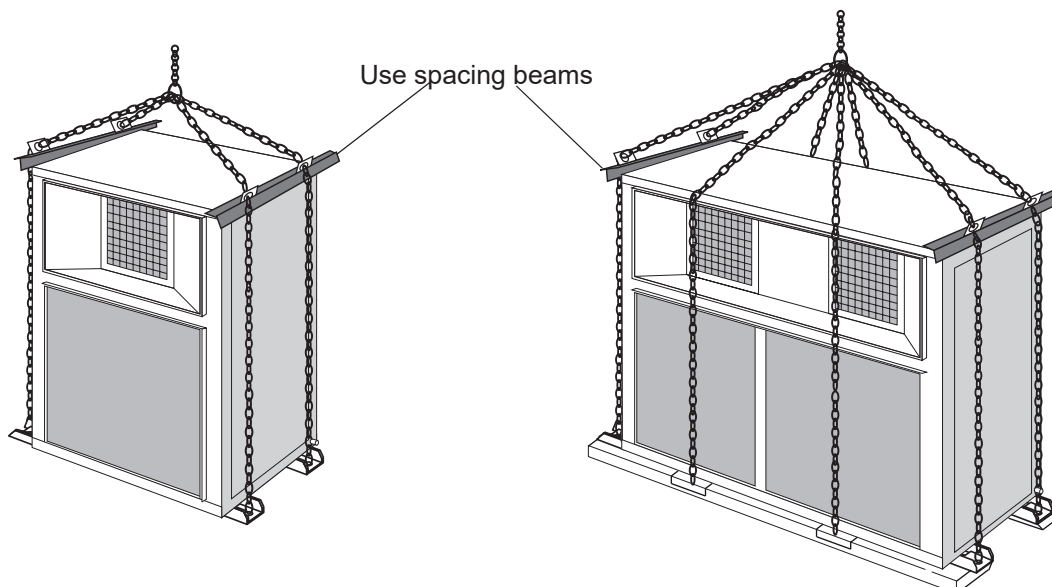
INDOOR UNITS
B&C-BOX WITH SUPPORTS
MADE OF METAL

How to lift the Package / Outdoor Unit

For loading, unloading and placement operations of the unit, always use a forklift and/or crane.

For handling operations of the units of the B-BOX range, the manual pallet truck can also be used. This element can never be used to move the units of the C-BOX range.

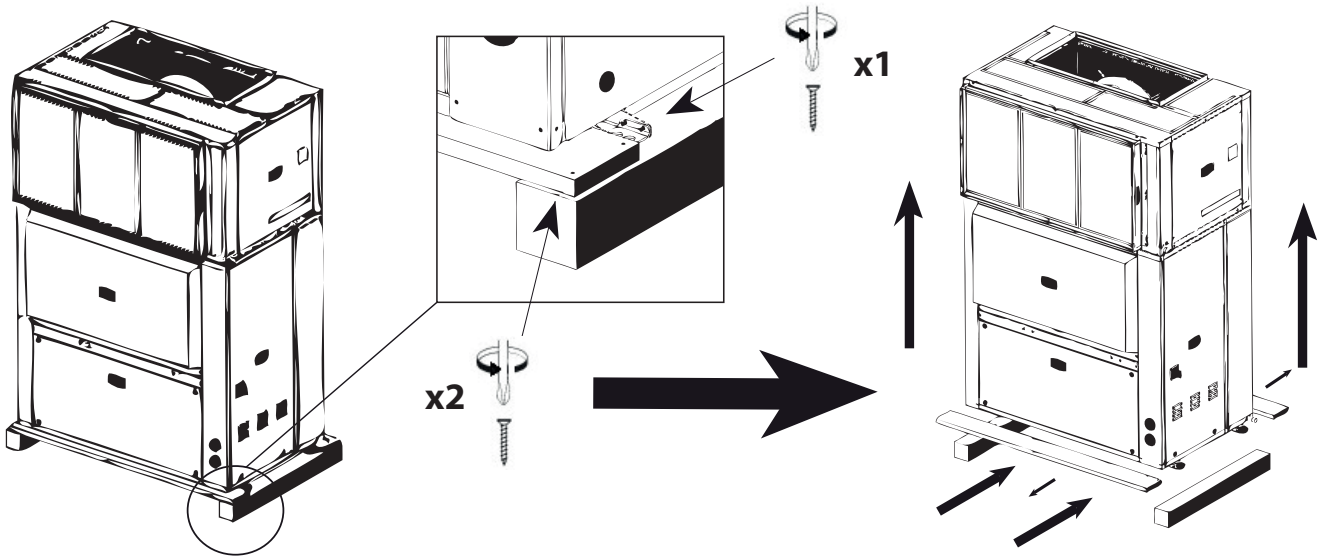
If for these operations a crane is required, the suspension cables must be secured as shown in below picture. To lift units of the C-BOX range, the unit must be maintained on the removable metal structure, to lift the unit.



2.2.- UNIT ACCEPTANCE.

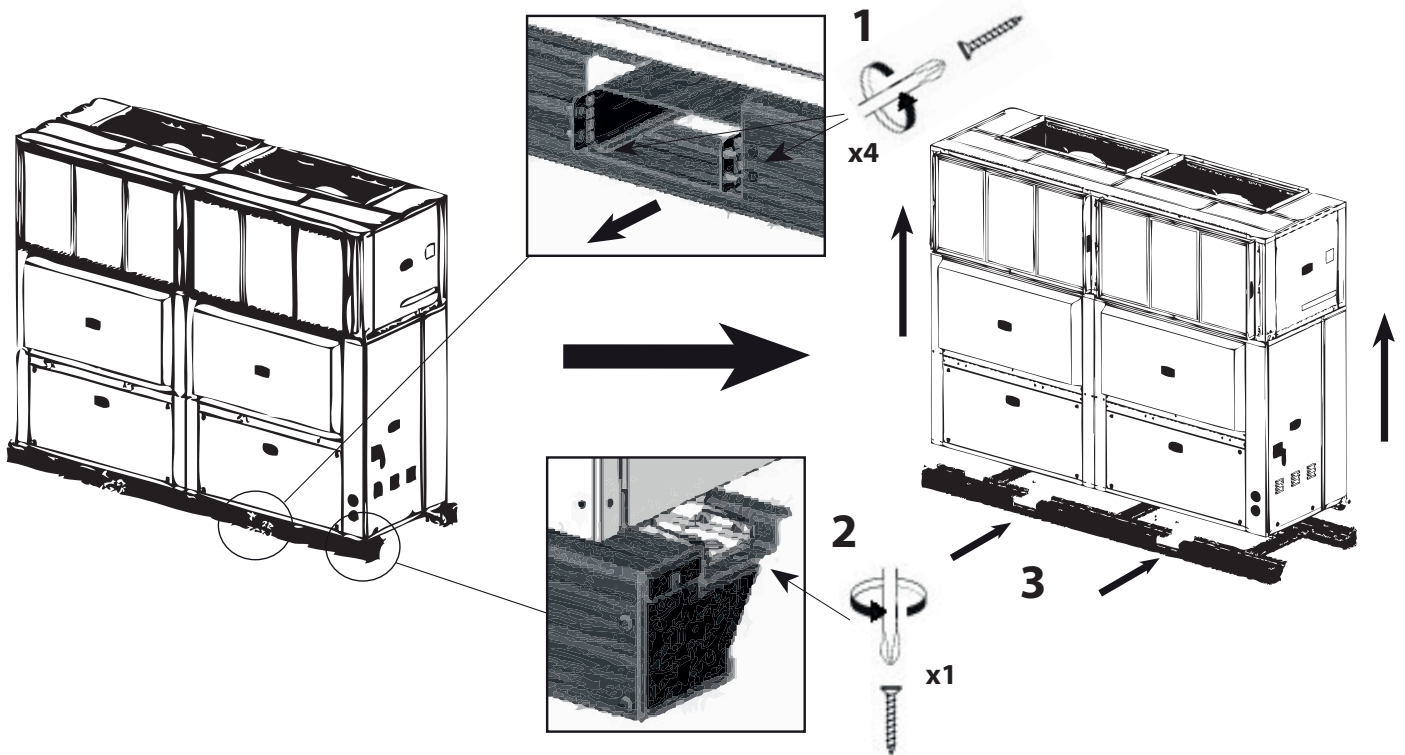
Handling and positioning of the unit

Dismantling of the wooden pallet (units of the B-BOX range)



Dismantling of the metallic structure, if considered necessary (units of the C-BOX range)

- 1- Remove the fixing screws and disassemble the cross bedplates, as shown in below picture.
- 2- Remove the fixing screws of the unit to the metallic structure.
- 3- Insert the nails of the forklift and lift the unit, as shown in below picture.



2.3.- 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. Place the anti-vibration to avoid any buckling.
- The unit is able to work in normal radioelectronic conditions for commercial 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 an electrical heater, below the likely coils on the drip tray, which avoids the causing of ice in the coil during defrost cycle.

2.4.- DUCTS AND SENSOR INSTALLATION

Place sheet metal duct connections in the indoor air supply and fiix sensors.

		INDOOR SECTION	OUTDOOR SECTION
DUCTS	Supply	Install 1 or 2 ducts	Mandatory 2 ducts*
	Return	Install 1 duct	Install 1 duct

* To avoid by-pass



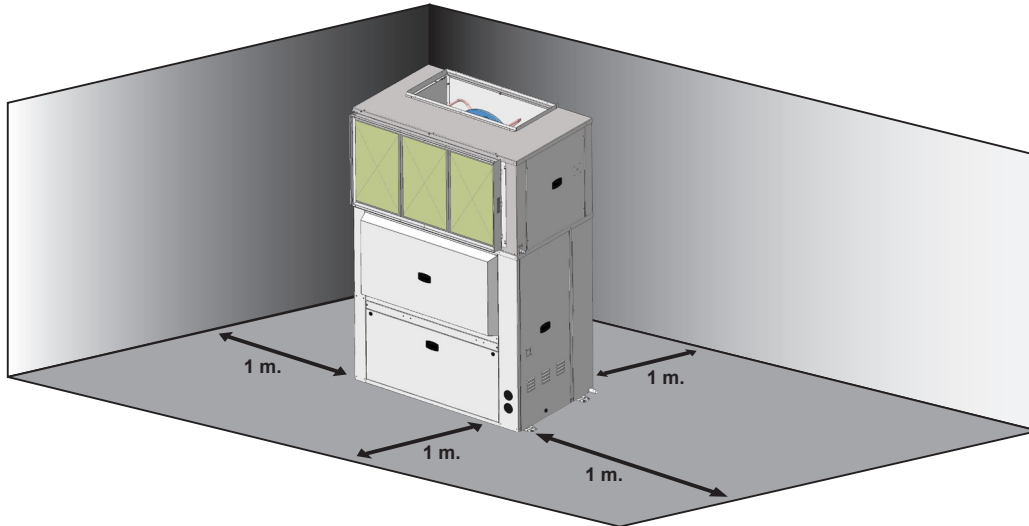
SENSORS POSITION	
Supply	Placed in the fan cabinet in the indoor section.
Return	Install in the retun duct
Outdoor	Place in the installation to assure outdoor temperature measurement.

2.5.- INSTALLATION CLEARANCES.

Clearance around the unit for service and maintenance.

SERVICE SPACE

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



LOCATION

Install air entry and exit ducts should be fitted. The 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. Place the anti-vibration to avoid any buckling.

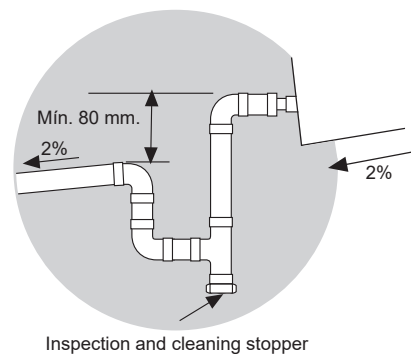
2.6.- DRAINS.

All the outdoor and indoor sections of these units have a 3/4" steel threaded drain pipe welded to the condensation tray. The units which have a double circuit (060/075/085) have two drain pipes, one on each side and both have to be connected.

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.

Also slightly tip the unit 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.

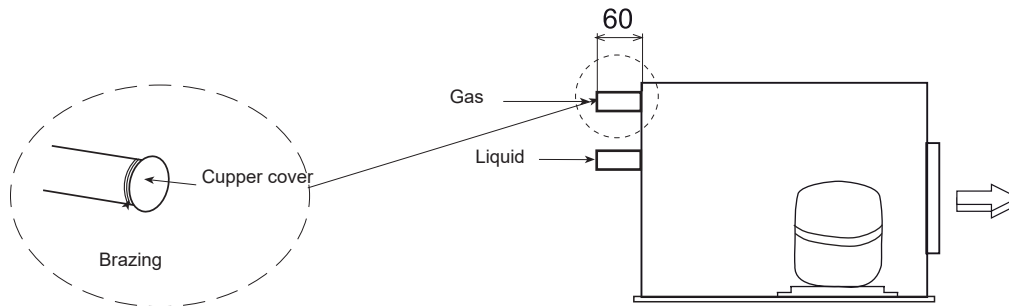
The drains must be independents, no connect the condenser drain with the evaporator drain



To assure proper water evacuation in the base of the unit to avoid overflow or ice accumulation

2.7.- REFRIGERANT CONNECTIONS

Split units are supplied with gas and liquid lines sealed with copper covers, and located 60mm from casing.



! Split units are supplied with nitrogen gas, which must be removed before carrying other operation and then proceed as follow.

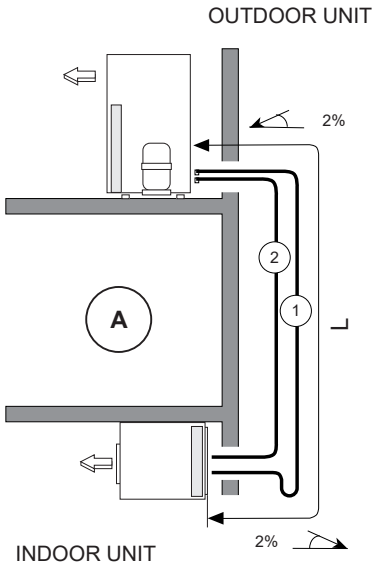
1. Remove the nitrogen gas through the high and low 5/16" service ports located inside and provide a low vacuum for safety.
2. Remove the caps from the connecting lines.
3. Braze the piping connection lines. Select piping diameter from table 2.6.1.
(When brazing refrigerant pipes, nitrogen gas must be supplied into the pipes through the service ports to remove the air).
4. Leak test:
Add nitrogen gas, check that a pressure of 5 kg/cm² has been reached and that there are no leaks in the circuit or brazing by applying soapy water to the pipes which will cause the bubbles to form where there are leaks.
To detect small leaks, proceed as follows:
Add nitrogen gas and check that a pressure of 25 kg/cm² has been reached, there are no leaks if the pressure remains the same for at least 24 hours and the final pressure is not less than 10% below the initial pressure.
5. Ensure that the gas line is insulated.
6. Evacuation:
Remove the nitrogen gas, connect the gauge manifold and vacuum pump to both the liquid and gas lines, fully open the gauge manifold valve and switch on the vacuum pump. Check to make sure the gauge shows a pressure of -750mm Hg. Once a level of -750mm Hg is reached, keep the vacuum pump running for at least one hour.
7. Refrigerant charge:
 - Check TABLE for the amount of refrigerant charge, depending on the length and size of the pipe connections.
 - Disconnect the vacuum pump and connect to the refrigerant-charging bottle. Open the charging pump and purge the air from the hose at the pressure gauge manifold.
 - Set up the amount of additional refrigerant on the weighing scale, open the high pressure and charged in the liquid state. If the total amount of refrigerant charge has not been reached because the pressure is balanced, turn off the high side of the gauge manifold, turn on the unit, and add the remaining amount of the refrigerant charge required slowly through the low side of the pressure gauge. (With R-410A refrigerant, the charging bottle must be in a vertical position and charged in the liquid state). Close the pressure gauge, disconnect it from the from the service port of the unit and fit caps on the service ports. The unit is then ready to operate.

! 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 line installation.

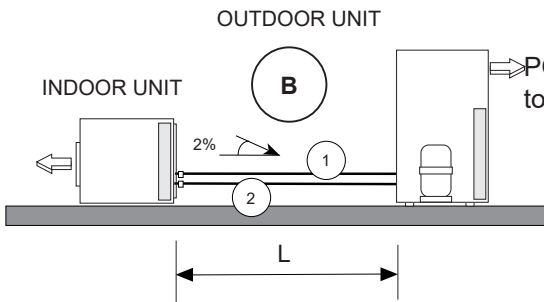
! Legislation does not allow refrigerant gas emissions to the atmosphere, so the refrigerants have to be recycled to avoid being released to the atmosphere. Those recycled refrigerants shall be processed afterwards by an authorized waste manager.
Those components derived from the recycling of the unit have to be managed by authorized waste manager or be left in local waste facilities according the local normative in each country.

2.7- REFRIGERANT CONNECTIONS

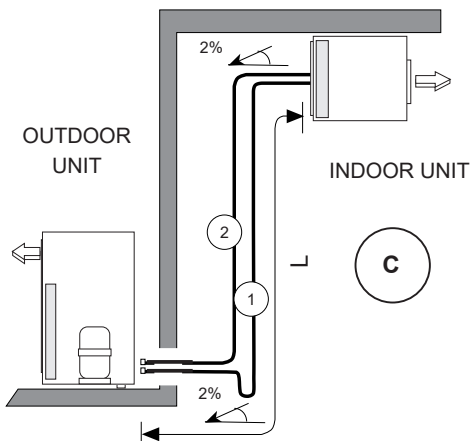
To locate the outdoor and the indoor units, refer to the following information:



POSITION A : A syphon suction must be installed at the base of the vertical of the gas line, and syphons must be installed every 8 meters upward. The minimum speed suction must not be below 6m/s. Maximum vertical length 16m.



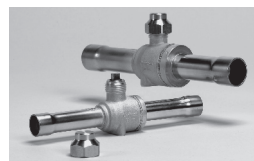
POSITION B : Tip the lines toward the outdoor unit. Make special attention to line length longer than 10m and avoid collapse on pipe lines installation.



POSITION C : Install a syphon at the base of the vertical of the gas line; no more syphons are necessary. Maximum vertical length 16m.

A,B,C : Unit positions
L : Total length
1 = Gas line
2 = Liquid line

NOTE: The refrigerant connections are brazing connections. Service valves can be supplied as option if required.



- THE GAS LINE MUST BE ALWAYS INSULATED.
- THE HORIZONTAL LINES MUST BE TIPPED AT LEAST 2% TOWARD THE OUTDOOR UNIT.
- THE MAXIMUM SPEED INSIDE LINES SHOULD NOT BE MORE THAN 15 m/seg.

2.7- REFRIGERANT CONNECTIONS

In the double circuit units , check before connecting C1 and C2 circuits , that they are the same circuit for the indoor and the outdoor section

TABLE 1: REFRIGERANT LINES SELECTION

REFRIGERANT LINES				UNIT - MODEL						UNIT -MODEL Position A Vertical line					
				020S	035S	045S	060D	075D	085D	020S	035S	045S	060D	075D	085D
Total line length (refrigerant line length between indoor and outdoor units)	0 to 30 m. (Standard connection unit)	Ø Liquid	C1	1/2"	5/8"	5/8"	5/8"	5/8"	5/8"	1/2"	5/8"	5/8"	5/8"	5/8"	5/8"
			C2	n/a	n/a	n/a	5/8"	5/8"	5/8"	n/a	n/a	n/a	5/8"	5/8"	5/8"
		Ø Gas	C1	7/8"	1 1/8"	1 3/8"	1 1/8"	1 1/8"	1 3/8"	5/8"	7/8"	1 1/8"	7/8"	7/8"	1 1/8"
			C2	n/a	n/a	n/a	1 1/8"	1 3/8"	1 3/8"	n/a	n/a	n/a	7/8"	7/8"	1 1/8"
	Max. n ^{er} of bends			12	12	12	12	12	12	12	12	12	12	12	
	30 to 45 m.	Ø Liquid	C1	5/8"	5/8"	3/4"	5/8"	5/8"	3/4"	5/8"	5/8"	3/4"	5/8"	5/8"	3/4"
			C2	n/a	n/a	n/a	5/8"	5/8"	3/4"	n/a	n/a	n/a	5/8"	5/8"	3/4"
		Ø Gas	C1	1 1/8"	1 3/8"	1 5/8"	1 3/8"	1 3/8"	1 5/8"	5/8"	7/8"	1 1/8"	7/8"	7/8"	1 1/8"
			C2	n/a	n/a	n/a	1 3/8"	1 5/8"	1 5/8"	n/a	n/a	n/a	7/8"	7/8"	1 1/8"
		Max. n ^{er} of bends			12	12	18	18	18	18	12	12	18	18	18

n/a: not available



The unit is precharged from factory with nitrogen . The installer should remove this gas and charge the units with the charge of refrigerant R410A , shown in the following tables plus the charge by additional meter shown in the TABLE 2

The unit is supplied with brazing connections. As an option , the unit can be supplied with gas precharge from the factory ; in that case only the TABLE 2 has to be taken into account. (this option includes the service valves).

TABLE 2 : EXTRA REFRIGERANT CHARGE R410A BY METER OF COPPER PIPE

Liquid	Gas	gr/m
1/2"	7/8"	108
5/8"	1-1/8"	177
5/8"	1-3/8"	182
3/4"	1-3/8"	265
3/4"	1-5/8"	271
7/8"	1-5/8"	374



Legislation does not allow refrigerant gas emissions to the atmosphere, so the refrigerants have to be recycled to avoid being released to the atmosphere. Those recycled refrigerants shall be processed afterwards by an authorized waste manager.

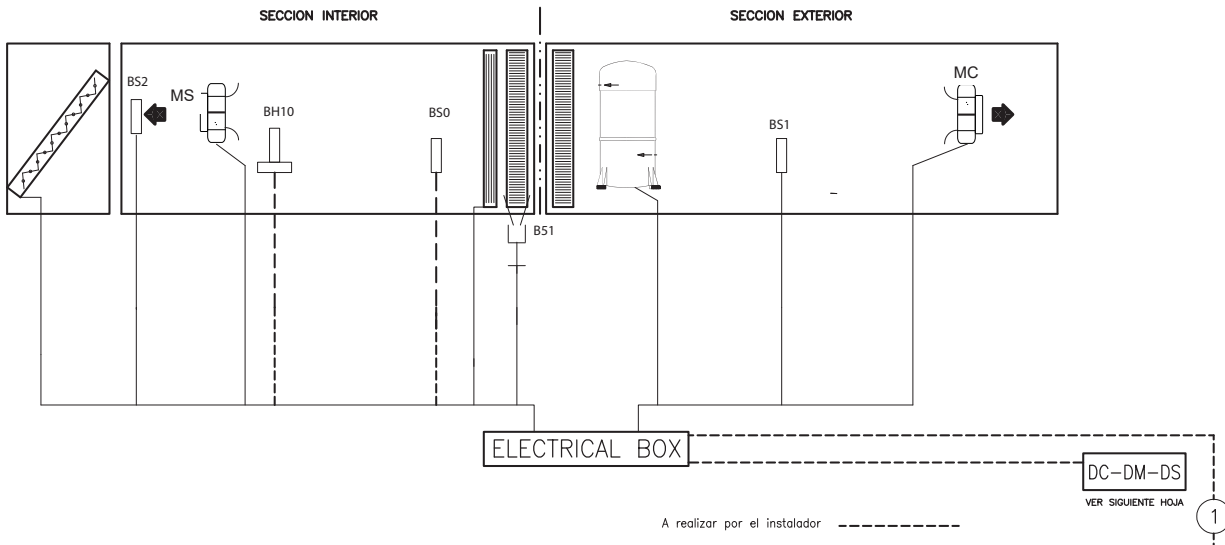
Those components derived from the recycling of the unit have to be managed by authorized waste manager or be left in local waste facilities according the local normative in each country.

2.8.- ELECTRICAL CONNECTIONS.



- Before making the electrical connections, ensure that all circuit breakers are open.
- To make the electrical connections, follow the electrical diagram supplied with the unit.
- Take into account the current standard for the installation of the unit, whether local, regional or national standards.
- USE SUPERINMUNIZED DIFFERENTIAL SWITCHES.

2.8.1.- ELECTRICAL CONNECTION FOR PACKAGE UNITS.



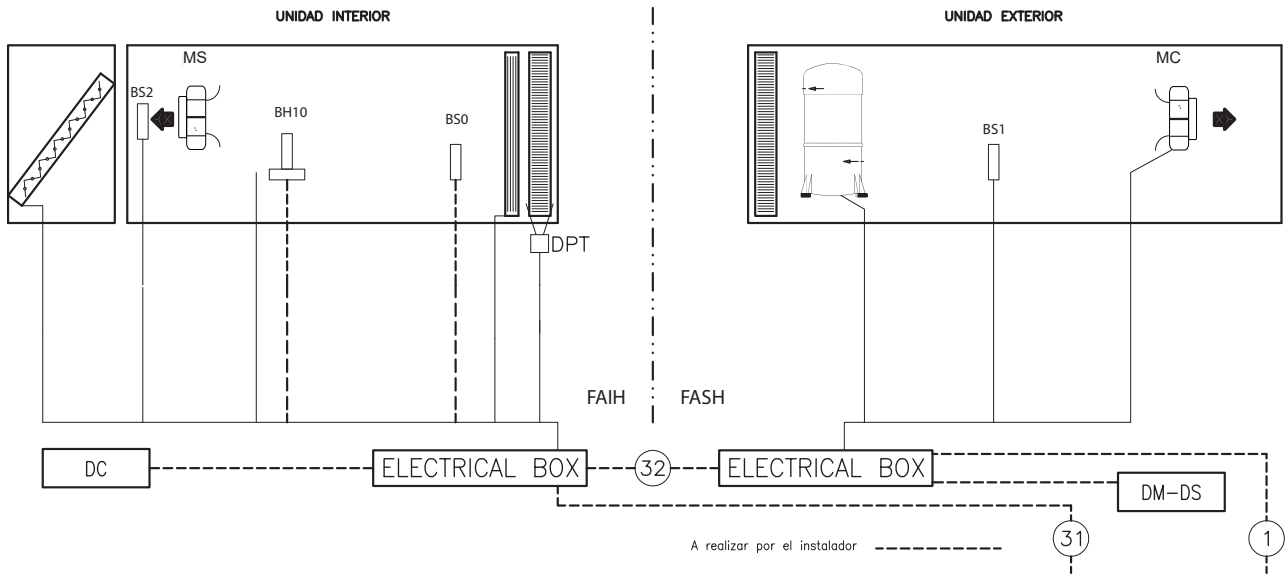
Unit	Connection 1			
	Base unit	Base unit + ELHS	Base unit + ELHM	Base unit + ELHHM
020		4G x 6mm ²		4G x 10mm ²
035		4G x 6mm ²		4G x 16mm ²
045		4G x 10mm ²		4G x 16mm ²
060		4G x 16mm ²		3 x 50mm ² 1 x 25mm ²
075		3 x 25mm ² 1 x 16mm ²		3 x 50mm ² 1 x 25mm ²
085		3 x 25mm ² 1 x 16mm ²		3 x 70mm ² 1 x 55mm ²

2.8.- ELECTRICAL CONNECTIONS.



- Before making the electrical connections, ensure that all circuit breakers are open.
- To make the electrical connections, follow the electrical diagram supplied with the unit.
- Take into account the current standard for the installation of the unit, whether local, regional or national standards.
- USE SUPERINMUNIZED DIFFERENTIAL SWITCHES.

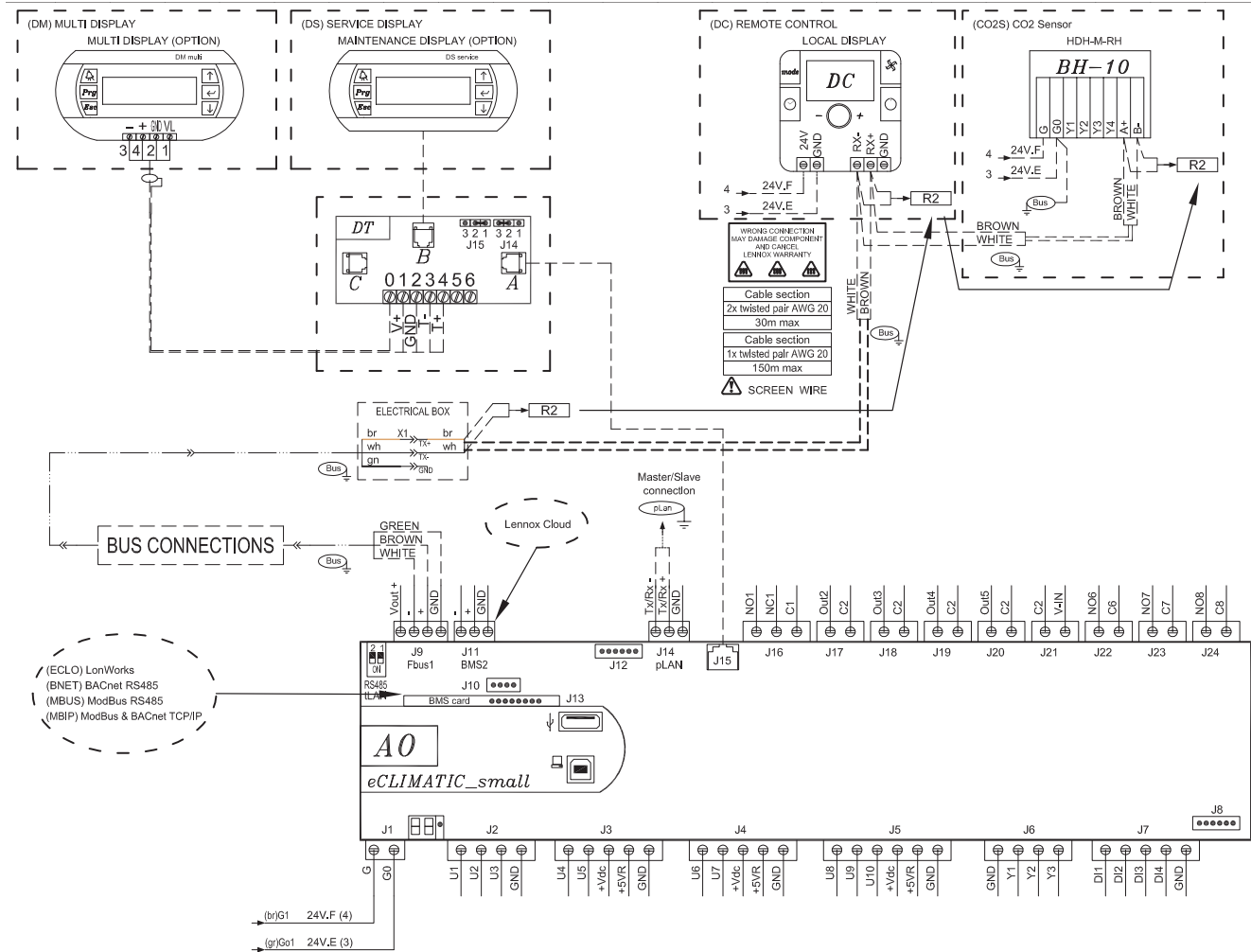
2.8.2.- ELECTRICAL CONNECTION FOR SPLIT UNITS.



Unit	Connection 1	Connection 31			Connection 32	
	Base unit	Base unit	ELHS	ELHM	ELHHM	Interconnection
020	4G x 4mm ²	4G x 2.5mm ²		4G x 6mm ²		3 x 0.5mm ² shielded
035	4G x 6mm ²	4G x 2.5mm ²		4G x 6mm ²		3 x 0.5mm ² shielded
045	4G x 6mm ²	4G x 2.5mm ²		4G x 6mm ²		3 x 0.5mm ² shielded
060	4G x 10mm ²	4G x 2.5mm ²		4G x 16mm ²		3 x 0.5mm ² shielded
075	4G x 16mm ²	4G x 2.5mm ²		4G x 16mm ²		3 x 0.5mm ² shielded
085	4G x 16mm ²	4G x 2.5mm ²		4G x 16mm ²		3 x 0.5mm ² shielded

2.9.- TERMINAL CONNECTION.

2.9.1.- TERMINAL CONNECTION WITH PACKAGE UNIT.



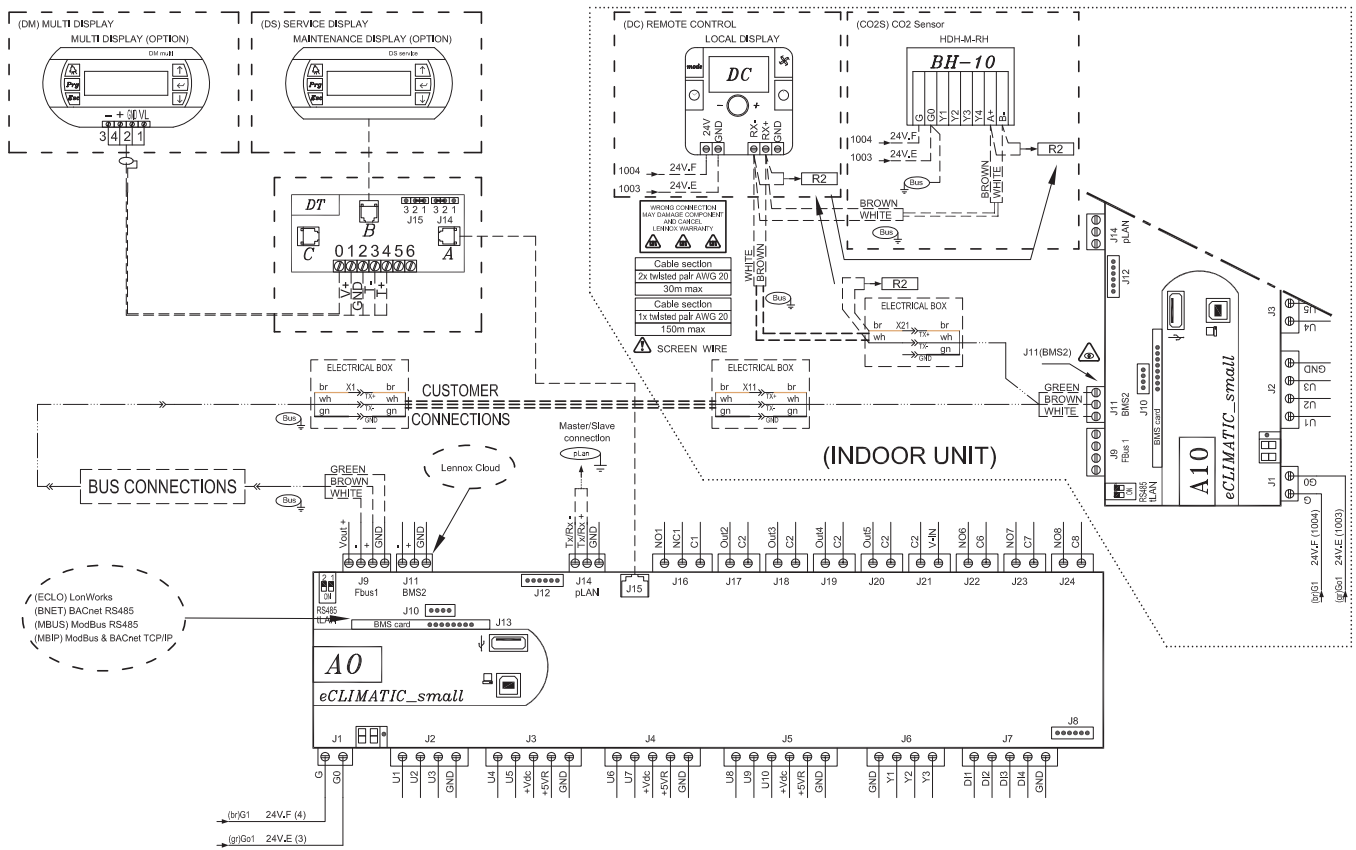
! IMPORTANT !
 THE SHIELDED CONNECTING CABLE BETWEEN THE CONTROL PANEL AND THE UNIT MUST BE SEPARATED FROM ANY OTHER TYPE OF ELECTRICAL WIRING. CONNECT IT TO THE ELECTRIC PANEL LOCATED IN THE OUTDOOR UNIT.

NOTES:

- For securing and connecting the Control Panel, consult the control panel Manual supplied with the unit.
- Connection between the DC and the unit must be made using shielded twisted pair cables and shielded (where the screens is connected to ground by the side of the electrical panel) and with a hose of two cables.
- The Tx+ and Tx- polarity must strictly comply with the electrical diagram supplied with the unit.
- Wiring the hose separated from the power cables a minimum of 500mm.
- Wiring the hose separated from the halogen lamps a minimum of 500mm.
- Wiring the hose separated from switchboard, antennas, transmitters... a minimum of 500mm.
- NEVER ROLL UP THE EXCESSING HOSE, CUT THE HOSE FROM THE SIDE OF THE TERMINAL.

2.9.- TERMINAL CONNECTION.

2.9.2.- TERMINAL CONNECTION WITH SPLIT UNIT.



! IMPORTANT !
 THE SHIELDED CONNECTING CABLE BETWEEN THE CONTROL PANEL AND THE UNIT MUST BE SEPARATED FROM ANY OTHER TYPE OF ELECTRICAL WIRING. CONNECT IT TO THE ELECTRIC PANEL LOCATED IN THE OUTDOOR UNIT.

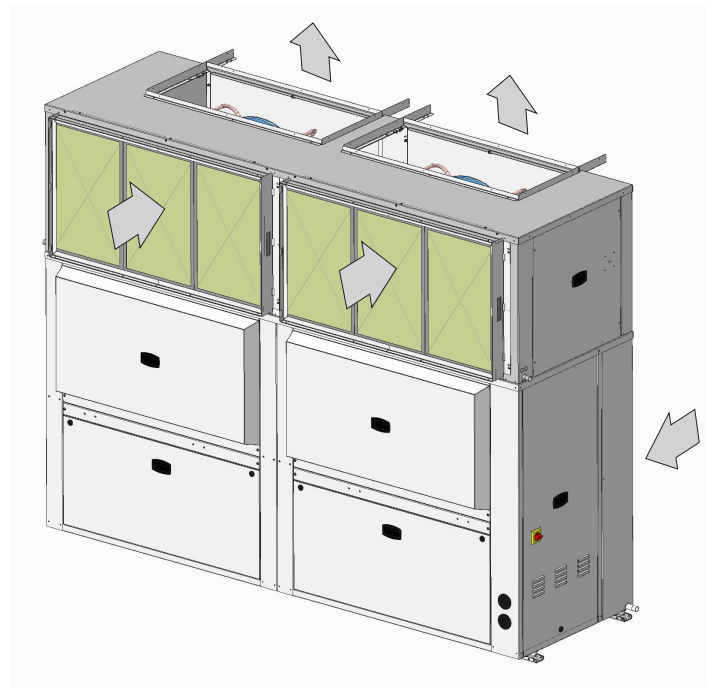
NOTES:

- For securing and connecting the Control Panel, consult the control panel Manual supplied with the unit.
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- Wiring the hose separated from the power cables a minimum of 500mm.
- Wiring the hose separated from the halogen lamps a minimum of 500mm.
- Wiring the hose separated from switchboard, antennas, transmitters... a minimum of 500mm.
- NEVER ROLL UP THE EXCESSING HOSE, CUT THE HOSE FROM THE SIDE OF THE TERMINAL.

3.1.- PRELIMINARY CHECKS BEFORE START UP.

1. Check that drain pipe connections, their fixtures 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. Inspect the air filter, which should be in its housing and properly positioned (the metal grille should be toward the inside).

FIGURE FOR THE STANDARD UNIT CONFIGURATION FOR PACKAGE MODELS
060D-075D-085D



Legislation does not allow refrigerant gas emissions to the atmosphere, so the refrigerants have to be recycled to avoid being released to the atmosphere. Those recycled refrigerants shall be processed afterwards by an authorized waste manager.

Those components derived from the recycling of the unit have to be managed by authorized waste manager or be left in local waste facilities according the local normative in each country.

3.2.- PRELIMINARY CHECKS DURING START UP.

LENNOX REFAC, S.A. Designs and develops its machines always looking for the greater comfort and well-being of its customers and users, at the same time as the greater energy efficiency of the elements that constitute the units. This effort would be fruitless if it was not united to a responsible use of these equipment. For this reason, we invite you to use these machines in a responsible way with the environment, combining the adequate comfort, with a responsible consumption of the energy resources. To start the unit, follow the instructions given in the User Manual for the control supplied with the unit (requiring operation in any of the modes, cooling, heating, or automatic).

After a time delay, the unit will start.

With the unit operating, check that the fans are turning freely and in the correct direction.

CHECK THAT THE COMPRESSOR IS ROTATING IN THE CORRECT DIRECTION:

- If you have the option phase rotation indicator, use it to check the correct rotation.
- If you do not have three phase return lock, check the correct direction of rotation. The suction pressure decreases and the discharge pressure increases when the compressor is started.
- If the connection is incorrect, 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 operate to shut down the unit. The solution is to disconnect, reverse two of the phases and connect again.

ASTP Protection is included with the fix speed compressors . See "Fault diagnosis" for more information.

WITH OPERATING UNIT, CHECK:

- Low pressure and high pressure.
- Use the evaporating and liquid temperature to calculate superheat and subcooling.
- Adjust the refrigerant charge and/or expansion valve according to the preceding values.

3.2.- PRELIMINARY CHECKS DURING START UP.



The unit must be installed in accordance with local safety codes and regulations and can only be used in a well ventilated area. Please read carefully the manufacturer's instructions before starting this unit.

All work on the unit must be carried out by a qualified and authorised employee.

Non-compliance with the following instructions may result in injury or serious accidents.

Work on the unit:

The unit shall be isolated from the electrical supply by disconnection and locking using the main isolating switch. Workers shall wear the appropriate personal protective equipment (helmet, gloves, glasses, etc.).

Electrical system:

Work on electric components shall be performed with the power off (see below) by employees having valid electrical qualification and authorisation.

Electrical connections can become loose during transport. Please check them before starting-up the unit Compressors with specific rotation direction. Check the correct rotation direction of the fan before closing the compressor circuit breakers. If the direction is incorrect, the phases must be reversed at the head of the main switch.

Refrigerating circuit(s):

After more than 12 hours of power cut, the crankcase heater (compressor) should be powered for 5 hours before any return to service. Non-compliance with this instruction can cause deterioration of the compressors.

Monitoring of the pressures, draining and filling of the system under pressure shall be carried out using connections provided for this purpose and suitable equipment. To prevent the risk of explosion due to spraying of coolant and oil, the relevant circuit shall be drained and at zero pressure before any disassembly or unbrazing of the refrigerating parts takes place.

To avoid the risks of explosion, cooling gases elements and oil, shall check, before carrying out any dismantling or disassemble any cooling elements, **that the circuit that cause the explosion and its pressure is zero.**

There is a residual risk of pressure build-up by degassing the oil or by heating the exchangers after the circuit has been drained. **Zero pressure shall be maintained** by venting the drain connection to the atmosphere on the low pressure side.

The brazing shall be carried out by a qualified brazier and shall comply according to code ASME section IX following the procedures specification.

Before the start up:

- Raise the system to the test maximum pressure (see firmplate).
- Check the correct behaviour of the high pressure device.
- Check the components general condition and circuit piping.

Spare parts:

In order to maintain CE marking compliance, replacement of components shall be carried out using spare parts, or using parts approved by Lennox.

Only the coolant shown on the manufacturer's nameplate shall be used, to the exclusion of all other products (mix of coolants, hydrocarbons, etc.).

CAUTION:

In case of fire, cooling circuits can cause an explosion and spray coolant gas and oil.



3.3.- CLIMATIC™ CONFIGURATION

Settings

1. Supply Air-flow adjustment (depending on customer requirements)
 - a. 3333 = nominal air flow / pressure
 - b. 3334 = reduced air flow / pressure

2. Scheduling (depending on customer requirements)
 - a. Zones & Modes (Night/Day/Day I/ DayII)
 - b. Setpoints per mode

3. Regulation temperature probe selection
 - a. Select the regulation probe (DC, Return, Customer, etc.) in the Room Temp. Config screen

4. Outside temperature probe selection
 - a. Select the outdoor temp probe (Unit, Customer) in the Outside Temp. Config screen

5. Air quality sensor selection (optional)
 - a. Select the air quality CO2 sensor (Remote, Customer) in the CO2 Config screen

6. Remote display configuration
 - a. 3151 = DC simple / DC full / DM

7. Minimum fresh air
 - a. 3121 = minimum opening %

Commissioning

Check:

1. Airflow Vs Damper
 - a. Test B.Nom100% :
 - i. adjust the blower speed % (3333) to get the required air-flow
 - ii. adjust the exhaust speed % (3864) to get the required air-flow
 - b. Test B.Nom0%:
 - i. adjust the damper compensation (3335) to maintain the required air-flow even with damper fully closed.
 - ii. adjust the damper compensation (3336) to maintain the required air-flow even with damper fully closed.
2. Filter safety thresholds
 - a. Test B.Nom100% and Test B.Nom0%: read filter ΔP (3442) and adjust the bigger measure multiplied by 2.5 at threshold 3345
3. Frigorific circuit tests
 - a. Cooling mode
 - i. Test C---Cool: (if variable speed compressor, set speed value)
 1. Check circuit pressures and temperatures
 2. Check electrical consumptions
 - b. Heating mode
 - i. Test C---Heat: (if variable speed compressor, set speed value)
 1. Check circuit pressures and temperatures
 2. Check electrical consumptions
4. Unit option tests
 - a. Electrical Auxiliary heaters (Test H1-1 full)
 - i. Check supply temperature
 - ii. Check electrical consumption
5. Advanced regulation optimization
 - a. Auxiliary heaters ΔT (Gas burner or electrical)
 - i. Heating.
 1. Test H1-1: read | Mix-Supply| temp and adjust heaters stage ΔT at menu 3734
 - b. Staging sequence(compressor/electrical)
 - i. Aux Heaters Priority 3731= Never/ Always /OutTemp
 - c. Dynamic setpoint
 - i. 3225= ΔT between customer set point and outdoor temperature
 - d. Fine temperature control
 - i. Smooth 3231= No/ DeadZone/Comfort

Once all the settings have been adjusted, the list of parameters must be downloaded (Wizard tool), stored and signed by the customer.



WARNING! During the settings, wait until the economizer is fully closed or opened, since it takes 1-2 minutes to switch.

When carrying out maintenance works on these units, please make a correct segregation of the non-hazardous waste generated: insulation, air filters, plastic or metallic elements, packaging, etc., as well as waste considered hazardous: oils, filters and rags Impregnated with oils, welding elements such as filler material, strippers, electrical and electronic waste, batteries, lamps, etc., these must be managed by an authorized dealer.

The refrigerant gas can be reused, or collected in a bottle and managed as hazardous waste by an authorized dealer.

4.1.- PREVENTIVE MAINTENANCE.



**PREVENTIVE MAINTENANCE PREVENTS COSTLY REPAIRS,
THIS REQUIRES PERIODIC INSPECTIONS:**

- GENERAL STATE OF THE CASING:

Casing, paint, damage due to shocks, rust spots, levelling and supporting, condition of the shock absorbers, if installed, screwed panels, etc.

- ELECTRICAL CONNECTIONS:

State of hoses, tightness of screws, earthing, current consumption of the compressor and fans and check that the unit is receiving the correct voltage.

- COOLING CIRCUIT:

Check that the pressures are correct and that there are no leaks. Check that there is no damage to the pipe insulation, that the condition of the coils is good and that they are not blocked by bits of paper or plastic drawn in by the air flow, etc.

- COMPRESSOR:

If a sight glass is fitted, check the oil level. Check the condition of the silentblock mountings.

- FANS:

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

- CONTROL:

Check set points and normal operation.

- ELECTRIC PANEL GRILLES:

They must be kept clean for the entrance of the air circulation.

- AIR FILTER:

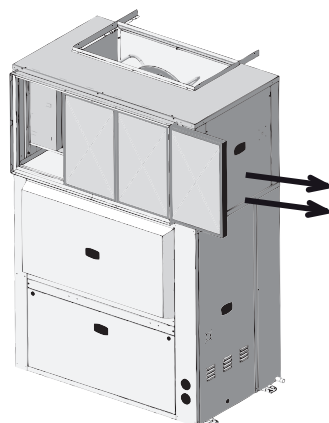
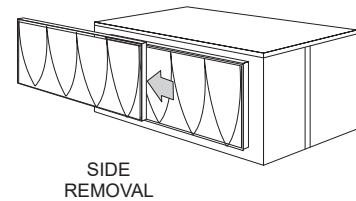
The air filter can be removed through the side by sliding it over the rail or downwards. (See figure). For downwards removal, remove the two profiles that support it (depending on the model) which are under the filter guide rail and screwed onto the unit.

The filter should be cleaned with a vacuum cleaner or washed in soapy water. The frequency for cleaning or changing the air filters will depend on the quality air in the area (fumes, vapors, suspended dust particles, etc.).

Remember that the metal grille should always be toward the inside of the unit.

- DRAINS:

Clean the base or drip tray, remove dirt in siphons and check if they are blocked by ice.



LATERAL EXTRACTION

4.2. MAINTENANCE PLAN

Task	Operating mode	Monthly	+ Quarterly	+ Half Yearly
Clean or replace filters: Disposable, or metal frame.	Replace filters with new ones if disposable. Vacuum clean or blow the dirt. Wash and dry carefully. Replace Filter if necessary by an original Lennox filter. Blocked filter will reduce the performance of the unit. THE UNIT SHOULD NEVER BE OPERATED WITHOUT FILTERS	●		
Visual check of the oil level (if sight glass fitted) and check the oil for acidity on the refrigerant circuits	Visually check the oil level through the sight glass on the side of the compressor casing Test the oil every 3 years and after each intervention on the refrigerant circuit	●		
Clean condensate drain, drain pan, indoor coils and outdoor coils (following local regulations)	It's mandatory to clean the external coils, according to the environment where the unit is located, the frequency of the cleaning varies from once in a month to minimum twice in a year. The performance and the sustainability of the machine is based on the perfect heat exchange. The use of a neutral pH cleaning product is mandatory (WARNING: Fins and copper tubes are very fragile! Any damage WILL reduce the performances of the unit).	█	█	█
Check for the Amps consumed	Check for the Amps consumed on all three phases; compare with the nominal value given in the electrical wiring diagram.		█	
Check Smoke detector (if fitted)	Start the unit. Trigger the smoke detector with an aerosol tester. Reset unit and control.		█	
Check CLIMATIC™ control, set-points and variables	Refer to the commissioning sheet; Check all set points are set according to this document.		█	
Check refrigeration system for proper functioning	Retrieve/Check the values of Overheating and subcooling		█	
Check the position and tightness of refrigeration components	Check systematically all connections and fixings on the refrigeration circuit. Check for oil traces, eventually a leak test should be conducted. Check operating pressures correspond to the ones, indicated on the commissioning sheet		█	
Check the position of the crankcase heaters (around the compressor, if fitted) and the proper functioning of it	Check the well fixation of the crankcase heaters, if it is tight enough And check the crankcase heaters overall working.		●	
Check defrost cycle with 4-way valve inversion.	Switch the unit to heat pump mode. Change the set point to obtain the standard defrost mode and reduce the cycle time to the min value. Check the operation of the defrost cycle.		█	
Check the plug fans (freewheel)	Check the rotation of the fan (free rotation, detection of vibration or bearing noises) Check for the Amps consumed on all three phases; compare with the nominal value given in the electrical wiring diagram.			●
Check Airflow rate safety switch (if fitted).	Shut down supply fan. The fault must be detected within 5 seconds.			●
Check economizer actuator operation	Check all fixings and transmission. Stop the unit using the control. The fresh air damper must close. Start the unit, the fresh air damper should open. Make a forced opening and closure of the motorized dampers.			█
Check tightness of all electrical connections	Power down the unit and check and tighten all screws, terminal and electric connections (including the terminal boxes) When turning on the unit, check the deterioration of the electrical components with a thermal camera, with the unit working at 100% of its power.			█
Check HP / LP safety switches	Install a pressure gauge HP / LP and check if the safety switches overall working.			█
Check the value of the analogue sensors	Install the pressure gauge calibrated to check the analogue sensors. Install a thermometer calibrated to control the sensors.			█
Check the position of all sensors	Check the good positioning and the fixation of all sensors.			●
Check electric heater element for excessive corrosion	Turn off the unit; Pull the electric heater out of the heater module box and check the resistances of traces of corrosion; Replace resistance as required;			█
Check anti-vibration mountings, for wear and tear.	Visually check anti-vibration mountings on compressors. Replace if damaged.			●
Check casing and equipment corrosion	To treat and neutralize eventuals rust spots			●

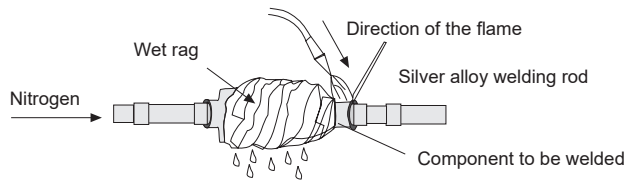
4.3.- CORRECTIVE MAINTENANCE.



IMPORTANT:
MAKE SURE THAT THE UNIT IS FULLY DISCONNECTED FROM THE POWER SUPPLY WHEN CARRYING OUT ANY TYPE OF WORK ON THE MACHINE.

If any **component** in the cooling circuit is to be replaced, follow these recommendations:

- Always **use original replacement parts**.
- If the component can be isolated, it is not necessary to remove the entire **refrigerant charge**, if the component cannot be isolating and the refrigerant charge is removed, it should be removed through the Schrader valves located in the outdoor section. Create a slight vacuum as a safety measure.
- **Regulation imposes the recovery of refrigerant fluids and prohibits the release of 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 forming.
- Use **silver alloy brazing rod**.
- **Take special care that the flame** from the torch is directed away from the component to be welded and cover with a wet rag to prevent overheating.



- **Take very special care if 4-way or check valves are to be replaced** since these have internal components that are very heat-sensitive such as plastic, teflon, etc.
- If a **compressor is to 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.
- **Evacuate 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 running 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 WHEN USING OF R-410A REFRIGERANT:

R-410A refrigerant is used in the unit, the following standard precautions for this gas should therefore be taken:

- The Vacuum Pump must have a Check Valve or Solenoid Valve fitted.
- Pressure Gauges and Hoses for exclusive use with R-410A Refrigerant should be used.
- Charging should be carried out in the Liquid Phase.
- Always use scales to weigh-in charge
- Use the Leak Detector exclusive for R-410A 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, collect what remains of the charge, create a vacuum in the unit and completely recharge with new R-410A Refrigerant.
- Brazing should always be carried out in a nitrogen atmosphere.
- Reamers should always be well sharpened.



WASTE MANAGEMENT:

All the components derived from the recycling of the unit should be managed according local legislation, and have to be classified and separated while dealt by authorized waste manager or be left in local waste facilities.
 Refrigerant fluids, electronic boards, heat exchangers and the oil extracted from the refrigerant circuit, as well as the oil recipients used must be recycled as hazardous waste according the local normative through an authorized waste manager or be left in local waste facilities. The rest of the components considered as non-hazardous wastes must be recycled according to the corresponding norms.
 At the end of its life, the equipment should be recycled in local waste facilities or by an authorized waste manager.

4.4.- FAILURE DIAGNOSIS.

In case of failure or malfunction of the unit, the display on the control panel will show an error or alarm warning which is explained in the control panel manual.

Nevertheless, whenever there is a unit fault, the unit should be shut down and our service technicians consulted.

Fault	Possible causes	Possible solutions
Unit does not start.	Fault 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 switch or replace 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.	Reverse the power phases.
	Outdoor coil is dirty or clogged for passing air.	Inspect and clean.
	Excess refrigerant charge.	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 coils and indoor fan.	
Unit stops due to low pressure.	Low pressure switch defective.	Check the cut-off pressure with a pressure gauge and replace 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.	Reverse 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.	Check 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).	Check and reverse power phases.

5.- END OF THE MACHINE LIFE

At the end of the useful life of the units, please take into account the correct segregation of the waste generated. No Hazardous like: Painted metallic parts, plastic elements, copper pipes, batteries, exchangers, liquid receivers, water pumps, fans.. And Hazardous Materials such as batteries, electrical and electronic elements, compressors, dehydrating filters, valves or refrigerant gas, etc. to be managed with an authorized dealer.

INSTALLATION, OPERATING AND MAINTENANCE



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