Installation, operating and maintenance **COMPACTAIR-CMC/CMH**

• • • **Providing indoor climate comfort**

MIL87E-0209 03-2009

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

TABLE OF CONTENTS

Lennox have been providing environmental solutions since 1895, our COMPACTAIR 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.

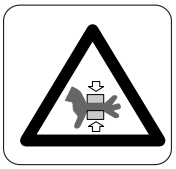
POINTS TO BEAR IN MIND

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** _____

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** _____

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 ____/____/____

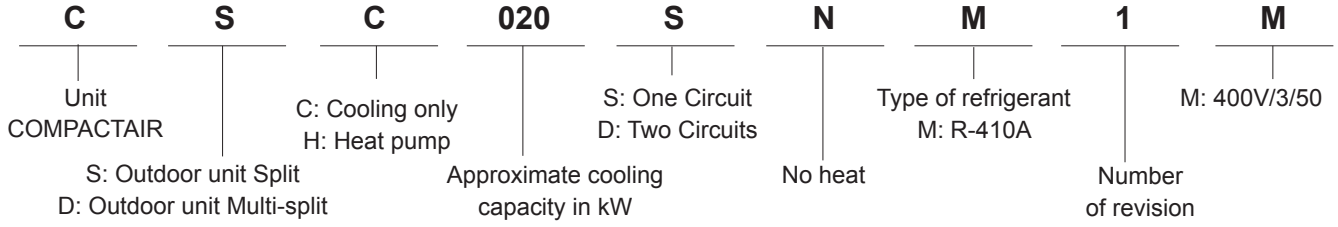
Outdoor fan section 2 ____/____/____

Options installed: _____

Comments: _____

1.- GENERAL CHARACTERISTICS

1.1.- PHYSICAL DATA



CSC/CDC: Cooling only unit R-410A.
CSH/CDH: Heat pump unit R-410A.

UNIT MODELS			CSC CSH 020S	CSC CSH 025S	CSC CSH 030S	CSC CSH 035S	CSC CSH 040S	CSC CSH 045D	CSC/CDC CSH/CDH 055D	CSC/CDC CSH/CDH 070D	CSC/CDC CSH/CDH 085D	CSC CSH 100D
Compressor		(Nr. / Type)	1/Scroll	1/Scroll	1/Scroll	1/Scroll	1/Scroll	2/Scroll	2/Scroll	2/Scroll	2/Scroll	2/Scroll
Net Weight (Kg)	CSC/CDC Cooling only unit	(Kg.)	257	290	297	352	365	443	524	549	581	865
	CSH/CDH Heat pump unit	(Kg.)	262	295	302	357	370	448	529	554	586	870
Air flow		(m^3/h)	7600	8500	10000	12000	11700	14000	20000	21000	22000	15500+11700
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 23 to calculate refrigerant charge for model CSC/CDC and CSH/DCH units to work with indoor units CIC/CIH). R-410A factory refrigerant precharge kit is available as an option.

1.2.- ELECTRICAL DATA

ELECTRICAL CONSUMPTION FOR STANDARD UNITS

UNIT MODELS		CSC CSH 020S	CSC CSH 025S	CSC CSH 030S	CSC CSH 035S	CSC CSH 040S	CSC CSH 045D	CSC/CDC CSH/CDH 055D	CSC/CDC CSH/CDH 070D	CSC/CDC CSH/CDH 085D	CSC CSH 100D
Maximum absorbed power (kW)											
	Compressor	8.25	10.1	11.8	15.5	16.9	20.2	23.5	31	33.8	42.5
	Fan	1.45	1.89	2.69	2.69	2.69	3.63	5.38	5.38	7.26	7.75
	Total power	9.7	11.99	14.49	18.19	19.59	23.83	28.98	36.38	41.06	50.25
Maximum current (A)											
	Compressor	15	21	22	25.6	31	42	44	51.2	62	77.6
	Fan	2.59	3.45	4.8	4.8	4.8	6.48	9.6	9.6	12.96	13.4
	Total current	17.59	24.45	26.8	30.4	35.8	48.48	53.6	60.8	74.96	91
Start up current (A)		88.4	97.8	105.1	139.1	173.1	121.8	131.9	169.5	212.3	228.3
Voltage V/f (50Hz)		3N~400V 50Hz									

1.3.- OPERATING LIMITS **(For installation with CIC-CIH 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 (020-025-030-045-055) 47ºC (035-040-070-085-100)	+10ºC STANDARD UNIT 0ºC (*) -15ºC (**)

(*) With option kit low temperature 0ºC.

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

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 (020-025-030-045-055) 47ºC (035-040-070-085-100)	+15ºC UNIDAD ESTÁNDAR 0ºC (*) -15ºC (**)
HEATING CYCLE OPERATION	INDOOR TEMPERATURE	27ºC DB	15ºC DB
	OUTDOOR TEMPERATURE	27ºC (With 20ºC outdoor temperature)	-12ºC (With 20ºC indoor temperature)

DB: Dry bulb temperature.

WB: Wet bulb temperature

(*) Active CL40 parameter to operate at 0ºC

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

1.4.- FAN PERFORMANCES **(Available static pressure Pa.)**

STANDARD UNITS WITHOUT OPTIONALS

020S	(rpm) \ (m3/h)	5300	6100	6850	7600	8100
Pulley closed	**751**	178	156	134	104	77
1 turn	**719**	162	140	118	89	64
2 turns	**686**	141	118	96	67	38
3 turns	**654**	124	101	78	47	6
4 turns	**621**	108	86	64	35	

025S	(rpm) \ (m3/h)	5950	6800	8500	9100
Pulley closed	**841**	223	195	126	91
1 turn	**805**	202	174	107	74
2 turns	**769**	177	148	88	44
3 turns	**732**	154	125	63	7
4 turns	**696**	135	107	40	4

030S	(rpm) \ (m3/h)	7000	8000	9000	10000
Pulley closed	**934**	272	234	194	142
1 turn	**894**	246	208	168	117
2 turns	**854**	213	175	134	84
3 turns	**814**	186	146	106	55
4 turns	**773**	161	123	82	36

035S	(rpm) \ (m3/h)	8400	9600	10800	12000	12850
Pulley closed	**741**	209	191	171	146	125
1 turn	**709**	189	171	152	126	105
2 turns	**677**	168	151	132	107	87
3 turns	**645**	148	131	112	88	68
4 turns	**613**	128	111	92	69	50

040S	(rpm) \ (m3/h)	8200	9350	10525	11700	12500
Pulley closed	**741**	205	188	170	148	●
1 turn	**709**	185	168	150	128	110
2 turns	**677**	163	146	128	106	89
3 turns	**645**	143	127	109	87	68
4 turns	**613**	126	110	91	69	51

045D	(rpm) \ (m3/h)	9800	11200	12600	14000
Pulley closed	**829**	237	213	183	136
1 turn	**794**	235	187	156	111
2 turns	**758**	233	161	130	86
3 turns	**722**	231	135	104	72
4 turns	**686**	229	109	77	57

055D	(rpm) \ (m3/h)	7000	8000	9000	10000	10700
Pulley closed	**741**	299	264	225	160	96
1 turn	**709**	271	235	195	137	83
2 turns	**677**	242	206	165	113	70
3 turns	**645**	213	178	135	73	57
4 turns	**613**	184	149	105	32	44

070D	(rpm) \ (m3/h)	7350	8400	9450	10500	11200
Pulley closed	**741**	272	230	182	122	66
1 turn	**709**	243	201	153	98	50
2 turns	**677**	213	172	124	74	33
3 turns	**645**	184	142	95	44	16
4 turns	**613**	154	113	66	13	-0.4

085D	(rpm) \ (m3/h)	7700	8800	9900	11000	11750
Pulley closed	**751**	277	235	187	126	69
1 turn	**719**	247	199	159	101	51
2 turns	**686**	208	162	120	71	36
3 turns	**654**	181	139	89	24	15
4 turns	**621**	154	112	65	12	n/a

100D (C1)	(rpm) \ (m3/h)	10850	12400	13950	15500	16600
Pulley closed	**846**	239	210	171	125	●
1 turn	**801**	207	180	138	92	58
2 turns	**756**	175	150	105	58	26
3 turns	**711**	143	121	72	26	n/a
4 turns	**666**	111	91	39	n/a	n/a

100D (C2)	(rpm) \ (m3/h)	8200	9350	10525	11700	12500
Pulley closed	**743**	201	187	157	141	119
1 turn	**711**	199	167	136	161	101
2 turns	**679**	197	148	116	102	83
3 turns	**647**	195	128	95	84	64
4 turns	**615**	193	108	75	65	46

● Illegal position because of the limit of engine power

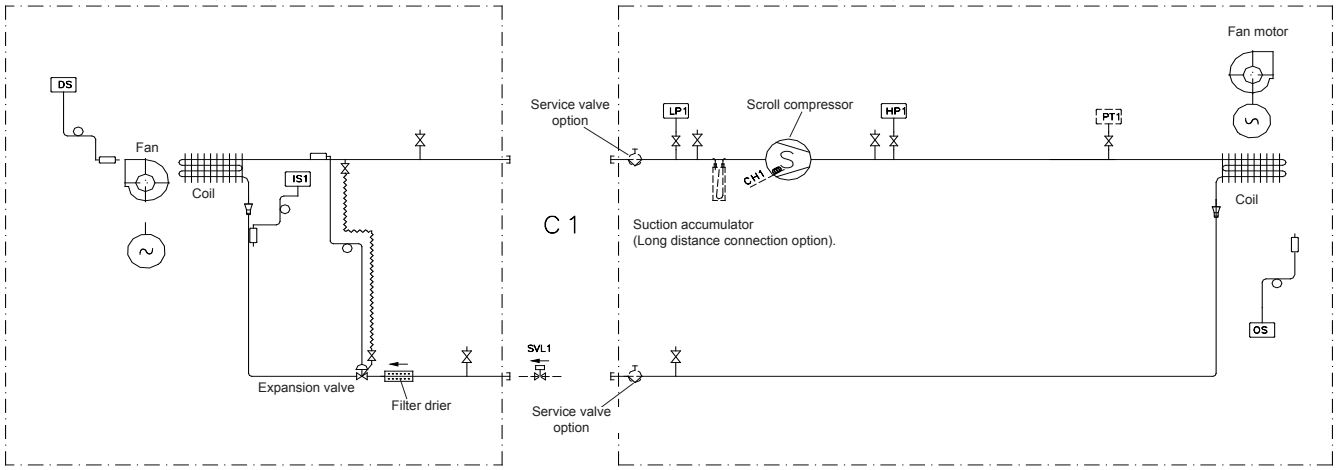
Note: The unit leaves factory with the pulley fit to 2 open turns

1.5.- PIPING DRAWINGS

COOLING ONLY UNITS

INDOOR UNIT
CIC 020/025/030/035/040

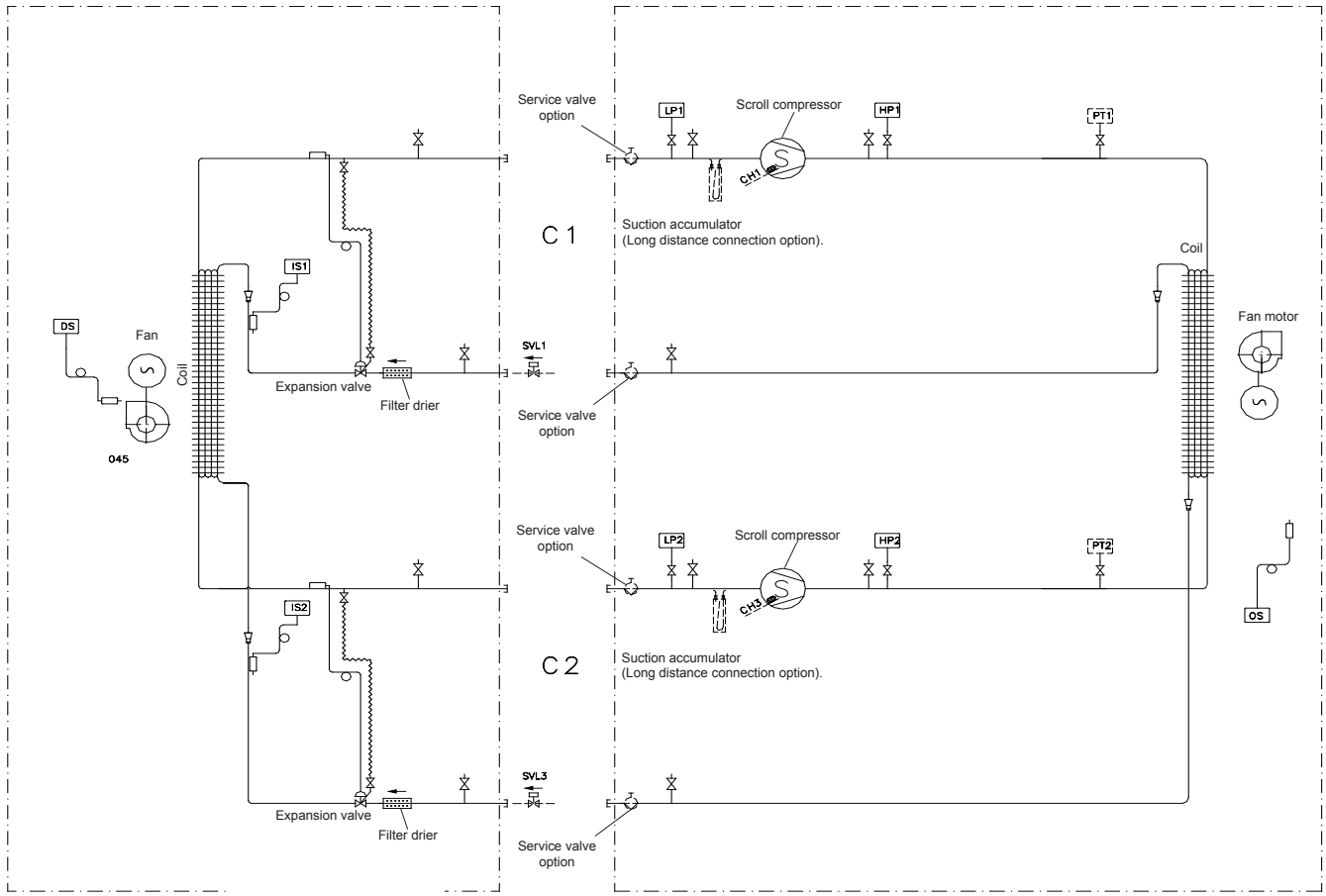
OUTDOOR UNIT
CSC 020/025/030/035/040



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

INDOOR UNIT
CIC 045

OUTDOOR UNIT
CSC 045

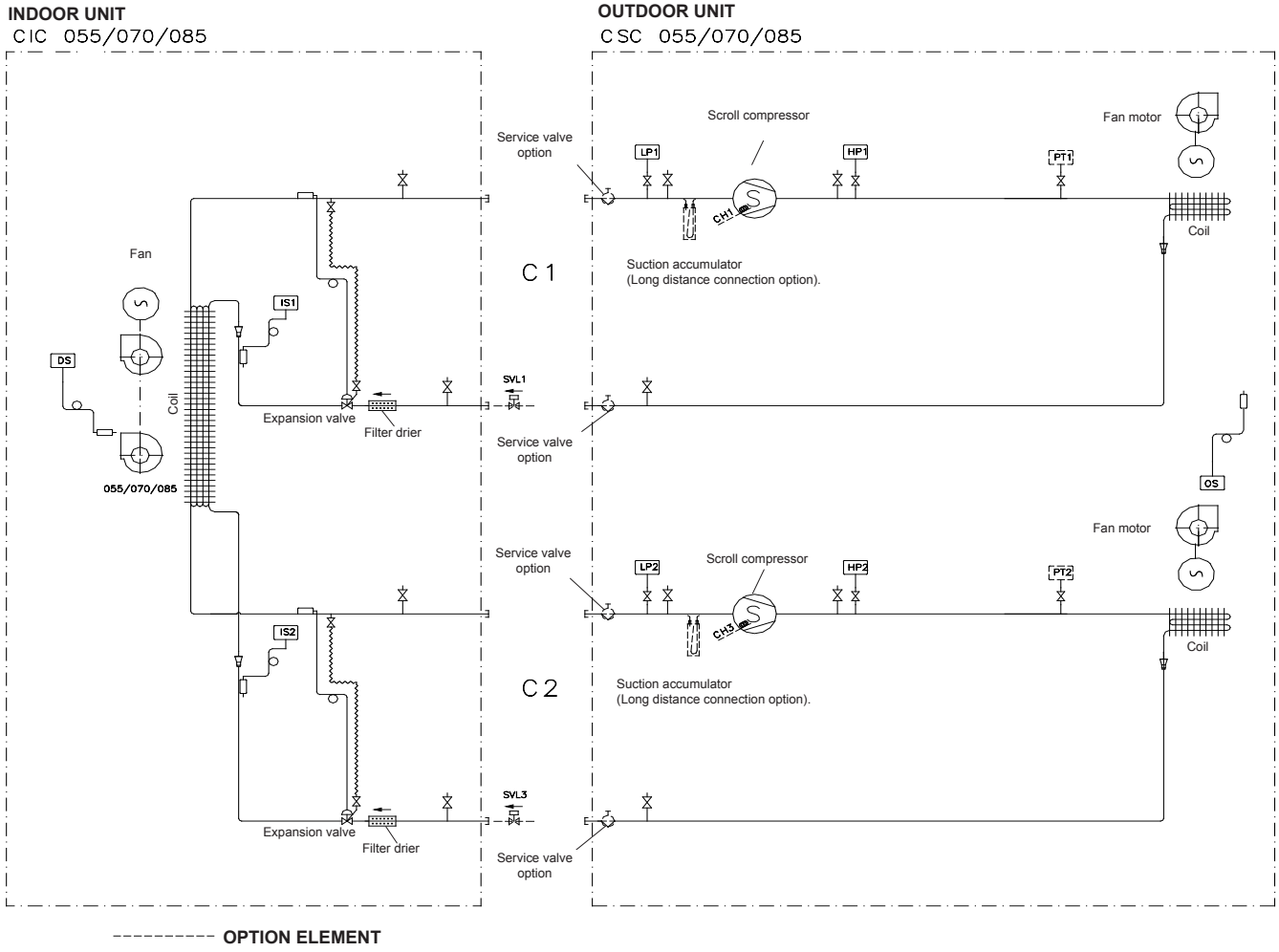


---------- **OPTION ELEMENT**

- Pressure gauge. (5/16" to be fitted by the installer).
- DS Discharge sensor. (With C50 control).
- IS1 Liquid-gas pipe sensor, circuit 1. (With C40 control).
- IS2 Liquid-gas pipe sensor, circuit 2. (With C40 control).
- SVL1 Liquid solenoid valve. (Long distance option). To be connected by the installer to indoor units.
- SVL3 Liquid solenoid valve. (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 or -15ºC option).
- CH3 Crank case heater. (Low ambient 0ºC or -15ºC option).
- PT1 Pressure transducer, circuit 1.(Low ambient 0ºC or -15ºC option).
- PT2 Pressure transducer, circuit 2. (Low ambient 0ºC or -15ºC option).
- OS Outdoor temperature sensor

1.5.- PIPING DRAWINGS

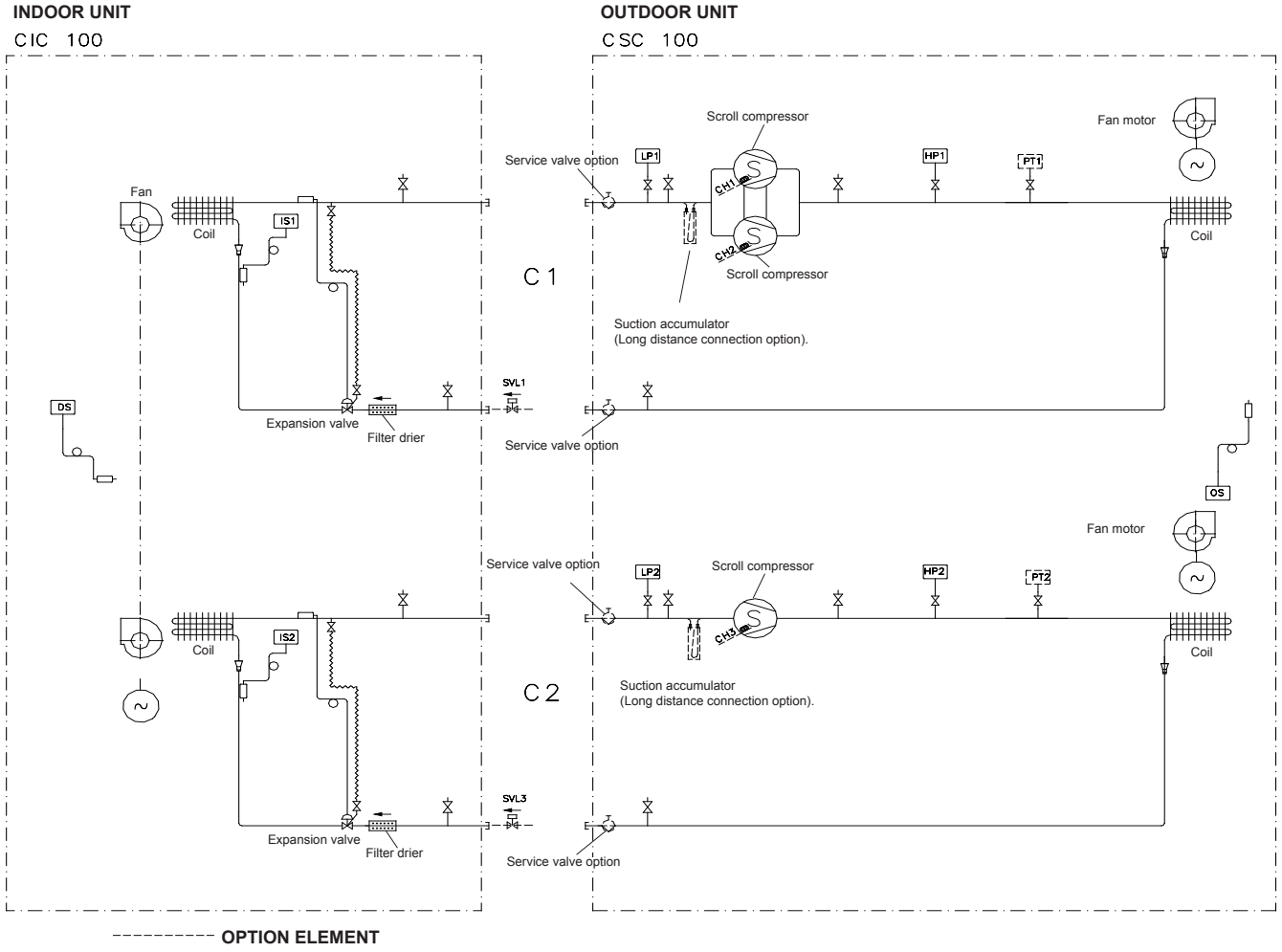
COOLING ONLY UNITS



- Pressure gauge. (5/16" to be fitted by the installer).
- DS Discharge sensor. (With C50 control).
- IS1 Liquid-gas pipe sensor, circuit 1. (With C40 control).
- IS2 Liquid-gas pipe sensor, circuit 2. (With C40 control).
- SVL1 Liquid solenoid valve. (Long distance option). To be connected by the installer to indoor units.
- SVL3 Liquid solenoid valve. (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 or -15ºC option).
- CH3 Crank case heater. (Low ambient 0ºC or -15ºC option).
- PT1 Pressure transducer, circuit 1.(Low ambient 0ºC or -15ºC option).
- PT2 Pressure transducer, circuit 2. (Low ambient 0ºC or -15ºC option).
- OS Outdoor temperature sensor

1.5.- PIPING DRAWINGS

COOLING ONLY UNITS



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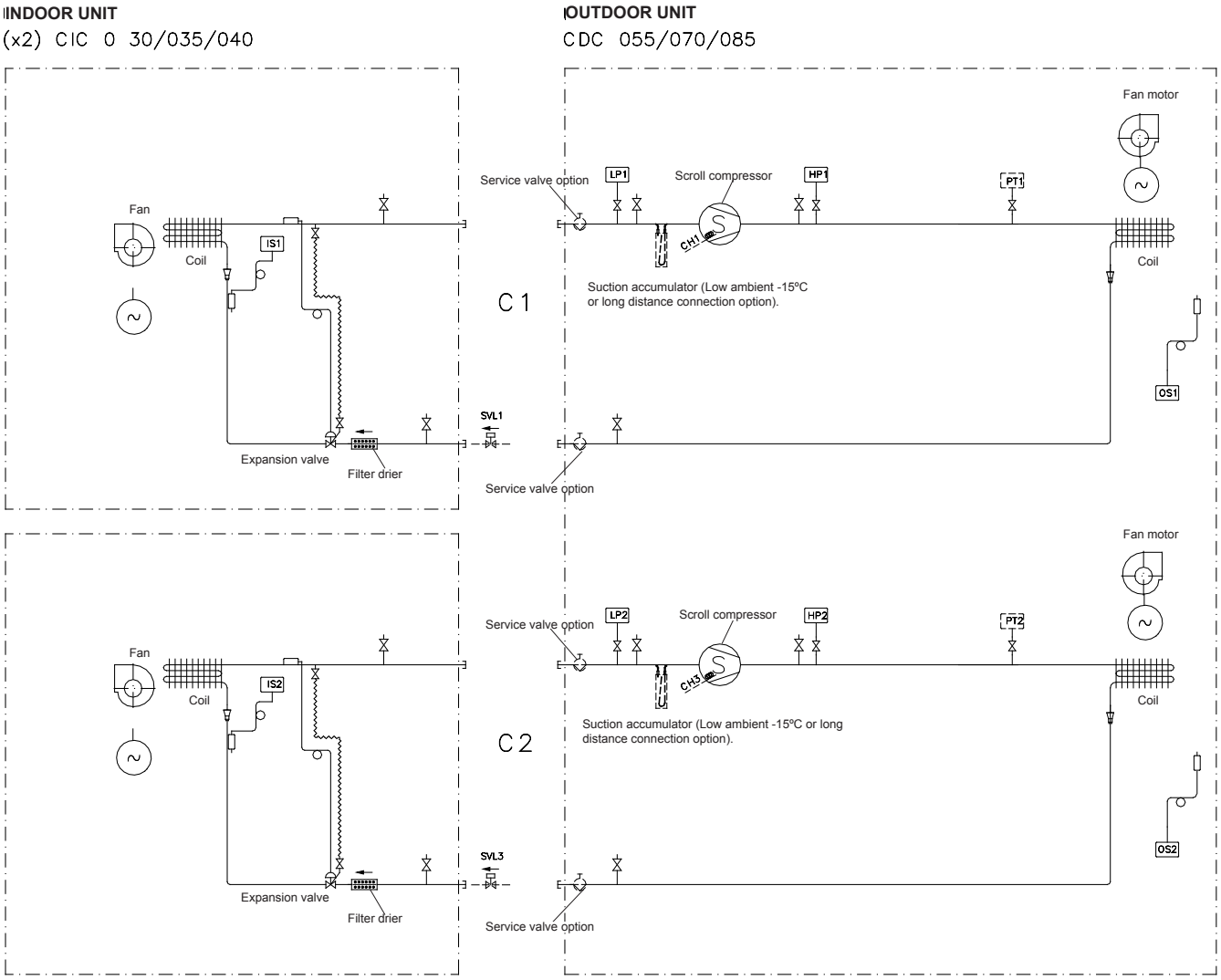
- DS Discharge sensor. (With C50 control).
- IS1 Liquid-gas pipe sensor, circuit 1. (With C40 control).
- IS2 Liquid-gas pipe sensor, circuit 2. (With C40 control).
- SVL1 Liquid solenoid valve (Long distance option). To be connected by the installer to indoor units.
- SVL3 Liquid solenoid valve (Long 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 or -15ºC option).
- CH2 Crank case heater. (Low ambient 0ºC or -15ºC option).
- CH3 Crank case heater. (Low ambient 0ºC or -15ºC option).
- PT1 Pressure transducer, circuit 1. (Low ambient 0ºC or -15ºC option).
- PT2 Pressure transducer, circuit 1. (Low ambient 0ºC or -15ºC option).
- OS Outdoor temperature sensor

1.5.- PIPING DRAWINGS

COOLING ONLY UNITS

MULTI-SPLIT SYSTEM



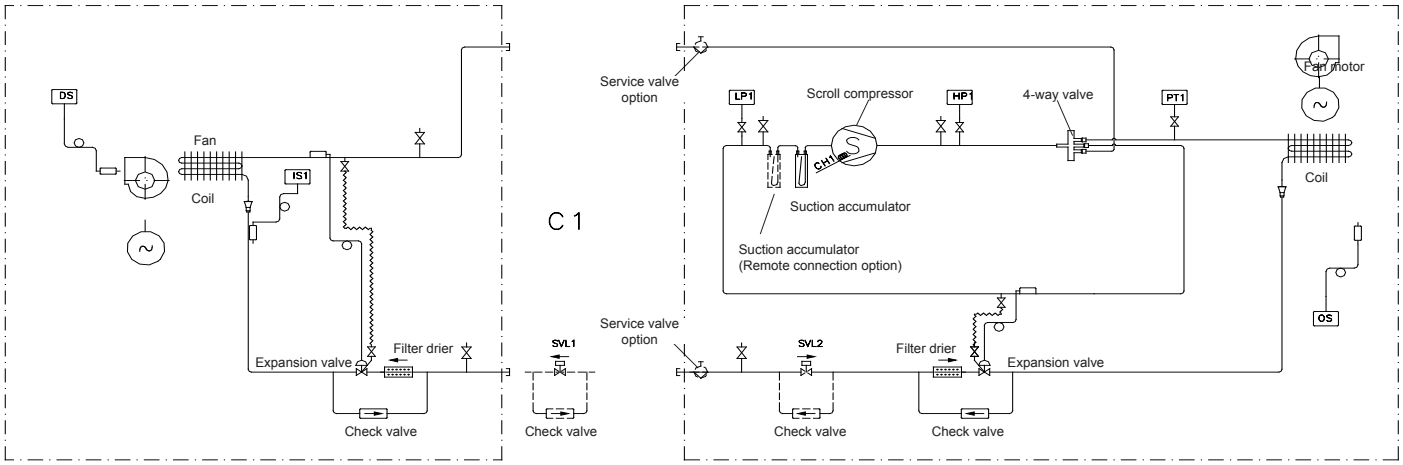
Pressure gauge. (5/16" to be fitted by the installer).
IS1 Liquid-gas pipe sensor, circuit 1. (With C40 control).
IS2 Liquid-gas pipe sensor, circuit 2. (With C40 control).
SVL1 Liquid solenoid valve (Long distance option).
To be connected by the installer to indoor units.
SVL3 Liquid solenoid valve (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 or - 15ºC option).
CH3 Crank case heater. (Low ambient 0ºC or - 15ºC option).
PT1 Pressure transducer, circuit 1. (Low ambient 0ºC or - 15ºC option).
PT2 Pressure transducer, circuit 2. (Low ambient 0ºC or - 15ºC option).
OS1 Outdoor temperature sensor, circuit 1.
OS2 Outdoor temperature sensor, circuit 2.

1.5.- PIPING DRAWINGS

HEAT PUMP UNITS

INDOOR UNIT
CIH 020/025/030/035/040

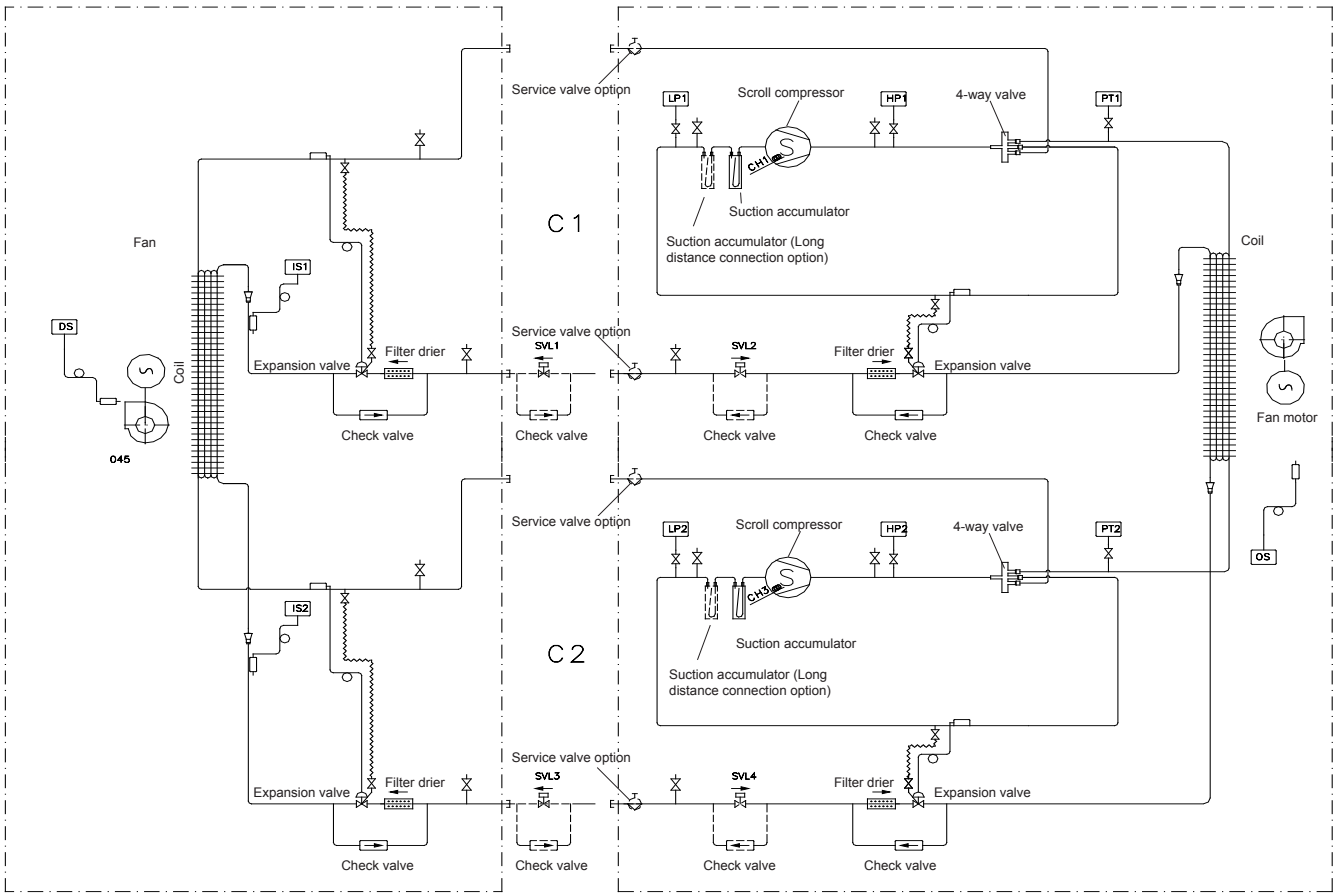
OUTDOOR UNIT
CSH 020/025/030/035/040



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

INDOOR UNIT :IOR
CIH 045

OUTDOOR UNIT
CSH 045

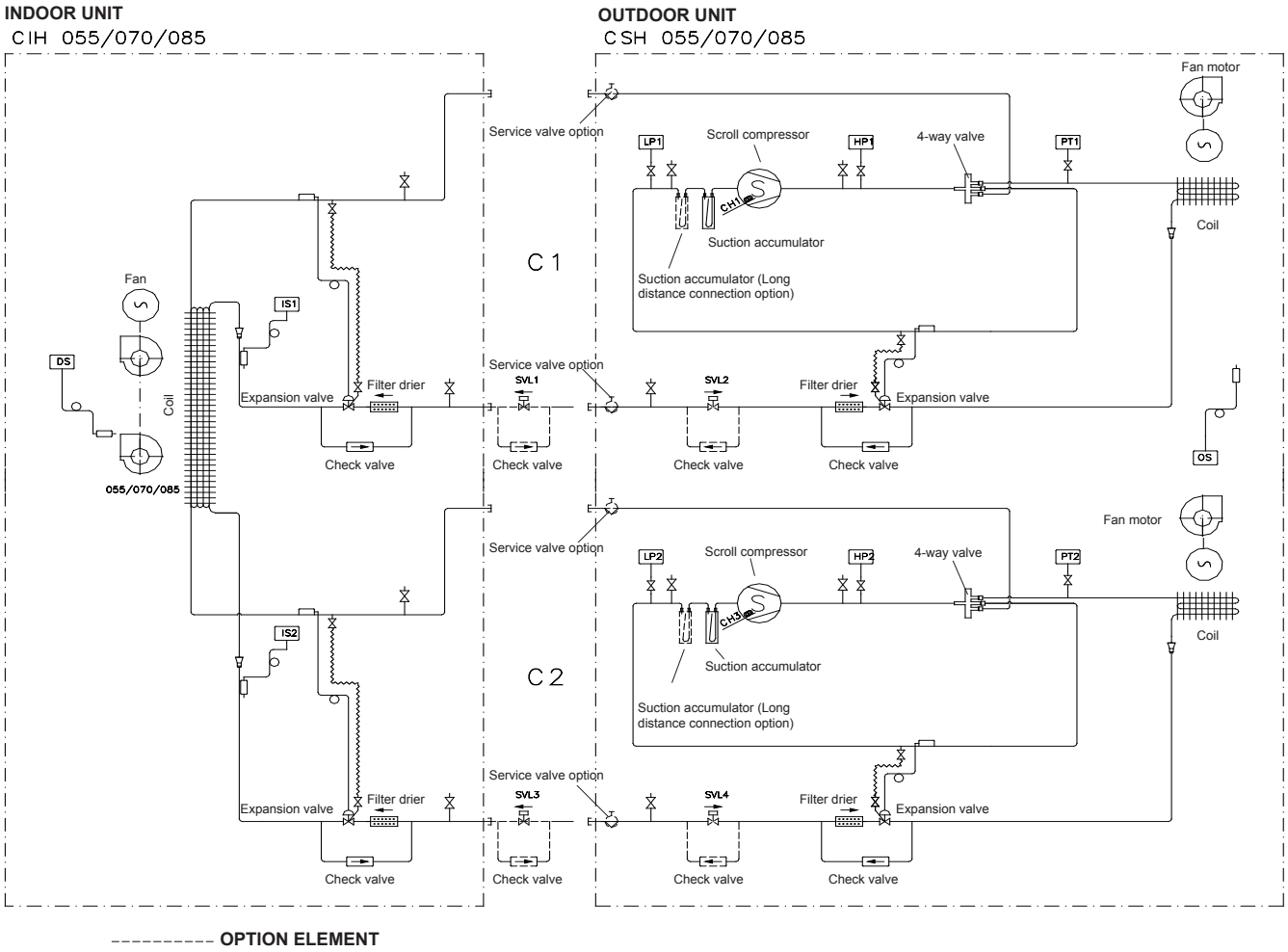


---------- **OPTION ELEMENT**

- Pressure gauge. (5/16" to be fitted by the installer).
- (DS) Discharge sensor. (C50 version).
- (IS1) Liquid-gas pipe sensorr, circuit 1. (With C40 control).
- (IS2) Liquid-gas pipe sensor circuit 2. (With C40 control).
- (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.
- (OS) Outdoor temperature sensor.

1.5.- PIPING DRAWINGS

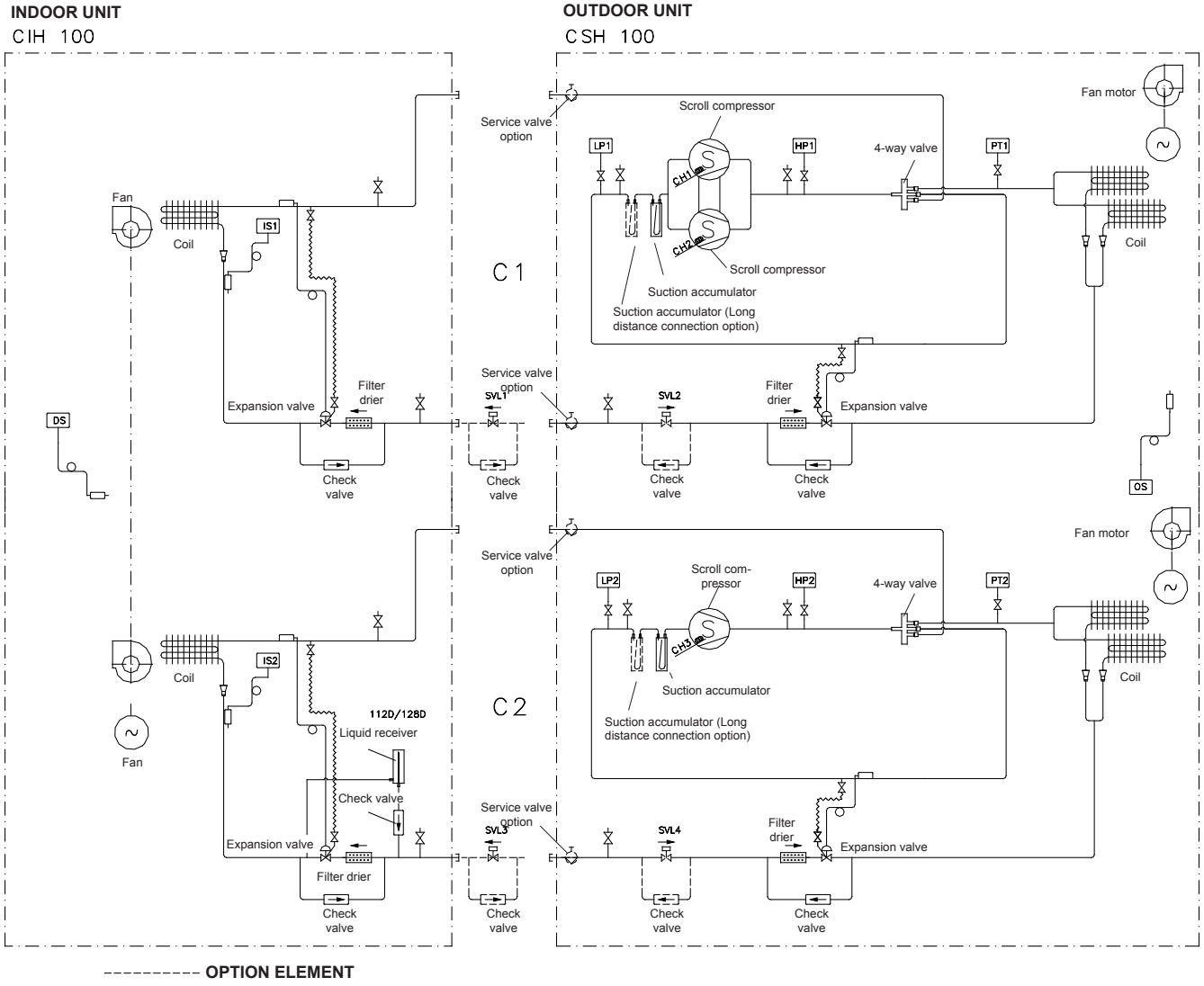
HEAT PUMP UNITS



- Pressure gauge. (5/16" to be fitted by the installer).
- DS Discharge sensor. (With C50 control).
- IS1 Liquid-gas pipe sensorr, circuit 1. (With C40 control).
- IS2 Liquid-gas pipe sensor circuit 2. (With C40 control).
- 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.
- OS Outdoor temperature sensor.

1.5.- PIPING DRAWINGS

HEAT PUMP UNITS



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

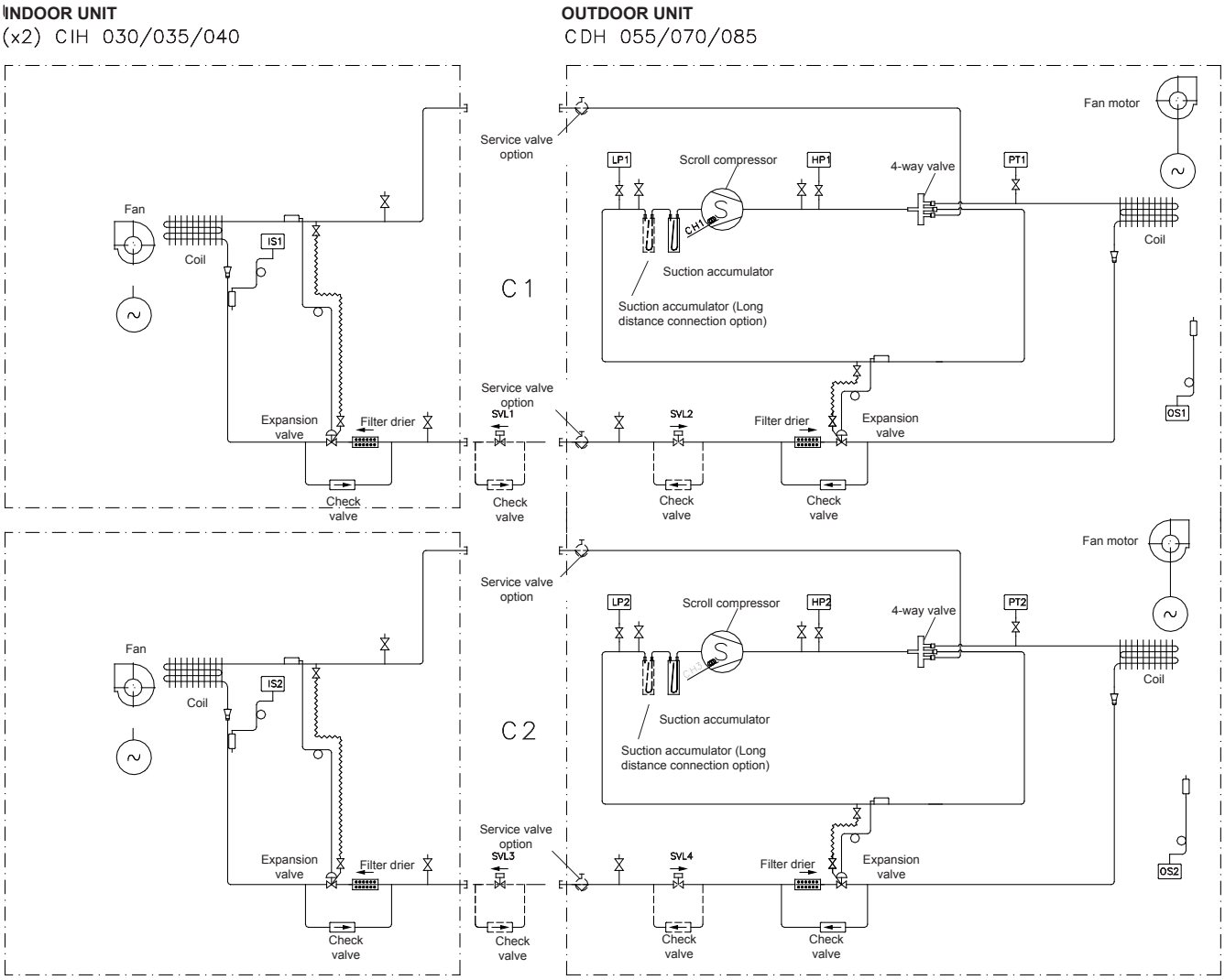
Pressure gauge. (5/16" to be fitted by the installer).
DS Discharge sensor. (With C50 control).
IS1 Liquid-gas pipe sensor, circuit 1. (With C40 control).
IS2 Liquid-gas pipe sensor, circuit 2. (With C40 control).
SVL1 Liquid solenoid valve (Long distance option).
To be connected by the installer to 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.
CH2 Crank case heater.
CH3 Crank case heater.
PT1 Pressure transducer, circuit 1.
PT2 Pressure transducer, circuit 2.
OS Outdoor temperature sensor.

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. (With C40 control).
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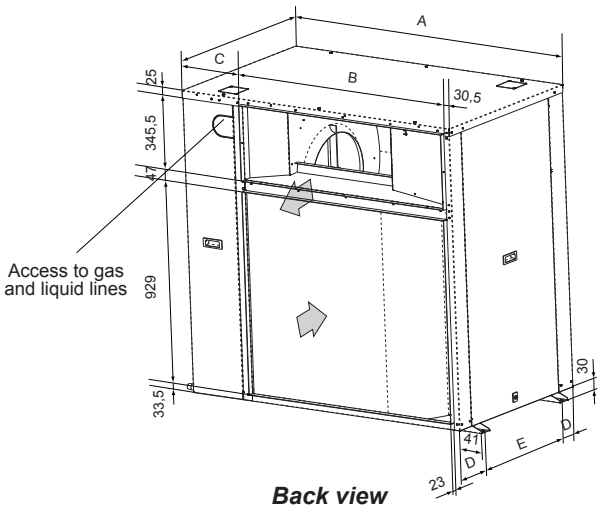
- HP2 High pressure switch, circuit 2.
- CH1 Crank case heater.
- CH3 Crank case heater.
- PT1 Pressure transducer, circuit 1.
- PT2 Pressure transducer, circuit 2.
- OS1 Outdoor temperature sensor, circuit 1.
- OS2 Outdoor temperature sensor, circuit 2.

1.6.- UNIT DIMENSIONS

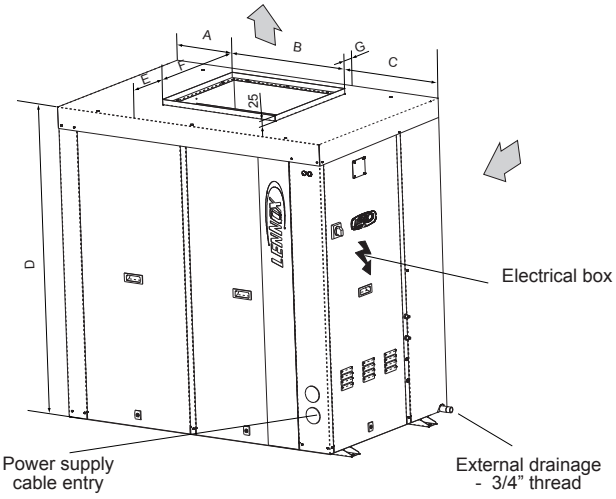
CSC/CSH 20S/25S/30S/35S/40S/45D

SPLIT - STANDARD HORIZONTAL DISCHARGE



Back view

SPLIT - OPTIONAL VERTICAL DISCHARGE



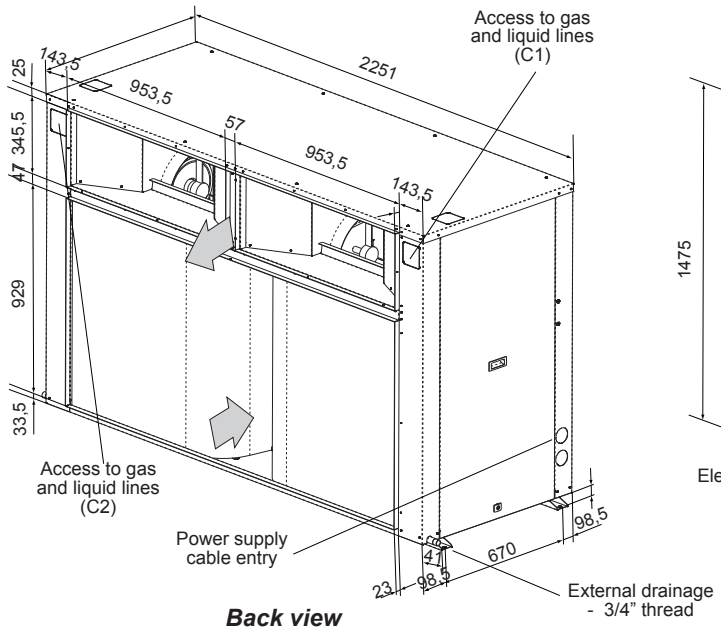
Front view

MODELS	"A" BOX	"B" BOX
	020 - 025 - 030 S	035S - 040S - 045D
A	1194	1445
B	1000	1093
C	163,5	321,5
D	102,5	133
E	540	600

MODELS	"A" BOX	"B" BOX
	020 - 025 - 030 S	035S - 040S - 045D
A	371,5	420
B	564	622
C	288,5	403
D	1410	1500
E	204,5	252,5
F	467	543
G	77,5	74,5

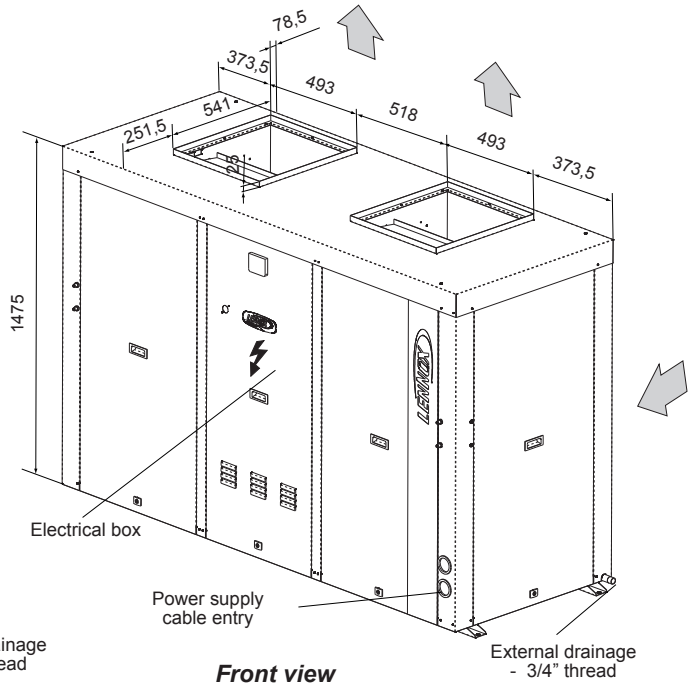
CSC/CSH/CDC/CDH 55D/070D/85D

SPLIT - STANDARD HORIZONTAL DISCHARGE



Back view

SPLIT - OPTIONAL VERTICAL DISCHARGE

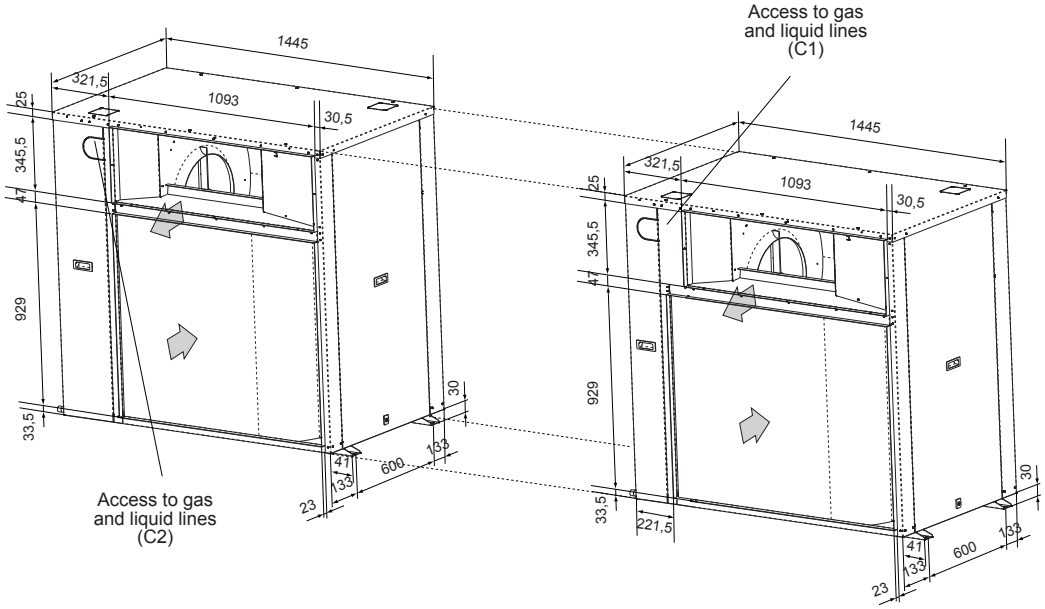


Front view

1.6.- UNIT DIMENSIONS

CSC/CSH 100D

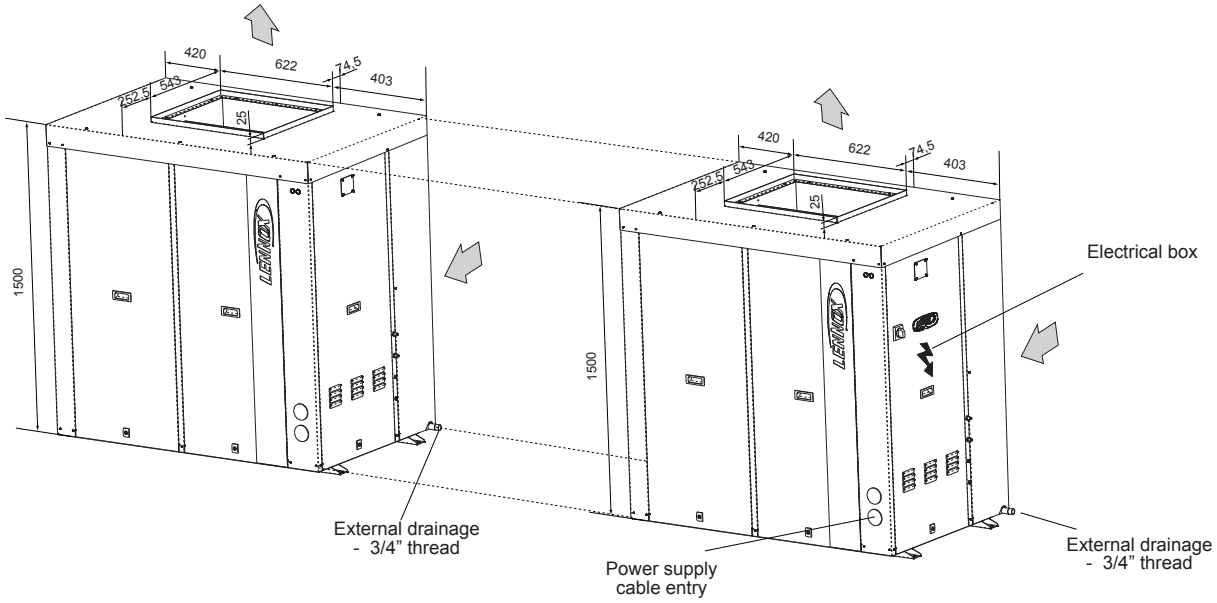
SPLIT - STANDARD HORIZONTAL DISCHARGE



Back view

CSC/CSH 100D

SPLIT - OPTIONAL VERTICAL DISCHARGE



Front view

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.

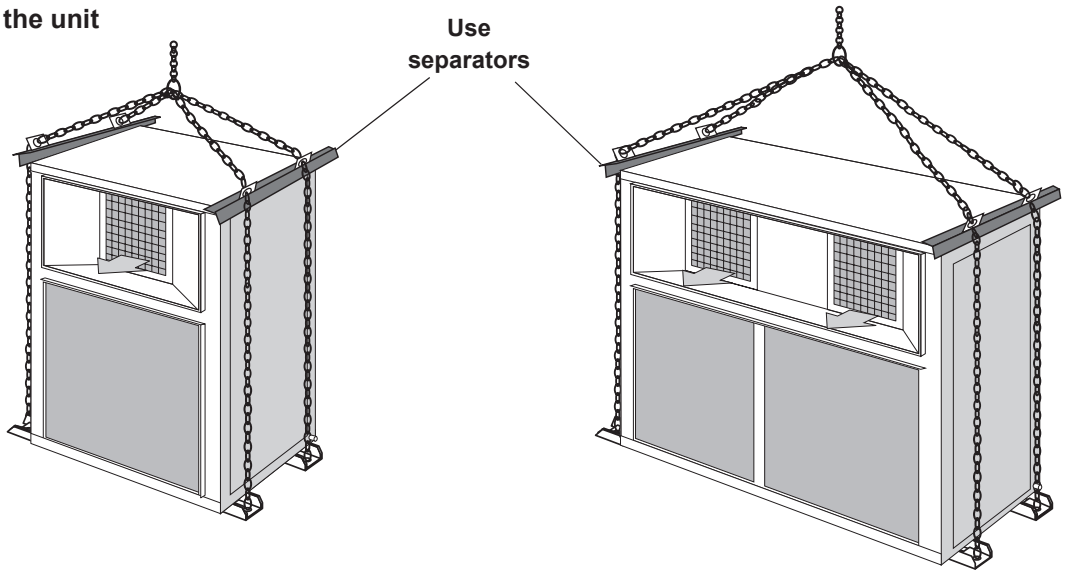
The units are designed to be installed with ducts designed by qualified technical staff. The joints to be used between ducts and openings in the unit should be Elastic Joints. Avoid the use of BYPASS joints between the extraction air and input air. The structure where the unit is placed must be able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

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 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

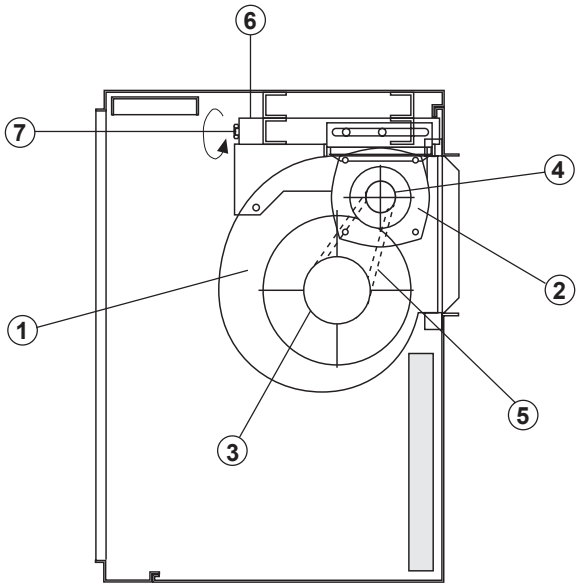


2.- INSTALLATION

2.3.- OPTIONAL OPERATIONS PRIOR TO UNIT INSTALATION

THE VENTILATION IS FORMED BY:

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



FLOW REGULATION IN THE FANS

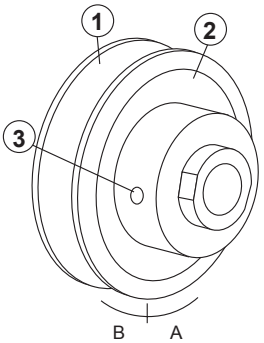
The fan in the outdoors units have a variable pulley incorporated into the activating motor, by which it is possible to vary, when the fan is off its diameter to modify the air flow of the unit, as required.

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

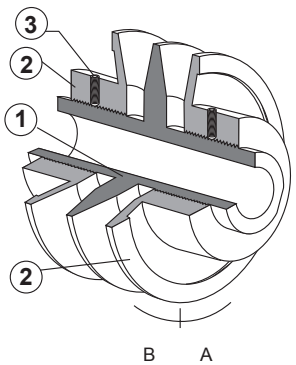
CLOSE PULLEY:
To increase the fan flow, turn the mobile part in direction “B” (Clock wise).
OPEN PULLEY:
To reduce the flow, turn in direction “A” (Unclock wise).

VARIABLE PULLEYS

SIMPLE PULLEY



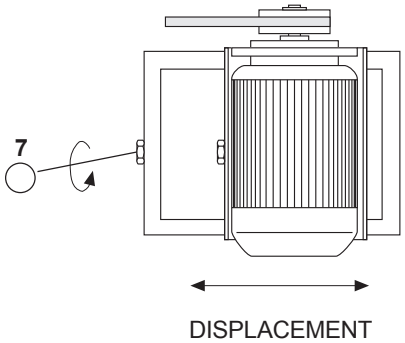
DOUBLE PULLEY



TENSION OF BELTS

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

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



2.- INSTALLATION

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.

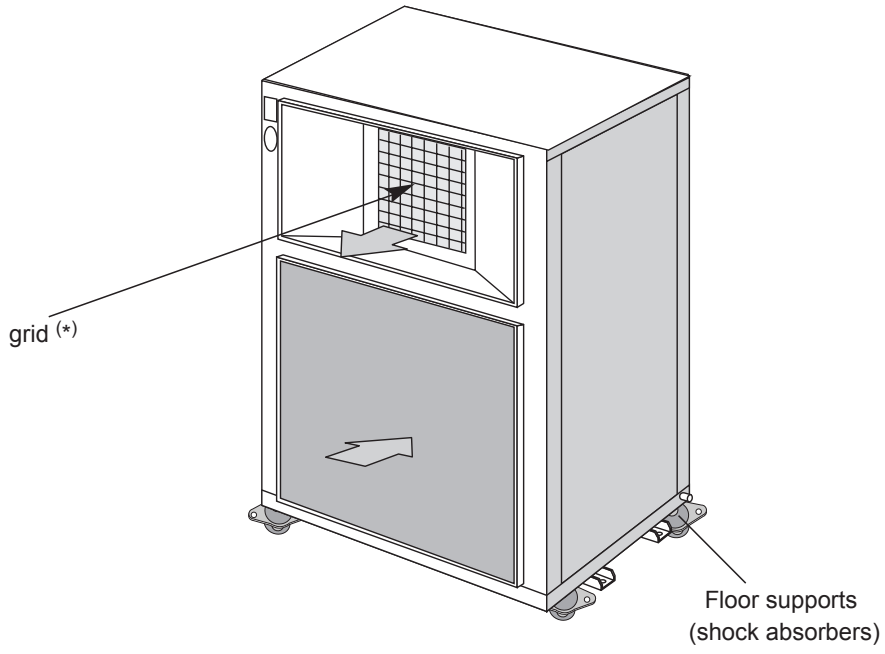
- If the unit is floor mounted, then the profiles should be isolated with shock absorbing material such as anti-vibration or pads. Keep in mind that fans rotate at approximately 850 rpm.
For the ones with variable pulley belts, see performances tables.

- The unit is able to work in normal 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.

- If the outdoor unit is going to be installed outside, it is needed to install isolation around the panel of electrical box, to make sure it became hermetic as well as isolate the electrical panel to avoid condensations. It is also needed to install isolation around the access panels and seal joints of the casing to make sure the unit became hermetic.

UNIT INSTALLED ON SHOCK ABSORBERS



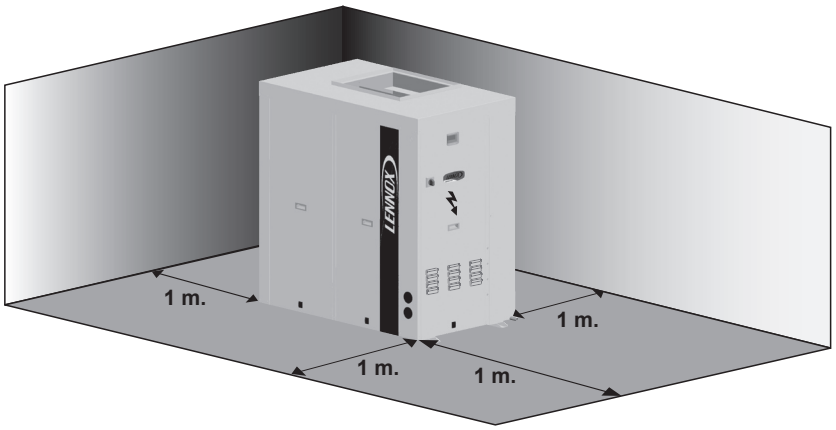
(*) If the unit is mounted outdoors, without discharge duct, the installer must mount a discharge protection grill in the outlet of the outdoor fan.

2.- INSTALLATION

2.4.- 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 cables, drainage connections, electric installation and cleaning filters, as well as easy access to the unit.

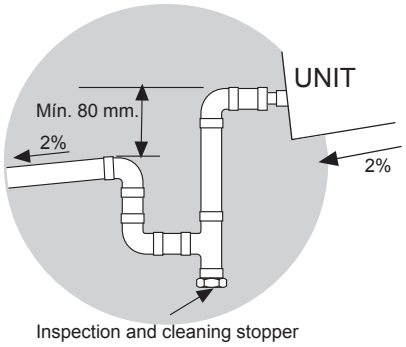


LOCATION
The unit can be installed outside. If it is installed, air entry and exit ducts should be fitted. Both the interior and exterior unit should be assembled on bases previously made and stood on absorbent and antivibrating material to avoid the vibrations being transmitted to the structure of the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

2.6.- DRAINS

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

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

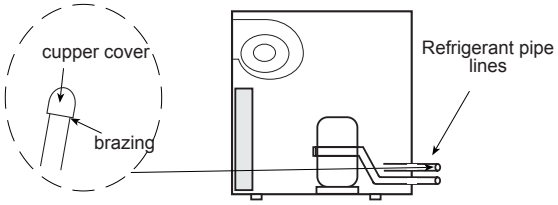


Also slightly tip the unit (2%) toward the drainage side. Check that the condensation trays are clean and free from dirt and other debris from the works and that water drains correctly.

2.- INSTALLATION

2.7- REFRIGERANT CONNECTIONS

The unit is supplied with gas and liquid lines sealed with copper covers inside the casing with possibility to install pipe lines horizontal or vertical. (only when precharged refrigerant option or service valves option is demanded).



The units are supplied with nitrogen gas. This must be removed before any operation.

As an option , the unit can include service valves in the liquid and gas lines , with the unit precharged with nytrogene, or with refrigerant R410A

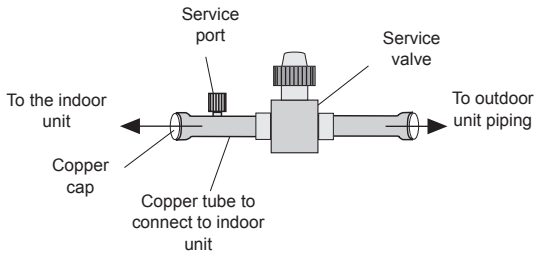
FOR STANDARD UNITS O SERVICE VALVES OPTION, PROCEED AS FOLLOW:

1º Remove the nitrogen gas, through the high and low 1/4" service ports locate inside, from both indoor and outdoor units.
2º Remove the covers from connecting lines.
3º Braze the piping connection lines. Refer to installation manual to select the diameter of the lines.
(When brazing refrigerant pipes, is necessary to supply nitrogen gas through the service ports into the pipes to remove the air)
4º Leak test:
- Add nitrogen gas and check 5 kg/cm2 pressure has been reached, and verify there are not leaks in the circuit or brazing, applying soapy water on pipes, because the leaks cause soapy water to form bubbles.
To detect small leaks proceed as follow:
Add nitrogen gas and check 32 kg/cm2 pressure has been reached, there is not leak if pressure remains the same at least during 24 hours and final pressure is not less than 10% from the initial pressure.
5º Be sure gas line is isolated.
6º Vacuuming.
Remove the nitrogen gas, connect the gauge manifold and vacuum pump to both liquid and gas lines, fully open the valve of the gauge manifold and switch on the vacuum pump. Check to make sure the gauge shows a pressure level of -750mm Hg, after a level of -750mm Hg is reached, keep on the vacuum pump at least during an hour.
7º Refrigerant charge:
-Refer to installation manual to verify amount and type of refrigerant which must be charged, and the total amount to be added must be calculated considering the refrigerant charge of the unit, and also the length and sizes of the refrigerant piping.
-Disconnect the vacuum pump and connect to the refrigerant-charging cylinder. Open the charging cylinder and purge the air from the hose at the gauge manifold.
-Set up the amount of additional refrigerant on the weighing scale, open the high pressure (liquid) and low pressure side (suction) of the gauge valve to start the process of refrigerant from outdoor unit. If the total amount of refrigerant charge has not been reached, because balance pressure, turn off the high side of the gauge manifold, turn on the unit, and add slowly through low side of the gauge the remain amount of the refrigerant charge needed.
(With R-407C refrigerant, the charging cylinder must be on horizontal position and it is important to charge in liquid state).
Close the sides of gauge valve from service port of the unit, put the covers on service ports. Then the unit is ready to work.

During installation operations, keep gas and liquid pipes covered, in order to prevent humidity and dirt, get into them.
Take special concern about refrigerant pipes are isolated.
Avoid collapse on pipe lines installation.

FOR UNITS WITH THE OPTION SERVICE VALVES AND PRECHARGE OF REFRIGERANT R410A , PROCEED AS FOLLOW:

1º Relief the refrigerant pressure in the interconnection pipe after the valve , through the schraeder connection in this pipe
2º Cut or braze the tap of the pipe connection
3º Braze to this pipe , the pipe line that comes from the indoor unit
4º With the service valves close , vacuum the systme, conecting the hose of the vacuum pump to the schraeder connection 5/16" of the copper pipe , until the vacuum reaches 750 mm Hg ; after that operation , maintain the vaccum pump between the connection pipes and the indoor unit . Disconnect the vacuum pump.

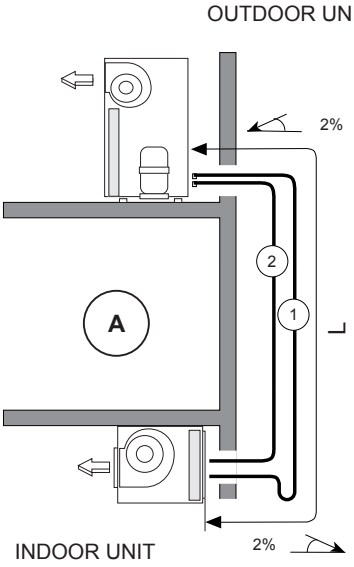


5º Charge of refrigerant. Remove the vacuum pump and connect to the refrigerant bottle. In table 2 you will find the charge of refrigerant by meter of pipe linnes for each model . Adjust the charge of refrigerant in the scale and open the manometer to start the charge in liquid phase. (With R410A the bottle of refrigerant must be in vertical position and charge in liquid phase) . Close the manometer , disconnect it from the schraeder connections in the unit and close with taps the schraeder connections.
6º Open the service valves
7º The installation is ready

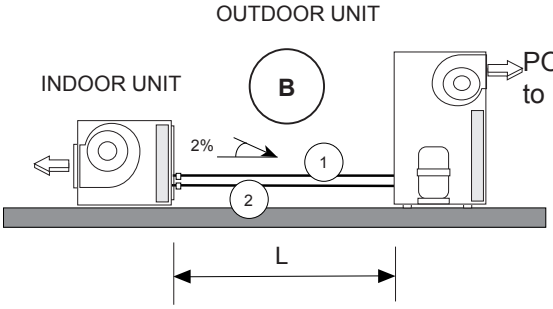
2.- INSTALLATION

2.7- REFRIGERANT CONNECTIONS

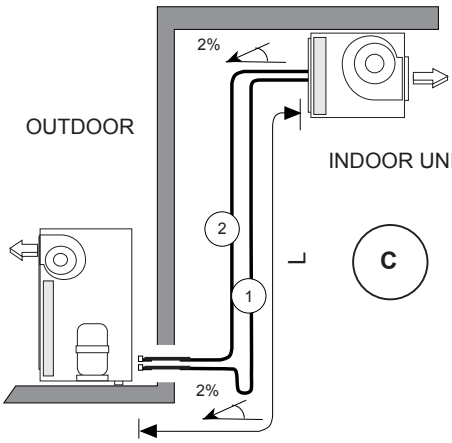
To locate the outdoor and the indoor units, refer to the following information:



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.



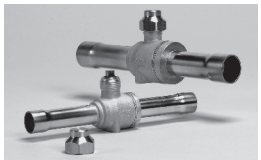
POSITION B : Tip the lines toward the outdoor unit. Make special attention to line length longer than 10m and avoid collapse on pipe lines installation.



POSITION C : Install a 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 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.- INSTALLATION

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

- IN MODEL 100D THE REFRIGERANT PIPES ARE FROM DIFFERENT SIZE . THE BIGEST SIZE CORRESPONDS TO CIRCUIT C1 AND THE SMALLEST ONE TO THE C2 CIRCUIT

TABLE 1: REFRIGERANT LINES SELECTION

REFRIGERANT LINES				UNIT - MODEL									
				020S	025S	030S	035S	040S	045D	055D	070D	080D	100D
Total line length (refrigerant line length between indoor and ourtoor units)	0 to 30 m. (Standard conection unit)	Ø Lquid	C1	1/2”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	3/4”
			C2	n/a	n/a	n/a	n/a	n/a	5/8”	5/8”	5/8”	5/8”	5/8”
		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”
			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”
		Max. n^{er} of bends		6	12	8	18	12	12	8	18	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”
			C2	n/a	n/a	n/a	n/a	n/a	5/8”	5/8”	3/4”	3/4”	3/4”
		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”
			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”
		Max. n^{er} of bends		12	18	18	18	18	18	18	18	18	12

n/a: not available

From 40 m to 65 meters , the long distance kit is required.

The unit is precharged from factory with nytrogene . 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

2.7- REFRIGERANT CONNECTIONS

TABLE 3.1.: REFRIGERANT CHARGE

Charge of R-410A refrigerant (g) for 0 meters of line (Cooling only)										
	020	**025**	**030**	**035**	**040**	**045**	**055**	**070**	**085**	**100**
C1	4800	5950	6700	8650	10000	5700	6800	8600	10250	13000
C2	------	------	------	------	------	5700	6800	8600	10250	9200

Charge of R-410A refrigerant (g) for 0 meters of line (Heat pump)										
	020	**025**	**030**	**035**	**040**	**045**	**055**	**070**	**085**	**100**
C1	5000	6150	6900	8950	10350	5850	7000	8850	10600	13450
C2	------	------	------	------	------	5850	7000	8850	10600	9500

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

Charge of R-410A refrigerant (g) for 0 meters of line (Cooling only)			
	055	**070**	**085**
C1	6800	8600	10250
C2	6800	8600	10250

Charge of R-410A refrigerant (g) for 0 meters of line (Heat pump)			
	055	**070**	**085**
C1	7000	8850	10600
C2	7000	8850	10600

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 CSH 030 + CIH 030 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: 6900 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 + 6900 = 10794 g

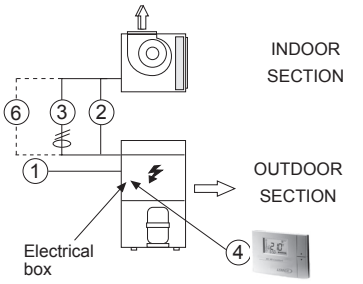
Note: If the outdoor unit includes the factory pre-charged kit, only the weight of refrigerant per meter of line in TABLE 2 is taken into account.

2.8.- ELECTRICAL CONNECTIONS

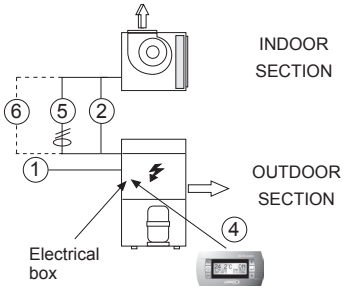
- BEFORE MAKING ANY ELECTRICAL CONNECTIONS, ENSURE THAT ALL CIRCUIT BREAKERS ARE OPEN.
- IN ORDER TO MAKE THE ELECTRICAL CONNECTIONS, FOLLOW THE ELECTRICAL DIAGRAM SUPPLIED WITH THE UNIT.

UNITS WITHOUT FREE-COOLING

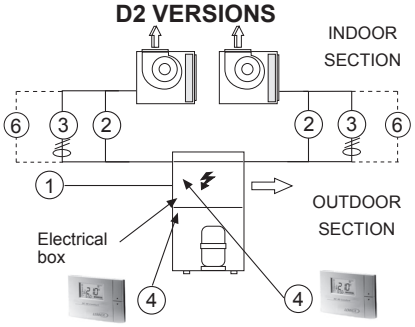
STANDARD VERSIONS



C50 VERSIONS



D2 VERSIONS



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

VERSIONS: STANDARD + C50

	Without BE supply	With BE supply	Outdoor units conection	FM Supply	Liquid-gas pipe sensor	Discharge sensor C50	BE supply (mm²)		
							6		
	1	**1"**		**2**	**3**	**5**	STANDARD	MEDIUM	HIGH
020	5 x 4 mm²	5 x 10 mm²					4 x 2.5 + 4 x 1.5 mm²	4 x 4 + 4 x 1,5 mm²	4 x 6 + 4 x 1,5 mm²
025	5 x 6 mm²	5 x 16 mm²			2 x 1 mm² shielded				
030	5 x 6 mm²	5 x 16 mm²							
035	5 x 6 mm²	3 x 25 + 2 x 16 mm²					4 x 4 + 4 x 1.5 mm²	4 x 6 + 4 x 1,5 mm²	4 x 10 + 4 x 1,5 mm²
040	5 x 10 mm²	3 x 25 + 2 x 16 mm²							
045	5 x 16 mm²	3 x 35 + 2 x 16 mm²		4 x 1.5 mm²	4 x 1 mm² shielded	2 x 1 mm² shielded	4 x 6 + 4 x 1.5 mm²	4 x 10 + 4 x 1,5 mm²	4 x 16 + 4 x 1,5 mm²
055	5 x 16 mm²	3 x 50 + 2 x 25 mm²							
070	3 x 25 + 2 x 16 mm²	3 x 70 + 2 x 35 mm²							
085	3 x 25 + 2 x 16 mm²	3 x 70 + 2 x 35 mm²							
100	3 x 35 + 2 x 16 mm²	3 x 95 + 2 x 50 mm²	2 x (4 x 4 mm²) + 10 x 1,5 mm² + 6 x 1 mm²				4 x 10 + 4 x 1.5 mm²	4 x 16 + 4 x 1.5 mm²	4 x 25 + 4 x 1.5 mm²

VERSION: D2

	Without BE supply	With BE supply	FM Supply	Liquid-gas pipe sensor	BE Supply (mm²)		
					6		
	1	**1"**	**2**	**3**	STANDARD	MEDIUM	HIGH
055	5 x 16 mm²	3 x 10 + 2 x 25	2 x [4 x 1,5 mm²]	2 x (2 x 1 mm² shielded)	2 x [4x2,5 + 4x1,5 mm²]	2 x [4x4 + 4x1,5 mm²]	2 x [4x6 + 4x1,5 mm²]
070	5 x 6 mm²	5 x 16 mm²			2 x [4x4 + 4x1,5 mm²]	2 x [4x6 + 4x1,5 mm²]	2 x [4x10 + 4x1,5 mm²]
085	5 x 6 mm²	5 x 16 mm²					

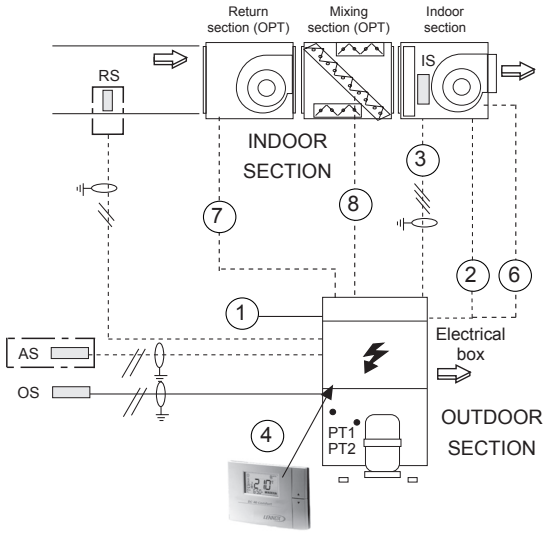
Note: For units with two circuits, indoor coil sensor IS1, must be connected with circuit C1 and indoor coil sensor IS2 with circuit C2, otherwise the protection will not work correctly.
The length of all cables for connection with indoor unit must be less than 65 m.

2.- INSTALLATION

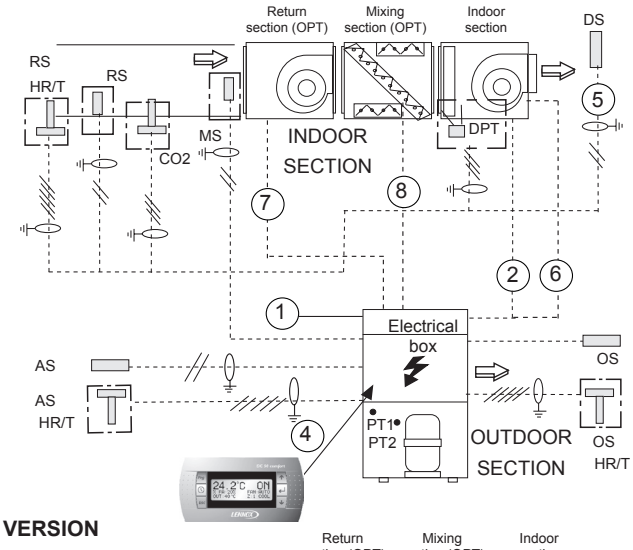
2.8.- ELECTRICAL CONNECTIONS

UNITS WITHOUT FREE-COOLING

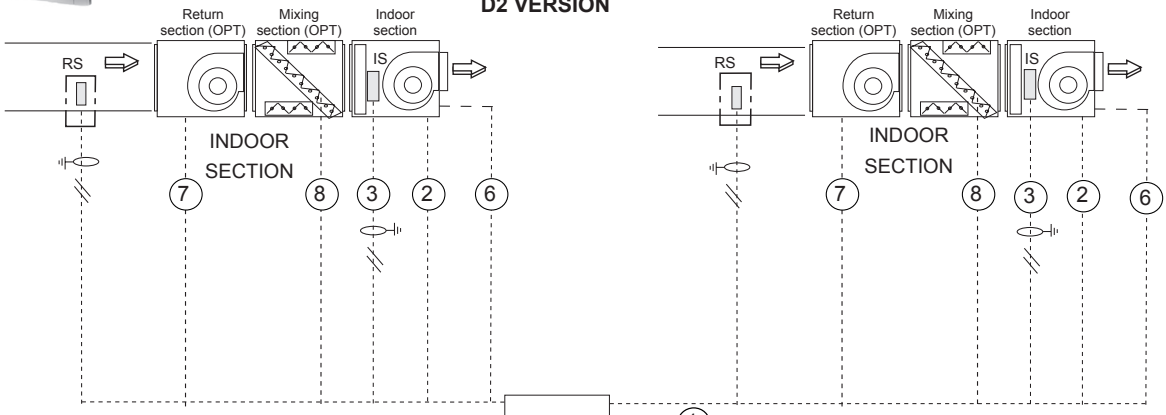
STANDARD VERSION

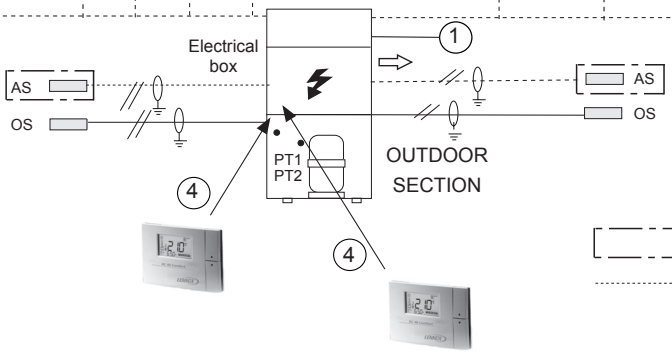


C50 VERSION



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

CONTROL CONNECTION ELEMENTS:

COMPONENTS VERSIONS	STANDARD	C50	D2	No. OF CABLES X SECTION
DS (Discharge sensor).		STANDARD		2 x 1 mm² (shielded)
OS (Outdoor sensor).	STANDARD	STANDARD	STANDARD	2 x 1 mm² (shielded)
AS (Remote ambient sensor).	OPTION	STANDARD	OPCIONAL	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)
DPT (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)

RETURN AND EXHAUST FAN CONNECTIONS

	020	025-040	045	055-085	100
Exhaust fan	3x 1,5 mm²			4 x 1,5 mm²	
Return fan				4 x 1,5 mm²	4 x 2,5 mm²

FREE-COOLING CONNECTION

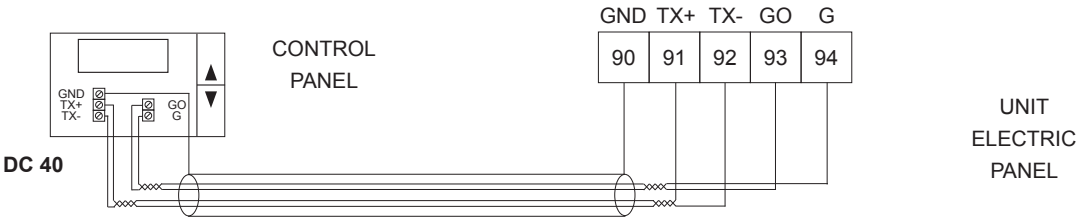
VERSION	
STD & D2	**5 x 1,5 mm²**
C50	**7 x 1,5 mm²**

VOLTAGE OPERATING LIMITS: 342-462V

2.- INSTALLATION

2.8.- ELECTRICAL CONNECTIONS

DC 40 THERMOSTAT, ELECTRICAL CONNECTION

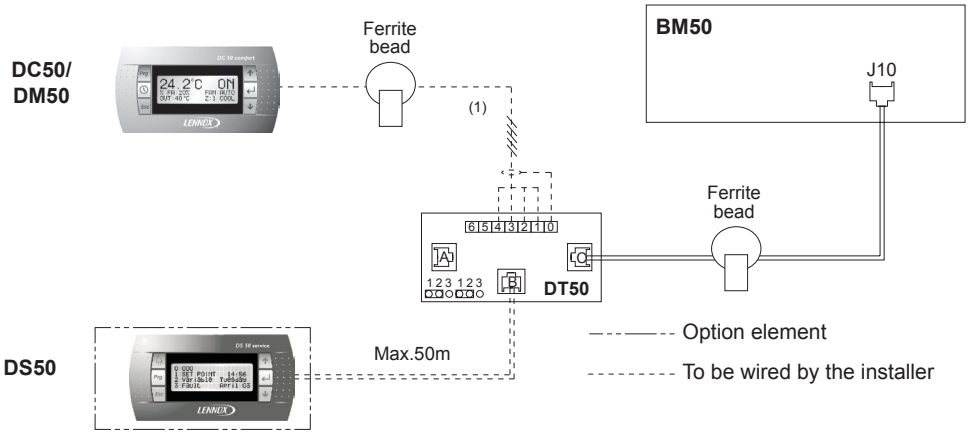


2 x Shielded twisted pairs AWG 20. 100 m maximum.
1x Shielded twisted pair AWG20 + 2 x 1,5 mm. 200m maximum.

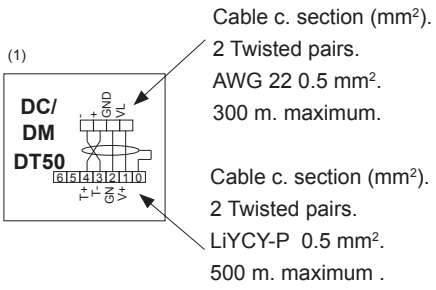
IMPORTANT
THE SHIELDED CONNECTING CABLE BETWEEN THE CONTROL PANEL AND THE UNIT MUST BE SEPARATED FROM ANY OTHER TYPE OF ELECTRICAL WIRING. CONNECT IT TO THE ELECTRIC PANEL LOCATED IN THE OUTDOOR UNIT.

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.



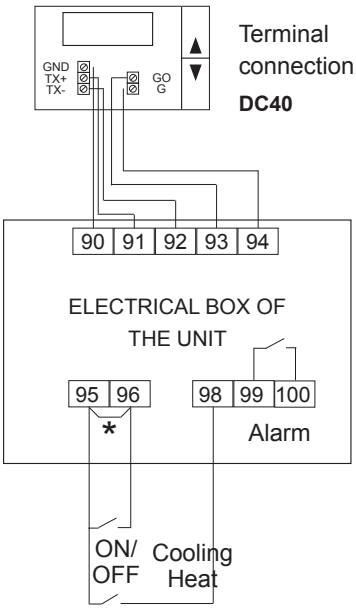
2.- INSTALLATION

2.8.- ELECTRICAL CONNECTIONS

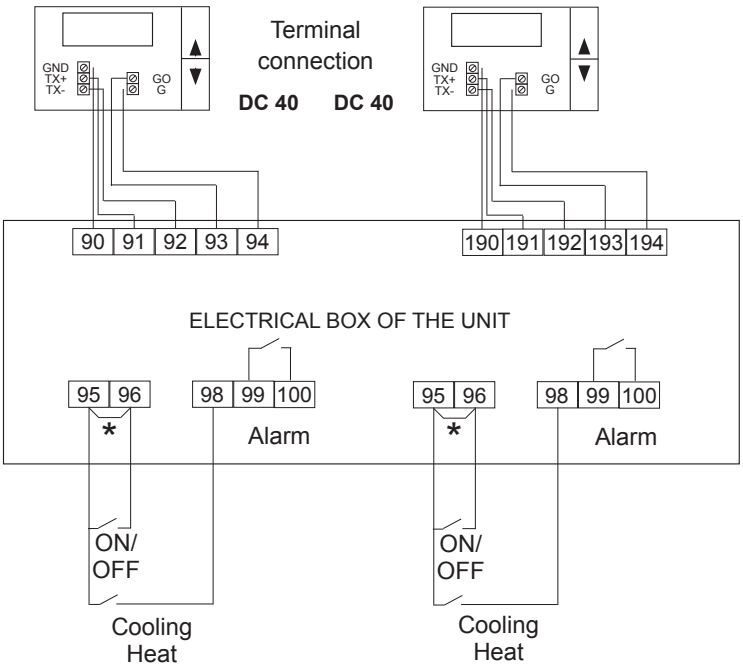
“REMOTE SIGNALS” ELECTRICAL CONNECTION

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

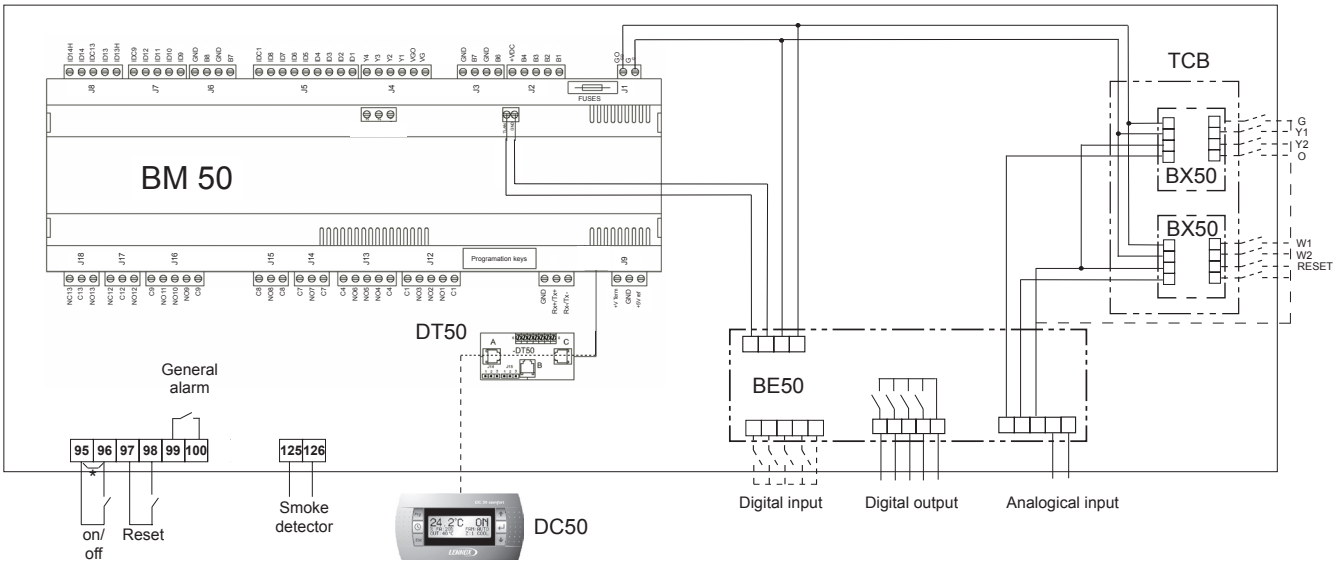


D2 VERSION



* Remove link for remote ON/OFF operation.

C50 VERSION



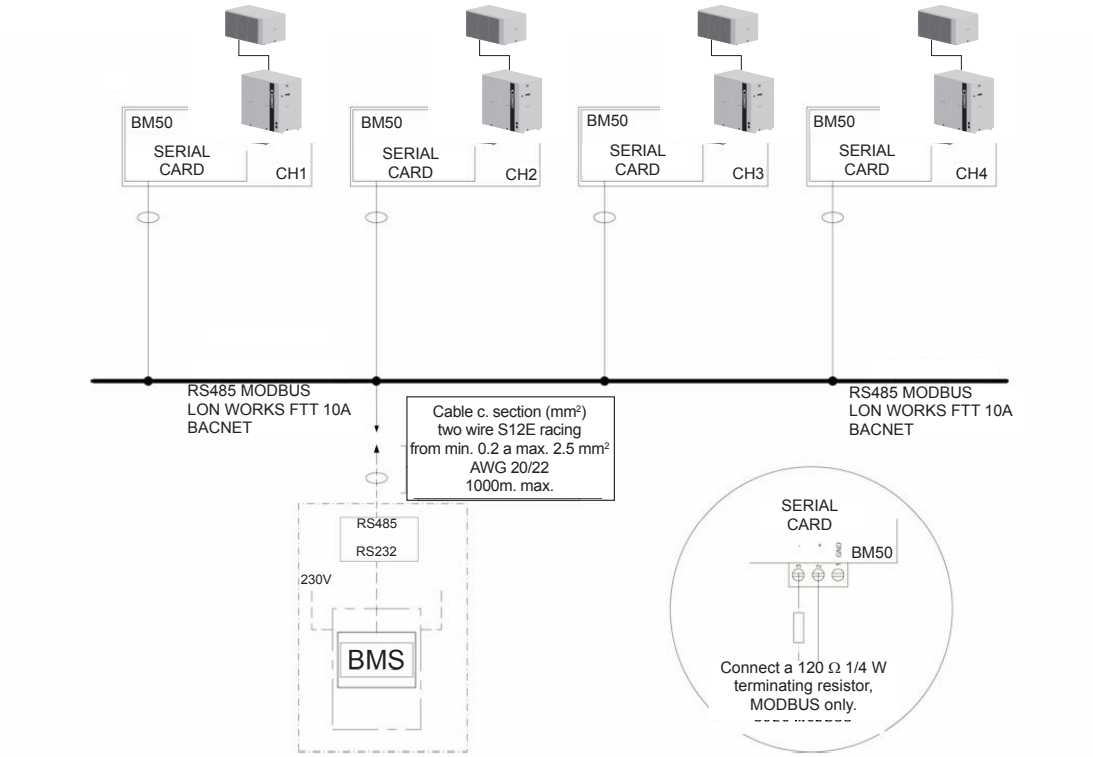
* Remove link for remote ON/OFF operation.

2.9.- OPTIONS INSTALLATION

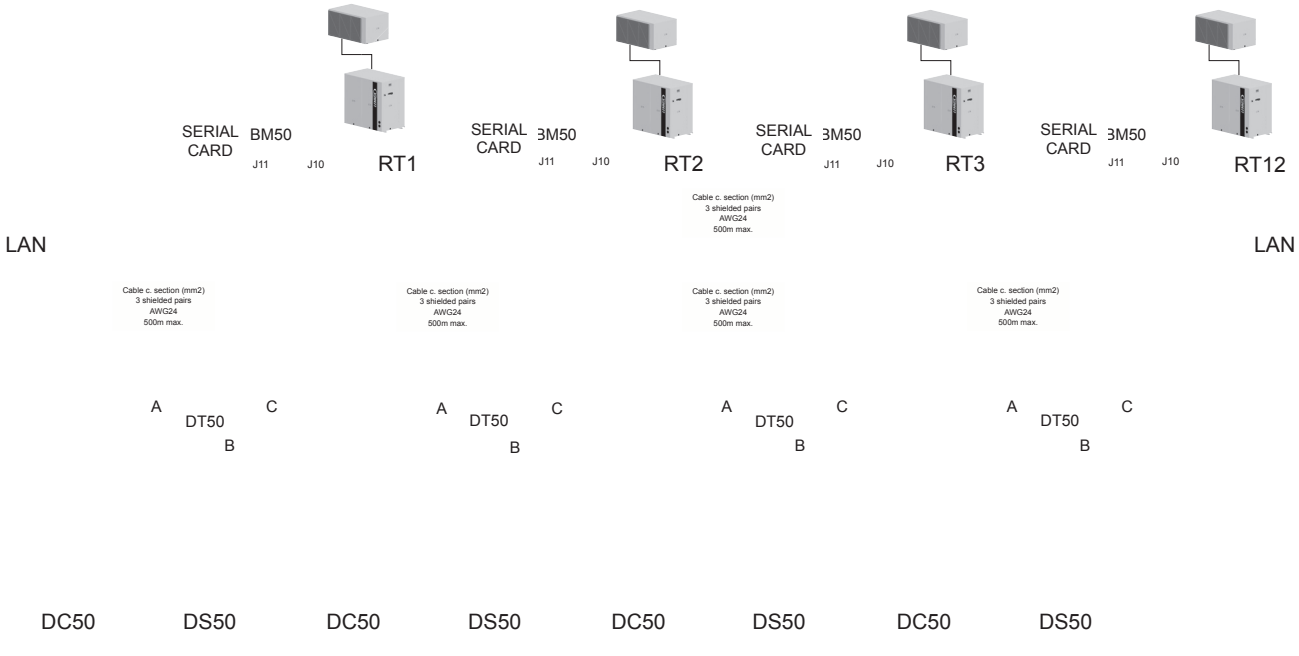
COMMUNICATION CAPABILITIES

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

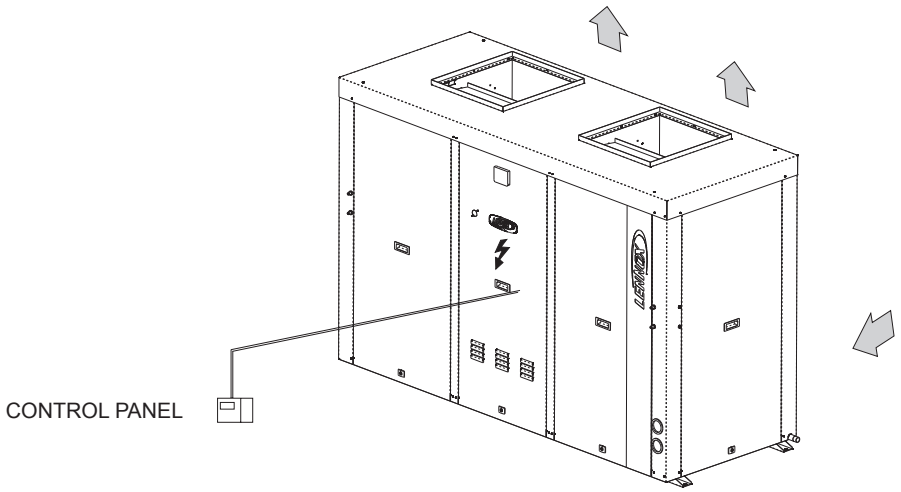
3.1.- PRELIMINARY CHECKS BEFORE STARTUP

- 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:
055D-070D-085D



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:
CSH 030 + CIH 030 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.**

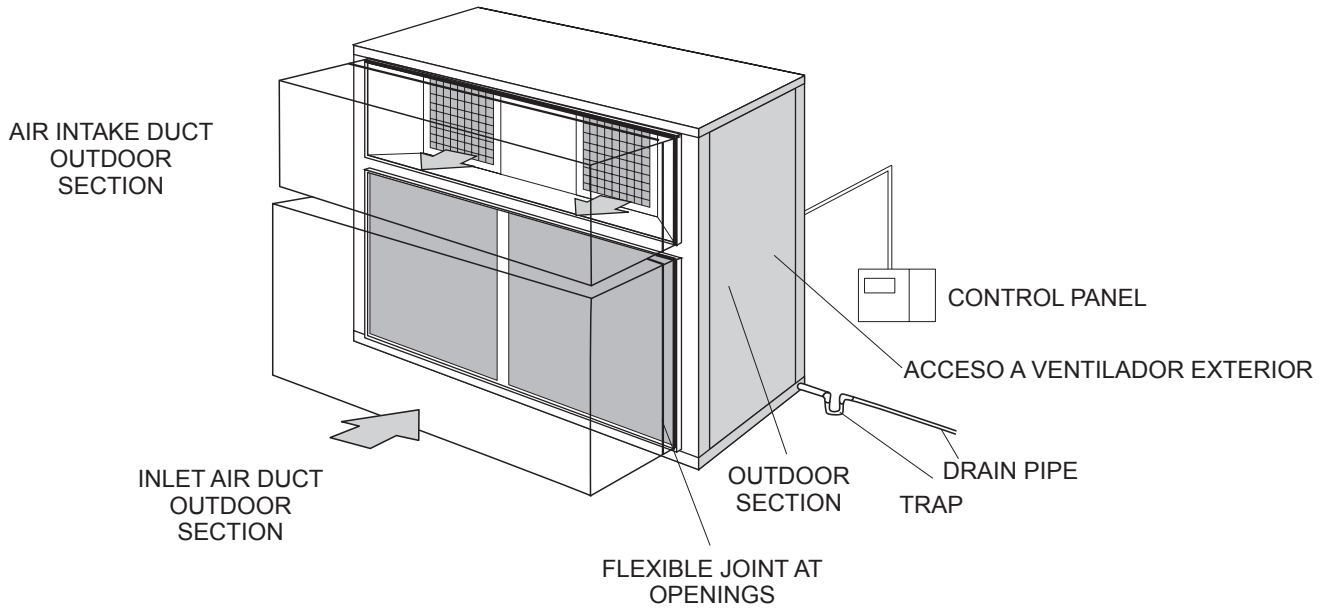
CHECK THAT THE COMPRESSOR IS ROTATING IN THE CORRECT DIRECTION.
- If you have the option phase rotation indicator, use it to check the correct rotation.
- If you do not have three phase return lock, check the correct direction of rotation. The suction pressure decreases and the discharge pressure increases 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.

DISCHARGE IN THE DOUBLE CIRCUIT UNITS
Always to be done through a common duct or plenum.



3.- COMMISSIONING AND OPERATION

3.2.- PRELIMINARY CHECKS AT STARTUP

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

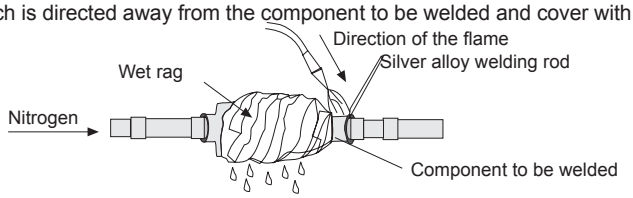
PREVENTIVE MAINTENANCE PREVENTS COSTLY REPAIRS.
THIS REQUIRES PERIODIC INSPECTIONS:

- 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.
- Reamers should always be well sharpened.

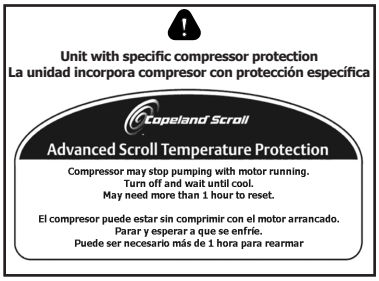
4.- MAINTENANCE

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 (C40): 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.

4.4.- REGULACTION

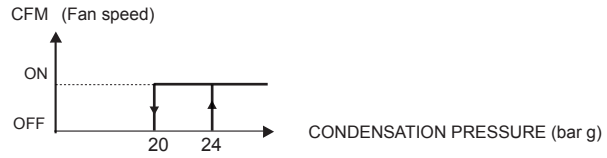
REGULATION WITH 40 CLIMATIC CONTROL

	COOLING		HEATING	
	RESET	SET	SET	RESET
LP/LP1/LP2	3,5	4,5	1,7	2,7
HP/HP1/HP2	43	34	43	34
PT/PT1/PT2	outdoor fan speed regulation		defrost	

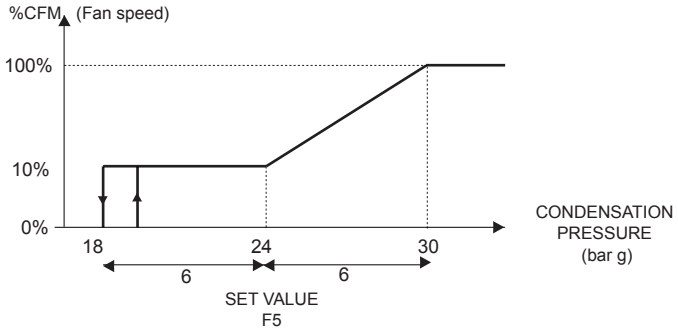
Tables values in bar g.

1.- OUTDOOR FAN SPEED REGULATION
(Low ambient 0ºC or - 15ºC option)
CSC,CDC,CSH,CDH

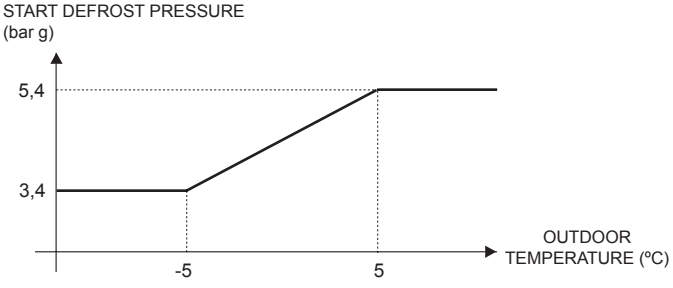
LOW AMBIENT 0ºC OPTION



LOW AMBIENT -15ºC OPTION



2.- DEFROST
- Start: suction pressure < pressure of starting defrost, for 60 sec.
- End: 30 bar or more than 8 minutes from the beginning of defrost.



REGULATION WITH 50 CLIMATIC CONTROL

	COOLING		HEATING	
	SET	RESET	SET	RESET
LP/LP1/LP2	1,7	2,7	1,7	2,7
HP/HP1/HP2	43	34	43	34
PT/PT1/PT2	outdoor fan speed regulation		defrost	

Tables values in bar g.

1.- OUTDOOR FAN SPEED REGULATION
(Low ambient 0ºC or - 15ºC option)
CSC,CSH

LOW AMBIENT 0ºC OPTION

LOW AMBIENT -15ºC OPTION

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

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

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