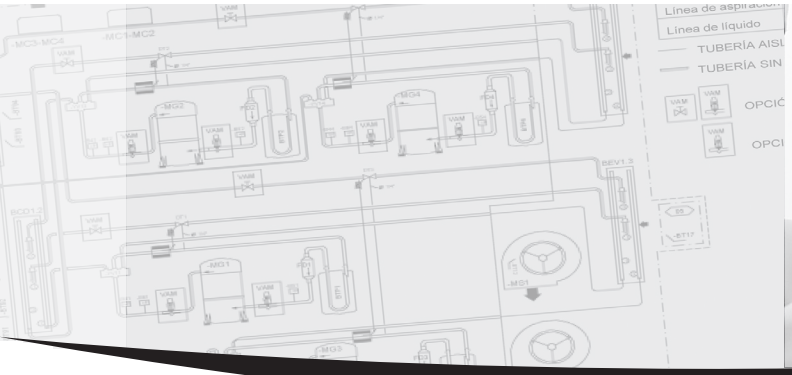
Installation, operating and maintenance

AIRCOOLAIR - KNCM/KNHM



• • • Providing indoor climate comfort

MIL83E-0607 08-2008

WARNING: Read this manual before installation, reparation o maintenance works.

TABLE OF CONTENTS

Lennox have been providing environmental solutions since 1895, our AIRCOOLAIR 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.lennoxeurope.com.

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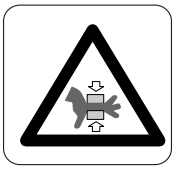
POINTS TO BEAR IN MIND

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.

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.

DATA PAGE FOR UNIT COMMISSIONING

UNIT: _____ SERIAL Nr: _____

CONTROL PANEL IDENTIFICATION CODE: _____

INSTALLATION ADDRESS: _____

INSTALLER: _____ INSTALLER TEL: _____

INSTALLER ADDRESS: _____

DATE OF COMMISSIONING: _____

CHECKS:

SUPPLY VOLTAGE: _____ RATED VOLTAGE OF THE UNIT: _____

	YES	**NO**
UNIT ON SHOCK ABSORBERS	☐	☐
DRAINAGE WITH TRAP	☐	☐
MAIN POWER SUPPLY CONNECTION	☐	☐
CONTROL PANEL CONNECTION	☐	☐
COMPRESSOR OIL LEVEL INDICATOR	☐	☐

DATA INPUT:

COOLING CYCLE

Air intake temperature to the outdoor coil: < **1** __ºC, **2** __ºC

Air output temperature to the outdoor coil: < **1** __ºC, **2** __ºC

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 ____/____/____

HEATING CYCLE

Air intake temperature to the outdoor coil: < **1** __ºC, **2** __ºC

Air output temperature to the outdoor coil: < **1** __ºC, **2** __ºC

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

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

Compressor 1 __/__/__ Compressor 2 __/__/__

Compressor 3 __/__/__

Outdoor fan section 1 ____/____/____

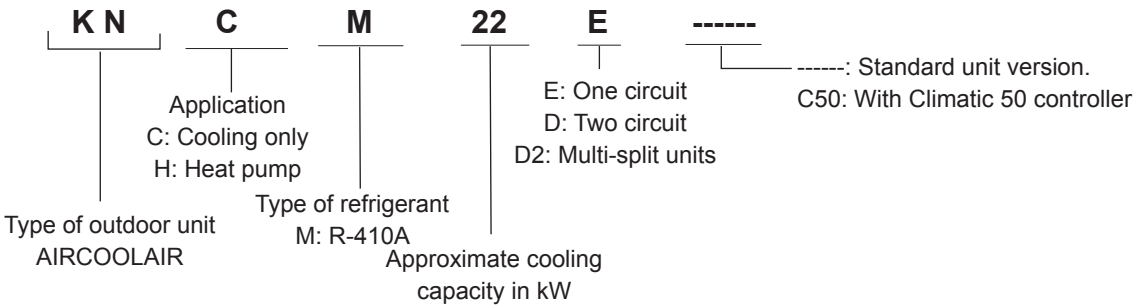
Outdoor fan section 2 ____/____/____

Options installed: _____

Comments: _____

1.- GENERAL CHARACTERISTICS

1.1.- PHYSICAL DATA



KNCM: Cooling only unit R-410A.
KNHM: Heat pump unit R-410A.

UNIT MODELS	KNCM KNHM 22E	KNCM KNHM 26E	KNCM KNHM 32E	KNCM KNHM 38E	KNCM KNHM 43E	KNCM KNHM 52D/D2	KNCM KNHM 64D/D2	KNCM KNHM 76D/D2	KNCM KNHM 86D/D2	KNCM KNHM 112D/D2	KNCM KNHM 128D/D2	KNCM KNHM 152D
Compressor Nr. / Type	1/Scroll	1/Scroll	1/Scroll	1/Scroll	1/Scroll	2/Scroll	2/Scroll	2/Scroll	2/Scroll	3/Scroll	3/Scroll	3/Scroll
Net weight												
KNCM cooling only unit Kg	160	210	216	233	255	443	452	481	520	632	797	906
KNHM Heat pump unit Kg	168	219	221	239	258	452	463	499	537	748	828	932
Air flow m3/h	6800	9750	11500	11300	11000	9750+9750	11500+11500	11300+11300	11000+11000	22700+18100	22700+18100	22700+22700
Refrigerant charge	NITROGEN(*)											

(*) The units are supplied with nitrogen gas; this must be removed and the unit charged with refrigerant R-410A, depending on unit model.
(see page 21 to calculate refrigerant charge for model KNCM/KNHM units to work with indoor units LECM /LEHM).
R-410A factory refrigerant precharge kit is available as an option.

ADDITIONAL WEIGHT FOR OPTIONS

125Pa FP1 HIGH PRESSURE KIT (Only available for units 112D/D2-128D/D2-152D)

MODELS KNCM/HM	**112D/D2**	**128D/D2**	**152D**
WEIGHTS Kg (*)	40	40	40

250Pa FP2 HIGH PRESSURE KIT (Only available for units 112D/D2-128D/D2-152D)

MODELS KNCM/HM	**112D/D2**	**128D/D2**	**152D**
WEIGHTS Kg (*)	40	40	40

SOFT STARTER-COMPRESSOR STARTING CURRENT LIMIT

MODELS	WEIGHTS (*)
22E-26E-32E-38E-43E	3
52D/D2-64D/D2-76D/D2-86D/D2	6
112D/D2-128D/D2-152D	9

1.- GENERAL CHARACTERISTICS

1.2.- ELECTRICAL DATA

ELECTRICAL CONSUMPTION FOR STANDARD UNITS

UNIT MODELS		KNCM KNHM 22E	KNCM KNHM 26E	KNCM KNHM 32E	KNCM KNHM 38E	KNCM KNHM 43E	KNCM KNHM 52D/D2	KNCM KNHM 64D/D2	KNCM KNHM 76D/D2	KNCM KNHM 86D/D2	KNCM KNHM 112D/D2	KNCM KNHM 128D/D2	KNCM KNHM 152D
Voltage	V/f (50Hz)	3N~400V 50Hz											
Maximum absorbed power (kW)													
	Compressor	8.25	10.1	11.8	15.6	16.9	20.2	23.6	31.1	33.8	42.6	45.6	55.9
	Fan	0.30	0.69	0.69	0.84	0.84	1.38	1.38	1.68	1.68	3.05	3.05	4.00
	Total power	8.55	10.8	12.5	16.4	17.7	21.6	25.0	32.8	35.5	45.6	48.7	59.9
Maximum current (A)													
	Compressor	15.0	21.0	22.0	25.6	31.0	42.0	44.0	51.2	62.0	77.6	84.0	102
	Fan	1.60	3.00	3.40	3.40	3.40	6.00	6.80	6.80	6.80	6.40	6.40	8.00
	Total current	16.6	24.0	25.4	29.0	34.4	48.0	50.8	58.0	68.8	84.0	90.4	110
Start up current (A)		87.5	97.4	104	138	172	121/195	129/207	167/275	206/343	221/330	228/365	292

ADDITIONAL ELECTRICAL CONSUMPTION FOR THE OPTIONS

OPTION FP1-FP2		KNCM KNHM 112D/D2 FP1-FP2	KNCM KNHM 128D/D2 FP1-FP2	KNCM KNHM 152D FP1-FP2
Voltage	Ph/V/Hz	3~400V 50Hz		
Maximum absorbed power	kW	2.00-6.20	2.00-6.20	1.00-5.20
Maximum current	A	3.20-9.80	3.20-9.80	1.60-8.20
Start up current	A	3.20-9.80	3.20-9.80	1.60-8.20

1.3.- FAN PERFORMANCES

1.3.1.- OUTDOOR UNIT WITH AVAILABLE HIGH PRESSURE FAN (OPTION)

Air flow data. Option FP1.

MODELS				112D-128D-152D
Fan type				Axial-Direct coupling 900 r.p.m. (Low speed) 3~400V
No. of fans:				2
Available static pressure Pa.	50	Air flow	m^3/h	19000+19000
		Absorbed power	kW	5
	75	Air flow	m^3/h	18000+18000
		Absorbed power	kW	5.1
	100	Air flow	m^3/h	17000+17000
		Absorbed power	kW	5.2
	125	Air flow	m^3/h	15000+15000
		Absorbed power	kW	5.3

Air flow data. Option FP2.

MODELS				112D-128D-152D
Fan type				Axial "short case"-Direct coupling 1450 r.p.m. (High speed) 3~400V
No. of fans:				2
Available static pressure Pa.	150	Air flow	m^3/h	22000+22000
		Absorbed power	kW	9.2
	200	Air flow	m^3/h	20000+20000
		Absorbed power	kW	9.3
	250	Air flow	m^3/h	18000+18000
		Absorbed power	kW	9.4

1.4.- OPERATING LIMITS **(For installation with LECM-LEHM units)**

OPERATING LIMITS FOR (COOLING ONLY) UNITS		MAXIMUM TEMPERATURES	MINIMUM TEMPERATURES
COOLING CYCLE OPERATION	INDOOR TEMPERATURE	32ºC DB / 23ºC WB	21ºC DB / 15ºC WB
	OUTDOOR TEMPERATURE	45ºC (22E-26E-32E-52D-64D) 47ºC (38E-43E-76D-86D-112D -128D-152D)	+10ºC STANDARD UNIT 0ºC (*) -15ºC (**)

(*) With option kit low temperature 0ºC.

(**) With option kit low temperature -15ºC or long distance.

OPERATING LIMITS FOR (HEATING PUMP) UNITS		MAXIMUM TEMPERATURES	MINIMUM TEMPERATURES
COOLING CYCLE OPERATION	INDOOR TEMPERATURE	32ºC DB / 23ºC WB	21ºC DB / 15ºC WB
	OUTDOOR TEMPERATURE	45ºC (22E-26E-32E-52D-64D) 47ºC (38E-43E-76D-86D-112D -128D-152D)	0ºC
HEATING CYCLE OPERATION	INDOOR TEMPERATURE	27ºC DB	15ºC DB
	OUTDOOR TEMPERATURE	DEPENDING ON MODEL (See tables for heating capacities)	-10ºC DB / -11ºC WB

DB: Dry bulb temperature.

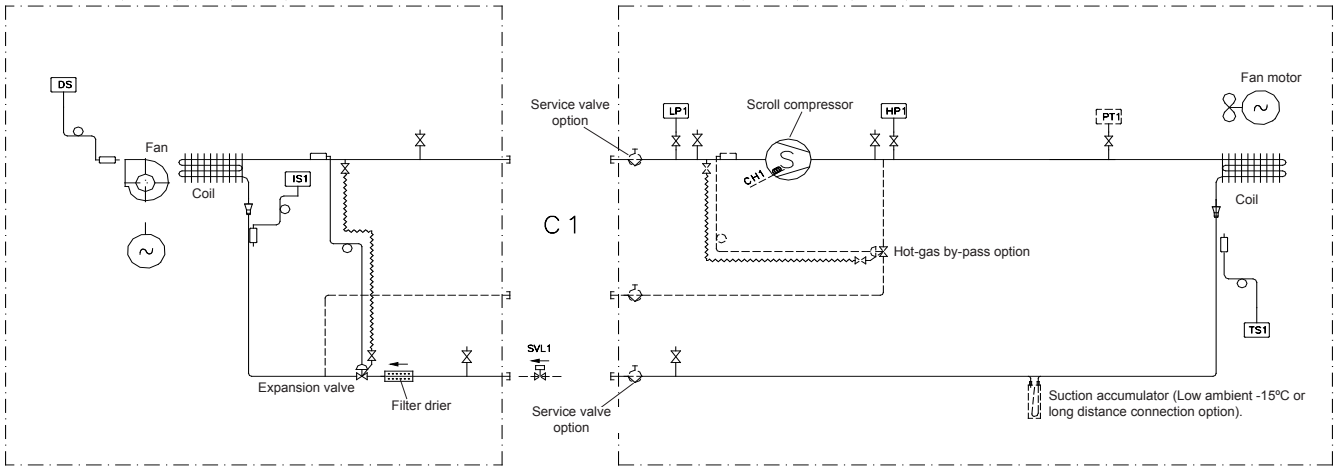
WB: Wet bulb temperature

1.5.- PIPING DRAWINGS

COOLING ONLY UNITS

INDOOR UNIT
LECM 22E/26E/32E/38E/43E

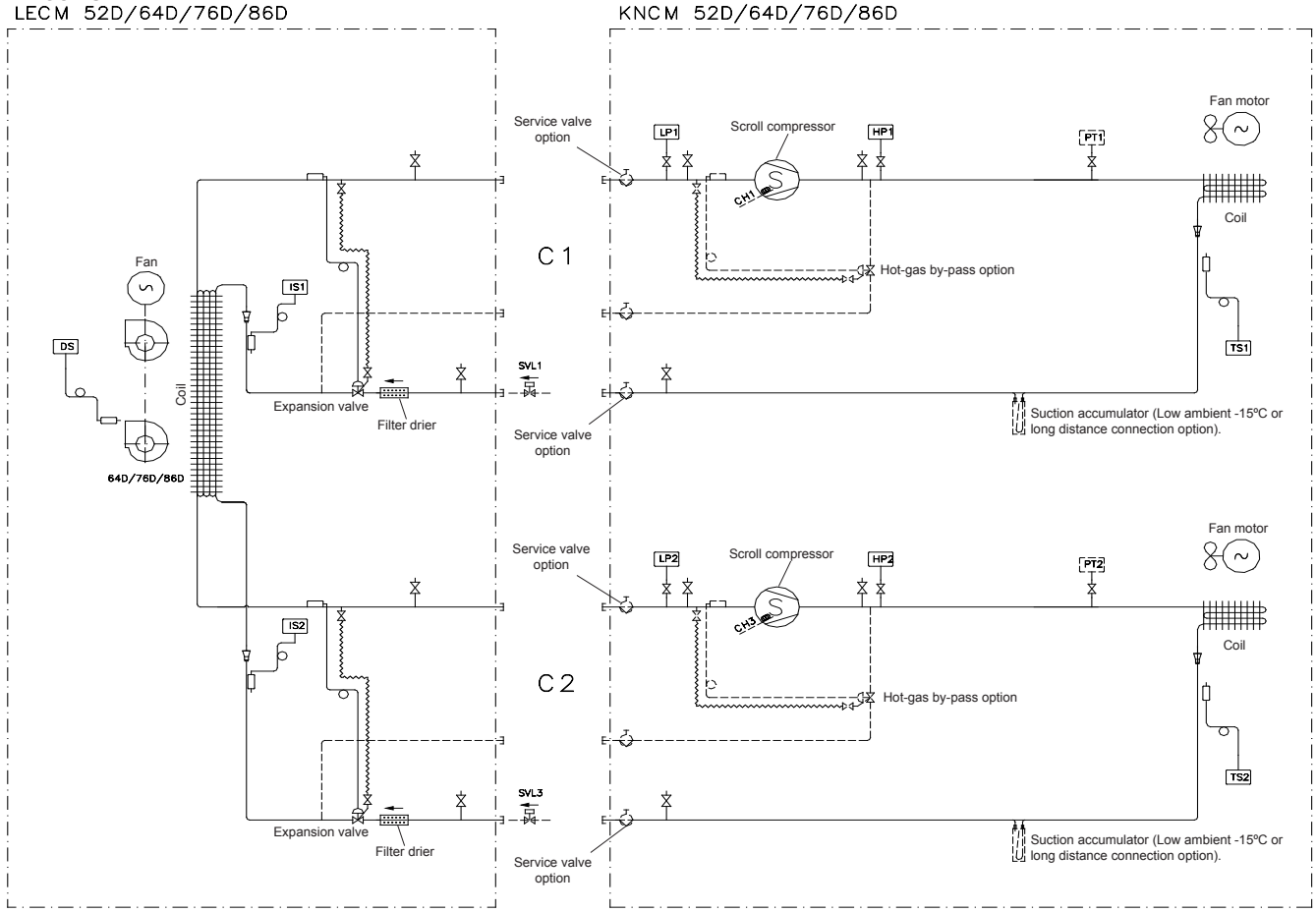
OUTDOOR UNIT
KNCM 22E/26E/32E/38E/43E



---------- **OPTION ELEMENT**

INDOOR UNIT
LECM 52D/64D/76D/86D

OUTDOOR UNIT
KNCM 52D/64D/76D/86D

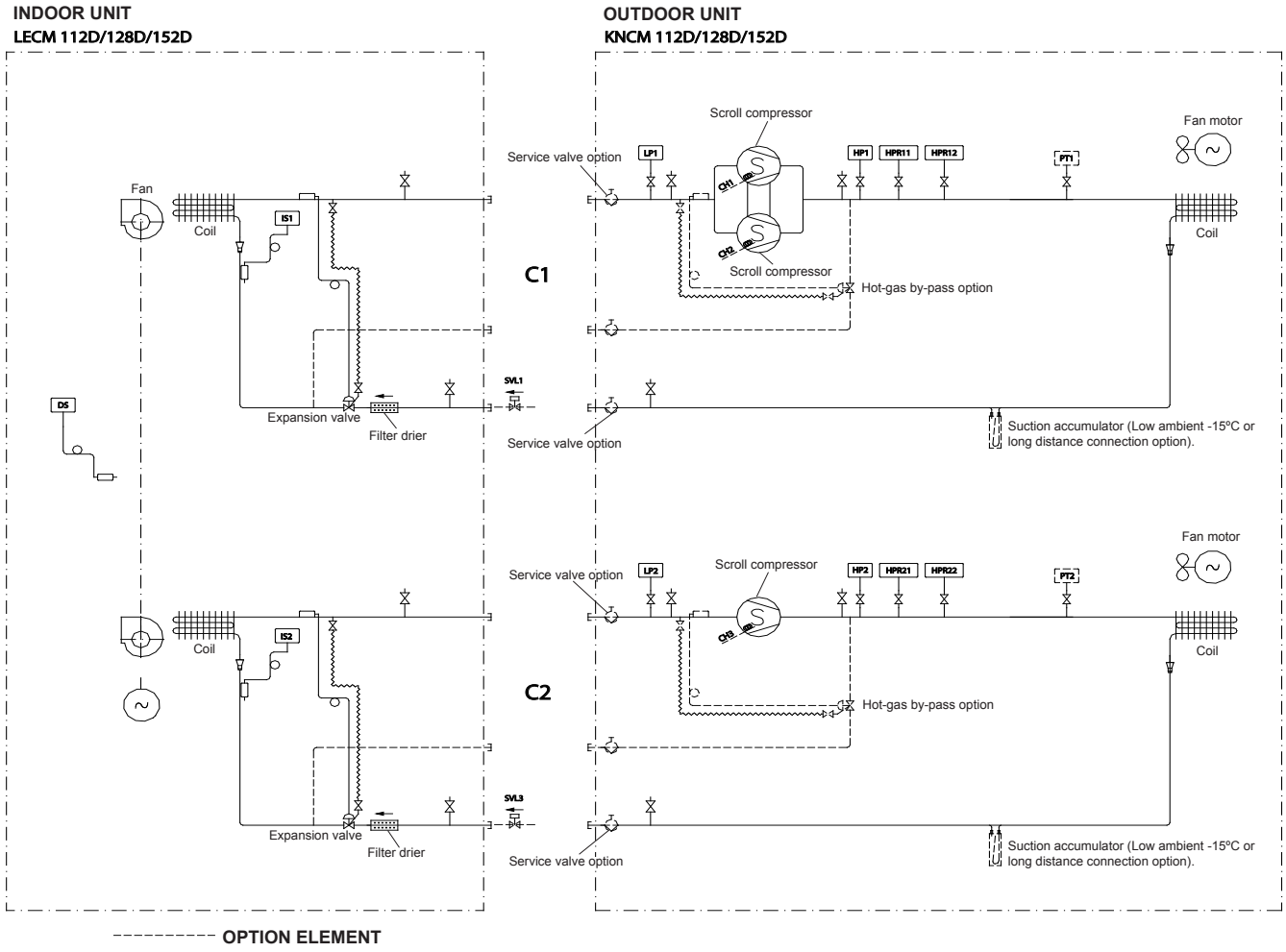


---------- **OPTION ELEMENT**

- Pressure gauge. (5/16" to be fitted by the installer).
- DS Discharge sensor. (C50 version).
- IS1 Liquid-gas pipe sensor, circuit 1. (STD and D2 version).
- IS2 Liquid-gas pipe sensor, circuit 2. (STD and D2 version).
- SVL1 Liquid solenoid valve. (Low ambient -15ºC or long distance option). To be connected by the installer to indoor units.
- SVL3 Liquid solenoid valve. (Low ambient -15ºC or long distance option). To be connected by the installer to indoor units.
- LP1 Low pressure switch, circuit 1.
- LP2 Low pressure switch, circuit 2.
- HP1 High pressure switch, circuit 1.
- HP2 High pressure switch, circuit 2.
- CH1 Crank case heater. (Low ambient 0ºC option).
- CH3 Crank case heater. (Low ambient 0ºC option).
- PT1 Pressure transducer, circuit 1.(Low ambient -15ºC or long distance and C50).
- PT2 Pressure transducer, circuit 2. (Low ambient -15ºC or long distance and C50).
- TS1 Condensing temperature sensor, circuit 1 (STD and D2 version).
- TS2 Condensing temperature sensor, circuit 2 (STD and D2 version).

1.5.- PIPING DRAWINGS

COOLING ONLY UNITS



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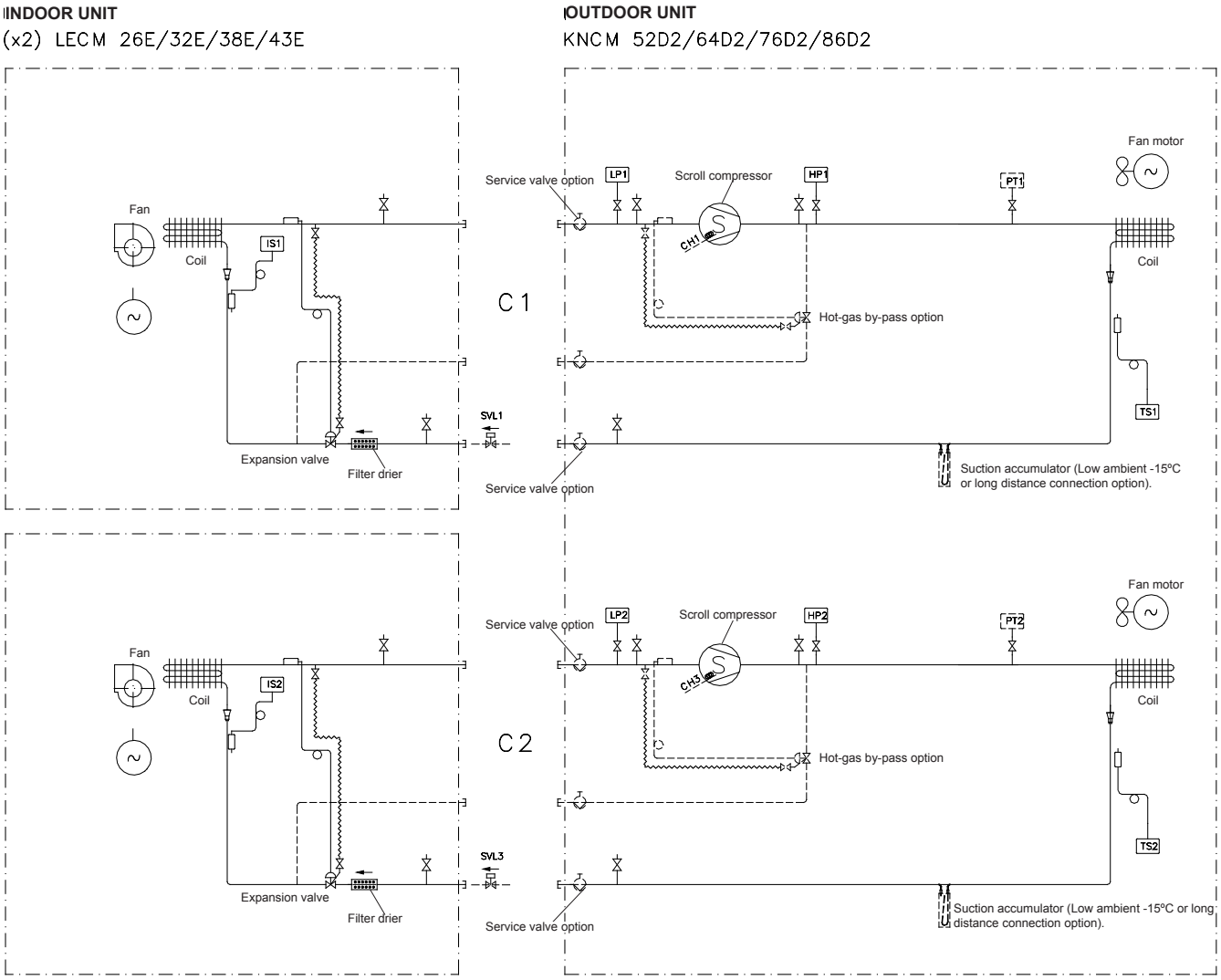
- DS Discharge sensor. (C50 version).
- IS1 Liquid-gas pipe sensor, circuit 1. (STD and D2 version).
- IS2 Liquid-gas pipe sensor, circuit 2. (STD and D2 version).
- SVL1 Liquid solenoid valve (Low ambient -15ºC or long distance option). To be connected by the installer to indoor units.
- SVL3 Liquid solenoid valve (Low ambient -15ºC or long distance option). To be connected by the installer to indoor units.
- LP1 Low pressure switch, circuit 1.
- LP2 Low pressure switch, circuit 2.
- HP1 High pressure switch, circuit 1.
- HP2 High pressure switch, circuit 2.
- HPR11 Condensing pressure control fan motor ON/OFF, circuit 1 (STD and D2 version).
- HPR21 Condensing pressure control fan motor ON/OFF, circuit 2 (STD and D2 version).
- HPR12 Condensing pressure control low/high speed, circuit 1 (STD and D2 version).
- HPR22 Condensing pressure control low/high speed, circuit 2 (STD and D2 version).
- CH1 Crank case heater. (Low ambient 0ºC option).
- CH2 Crank case heater. (Low ambient 0ºC option).
- CH3 Crank case heater. (Low ambient 0ºC option).
- PT1 Pressure transducer, circuit 1. (Low ambient -15ºC or long distance op. and C50).
- PT2 Pressure transducer, circuit 2. (Low ambient -15ºC or long distance op. and C50).

1.5.- PIPING DRAWINGS

COOLING ONLY UNITS

MULTI-SPLIT SYSTEM

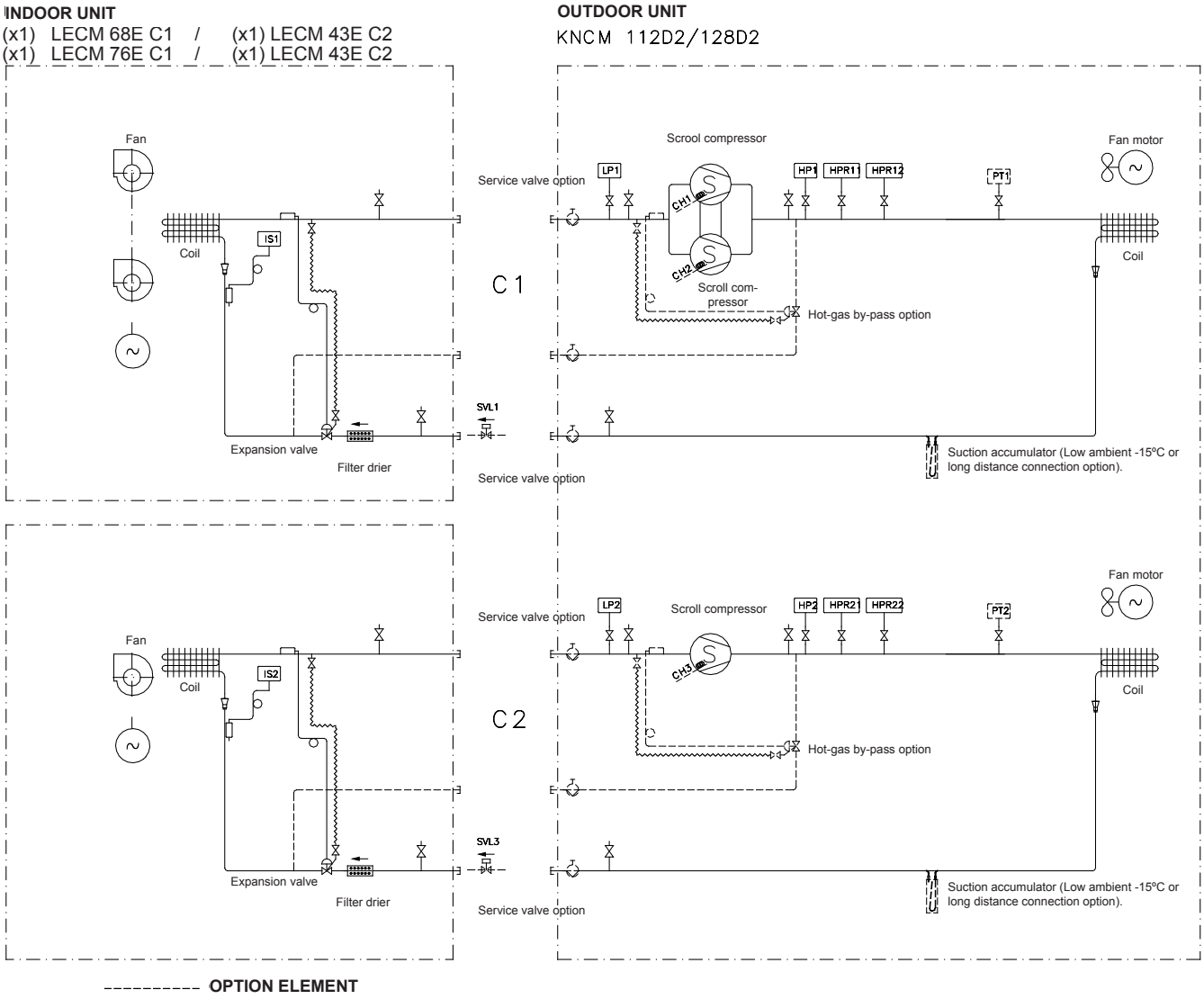


Pressure gauge. (5/16" to be fitted by the installer).
IS1 Liquid-gas pipe sensor, circuit 1. (STD and D2 version).
IS2 Liquid-gas pipe sensor, circuit 2. (STD and D2 version).
SVL1 Liquid solenoid valve (Low ambient -15ºC or long distance option). To be connected by the installer to indoor units.
SVL3 Liquid solenoid valve (Low ambient -15ºC or long distance option). To be connected by the installer to indoor units.
LP1 Low pressure switch, circuit 1.
LP2 Low pressure switch, circuit 2.
HP1 High pressure switch, circuit 1.
HP2 High pressure switch, circuit 2.
CH1 Crank case heater. (Low ambient 0ºC option).
CH3 Crank case heater. (Low ambient 0ºC option).
PT1 Pressure transducer, circuit 1. (Low ambient -15ºC or long distance op. and C50).
PT2 Pressure transducer, circuit 2. (Low ambient -15ºC or long distance op.and C50).
TS1 Condensing temperature sensor, circuit 1 (STD and D2 version).
TS2 Condensing temperature sensor, circuit 2 (STD and D2 version).

1.5.- PIPING DRAWINGS

ONLY COOLING UNITS

MULTI-SPLIT SYSTEM



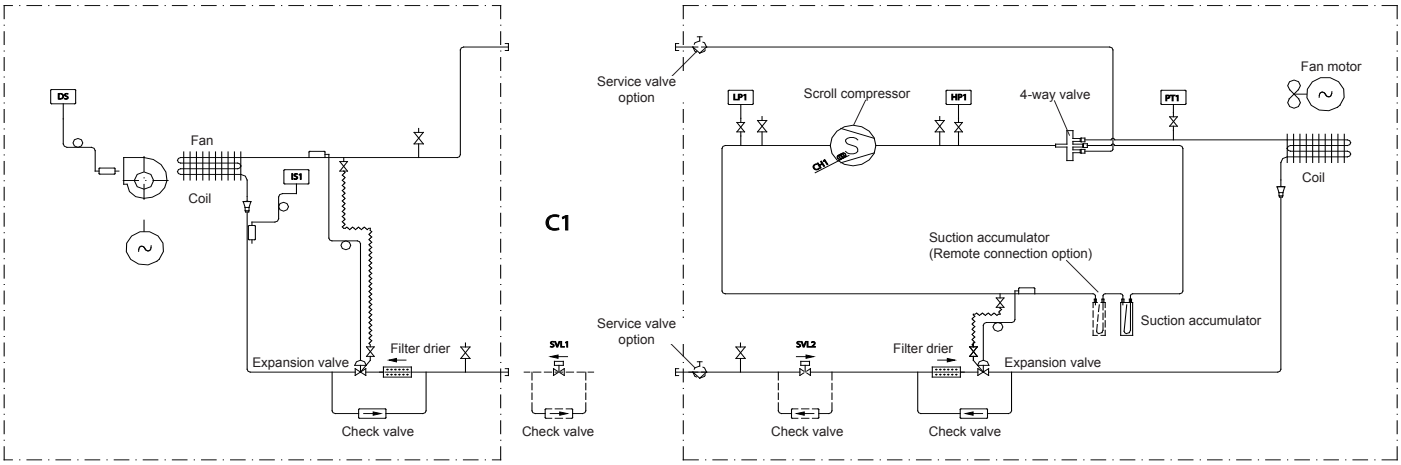
- Pressure gauge. (5/16" to be used by the installer).
- IS1 Liquid-gas pipe sensor, circuit 1. (STD and D2 version).
- IS2 Liquid-gas pipe sensor, circuit 2. (STD and D2 version).
- SVL1 Liquid solenoid valve (Low ambient -15ºC or long distance option). To be connected by the installer to indoor units.
- SVL3 Liquid solenoid valve (Low ambient -15ºC or long distance option). To be connected by the installer to indoor units.
- LP1 Low pressure switch, circuit 1.
- LP2 Low pressure switch, circuit 2.
- HP1 High pressure switch, circuit 1.
- HP2 High pressure switch, circuit 2.
- HPR11 Condensing pressure control fan motor ON/OFF, circuit 1 (STD and D2).
- HPR21 Condensing pressure control fan motor ON/OFF, circuit 2 (STD and D2).
- HPR12 Condensing pressure control low/high speed, circuit 1 (STD and D2 version).
- HPR22 Condensing pressure control low/high speed, circuit 2 (STD and D2 version).
- CH1 Crank case heater. (Low ambient 0ºC option).
- CH2 Crank case heater. (Low ambient 0ºC option).
- CH3 Crank case heater. (Low ambient 0ºC option).
- PT1 Pressure transducer, circuit 1.(Low ambient -15ºC or long distance op).
- PT2 Pressure transducer, circuit 2. (Low ambient -15ºC or long distance op).

1.5.- PIPING DRAWINGS

HEAT PUMP UNITS

INDOOR UNIT
LEHM 22E/26E/32E/38E/43E

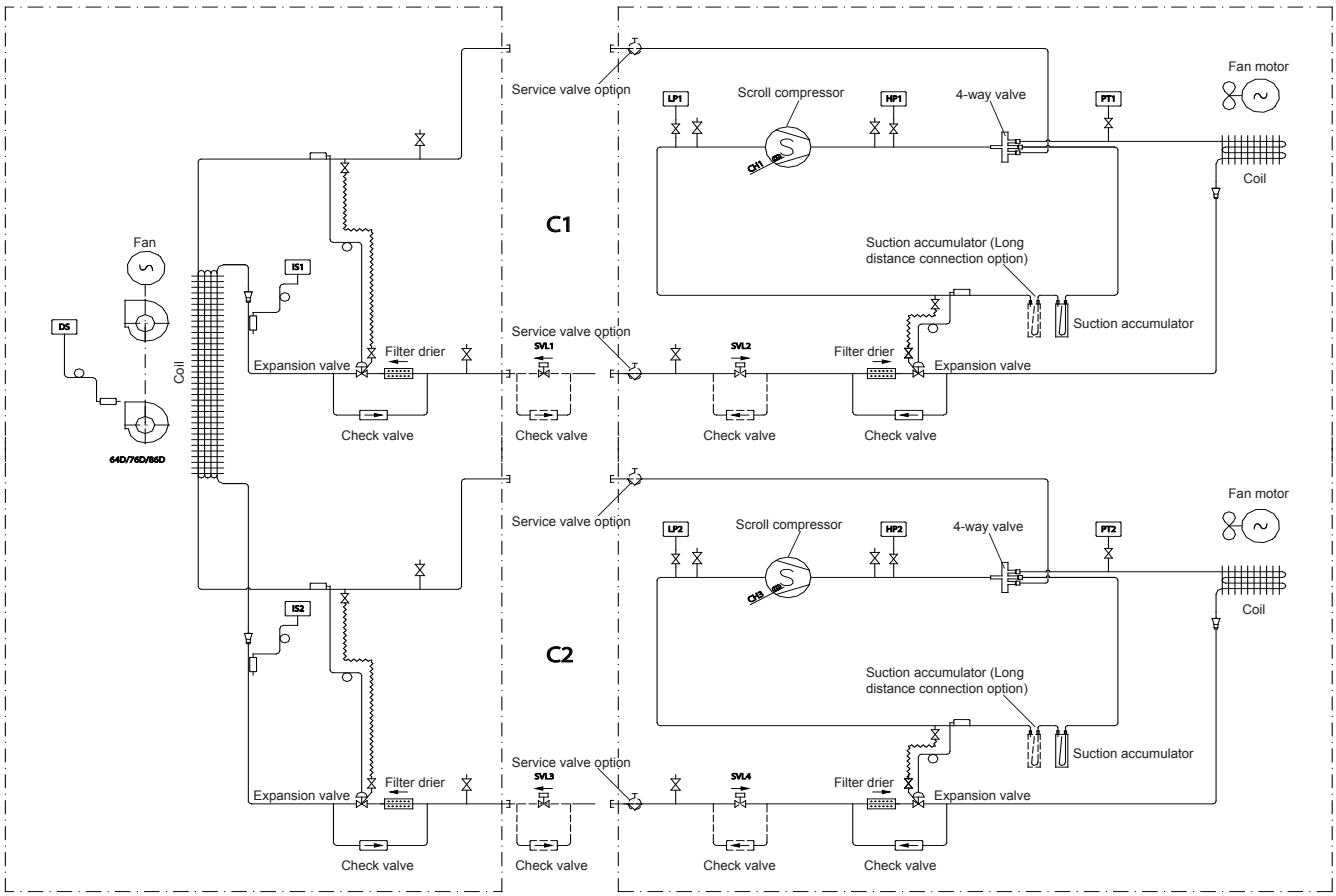
OUTDOOR UNIT
KNHM 22E/26E/32E/38E/43E



---------- **OPTION ELEMENT**

INDOOR UNIT
LEHM 52D/64D/76D/86D

OUTDOOR UNIT
KNHM 52D/64D/76D/86D

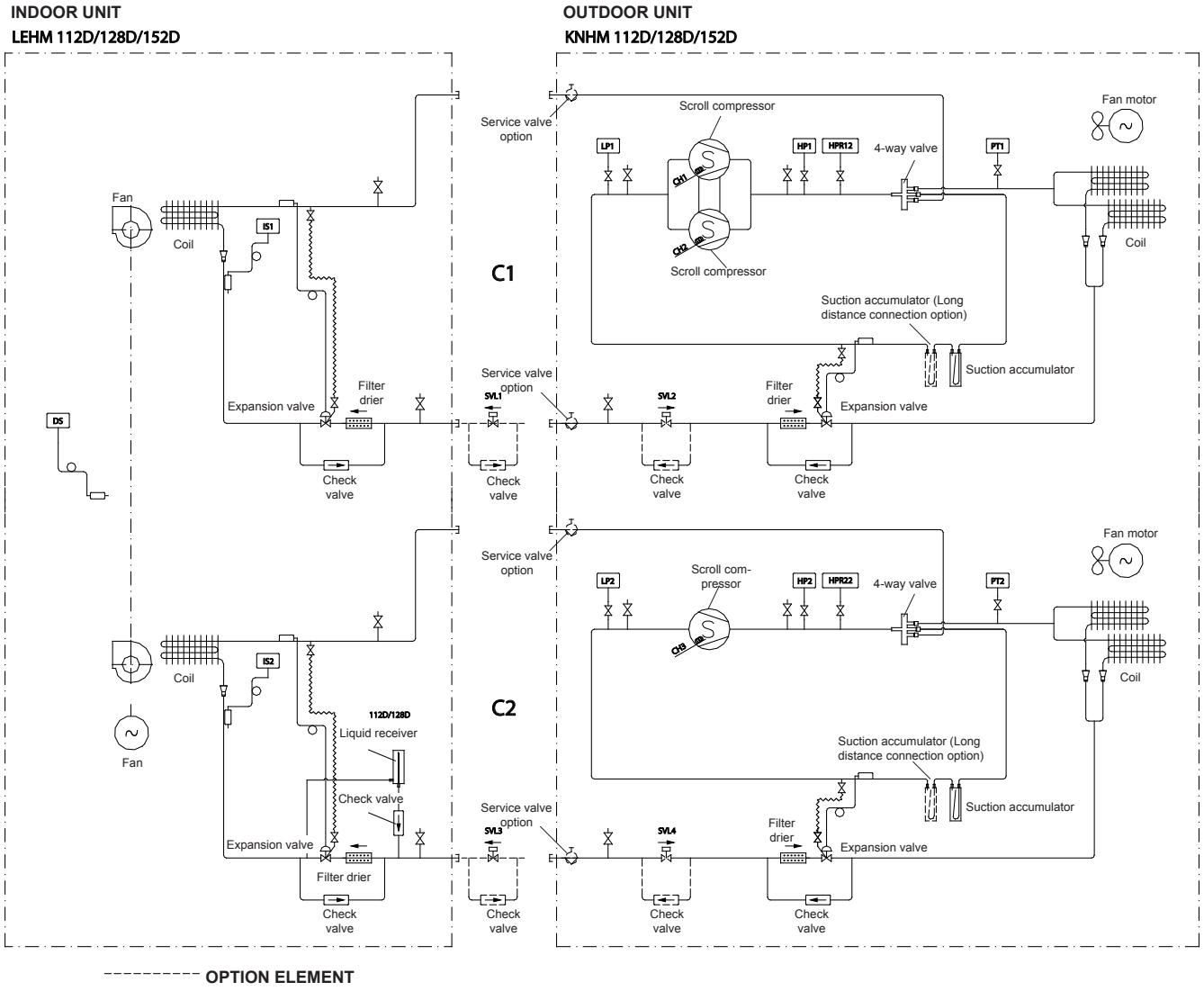


---------- **OPTION ELEMENT**

- Pressure gauge. (5/16" to be fitted by the installer).
- DS Discharge sensor. (C50 version).
- IS1 Liquid-gas pipe sensorr, circuit 1. (STD and D2 version).
- IS2 Liquid-gas pipe sensor circuit 2. (STD and D2 version).
- SVL1 Liquid solenoid valve (Long distance option). To be connected by the installer in the indoor unit.
- SVL2 Liquid solenoid valve (Long distance option).
- SVL3 Liquid solenoid valve (Long distance option). To be connected by the installer in the indoor unit.
- SVL4 Liquid solenoid valve (Long distance option).
- LP1 Low pressure switch, circuit 1.
- LP2 Low pressure switch, circuit 2.
- HP1 High pressure switch, circuit 1.
- HP2 High pressure switch, circuit 2.
- CH1 Crank case heater.
- CH3 Crank case heater.
- PT1 Pressure transducer, circuit 1.
- PT2 Pressure transducer, circuit 2.

1.5.- PIPING DRAWINGS

HEAT PUMP UNITS



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IS1 Liquid-gas pipe sensor, circuit 1. (STD and D2 version).
IS2 Liquid-gas pipe sensor, circuit 2. (STD and D2 version).
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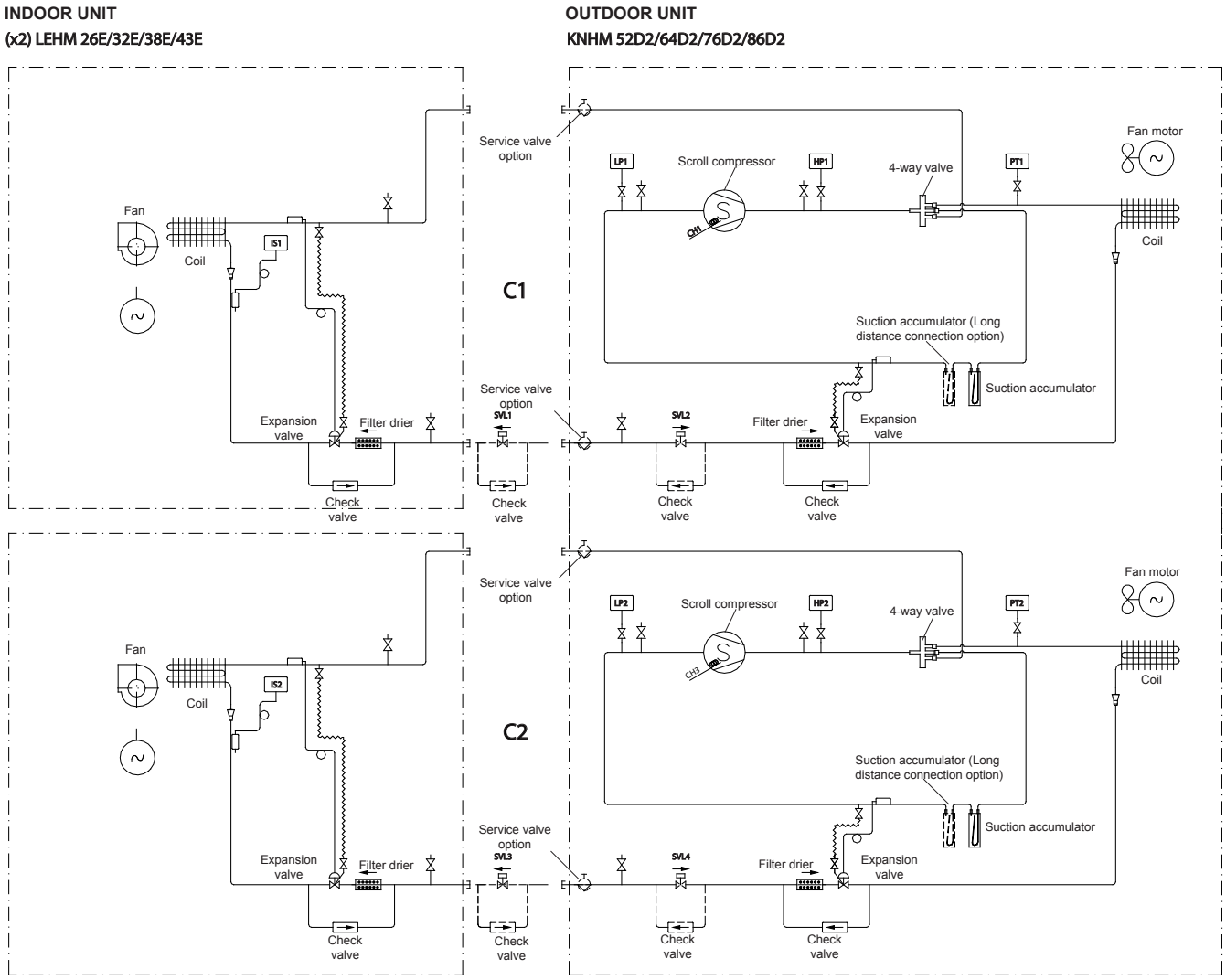
SVL3 Liquid solenoid valve (Long distance option).
To be connected by the installer to indoor units.
SVL4 Liquid solenoid valve (Long distance option).

LP1 Low pressure switch, circuit 1.
LP2 Low pressure switch, circuit 2.
HP1 High pressure switch, circuit 1.
HP2 High pressure switch, circuit 2.
HPR12 Condensing pressure control low/high speed, circuit 1.(STD and D2 version).
HPR22 Condensing pressure control low/high speed, circuit 2.(STD and D2 version).
CH1 Crank case heater.
CH2 Crank case heater.
CH3 Crank case heater.
PT1 Pressure transducer, circuit 1.
PT2 Pressure transducer, circuit 2.

1.5.- PIPING DRAWINGS

HEAT PUMP UNITS

MULTI-SPLIT SYSTEM

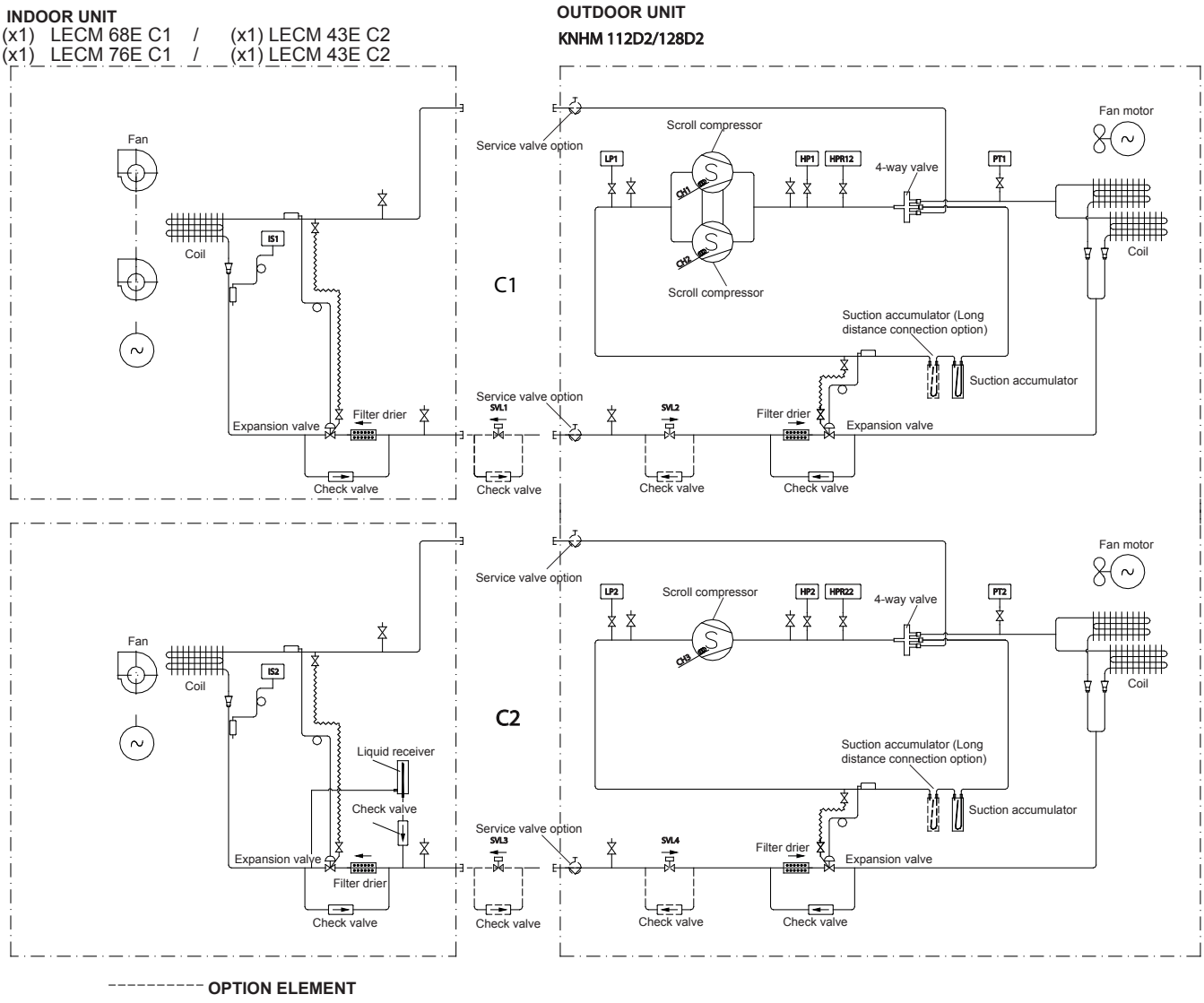


Pressure gauge. (5/16" to be fitted by the installer).
IS1 Liquid-gas pipe sensor circuit 1. (STD and D2 version).
IS2 Liquid-gas pipe sensor circuit 2. (STD and D2 version).
SVL1 Liquid solenoid valve (Long distance option).
To be connected by the installer to indoor units.
SVL2 Liquid solenoid valve (Long distance option).
SVL3 Liquid solenoid valve (Long distance option).
To be connected by the installer to indoor units.
SVL4 Liquid solenoid valve (Long distance option).
LP1 Low pressure switch, circuit 1.
LP2 Low pressure switch, circuit 2.
HP1 High pressure switch, circuit 1.
HP2 High pressure switch, circuit 2.
CH1 Crank case heater.
CH3 Crank case heater.
PT1 Pressure transducer, circuit 1.
PT2 Pressure transducer, circuit 2.

1.5.- PIPING DRAWINGS

HEAT PUMP UNITS

MULTI-SPLIT SYSTEM



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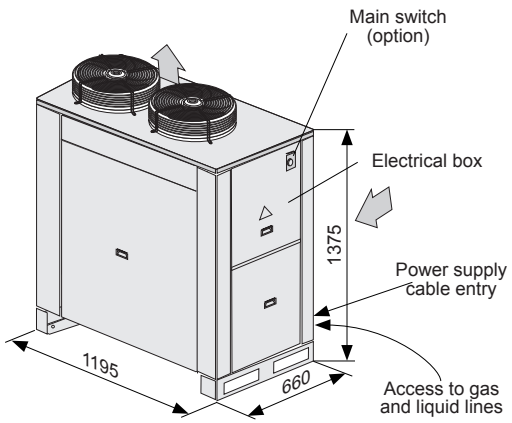
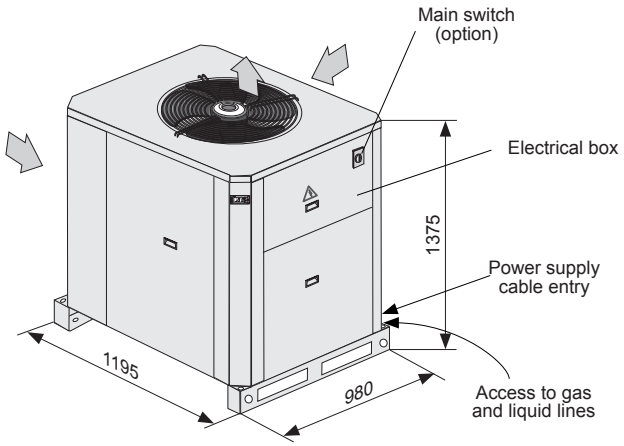
HP1 High pressure switch, circuit 1.
HP2 High pressure switch, circuit 2.
HPR12 Condensing pressure control low/high speed, circuit 1 (STD and D2).
HPR22 Condensing pressure control low/high speed, circuit 2 (STD and D2).
CH1 Crank case heater.
CH2 Crank case heater.
CH3 Crank case heater.
PT1 Pressure transducer, circuit 1.
PT2 Pressure transducer, circuit 2.

1.6.- DIMENSIONS OF KNCM/KNHM UNIT

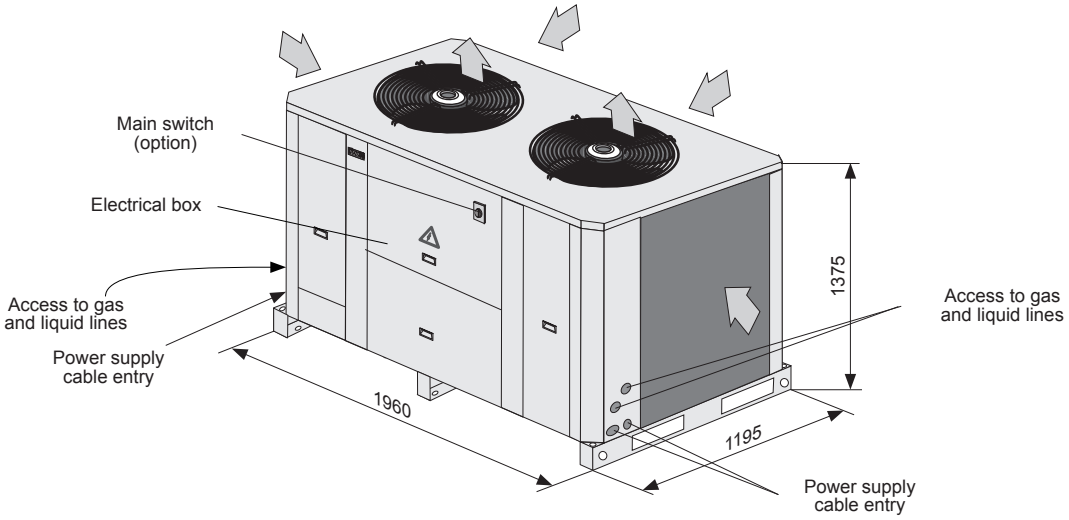
22E



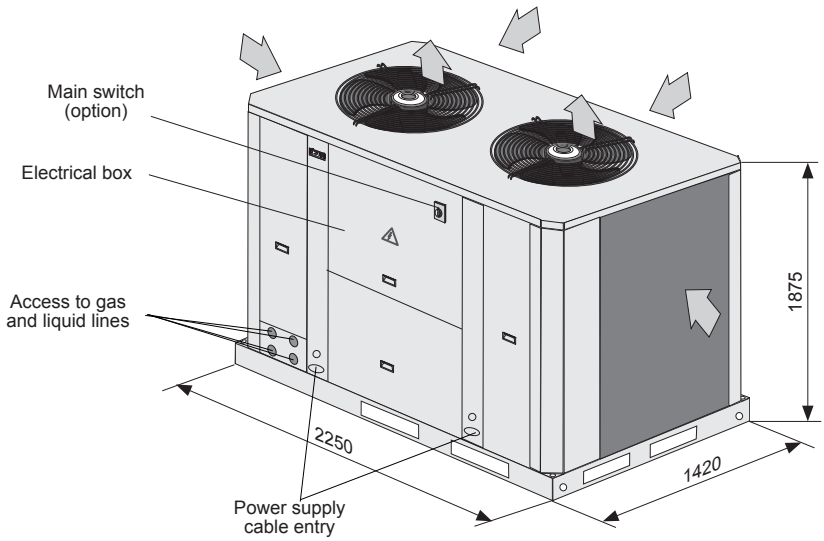
26E-32E-38E-43E



52D/D2-64D/D2-76D/D2-86D/D2



112D/D2-128D/D2-152D



2.- INSTALLATION

2.1.- PRELIMINARY PREPATATIONS

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

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.
Sufficient space must be allowed to facilitate installation of the unit.
The unit may be mounted outdoors. When the unit is mounted on the floor, ensure that the position is not subject

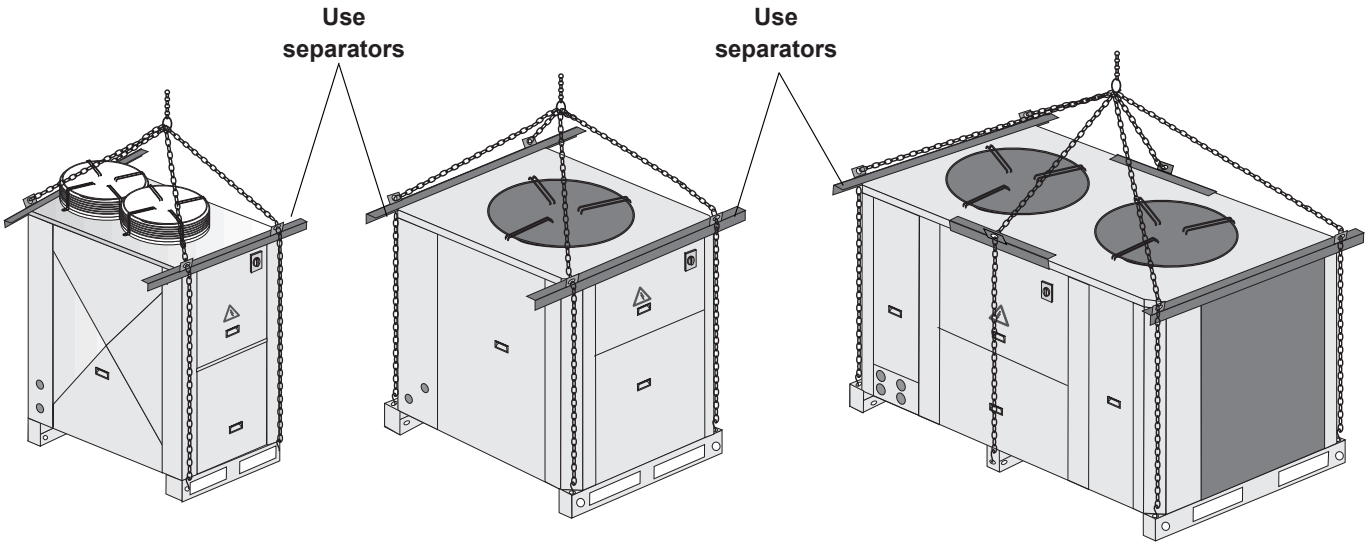
When positioning the unit, be sure that the Rating Plate is always visible since this data will be necessary to ensure correct maintenance.

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.

2.2.- UNIT RECEPTION

All units have Metal Bedplate Profiles.
If unloading and installation require the use of a crane, then the suspension cables must be secured as shown in the diagram.

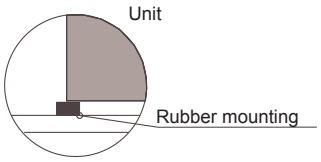
How to hoist the unit



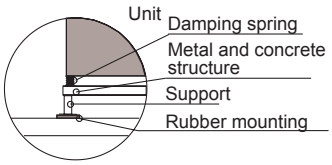
2.- INSTALLATION

2.3.- UNIT LOCATION

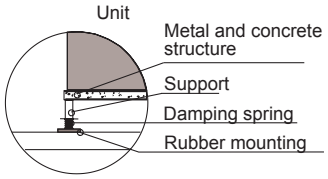
- The bedplate is made up of metal sections, capable of withstanding the weight of the unit.
- If the unit is floor mounted, then the profiles should be isolated with shock absorbing material such as anti-vibration units or pads. Bear in mind that the fans rotate at approximately 850 rpm.
- The unit is able to work in normal radio interference conditions for commercial and residential installations. For any other conditions please consult us.
- If the outside temperature in the area where the heat pump unit is to be installed is low or the operating cycle is too long, it may be necessary to install an electrical heater in the drip tray, to prevent the formation of ice in the coil during the defrost cycle.



1.- Mounting on a low sensitivity area.



2.- Mounting on a medium sensitivity area.



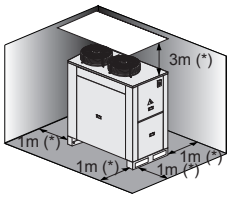
3.- Mounting on a high sensitivity area (Check floor loading).

2.4.- INSTALLATION CLEARANCES

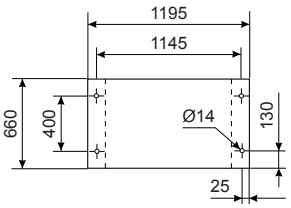
FAILURE TO INSTALL THE UNITS AS SHOWN WILL IMPACT PERFORMANCE AND RELIABILITY.

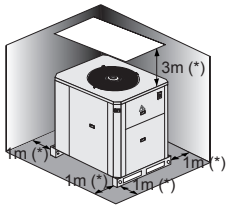
INSTALLATION CLEARANCES

DETAILING AVM POSITIONS

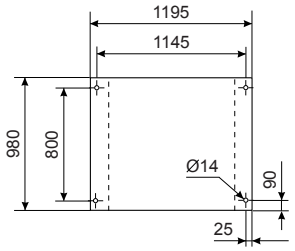


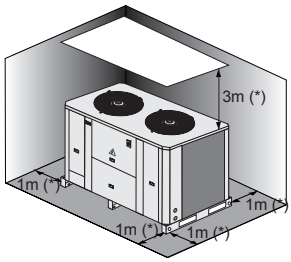
KNCM-HM 22E



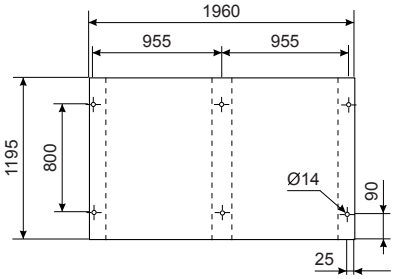


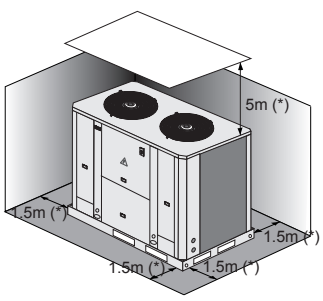
KNCM-HM 26E-32E-38E-43E



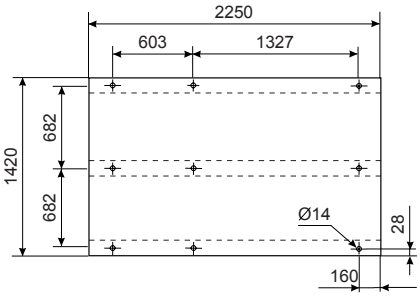


KNCM-HM 52D/D2-64D/D2-76D/2-86D/D2





KNCM-HM 112D/D2-128D/D2-152D

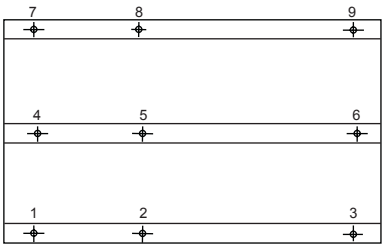


(*) Clearance around the unit.

Size in mm.

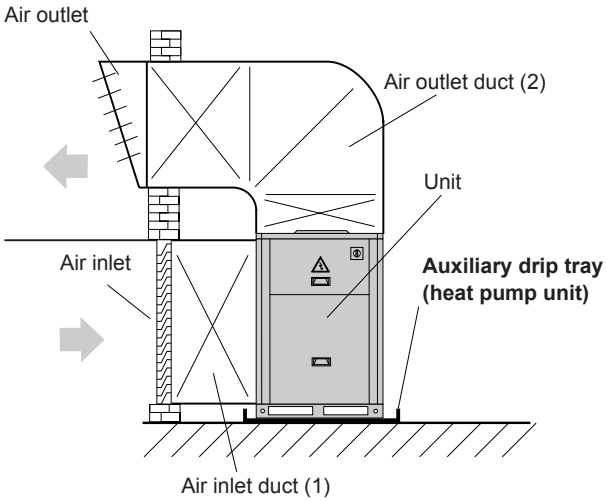
2.- INSTALLATION

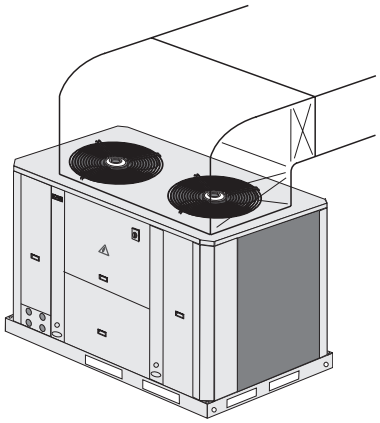
2.5.- DETAILS OF ANTI-VIBRATION **SPRING** POSITION **KNCM/HM 112D-152D**



POSITION Nr.	ANTI-VIBRATION TYPE
1	350
2	350
3	350
4	350
5	350
6	350
7	250
8	250
9	250

2.6.- INDOOR LOCATION





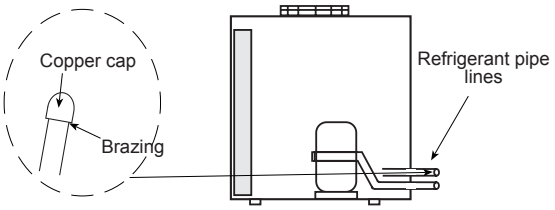
In heat pump units with double circuits and cooling units 112D-152D only, if only one duct is going to be installed, a regulated pressure damper should be installed for each fan, to avoid air by-pass through the fan if it has stopped.

For inside location, keep the following advice in mind:
- During the heat pump defrost cycle, the units produce a large quantity of melted water. If you wish to drain this water, adequate drainage should be installed below the unit to collect and lead the water to the desired location.
- Air duct installation:
  If an air duct has been installed, the operating limits will be reduced (see operating limits section in this manual).
  (1) The air intake plenum (option) available for models 112D to 152D facilitates the installation of the air intake duct.
  (2) The discharge plenum (option) permits the installation of a square discharge duct with options FP1 and FP2.

2.- INSTALLATION

2.7- REFRIGERANT CONNECTIONS

The unit is supplied with the gas and liquid lines sealed with copper caps outside the casing with possibility to install pipe lines (unless the unit is supplied with the factory precharged refrigerant kit (option) or service valves kit (option).



Standard units are filled with Nitrogen gas, which must be removed before any operation on the unit.

As an option, the unit can be supplied with service valves on the gas and liquid lines, with Nitrogen charge (N_2) or refrigerant charge (R-410A).

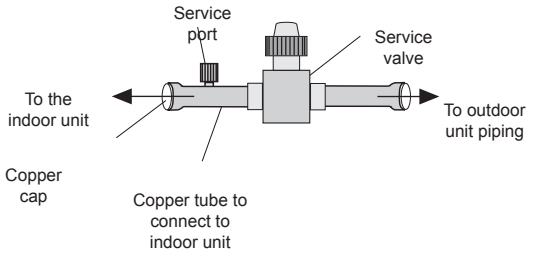
FOR STANDARD UNITS AND UNITS SUPPLIED WITH SERVICE VALVES PROCEED AS FOLLOW:

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 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/cm^2 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/cm^2 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 3.1. and 3.2. 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, keep the gas and liquid pipes covered, in order to prevent humidity and dirt from entering them.
Take special care that the refrigerant pipes are insulated.
Avoid collapse on lines installation.

FOR UNITS SUPPLIED WITH SERVICE VALVES AND FACTORY PRECHARGED REFRIGERANT KIT, PROCEED AS FOLLOWS:

1. Release the refrigerant pressure from the connecting line through the service port located in that line.
2. Remove the caps from the connecting lines.
3. Braze the interconnection line to the indoor unit.
4. With the service ports closed, evacuate and connect the vacuum pump to the 5/16" service port on the connecting line to achieve a pressure of -750mm Hg; after that, keep the vacuum pump running for at least one hour in order to provide a vacuum to the connecting lines and the indoor unit. Disconnect the vacuum pump.

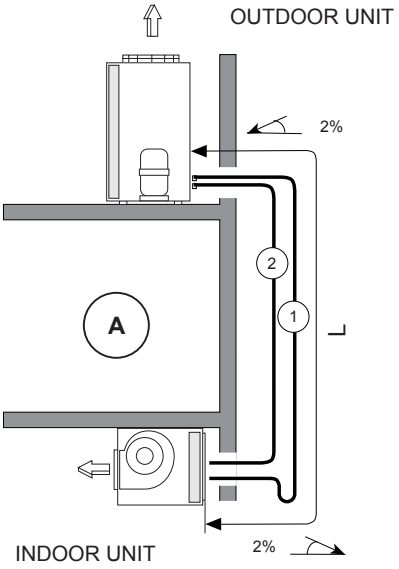


5. Refrigerant charge:
   Remove vacuum pump and connect the refrigerant bottle. Check TABLE 2 for refrigerant charge per meter of copper pipe for the corresponding model.
   Adjust the amount of refrigerant on the weighting scale and open the pressure gauge to charge in liquid state.
   (with R-410A refrigerant, the charging bottle must be in a vertical position and it is important to charge in the liquid state).
   Close the pressure gauge, disconnect it from the service port of the unit and fit the caps.
6. Open the service valves.
7. The unit is ready to operate.

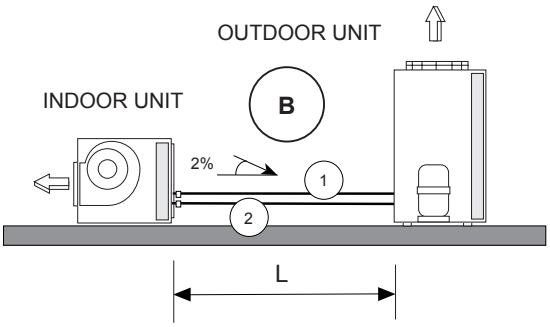
2.- INSTALLATION

2.7- REFRIGERANT CONNECTIONS

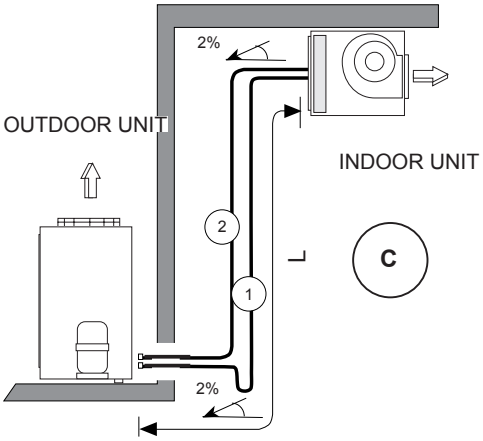
To locate outdoor and indoor units, refer to the following information:



POSITION **A:** A siphon suction must be installed in the vertical part of the gas line, and siphons must be installed every 8 meters in the rising section. The minimum suction speed must not be below 6m/s. Maximum vertical length 16m.



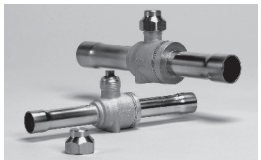
POSITION **B:** Slope the lines toward the outdoor unit. Take special care with lines longer than 10, and avoid collapse.



POSITION **C:** Install a siphon at the base of the vertical of the gas line, no more siphons are necessary. Maximum vertical length 16m.

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

NOTE: The units are supplied with welded connections. As an option, service valves are available for liquid and gas lines.



- GAS LINES MUST ALWAYS BE INSULATED.
- THE HORIZONTAL LINES MUST SLOPE AT LEAST 2% TOWARDS THE OUTDOOR UNIT.
- THE MAXIMUM SPEED IN THE LINES, SHOULD NOT BE MORE THAN 15 m/sec.

2.7- REFRIGERANT CONNECTIONS

For units with 2 circuits, please be sure to connect indoor unit circuits C1 and C2 to the corresponding C1 and C2 circuits of the outdoor unit.

- MODELS 112D/D2 and 128D/D2 USE DIFFERENT SIZES OF PIPE CONNECTIONS: LARGE SIZE FOR CIRCUIT 1 AND SMALL SIZE FOR CIRCUIT 2.

TABLE 1: REFRIGERANT LINES SELECTION

REFRIGERANT LINES				UNIT - MODEL											
				22E	26E	32E	38E	43E	52D-D2	64D-D2	76D-D2	86D-D2	112D-D2	128D-D2	152D
Total line length. (Length refrigerant lines between indoor unit and outdoor unit.)	0 to 30 m. (Standard connection of unit)	Ø Liquid	C1	1/2”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	3/4”	3/4”	3/4”
			C2	n/a	n/a	n/a	n/a	n/a	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	3/4”
		Ø Gas	C1	7/8”	1 1/8”	1 1/8”	1 3/8”	1 3/8”	1 1/8”	1 1/8”	1 3/8”	1 3/8”	1 5/8”	1 5/8”	1 5/8”
			C2	n/a	n/a	n/a	n/a	n/a	1 1/8”	1 1/8”	1 3/8”	1 3/8”	1 3/8”	1 3/8”	1 5/8”
		Max. No. of bends		6	12	8	18	12	12	8	18	12	12	12	12
	30 to 65 m.	Ø Liquid	C1	5/8”	5/8”	5/8”	3/4”	3/4”	5/8”	5/8”	3/4”	3/4”	7/8”	7/8”	7/8”
			C2	n/a	n/a	n/a	n/a	n/a	5/8”	5/8”	3/4”	3/4”	3/4”	3/4”	7/8”
		Ø Gas	C1	1 1/8”	1 1/8”	1 3/8”	1 3/8”	1 5/8”	1 1/8”	1 3/8”	1 3/8”	1 5/8”	1 5/8”	1 5/8”	1 5/8”
			C2	n/a	n/a	n/a	n/a	n/a	1 1/8”	1 3/8”	1 3/8”	1 5/8”	1 5/8”	1 5/8”	1 5/8”
		Max. No. of bends		12	18	18	18	18	18	18	18	18	12	12	12

n/a: not available

With lines length between 40 and 65m long distance option must be selected.

Units are factory pre-charged with Nitrogen (N_2).
The installer should remove the nitrogen and charge the units with the R-410A refrigerant shown in the following tables and also the charge per meter of line shown in TABLE 2.

The unit is supplied as standard with brazed connections. A factory pre-charged kit is available as an option. If fitted, TABLE 2 is the only one to take into account (this option includes service valves).

TABLE 2: WEIGHT OF R-410A REFRIGERANT PER METER OF LINE

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

2.7- REFRIGERANT CONNECTIONS

TABLE 3.1.: REFRIGERANT CHARGE

Charge of R-410A refrigerant (g) for 0 meters of line KNCM + LECM (Cooling only)												
	22E	**26E**	**32E**	**38E**	**43E**	**52D**	**64D**	**76D**	**86D**	**112D**	**128D**	**152D**
C1	4655	5315	5700	7950	9745	6250	5775	7870	9800	12130	15585	15500
C2	------	------	------	------	------	6250	5775	7870	9800	10450	10045	15400

Charge of R-410A refrigerant (g) for 0 meters of line KNHM + LEHM (Heat pump)												
	22E	**26E**	**32E**	**38E**	**43E**	**52D**	**64D**	**76D**	**86D**	**112D**	**128D**	**152D**
C1	4900	5900	6330	8835	10830	6940	6420	8740	10900	13480	17315	17230
C2	------	------	------	------	------	6940	6420	8740	10900	11600	11160	17100

TABLE 3.2.: CHARGE OF REFRIGERANT FOR MULTI-SPLIT SYSTEM

Charge of R-410A refrigerant (g) for 0 meters of line KNCM + 2xLECM (Cooling only)						
	52D2	**64D2**	**76D2**	**86D2**	**112D2**	**128D2**
C1	6250	5775	7870	9800	12130	15585
C2	6250	5775	7870	9800	10450	10045

Charge of R-410A refrigerant (g) for 0 meters of line KNHM + 2xLEHM (Heat pump)						
	52D2	**64D2**	**76D2**	**86D2**	**112D2**	**128D2**
C1	6940	6420	8740	10900	13480	17315
C2	6940	6420	8740	10900	11600	11160

C1: Circuit 1. **C2: Circuit 2.**

- MODELS 112D/D2 AND 128D/D2 USE DIFFERENT SIZES OF PIPE CONNECTIONS: LARGE SIZE FOR CIRCUIT 1 AND SMALL SIZE FOR CIRCUIT 2.

REFRIGERANT CHARGE FOR THE SET:

EXAMPLE:

To install a KNHM 32E + LEHM 32E set, with 22m refrigerant line length between the outdoor and indoor units, the refrigerant charge must be calculated as follows:
1· TABLE 1 (p. 20) shows that for 22m of line length between the indoor unit and outdoor units, the line sizes are: liquid 5/8” and gas 1 1/8”.
2· TABLE 2 (p. 20) shows, for line sizes of 5/8”-1 1/8”, the charge per meter of line is: 177 g/m x 22m = 3894 g.
3· TABLE 3.1 shows charge of refrigerant for a set with 0m line length is: 6330 g.
4· To determine the charge of the set:
Add the charge in the refrigerant lines + the charge in the indoor unit and outdoor refrigerant units.

Total charge for the set: 3894 + 6330 = 10224 g

Note: If the outdoor unit includes the factory pre-charged kit, only the weight of refrigerant per meter of line in TABLE 2 is taken into account.

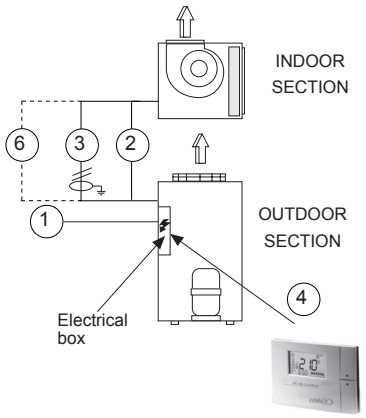
2.- INSTALLATION

2.8.- ELECTRICAL CONNECTIONS

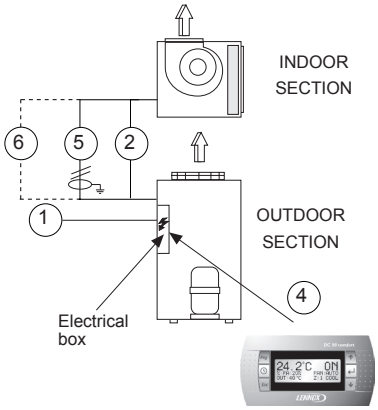
- BEFORE MAKING ANY ELECTRICAL CONNECTIONS, ENSURE THAT ALL CIRCUIT BREAKERS ARE OPEN.
- IN ORDER TO MAKE THE ELECTRICAL CONNECTIONS, FOLLOW THE ELECTRICAL DIAGRAM SUPPLIED WITH THE UNIT.

UNITS WITHOUT FREE-COOLING

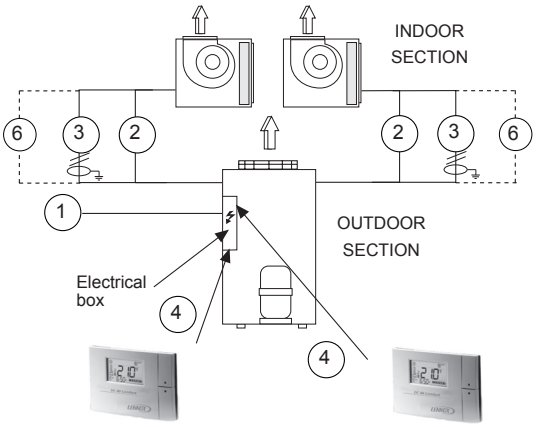
STANDARD VERSIONS



C50 VERSIONS



D2 VERSIONS



(1) Power supply.
(2) Indoor motor fan electrical connection.
(3) Liquid-gas pipe sensor (STD and D2 Only).
(4) Terminal connection (see controller electrical connections).
(5) Discharge sensor (C50 Only).
(6) BE connection (option).

VERSIONS: STANDARD + C50							
	Without BE supply	With BE supply	FM Supply	Liquid-gas pipe sensor	Discharge sensor C50	BE supply (mm^2)	
	1	1"	2	3	5	6 1 STAGE	6 2 STAGES
22E	5 x 4 mm^2	5 x 10 mm^2	4 x 1.5 mm^2	2 x 1 mm^2 shielded	2 x 1 mm^2 shielded	4 x 4 + 3 x 1.5 mm^2	
26E	5 x 6 mm^2	5 x 16 mm^2					
32E	5 x 6 mm^2	5 x 16 mm^2					
38E	5 x 6 mm^2	5 x 16 mm^2					
43E	5 x 10 mm^2	5 x 16 mm^2					
52D	5 x 16 mm^2	3 x 25 + 2 x 16 mm^2		4 x 1 mm^2 shielded			4 x 6 + 4 x 1.5 mm^2
64D	5 x 16 mm^2	3 x 35 + 2 x 16 mm^2				4 x 6 + 3 x 1.5 mm^2	4 x 10 + 4 x 1.5 mm^2
76D	3 x 25 + 2 x 16 mm^2	3 x 35 + 2 x 16 mm^2					
86D	3 x 25 + 2 x 16 mm^2	3 x 50 + 2 x 25 mm^2					
112D	3 x 35 + 2 x 16 mm^2	3 x 70 + 2 x 35 mm^2	4 x 2.5 mm^2			4 x 16 + 3 x 1.5 mm^2	40kw: 2x(4x6mm^2) +4x1.5mm^2 60kw: 2x(4x10mm^2) + 4x1.5mm^2
128D	3 x 35 + 2 x 16 mm^2	3 x 70 + 2 x 35 mm^2					
152D	3 x 50 + 2 x 25 mm^2	3 x 70 + 2 x 35 mm^2					

VERSION: D2							
	Without BE supply	With BE supply	FM Supply	Liquid-gas pipe sensor	Discharge sensor	BE Supply (mm^2)	
	1	1"	2	3	5	6 1 STAGE	6 2 STAGES
52D2	5 x 16 mm^2	3 x 35 + 2 x 16 mm^2	2 x (4 x 1.5) mm^2	2 x (2 x 1 mm^2 shielded)		2 x (4 x 4 + 3 x 1.5) mm^2	
64D2	5 x 16 mm^2	3 x 35 + 2 x 16 mm^2	2 x (4 x 1.5) mm^2				
76D2	3 x 25 + 2 x 16 mm^2	3 x 50 + 2 x 25 mm^2	2 x (4 x 1.5) mm^2				
86D2	3 x 25 + 2 x 16 mm^2	3 x 50 + 2 x 25 mm^2	2 x (4 x 2.5) mm^2				
112D2	3 x 35 + 2 x 16 mm^2	3 x 70 + 2 x 35 mm^2	2 x (4 x 2.5) mm^2			(4 x 6 + 3 x 1.5) + (4 x 4 + 3 x 1.5) mm^2	(4 x 10 + 4 x 1.5) + (4 x 4 + 4 x 1.5) mm^2
128D2	3 x 35 + 2 x 16 mm^2	3 x 70 + 2 x 35 mm^2	2 x (4 x 2.5) mm^2				

Note: For units with two circuits, indoor coil sensor IS1, must be connected with circuit C1 and indoor coil sensor IS2 with circuit C2, otherwise the protection will not work correctly.

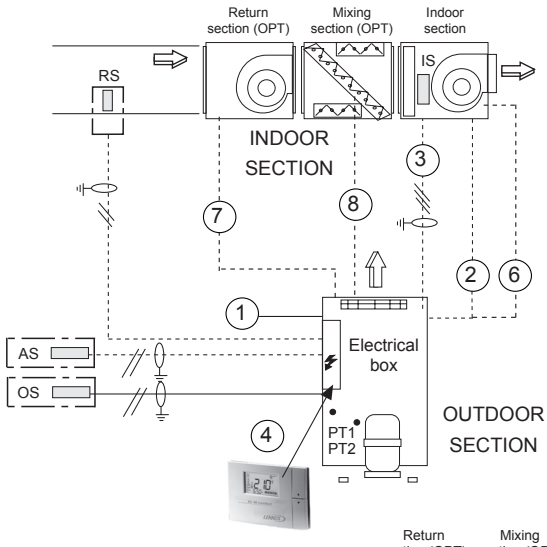
The length of all cables for connection with indoor unit must be less than 65 m.

2.- INSTALLATION

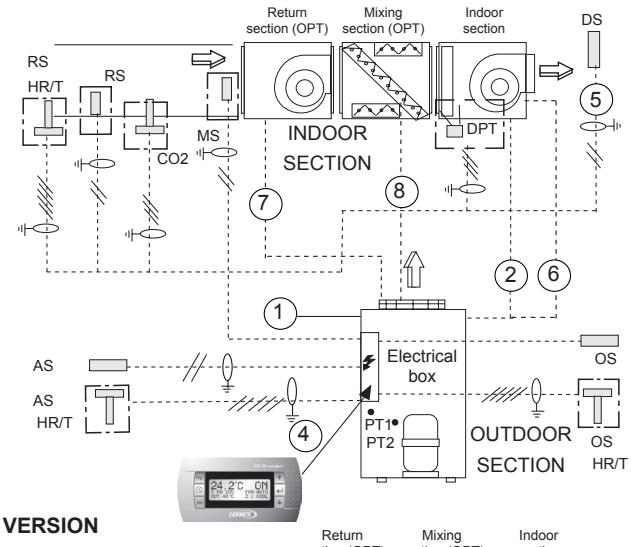
2.8.- ELECTRICAL CONNECTIONS

UNITS WITH FREE-COOLING

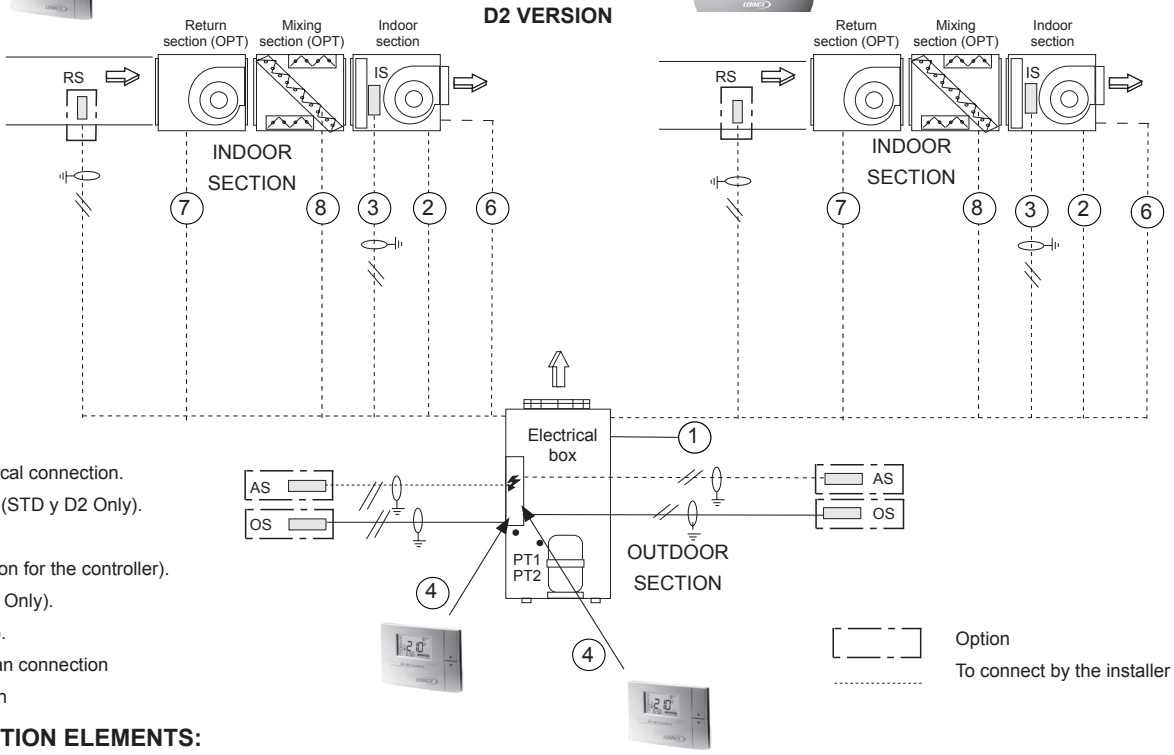
STANDARD VESION



C50 VERSION



D2 VERSION



① Electrical supply.
② Indoor motor fan electrical connection.
③ Liquid-gas pipe sensor (STD y D2 Only).
④ Terminal connection
(see electrical connection for the controller).
⑤ Discharge sensor (C50 Only).
⑥ Connection BE (option).
⑦ Exhaust fan or return fan connection
⑧ Free-cooling connection

Option
To connect by the installer

CONTROL CONNECTION ELEMENTS:

COMPONENTS VERSIONS	STANDARD	C50	D2	No. OF X SECTION CABLES
DS (Discharge sensor).		STANDARD		2 x 1 mm² (shielded)
OS (Outdoor sensor).	OPTION	STANDARD	OPTION	2 x 1 mm² (shielded)
AS (Remote ambient sensor).	OPTION	STANDARD	OPTION	2 x 1 mm² (shielded)
RS (Duct sensor). Replaces AS.	OPTION	OPTION	OPTION	2 x 1 mm² (shielded)
IS (Liquid-gas pipe sensor).	STANDARD		STANDARD	2 x 1 mm² (shielded)
MS (Duct sensor for thermostatic and enthalpic free cooling).		OPTION		2 x 1 mm² (shielded)
RS HR/T (Remote duct sensor) for enthalpic free cooling.		OPTION		5 x 1 mm² (shielded)
CO_2 (CO_2 Air quality probe).		OPTION		3 x 1 mm² (shielded)
DP (Differential air pressure transducer).		OPTION		3 x 1 mm² (shielded)
OS HR/T (Outdoor sensor) for enthalpic free-cooling.		OPTION		5 x 1 mm² (shielded)
AS HR/T (Remote ambient sensor) for enthalpic free-cooling.		OPTION		5 x 1 mm² (shielded)

	22E	26 to 43E	52D/D2	64D/D2 a 86D/D2	112D/D2-128D/D2-152D
Ventilador de extracción	3x 1,5 mm²			4 x 1,5 mm²	
Ventilador de retorno				4 x 1,5 mm²	4 x 2,5 mm²

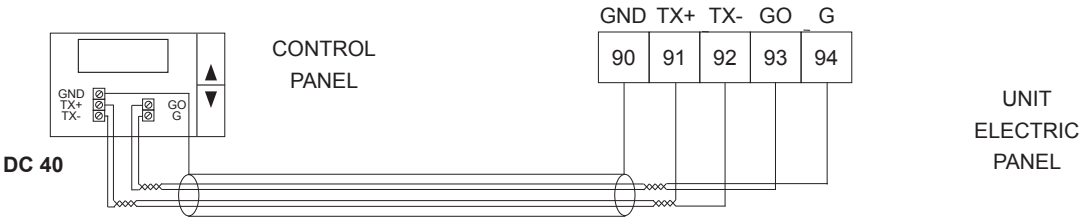
VERSION	
STD ó D2	**5 x 1,5 mm²**
C50	**7 x 1,5 mm²**

VOLTAGE OPERATING LIMITS: 342-462V

2.- INSTALLATION

2.8.- ELECTRICAL CONNECTIONS

DC 40 THERMOSTAT, ELECTRICAL CONNECTION



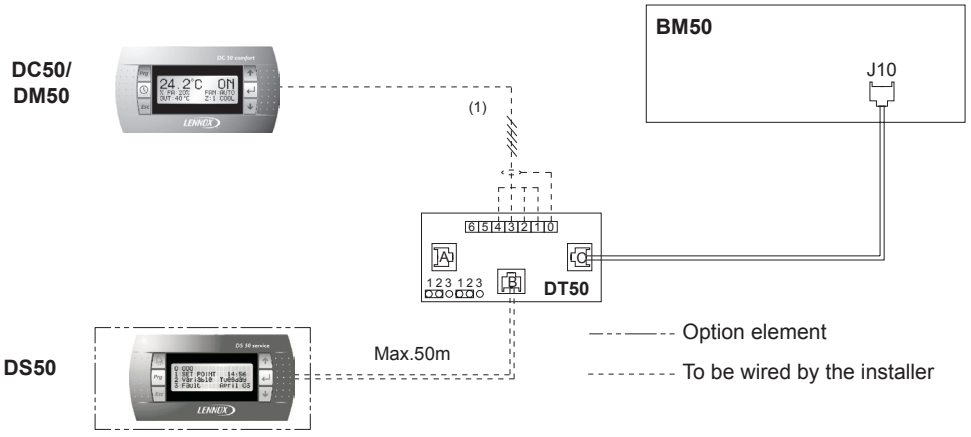
2 x Shielded twisted pairs AWG 20. 100 m maximum.
1x Shielded twisted pair AWG20 + 2 x 1,5 mm. 200m maximum.

IMPORTANT

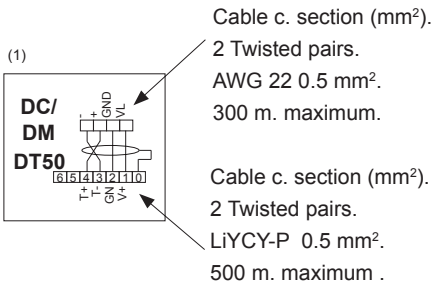
THE SHIELDED CONNECTING CABLE BETWEEN THE CONTROL PANEL AND THE UNIT MUST BE SEPARATED FROM ANY OTHER TYPE OF ELECTRICAL WIRING. CONNECT IT TO THE ELECTRIC PANEL LOCATED IN THE OUTDOOR UNIT.

NOTES:
- For securing and connecting the Control Panel, consult the control panel Manual supplied with the unit.
- Connection between the DC40 and the unit must be made using shielded twisted pair cables (where the screens are connected to the control panel and the unit Electrical box).
- The Tx+ and Tx- polarity must strictly comply with the electrical diagram supplied with the unit.

TERMINAL DC50-DM50 COMFORT AND DS50 SERVICE CONNECTION (CONTROL CLIMATIC 50)



NOTE: In expansion module BE50, jumpers must be connected between 1 and 2 in order to make the power supply available to all connectors.



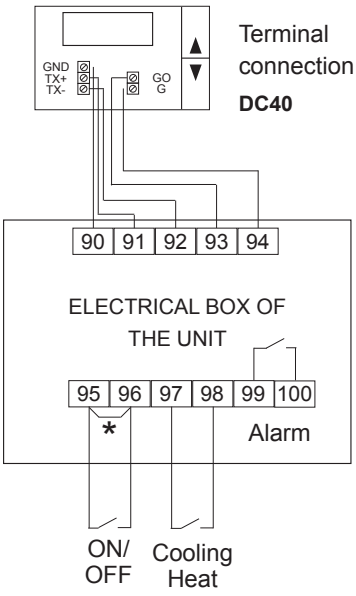
2.- INSTALLATION

2.8.- ELECTRICAL CONNECTIONS

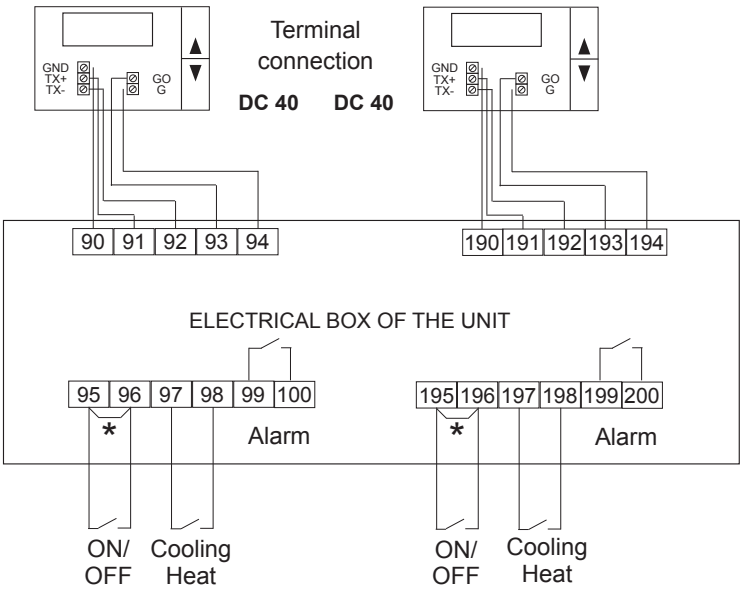
“REMOTE SIGNALS” ELECTRICAL CONNECTION

In the whole range, the Electrical box provides the following functions:
- Remote ON/OFF.
- One alarm signal.
- Remote winter/summer change.(Standard and D2 units).

STANDARD VERSION

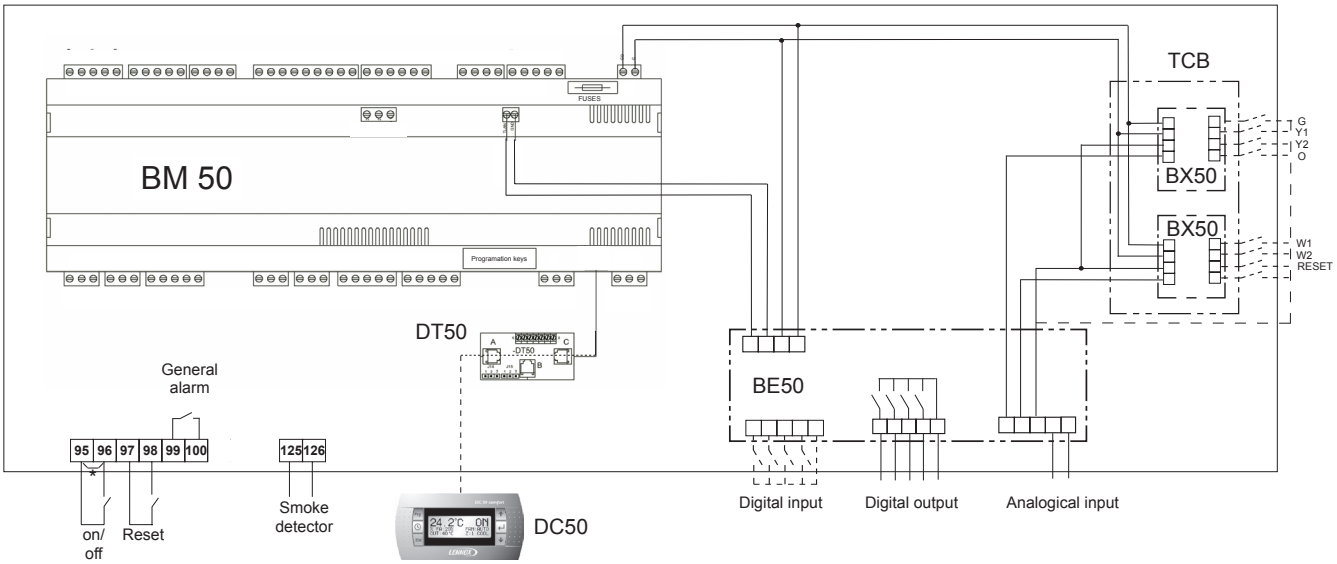


D2 VERSION



* Remove link for remote ON/OFF operation.

C50 VERSION



* Remove link for remote ON/OFF operation.

2.9.- OPTIONS INSTALLATION

COMMUNICATION CAPABILITIES

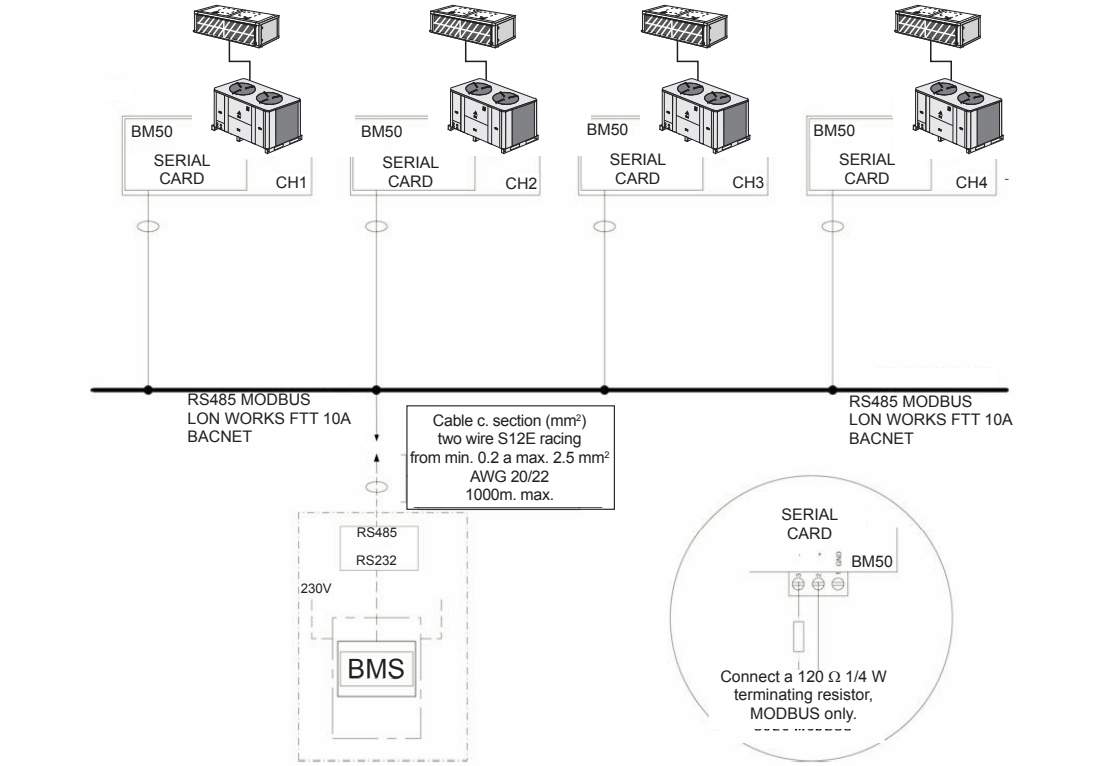
STANDARD AND D2 VERSIONS

1. BMS MODBUS_RS485 connection.

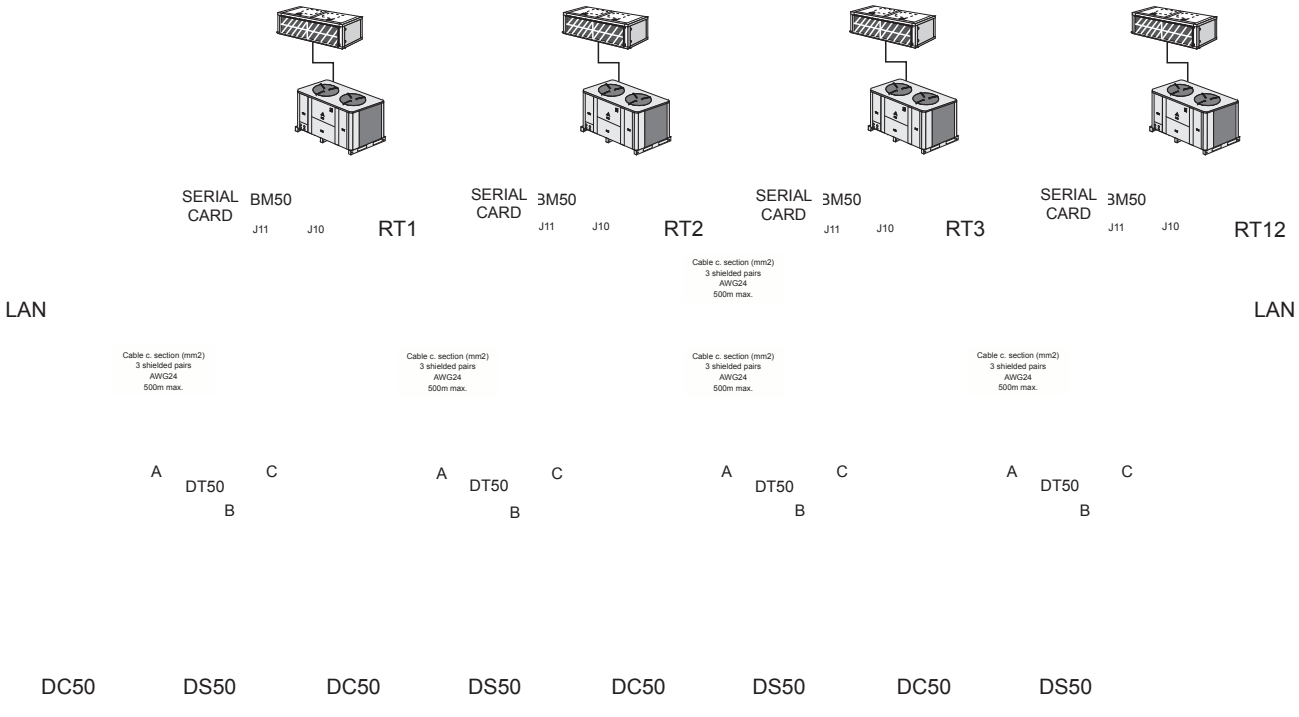
The Climatic 40 Controller offers the possibility of communication with Building Management Systems (BMS) via MODBUS protocol. This option includes a remote sensor and eliminates the DC40 terminal-thermostat.

C50 VERSION

1. BMS MODBUS_RS485 connection.
2. BMS LONWORKS_Echelon connection.
3. BMS BACnet connection.



A master-slave connection is possible with version C50 units:



3.- COMMISSIONING AND OPERATION

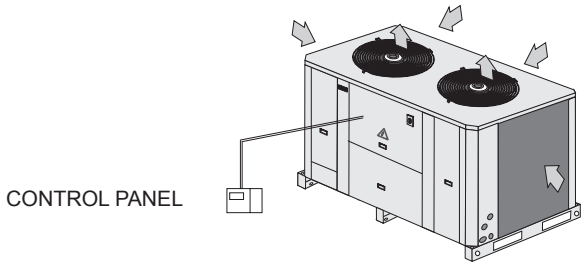
3.1.- PRELIMINARY CHECKS BEFORE STARTUP

- 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**.
- Check the **control panel connections.**

(If the connection is incorrect, the unit will not operate and the control panel display will not light).

- Check with your hand that the **fans are turning freely.**

FIGURE FOR THE STANDARD UNIT CONFIGURATION FOR MODELS:
52D-64D-76D-86D



CHECK COMPRESSOR OIL LEVEL

- Part of the compressor oil is pumped to the system when the compressor starts, so for split systems part of the oil can be placed in the system: piping lines, traps, evaporator, etc.
- The quantity of oil in the system depends on the refrigerant charge. The compressor cannot work with incorrect or excessive refrigerant.
- It may be necessary to add oil to the system, depending on the piping length.
- See below an example of calculation of the oil quantity to be added to the system.

EXAMPLE:
KNHM 32E + LEHM 32E with 65m. (With remote option).
- Refrigerant charge = 6.33kg. (TABLE 3.1, p. 21).
- Refrigerant charge to add with 65m = 182g/m x 65 = 11.83kg. (TABLE 2, p. 20).
- Total refrigerant charge = 6.33 + 11.83 = 18.16kg.
- Oil compressor charge (l) = 3.25.
- Oil compressor charge (kg) = 2.925 (density = 0.9).
- Permissible quantity in the system (kg) = 0.03 (= 2.925 x 0.01).
- Permissible refrigerant charge (kg) = 6 (= 0.03/ 0.005).
- Excess refrigerant charge = 18.16 - 6 = 12.16

60.8g (= 12.16 x 5g) quantity of oil to be added to the system.
0.55l of oil to be added to the system.

In the event of having to add oil, remember the type of oil is synthetic POE.
The original oil charge, including the compressor, is ICI Emkarate RL32-3MAF. This type of oil must also be used when replacing the oil completely.
If only topping up, RL32-3MAF or Mobil EAC Artic 22C can be used.

3.- COMMISSIONING AND OPERATION

3.2.- PRELIMINARY CHECKS AT STARTUP

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 unit 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.

COMPRESSOR OIL LEVEL
The oil level must always be checked. When the compressor is at rest, the level should be between 1/4 and 3/4 in the sight glass, while when running the level should be between 3/4 and full.
In the event of having to add oil, remember the type of oil is synthetic POE.
The original oil charge in the compressor is ICI Emkarate RL32-3MAF. This type of oil must also be used when replacing the oil completely.
When only topping up, RL32-3MAF or Mobil EAC Artic 22C can be used.

The unit must be installed in accordance with local safety codes andregulations and can only be used in a well ventilated area. Please readcarefully 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:

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

Refrigerating circuit(s):

After more than 12 hours of power cut, the cranckcase 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.

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 according to code ASME section IX following the procedures specific.

Before starting up

-Test the circuit to the maximum working pressure(see the nameplate)
-Verifify the operation of the high pressure swich.
-Check the piping and the components of the refrigerant circuit.

Replacing components:

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

4.- MAINTENANCE

4.1.- PREVENTIVE MAINTENANCE

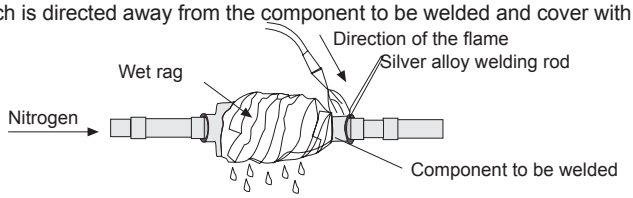
PREVENTIVE MAINTENANCE PREVENTS COSTLY REPAIRS.
THIS REQUIRES PERIODIC INSPECTIONS:

- GENERAL STATE OF THE CASING:
Furniture, 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 silentbloc mountings.
- FANS:
Check that fans turn freely and in the correct direction without excessive noise.
- CONTROL:
Check Set Points and normal operation.

4.2.- 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 **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.

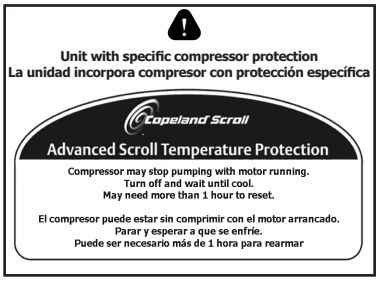
4.- MAINTENANCE

4.3.- FAULT 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.

4.3.1.- SAFETY DEVICES



ASTP COMPRESSOR PROTECTION:
This device protects the compressor against high discharge temperatures. When the temperature reaches critical values, ASTP protection causes the "Scrolls" to separate. The compressor stops pumping but the motor continues to run.

- Occasionally, when the compressor stops and starts, there is a metallic noise due to the compressor scrolls. This is normal.
- Connect high and low pressure gauges and check that the operating pressures are normal.
- Measure electrical consumption for the unit and check that it is close to that indicated on the specification plate.
- Check the electrical consumption of the compressor and the fans against that specified in the physical data sheets.
- In the case of a Heat Pump unit, make a cycle change on the Control Panel, checking that the 4-way valve makes the change correctly. Check the pressures in the new cycle.

- STD and D2: Low pressure switch and high pressure switch are reset automatically and if it operates 3 times in one hour, they change to manual reset, through the control unit.
- C50: Low pressure switch and high pressure switch are reset automatically and if it operates 3 times in one day, they change to manual reset, through the control unit.

REGULATION WITH 40 CLIMATIC CONTROL

KNCM COOLING UNITS ONLY

22E to 43E							52D to 86D							112D to 152D								
	STD UNIT			COOLING LAK -15ºC				STD UNIT			COOLING LAK-15ºC				STD/FP1/FP2 UNIT			COOLING LAK -15ºC			COOLING LAK -15ºC (FP1/FP2)		
	Cycle	Set	Reset	Cycle	Set	Reset		Cycle	Set	Reset	Cycle	Set	Reset		Cycle	Set	Reset	Cycle	Set	Reset	Cycle	Set	Reset
LP	cooling	3,5	4,5	cooling	3,5	4,5	**LP1**	cooling	3,5	4,5	cooling	3,5	4,5	**LP1**	cooling	3,5	4,5	cooling	3,5	4,5	cooling	3,5	4,5
							LP2	cooling	3,5	4,5	cooling	3,5	4,5	**LP2**	cooling	3,5	4,5	cooling	3,5	4,5	cooling	3,5	4,5
HP		43	34	cooling	43	34	**HP1**	cooling	43	34	cooling	43	34	**HP1**	cooling	43	34	cooling	43	34	cooling	43	34
							HP2	cooling	43	34	cooling	43	34	**HP2**	cooling	43	34	cooling	43	34	cooling	43	34
														HPR11	cooling	22	28	FSC1 (6A)			FSC1 (12A) (112÷152) FSC1 (20A) (214)		
														HPR12	cooling	37	30						
PT	n/a			(*)			**PT1**	n/a			(*)			**PT1**	n/a			(*)			(*)		
														HPR21	cooling	22	28	FSC2 (6A)			FSC2 (12A) (112÷152) FSC2 (20A) (214)		
														HPR22	cooling	37	30						
							PT2	n/a			(*)			**PT2**	n/a			(*)			(*)		

Tables values in bar.

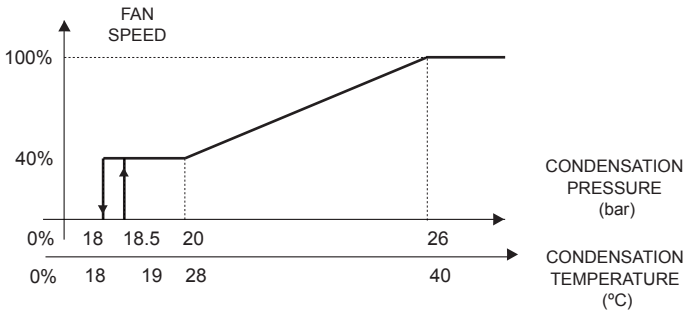
KNHM HEAT PUMP UNITS

22E to 43E				52D to 86D				112D to 152D			
	STD UNIT				STD UNIT				STD/FP1 / FP2 UNIT		
	Cycle	Set	Reset		Cycle	Set	Reset		Cycle	Set	Reset
LP	cooling	3,5	4,5	**LP1**	cooling	3,5	4,5	**LP1**	cooling	3,5	4,5
				LP2	cooling	3,5	4,5	**LP2**	cooling	3,5	4,5
HP	C/H	43	34	**HP1**	cooling	43	34	**HP1**	cooling	43	34
				HP2	cooling	43	34	**HP2**	cooling	43	34
								HPR12	cooling	37	30
PT	(*)			**PT1**	(*)			**PT1**	(*)		
								HPR22	cooling	37	30
				PT2	**(*)**			**PT2**	**(*)**		
								OT1	heating	6°C differential 2,3	

Tables values in bar.

22E-86D UNITS

1.- FAN SPEED REGULATION KNCM+KIT -15ºC AND KNHM 22E-86D (bar) / KNCM (ºC)



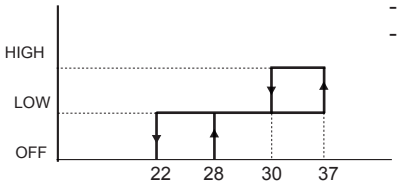
2.- DEFROST (PT/PT1/PT2)
- Start: 5.7 bar for 60 seconds.
- End: 30 bar or more than 8 minutes from the beginning of defrost.

112D-152D UNITS

1.- FAN SPEED REGULATION (PT1/PT2) KNHM STANDARD (with option FP1/FP2)

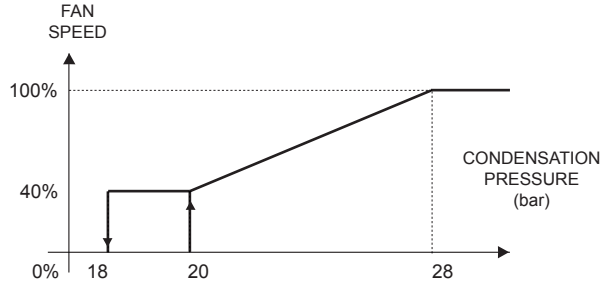
SPEED REGULATION (HPR12/HPR22)

- Fan start-up 28 bar.
- Cut off 22 bar.



2.- DEFROST (PT1/PT2)
- Start: 5.7 bar for 60 seconds.
- End: 30 bar or more than 8 minutes from the beginning of defrost.

3.- FAN SPEED REGULATION WITH PROPORTIONAL CONTROL (FSC1/FSC2)(PT1/PT2). KIT -15ºC.



REGULATION WITH 50 CLIMATIC CONTROL

KNCM COOLING UNITS ONLY

22E to 43E							52D to 86D							112D to 152D								
	STD UNIT			COOLING LAK -15ºC				STD UNIT			COOLING LAK-15ºC				STD/FP1/FP2 UNIT			COOLING LAK -15ºC			COOLING LAK -15ºC (FP1/FP2)		
	Cycle	Set	Reset	Cycle	Set	Reset		Cycle	Set	Reset	Cycle	Set	Reset		Cycle	Set	Reset	Cycle	Set	Reset	Cycle	Set	Reset
LP	cooling	1,7	2,7	cooling	1,7	2,7	**LP1**	cooling	1,7	2,7	cooling	1,7	2,7	**LP1**	cooling	1,7	2,7	cooling	1,7	2,7	cooling	1,7	2,7
							LP2	cooling	1,7	2,7	cooling	1,7	2,7	**LP2**	cooling	1,7	2,7	cooling	1,7	2,7	cooling	1,7	2,7
HP		43	34	cooling	43	34	**HP1**	cooling	43	34	cooling	43	34	**HP1**	cooling	43	34	cooling	43	34	cooling	43	34
							HP2	cooling	43	34	cooling	43	34	**HP2**	cooling	43	34	cooling	43	34	cooling	43	34
																		FSC1 (6A)			FSC1 (12A) (112÷152) FSC1 (20A) (214)		
PT	(*)			(*)			**PT1**	(*)			(*)			**PT1**	(*)			(*)			(*)		
																		FSC2 (6A)			FSC2 (12A) (112÷152) FSC2 (20A) (214)		
							PT2	(*)			(*)			**PT2**	(*)			(*)			(*)		

Tables values in bar.

KNHM HEAT PUMP UNITS

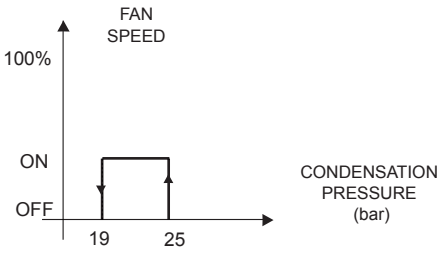
22E to 43E				52D to 86D				112D to 152D			
	STD UNIT				STD UNIT				STD/FP1 / FP2 UNIT		
	Cycle	Set	Reset		Cycle	Set	Reset		Cycle	Set	Reset
LP	cooling	1,7	2,7	**LP1**	cooling	1,7	2,7	**LP1**	cooling	1,7	2,7
				LP2	cooling	1,7	2,7	**LP2**	cooling	1,7	2,7
HP	C/H	43	34	**HP1**	cooling	43	34	**HP1**	cooling	43	34
				HP2	cooling	43	34	**HP2**	cooling	43	34
PT	(*)			**PT1**	(*)			**PT1**	(*)		
				PT2	**(*)**			**PT2**	**(*)**		
								OT1	heating	6°C differential 2,3	

Tables values in bar.

22E-86D UNITS

1.- FAN SPEED REGULATION KNCM+KIT -15ºC AND KNHM 22E-86D (bar) / KNCM (ºC)

COOLING CYCLE



Fan speed is regulated according to the condensation pressure if temperature is below 20ºC. In other case fan speed is the maximum one.

HEATING CYCLE

Fan speed is the maximum one (with compressor operating)

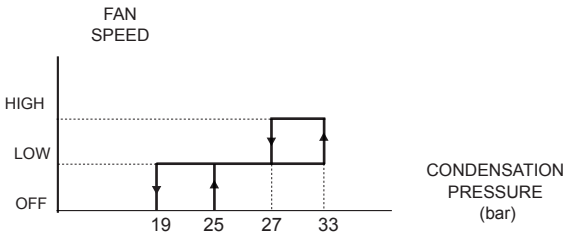
2.- DEFROST (PT/PT1/PT2)

- Start: Outdoor temperature <16ºC
- End: After outside fan starts by three times.

112D-152D UNITS

1.- FAN SPEED REGULATION KNCM/KNHM 112D-152D

COOLING CYCLE



HEATING CYCLE

Fan speed is the maximum one (with compressor operating and outdoor temperature below 6ºC). In other case the fan works at minimum speed.

2.- DEFROST (PT/PT1/PT2)

- Start: Outdoor temperature <16ºC
- End: After outside fan starts by three times.

NOTES

NOTES

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