LENNOX
EMEA

VERTICAL DUCTABLE CONDENSING UNIT

CSC/CSH

20 - 100 kW

CSC/CSH-AGU-1801-E

www.lennoxemea.com

LENNOX

CSC/CSH

APPLICATION GUIDE

Ref : CSC/CSH-AGU-1801-E

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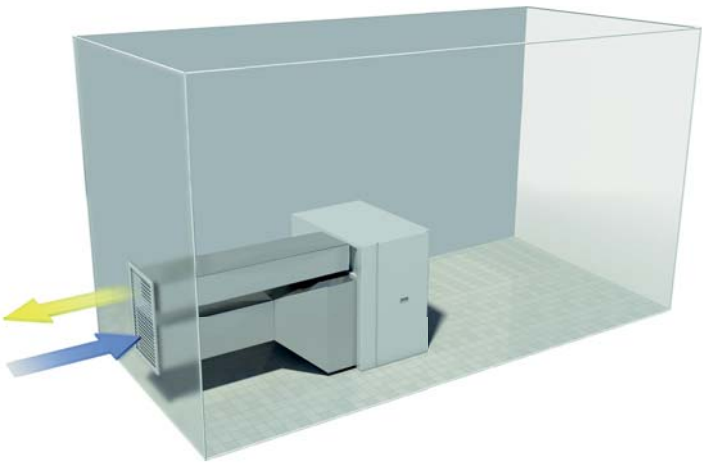
Product designed and manufactured under quality management systems certified ISO 9001 and ISO 14001.

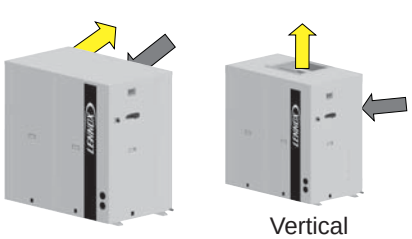
Our company's products comply with European standards.

MODEL NUMBER DESCRIPTION

C	C =	**CSC/CSH**
	-	1st letter
M	S =	Condensing unit
C	C =	Cooling
	H =	Heat pump
024	Cooling capacity	
S	S =	1 circuit
	D =	2 circuits
N	N =	Without refrigerant
M	M =	R410A
1	Revision number	
M	T =	230V/1/50
	M =	400V/3/50



THERMODYNAMIC SECTION



APPLICATION

Introduction

CSC/CSH is a ductable condensing unit for indoor installation, sheltered from bad weather conditions.
Its particular “cupboard” design is made for comfort cooling & heating of medium to large volume premises (200 to 1000m² per unit) in urban environments, where installation on the roof is too complex.

CSC/CSH is designed to be installed indoor with duct connections from the thermodynamic section to the outdoor

The CSC/CSH range has been designed to be flexible for our customers, it can either be a simple unit when first cost is the main driver, but options can be added to make the CSC/CSH a premium product.

Adaptable product:

- 20 to 100 kW cooling and heating capacity available in 4 different boxes
- Cooling only or reversible heat pump unit,
- Variable external static pressure up to 300 Pa to adapt to wide possibilities of ductwork

Preserving architecture

CSC/CSH is a ductable unit made for indoor installation: the only elements appearing outdoor are protection grills beyond duct connections. In many city centres, historical protection requires the preservation of building architecture. Having no HVAC machinery elements on the external building fronts protects the original architecture.
Grills are flexible elements that can be highly integrated in the environment.

Commercial footprint requirement minimized

Estate surface in urban areas can be rare and expensive. The compact vertical design of CSC/CSH minimises the occupied footprint, to preserve the available surface for commercial activity. For the CSC/CSH to be the market leader in efficiency on footprint it uses bended coils.

Easy installation

The vertical design of the CSC/CSH ensures it fits through most door openings and standard urban room height.

ENERGY SAVINGS

Dynamic defrost (under patent)

Heat pump units generally start defrosting when the outside temperature is below a given value. The cycle repeats periodically. This results sometimes in starting an expensive defrost cycle when it is very cold outside but very dry: in other words, when the coil is not frozen.
After many tests in the Lennox laboratory, it was found that it is possible to know exactly when the coil is frozen, by analysing the temperature difference between the coil and the outside temperature.
With this built-in feature of the CLIMATIC 60, Lennox ensures to start a defrost only when necessary, hence saving energy and improving comfort.

Gained values at 0°C, 90% humidity:

On energy efficiency:
The defrost cycles starts only when required: divided by 3 to 4 the number of cycles.
At the conditions mentioned, dynamic defrost saves up to 2h15 minutes of cooling cycles over 1day.
Those 2h15 minutes equals energy savings per day: 9% of energy saving.

On comfort:
In defrost cycles the air conditioning units operations are reversed. It means that instead of supplying heat in winter, it supplies cold. Speaking comfort, dynamic defrost avoids up to 2h15 minutes of cold air supply per day.

R410a refrigerant & Scroll compressors

Combined with scroll compressors on the whole range, R410A technology offers the optimal cooling and heating efficiency.

Timezone management

As a standard feature, CLIMATIC 60 provide time zone scheduling: respectively 2 and 4 scheduling time zones per day on 2 periods per week (week / weekend) or 7 days. This allows energy consumption management according to the building use. On each of the time zones, heating set point, cooling set point, minimum fresh air, humidity set point high and up, and even the different authorisations for cooling and heating can be adjusted.

Dynamic setpoint

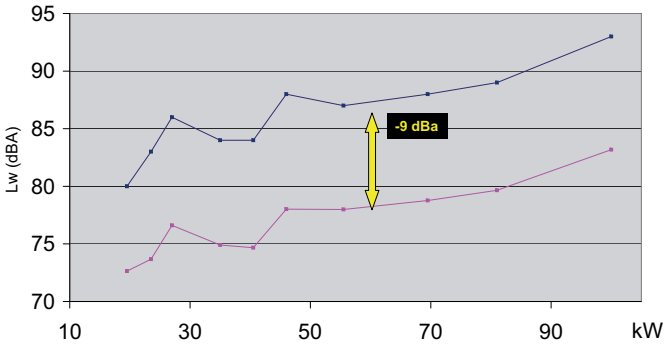
Throughout the year, the cooling requirement is not the same. Also the comfort requirement in a building depends on the outdoor temperature. Entering in a 22°C room when outdoor temperature is 35°C can create a feeling of cold instead of comfort. The dynamic set point function adapts the temperature set point throughout the year, increasing in hot days, approaching initial set temperature in more “average” days. This also creates energy savings, helping the CSC/CSH to reach the right temperature quicker

COMFORT

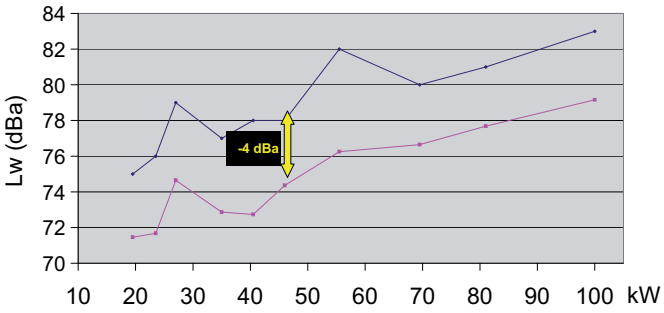
Low operating noise

CSC/CSH offers the best low noise performance for HVAC market. While designing the CSC/CSH unit for indoor installation and urban areas, the noise power level was considered critical by Lennox.

OUTDOOR NOISE POWER LEVEL



RADIATED NOISE POWER LEVEL



CONTROL

CSC/CSH is equipped with CLIMATIC 60 control platform which benefits from the better Lennox software experience and the improvements of previous versions .
CLIMATIC 60 controller intelligently improves efficiency and helps set up and service operations to guarantee long lasting performance

OPTIMIZED OPERATION AND SETUP SAVES ENERGY

CLIMATIC 60 is designed to provide the best energy efficiency throughout units life cycle while ensuring reliable and consistent operation with user friendly interfaces.

This control has the following features :

Refrigeration circuit efficiency management

It is able to optimize the refrigeration circuit operation to match perfectly the required cooling or heating load maximizing efficiency and comfort thanks to multiscroll compressor staging and thermostatic expansion valves.
It will also improve reliability with features such as compressor operating limits monitoring (high and low refrigerant pressure and temperature now measured and displayed on DS60 and Bus), or compressor operating time equalization and protection against excessive short cycling.
The CSC/CSH units benefit from an extended operating envelop thanks to its large heat exchangers and the possibility to unload compressors when outdoor temperature is very high (above 48°C) This feature will ensure that some cooling is still provided even with temperatures above 48°C.

Dynamic defrost

It is a standard feature of all Lennox heat pumps. It limits the number and the duration of the defrost cycles in winter to maximize COP.

Intelligent heating priority optimization:

This feature, unique on the market, allows the user to program the priority between the different heating elements, electrical heaters or hot water coils. This feature maximizes energy efficiency by optimizing heat pump operation depending on the outdoor temperature.

Step of heating priority

CLIMATIC 60 allows the user to decide which heating source will come first. This works perfectly on units using auxiliary heaters, it is possible to pioritize heat pump mode down to an adjustable set point (for example 0°C) and switch to hot water heating mode below this value. This gives the benefit of the excellent heat pump COP when outside temperature is not too cold and allows using hot water heated by gas boiler or solar panels when temperature is appropriate.

Flexibility

CLIMATIC offers incredible flexibility. For example, advanced users can go in the heart of the regulation in deciding reactivity of the PI algorythm or by setting supply temperature limits .They might even decide to authorize or not some heating or cooling device depending of the outside temperature.

Automatic summer/winter time change

CLIMATIC 60 offers an automatic time switch from winter to summer. This had always been a problem in the past for some customers to have kept their unit at the right time, jeopardising all their effort to optimize energy consumption by smart scheduling.

Noise reduction feature

During unoccupied timezone, CSC/CSH will work on half of its capacity by using only half of the compressors and half of the condensing fans (for double circuits units).
Therefore it may cycle more often but is quieter when running. This option is very often used at night when the capacity needed is lower and when low noise matters more.

Last 32 faults stored in the mother board

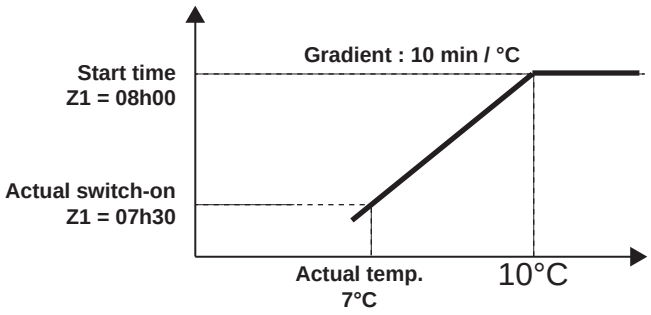
Part of the new features of CLIMATIC 60 is the storage in the main mother board of the last 32 faults with time, date and fault code. This can be seen with DS60 Service Display or ADALINK even if they were not connected when the fault occurred.

Staggered start feature

If there is a power shortage, units will not restart at the same time. To make this feature available, units have to be addressed with a different number between 1 and 12. The unit will start a number of minutes after power return depending on its address (Address * 10 seconds). Example : unit number 3 will start 30 seconds after power is back. This is a very important feature to avoid peaks of current.

Morning anticipation and dynamic set point

The unit can be programmed to switch-on in the morning to reach the occupied zone temperature set point just in time.
The unit will start heating the building at a different time in the morning depending on the outdoor temperature: The lower the outdoor temperature, the earlier the unit would start to ensure that the set point is reached by the time the first occupied zone (Z1) is starting. This is to avoid early start when outdoor temperature is mild.
Example for a unit programmed to anticipate morning switch-on if outdoor temperature is below 10°C at a rate of 10 minutes/°C.



Dynamic set point can be used in summer to offset the ambient temperature set point according to the outdoor temperature. This is to avoid large temperature difference between indoor and outdoor. The indoor temperature set point would then increase with the outdoor temperature improving comfort and saving large amount of energy.

Communication and unit interlink

Master/slave or cascade control is a standard feature of the CSC/CSH units. It can be used to connect up to 24 units. The units can then be programmed to optimize efficiency and improve reliability following 6 different strategies:

1: Master Slave "total":
The master gives the ventilation order, its set point and its room temperature/humidity/CO2 to all other units.

2: Master Slave "temperature":
The master gives the ventilation order and the room temperature/humidity/CO2 to all other units, but each has it's own set point.

3: Master Slave "average":
The master gives the ventilation order and the room temperature/humidity/CO2 used by all units is the average of all units, each unit has its own set point.

4: Master Slave "cooling/heating":
All units are stand-alone but the slaves have to have the same running mode as the master (cooling or heating).

5: Master Slave "back-up":
One unit is the back-up and will operate if any of the other units is stopped due to a major problem.

6: Rolling back-up mode:
Same as above, except the "back-up" unit will change once a week on Tuesday.
Note that, the outside temperature/humidity/CO2 given to all units can either be the average of all units connected or the external humidity/temperature of the master, allowing the use of a single "weather station" for the whole site.

Faults and alarms

CLIMATIC 60 manages more than 90 different faults and alarms codes and can store the last 32 defaults with time and date. The stored faults and alarms can then be displayed on the DS60 and on the communication bus with the full text detail.

Scheduling

In order to ensure the unit perfectly matches the requirements of the most difficult applications in terms of occupation and varying internal loads, the new CLIMATIC 60 offers now up to 7 time zones per day (Z0 to Z6) adjustable by steps of 10 minutes.
Each time zone can be programmed to follow one of four possible operating modes: A,B,C & D

EASE OF INSTALLATION & SERVICE

Circuit breakers

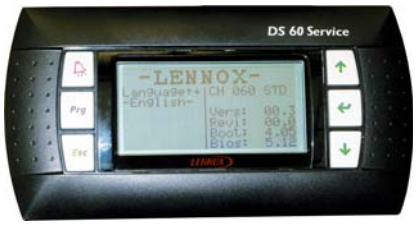
To improve the safety of the CSC/CSH and extend its life, circuit breakers protect against over-loading, over intensity and a disconnected supply phase. Maintenance is also improved as there is no requirement to change fuses. The electrical panel is manufactured in accordance with EN60204-1 (1998) electrical directive.

Easy to access

All internal components access of the CSC/CSH are closed by panels equipped by locks and handle for quick and easy dismounting. No more screws are used as panel fixtures.

External access to pressure gauges

Pressure intakes are installed externally for easy pressure measurement. This common measure doesn't require access to the refrigeration section and the CSC/CSH can continue to operate.



CLIMATIC 60 and eFlow™ can monitor the airflow rate and compensates for the dirty filters, while waiting for the necessary maintenance.

EXTENDED LIFECYCLE

Casing

Made of galvanized steel, the casing is covered with Epoxy RAL 9003 paint

Assembly quality, compliance to PED 2014/68/EU, EN 60204-1, CE, made in an ISO 9001v2000 factory.

Electrical components are selected to the highest standards, refrigeration components are generously sized to ensure maximum performance and reliability. Quality manufacturing procedures together with a culture of continuous improvement at all LENNOX factories, ensure the products are built to the highest standards. CSC/CSH complies to EN60204 norms, PED 2014/68/EU directive, is CE compliant and is built in an ISO9001v2000 certified factory.

SAFETY

Fire-insulation

As an option, we can fit M0 isolation.

CONTROL, COMMUNICATION & SUPERVISION

Inverter low noise control & winter cooling operations down to -15°C

Acts on 3 characteristics of the unit:

- reduces radiated noise power level around 4 dB(A)
- reduces unit in duct noise power level up to -9 dB(A)
- able very low ambient cooling operations in full security

CSC/CSH units being mostly installed inside buildings in urban environment, the noise created might be particularly annoying at certain moments: during the night for neighbourhood, for visitors in the day. Therefore, the CSC/CSH operation mode can be selected at any time zone for Low Noise or Performance. The Low Noise mode might work with high performance results up to high external temperature.
This option also able cooling operation in very cold ambient T°C with good performance on condenser fan belt lifecycle extension and starting peak current reduction.

DC 60 : Comfort Display

This is CLIMATIC 60 remote controller for non-technical customer. It has been wanted to aesthetically fit inside a room and be very easy to use. It can be installed at maximum 500 meters from the unit. This graphical display gives information such as running mode of the unit, status of the fan, set point, % of fresh air, outside air temperature.
Customer can change the scheduling of the different time zone, can modify temperature set point and % of fresh air for each zone. Customer can also overide the scheduling in either changing the set point for 3 hours or in forcing the rooftop to unoccupied mode for 1 to 7 days. ON/OFF key is also available. DC60 Comfort display, shows faults number when unit is in the failure mode. Customer can reset fault thanks to a combination of keys. Time and day of the unit can be seen and modified easily through the DC60.

DS 60 : Service Display

This service display controller directly plugs on the external wall of the unit equipped by CLIMATIC 60 control platform. This allows service personal to set up to 90 settings, read up to 125 variables, up to 45 faults and read the history of the last 16 faults. This controller has been designed to be very user friendly, with 6 different keys, a 4 lines display and this controller includes scrolling menus and true language (no codes). It will be in English or an other alternate language.

DM 60: Multi-unit display

This CLIMATIC 60 display offers the same possibilities than DC60 Customer Display applied to 12 units.

Extension control board - BE60

This board enables extra inlet and outlet to the CLIMATIC 60. Allow 4 analogical inputs, 4 digital inputs and 4 digital outputs. Depending to the optional equipment selected, this equipment might be already available in the unit.

Modbus Communication interface

This is a modbus interface, which is needed for anyone who would like a BMS system to talk to the CSC/CSH with "Modbus protocol". No other hardware is required to have modbus dialog.

LonTalk® interface

This board is a LonTalk® interface, which is needed for anyone who would like a BMS system to talk to the CSC/CSH with «Lon protocol » with FTT10. No other hardware than this board is required to have LonTalk® dialog. One board required per unit.

Bacnet® interface

This board is a Bacnet® interface, which is needed for anyone who would like a BMS system to talk to the CSC/CSH with “Bacnet protocol» RS485.

TCB (Thermostat Control Board)

This board has been developped for any customer who wants to take over the control of the unit. With 6 logical inputs (Compressor stage 1 and stage 2, heating step 1 and 2, 4 way valves and fan), this board will replace the control algorythm. However CLIMATIC 60 controller will stay in charge of all safety algorythm, defrost operation or free cooling operation. All Input are volt free contact. This is the perfect board, to have CSC/CSH managed by a zoning system, a universal thermostat or even a BMS system.

Adalink Distant Monitoring

Adalink is the solution for Retail & Light Commercial HVAC installation monitoring. It can control up to 32 units on the same site. Real gateway to the unit, Adalink can be used locally, via LAN network or directly plugged. It can be used remotely via modem. Adalink can show the whole site map showing status of the different units, zoom on each unit and allow the user to graphically change set point, access alarm list, look at trend curves.

INSTALLATION AND SAFETY

Main disconnect switch

Main disconnect switch is lockable to make a safe access to electrical panel. It is installed on the electrical panel door of the compressor section and controls all parts. Is also used as emergency cut off: it is mandatory to guarantee a proper access to this switch.Main disconnect switch is sized accordingly to the options fitted in the unit.

Compressor electrical protection

Return lock against 3 phases inversion at installation. This protection prevents the Scroll compressor to start and operate in wrong sense: in the case that the electrical phases are wrong connected, the compressor will not start. Particularly required when the installation of the AC unit is made before the installation of electrical wirings.

Coil anticorrosion protection

Lennox can provide several type of coil anticorrosion protection specifically made for salted or polluted environments.
For low polluted and salted environments, Lennox is offering Aluminium Coated Coil. This option can be selected on external coil only or external and treament coil for high level of fresh air are required.
This standard anticorrosion is particularly recommended in urban environements.
For more aggressive environements, such a coastal environment, Lennox offers solutions on special demand for Thermoguard treatment solutions. With Thermoguard treatment, coil are guaranteed against corrosion during 3-years (provided regular maintenance is performed). **Special option**

IMPORTANT:
CSC/CSH units are designed for only indoor installation, in case of outdoor installation , please provide a structure that covers completely the unit and protect the air treatement unit, the thermodynamic unit and the electrical board from any water infiltration.

REFRIGERATION OPTIONS

Winter cooling operations down to 0°C

This option allows the CSC/CSH to work in cooling mode with an outside temperature down to 0°C (instead of 15°C in the standard unit). This is specifically needed when free-cooling operation is not possible. This function is made of condenser fan alternate start/stop that maintain a constant condensing pressure.
Heat pump version has this possibility as standard

Service valves

Consists in liquid and gas service valves that isolate the refrigerant section during maintenance. This is particularly useful when components of the circuit have to be changed. It reduces the time and cost of maintenance operation.

OPTIONS

	Cooling only	Heat pump
Refrigeration option		
Winter cooling operations down 0 °C	x	STD
Service valves	x	x
Electrical and safety		
Main switch	x	x
Compressor electrical protection	x	x
Control & Communication		
Advanced control for enthalpy and humidity	x	x
Modbus	x	x
LONWork Echelon	x	x
BACNet	x	x
Customer display DC60	x	x
Service display DS60	x	x
Multi-unit display DM 60	x	x
Extension control board - BE 60	x	x
TCB: connection for voltage free contact control	x	x
Other options		
Inverter low noise control - Winter cooling operation down -15°C	x	x
Vertical air discharge	x	x
Coil anticorrosion protection	x	x

CSC/CSH			20S	25S	30S	35S	40S
Cooling mode - CSC							
Net cooling capacity (1)		kW	18,8	23,1	26,0	33,8	38,8
Net absorbed power (1)			7,3	9,3	11,0	13,7	15,9
Net EER (1)			2,58	2,48	2,36	2,47	2,44
Heating mode - CSH							
Net heating capacity (1)		kW	19,7	25,9	30,4	37,2	43,7
Net absorbed power (1)			6,6	8,6	10,7	12,4	14,0
Net COP (1)			2,58	2,48	2,36	2,47	2,44
Electrical data							
Supply		V/Ph/Hz	400/3/50				
Refrigerant circuit							
Number of compressors /Number of circuits			1/1				
Total refrigerant load (cooling only)		kg	4,3	5,4	6,0	7,8	9,0
Total refrigerant load (heat pump)			4,5	5,5	6,2	8,0	9,3
Ventilation data							
Nominal airflow rate		m^3/h	7600	8500	10000	12000	11700
Maximum available static pressure		Pa	178	223	272	209	205
Acoustic data							
Sound power level radiated by unit (1) Standard unit (Lw)		dB(A)	82	85	86	85	85
Sound power level radiated by unit (1) Low noise unit (Lw)			75	76	77	76	76
Radiated sound power level in room (1) Standard unit (Lw)			77	79	80	79	81
Radiated sound power level in room (1) Low noise unit (Lw)			76	76	77	77	78
Operating limits							
Cooling mode	Maximum indoor air temperature	°C	32°C DB / 23°C WB				
	Minimum indoor air temperature		21°C DB / 15°C WB				
	Maximum outdoor air temperature		45	45	45	47	47
	Minimum outdoor air temperature		15°C - Standard - Cooling only 0°C - Standard - Heat pump units				
Heating mode	Maximum indoor air temperature		27°C DB				
	Minimum indoor air temperature		15°C DB				
	Maximum outdoor air temperature		27°C (Indoor temperature = 20°C)				
	Minimum outdoor air temperature		-12°C DB (Indoor temperature = 20°C)				

(1) EUROVENT conditions
Cooling mode :
Outdoor temperature = 35°C DB
Entering coil temperature 27°C DB/19°C WB

Heating mode :
Outdoor temperature = 7°C DB / 6°C WB
Indoor temperature = 20°C DB

(2) Air inlet temperature = 20°C
Water temperature = 90-70°C

(3) S = Standard capacity
M = Medium capacity
H = High capacity

(4) -15°C with optional low temperature kit

CORRECTION COEFICIENT TO FIX THE CAPACITY OF DIFFERENT OUTDOOR AIR FLOW

	% Nominal airflow rate				
	70%	**80%**	**90%**	**100%**	**110%**
Total capacity	0.98	0.99	0.99	1	1
Sensible capacity	0.98	0.99	0.99	1	1
Power input	1.02	1.01	1.01	1	0.99

CSC/CSH		45D	55D	70D	85D	100D
Cooling mode - CSC						
Net cooling capacity (1)	kW	43,5	54,0	66,2	78,0	96,8
Net absorbed power (1)	kW	18,9	21,5	27,8	32,6	40,7
Net EER (1)		2,30	2,51	2,38	2,39	2,38
Heating mode - CSH						
Net heating capacity (1)	kW	52,0	61,0	72,8	86,0	105,1
Net absorbed power (1)	kW	17,4	20,3	24,8	28,5	35,4
Net COP (1)		2,99	3,00	2,94	3,02	2,97
Electrical data						
Supply	V/Ph/Hz	400/3/50				
Refrigerant circuit						
Number of compressors /Number of circuits		2/2	2/2	2/2	2/2	3/2
Total refrigerant load (cooling only)	kg	10,3	12,5	15,5	18,5	23,0
Total refrigerant load (heat pump)	kg	10,6	12,6	16,0	19,1	25,2
Ventilation data						
Nominal airflow rate	m^3/h	14000	20000	21000	22000	15500+ 11700
Maximum available static pressure	Pa	237	299	272	277	239+ 201
Acoustic data						
Sound power level radiated by unit (1) Standard unit (Lw)	dB(A)	88	87	88	89	92
Sound power level radiated by unit (1) Low noise unit (Lw)	dB(A)	78	78	79	80	83
Radiated sound power level in room (1) Standard unit (Lw)	dB(A)	82	82	82	83	-
Radiated sound power level in room (1) Low noise unit (Lw)	dB(A)	80	78	80	81	-
Operating limits						
Cooling mode Maximum indoor air temperature	°C	32°C BS / 23°C BH				
Cooling mode Minimum indoor air temperature	°C	21°C BS / 15°C BH				
Cooling mode Maximum outdoor air temperature	°C	45	45	47	47	47
Cooling mode Minimum outdoor air temperature	°C	15°C - Standard - Cooling only 0°C - Standard - Heat pump units				
Heating mode Maximum indoor air temperature	°C	27°C DB				
Heating mode Minimum indoor air temperature	°C	15°C DB				
Heating mode Maximum outdoor air temperature	°C	27°C (Indoor temperature = 20°C)				
Heating mode Minimum outdoor air temperature	°C	-12°C DB (Indoor temperature = 20°C)				

(1) EUROVENT conditions
Cooling mode :
Outdoor temperature = 35°C DB
Entering coil temperature 27°C DB/19°C WB

Heating mode :
Outdoor temperature = 7°C DB / 6°C BH
Indoor temperature = 20°C DB

(2) Air inlet temperature = 20°C
Water temperature = 90-70°C

(3) S = Standard capacity
M = Medium capacity
H = High capacity

(4) -15°C with optional low temperature kit

CORRECTION COEFICIENT TO FIX THE CAPACITY OF DIFFERENT OUTDOOR AIR FLOW

	% Nominal airflow rate				
	70%	**80%**	**90%**	**100%**	**110%**
Total capacity	0.98	0.99	0.99	1	1
Sensible capacity	0.98	0.99	0.99	1	1
Power input	1.02	1.01	1.01	1	0.99

CSC / CSH 20 S							
External static pressure	Pa	**35**	**47**	**101**	**151**	**178**
Airflow	m³/h	7600	7600	6100	5700	5300
Fan rotation speed	rpm	621	654	654	719	751
Fan motor power input	kW	1,11	1,20	0,86	0,93	0,92

CSC / CSH 25 S						
External static pressure	Pa	**40**	**63**	**107**	**148**	**223**
Airflow	m³/h	8500	8500	8500	6800	5950
Fan rotation speed	rpm	696	732	805	769	841
Fan motor power input	kW	1,56	1,68	1,93	1,31	1,3

CSC / CSH 30 S						
External static pressure	Pa	**36**	**55**	**106**	**146**	**272**
Airflow	m³/h	10000	10000	9000	8000	7000
Fan rotation speed	rpm	773	814	814	814	934
Fan motor power input	kW	2,33	2,51	2,12	1,79	1,89

CSC / CSH 35 S					
External static pressure	Pa	**50**	**107**	**152**	**209**
Airflow	m³/h	12850	12000	10800	8400
Fan rotation speed	rpm	613	677	709	741
Fan motor power input	kW	2,04	2,13	1,98	1,56

CSC / CSH 40 S						
External static pressure	Pa	**51**	**87**	**128**	**168**	**205**
Airflow	m³/h	12500	11700	10525	9350	8200
Fan rotation speed	rpm	613	645	677	709	741
Fan motor power input	kW	1,97	1,90	1,76	1,63	1,51

CSC / CSH 45 D						
External static pressure	Pa	**57**	**86**	**104**	**156**	**237**
Airflow	m³/h	14000	14000	12600	12600	9800
Fan rotation speed	rpm	686	758	722	794	829
Fan motor power input	kW	2,71	3,15	2,50	2,91	2,27

CSC / CSH 55 D						
External static pressure	Pa	**73**	**105**	**149**	**206**	**299**
Airflow	m³/h	20000	18000	16000	16000	14000
Fan rotation speed	rpm	645	613	613	677	741
Fan motor power input	kW	3,32	2,62	2,21	2,59	2,53

CSC / CSH 70 D							
External static pressure	Pa	**33**	**50**	**98**	**153**	**201**	**272**
Airflow	m³/h	22400	22400	21000	18900	16800	14700
Fan rotation speed	rpm	677	709	709	709	709	741
Fan motor power input	kW	4,22	4,53	4,11	3,53	2,99	2,70

CSC / CSH 85 D						
External static pressure	Pa	**36**	**51**	**101**	**154**	**277**
Airflow	m³/h	23500	23500	22000	15400	15400
Fan rotation speed	rpm	686	719	719	621	751
Fan motor power input	kW	4,62	4,98	4,51	2,14	2,93

CSC / CSH 100 D	Section 1						
	External static pressure	Pa	**39**	**58**	**105**	**150**	**239**
	Airflow	m³/h	13950	16600	13950	12400	10850
	Fan rotation speed	rpm	666	801	756	756	846
	Fan motor power input	kW	2,60	4,45	3,14	2,65	2,68

CSC / CSH 100 D	Section 2						
	External static pressure	Pa	**46**	**70**	**101**	**148**	**201**
	Airflow	m³/h	10500	10525	12500	9350	8200
	Fan rotation speed	rpm	615	615	711	679	743
	Fan motor power input	kW	2,00	1.52	2,45	1,53	1,53

OUTDOOR NOISE LEVEL - IN DUCT

STANDARD UNIT

Spectrum per octave band (dB(A))

CSC/CSH	125	250	500	1000	2000	4000	8000	Total sound power Lw dB(A)
20 S	75,6	77,7	75,4	74,4	73,4	71,5	65,9	80
25 S	78,6	79,4	78,2	76,4	76,1	74,0	69,1	83
30 S	81,4	81,5	81,9	79,5	79,6	77,5	73,3	86
35 S	79,4	80,5	80,2	77,4	77,5	75,2	68,1	84
40 S	79,2	80,2	79,8	77,4	77,6	74,7	67,9	84
45 D	81,7	83,1	83,5	80,5	80,9	80,6	72,8	88
55 D	85,6	81,3	83,4	80,1	81,5	78,8	72,9	87
70 D	85,5	81,9	84,2	81,1	81,6	79,2	73,1	88
85 D	85,8	82,5	85,0	82,2	82,6	80,0	74,2	89
100 D	85,6	87,1	88,9	85,7	85,3	84,1	78,6	92

WITH INVERTER LOW NOISE CONTROL*

Spectrum per octave band (dB(A))

CSC/CSH	63	125	250	500	1000	2000	4000	8000	Total sound power Lw dB(A)
20 S	64,6	66,1	68,2	66,8	67,8	65,5	64,7	58,8	73
25 S	66,1	69,6	70,4	69,0	67,1	67,5	64,5	63,0	74
30 S	67,3	71,9	72,0	72,4	69,7	70,6	67,6	66,3	77
35 S	67,9	70,4	71,5	71,2	67,9	69,0	65,8	61,3	75
40 S	67,8	70,2	71,2	70,7	67,7	68,9	65,4	61,8	75
45 D	68,3	72,2	73,6	73,9	70,8	71,5	70,6	66,1	78
55 D	74,3	76,1	71,8	73,8	70,2	72,6	68,7	67,7	78
70 D	75,1	76,5	72,9	75,2	71,7	72,9	69,9	65,6	79
85 D	75,3	76,8	73,5	76,0	72,7	73,8	70,9	66,8	80
100 D	73,5	76,6	78,1	79,9	76,5	76,4	75,0	70,5	83

Conditions: indoor temperature 21°C DB / 15°C WB; outdoor temperature: 25°C
At minimum speed

REFRIGERANT CONNECTIONS

REFRIGERANT LOAD (indicated in grammes)

Size		020	025	030	035	040	045	055	070	085	100
Cooling only	Circuit 1	4800	5950	6700	8650	10000	5700	6800	8600	10250	30000
	Circuit 2	-	-	-	-	-	5700	6800	8600	10250	9200
Heat pump	Circuit 1	5000	6150	6900	8950	10350	5850	7000	8850	10600	13450
	Circuit 2	-	-	-	-	-	5850	7000	8850	10600	9500

ELECTRICAL DATA

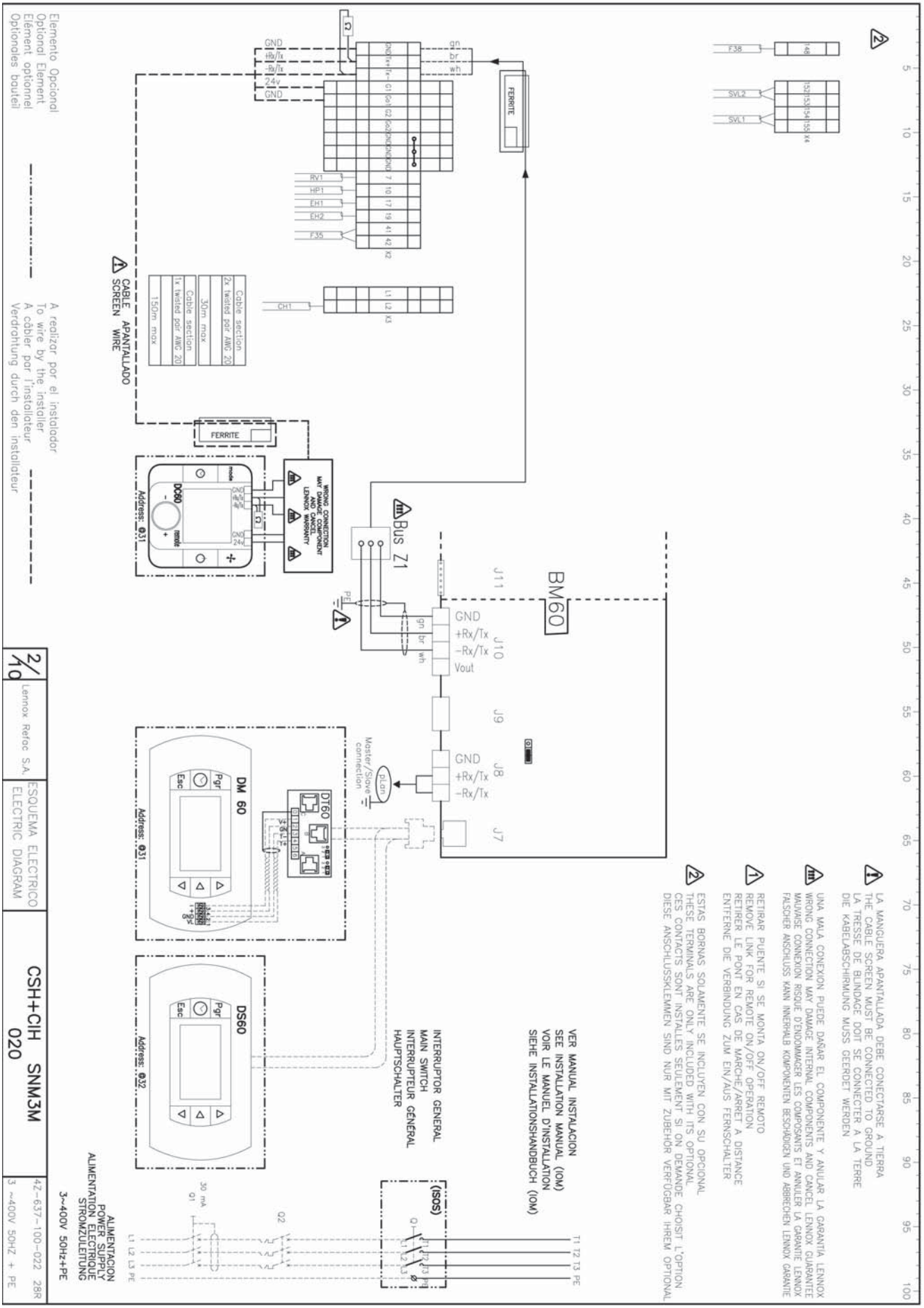
CSC - CSH		20 S	25 S	30 S	35 S	40 S	45 D	55 D	70 D	85 D	100 D
Voltage		400V/3/50 Hz									
Maximum absorbed power	kW	9,7	11,99	14,49	18,19	19,59	23,83	28,98	36,38	41,06	50,25
Start-up current	A	88,4	97,8	105,1	139,1	152,7	121,8	131,9	169,5	191,9	207,9
Maximum current	A	17,59	24,45	26,8	30,4	35,8	48,48	53,6	60,8	74,96	91

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

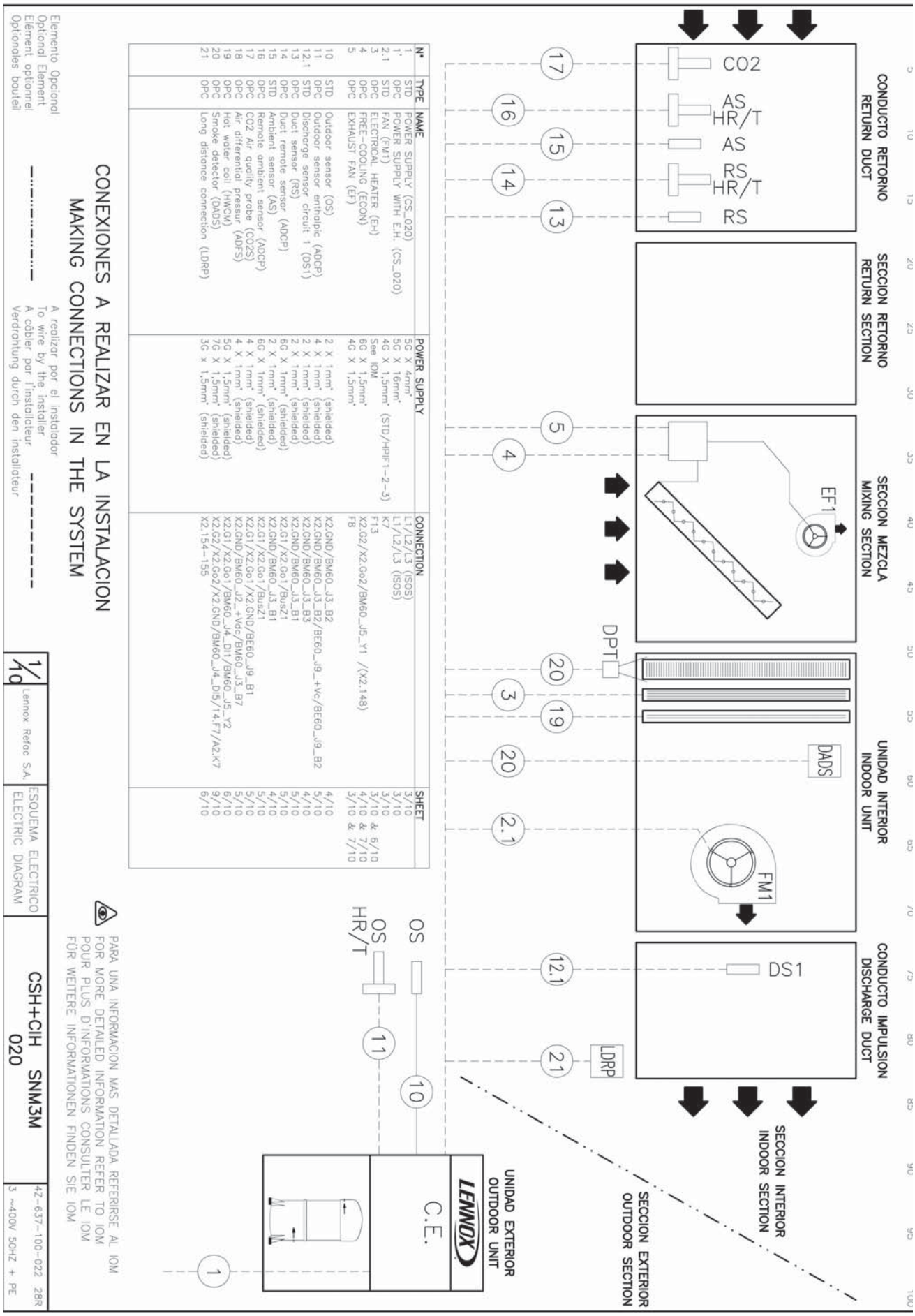
WIRING

Size	020	025	030	035	040	045	055	070	085	100
Supply	4 x 4 mm^2	4 x 6 mm^2	4 x 6 mm^2	4 x 6 mm^2	4 x 10 mm^2	4 x 16 mm^2	4 x 16 mm^2	3 x 25 + 1 x 16 mm^2	3 x 25 + 1 x 16 mm^2	3 x 35 + 1 x 16 mm^2
Connection between units										2 x (4 x 4 mm^2) + 10 x 1,5 mm^2 + 6 x 1 mm^2

EXAMPLE OF THERMOSTAT WIRING (CHECK THE WIRING DIAGRAM OF THE UNIT)

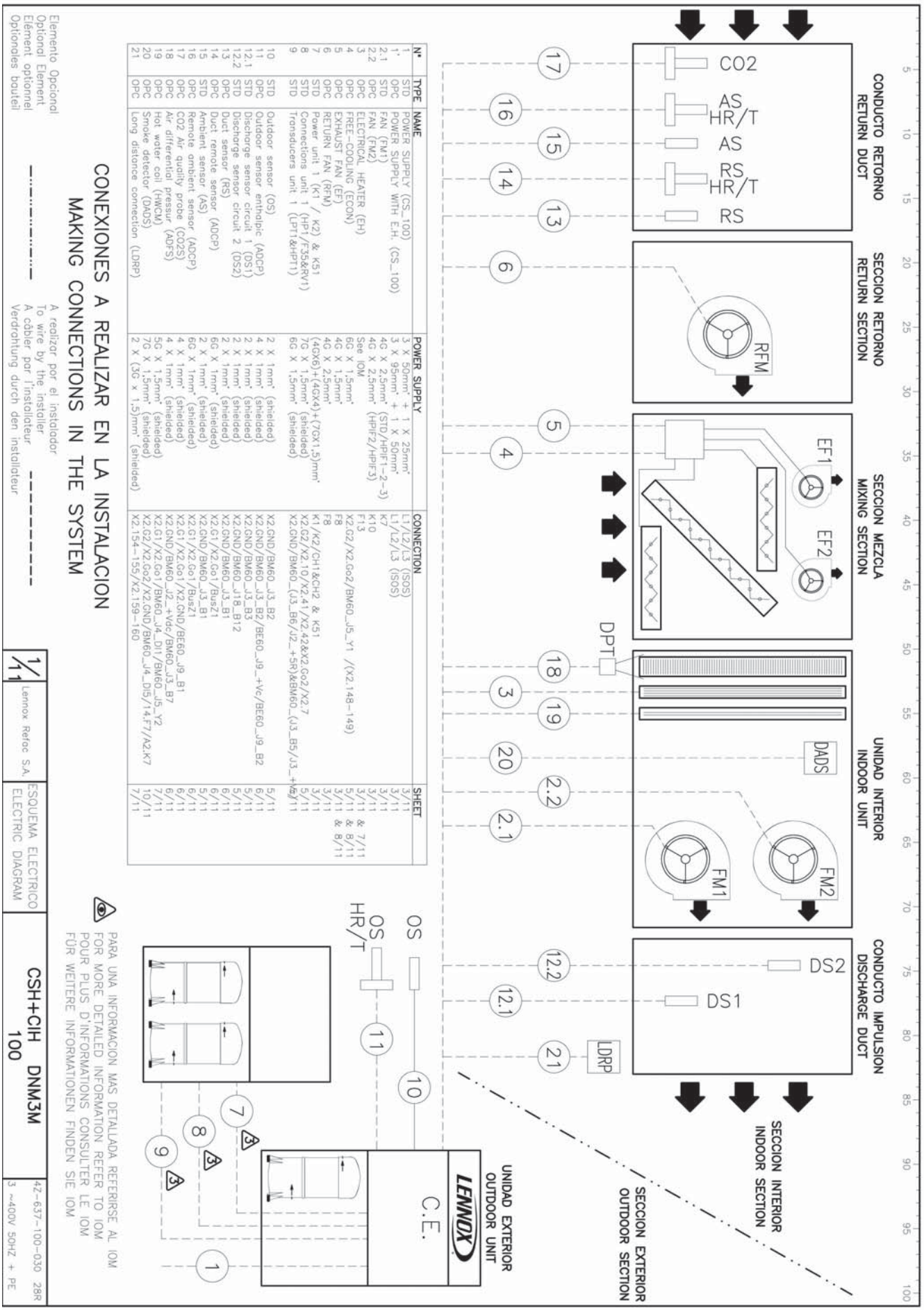


EXAMPLE OF THERMOSTAT WIRING / SENSORS IN ONE CIRCUIT UNITS (CHECK THE WIRING DIAGRAM OF THE UNIT)



N°	TYPE	NAME	POWER SUPPLY	CONNECTION	SHEET
1	STD	POWER SUPPLY (CS_020)	5G X 4mm²	L1/L2/L3 (SOS)	3/10
1'	OPC	POWER SUPPLY WITH E.H. (CS_020)	5G X 16mm²	L1/L2/L3 (SOS)	3/10
2.1	STD	FAN (FM1)	4G X 1,5mm² (STD/HPIF1-2-3)	K7	3/10
3	OPC	ELECTRICAL HEATER (EH)	See IOM	F13	3/10 & 6/10
4	OPC	FREE-COOLING (ECON)	6G X 1,5mm²	X2.G2/X2.Go2/BM60_J5_Y1 /(X2.148)	4/10 & 7/10
5	OPC	EXHAUST FAN (EF)	4G X 1,5mm²	F8	3/10 & 7/10
10	STD	Outdoor sensor (OS)	2 X 1mm² (shielded)	X2.GND/BM60_J3_B2	4/10
11	OPC	Outdoor sensor enthalpic (ADCP)	4 X 1mm² (shielded)	X2.GND/BM60_J3_B2/BE60_J9_+Vc/BE60_J9_B2	5/10
12.1	STD	Discharge sensor circuit 1 (DS1)	2 X 1mm² (shielded)	X2.GND/BM60_J3_B3	4/10
13	OPC	Duct sensor (RS)	2 X 1mm² (shielded)	X2.GND/BM60_J3_B1	5/10
14	OPC	Duct remote sensor (ADCP)	6G X 1mm² (shielded)	X2.G1/X2.Go1/BusZ1	5/10
15	STD	Ambient sensor (AS)	2 X 1mm² (shielded)	X2.GND/BM60_J3_B1	4/10
16	OPC	Remote ambient sensor (ADCP)	6G X 1mm² (shielded)	X2.G1/X2.Go1/BusZ1	5/10
17	OPC	CO2 Air quality probe (CO2S)	4 X 1mm² (shielded)	X2.G1/X2.Go1/X2.GND/BE60_J9_B1	5/10
18	OPC	Air differential pressur (ADFS)	4 X 1,5mm² (shielded)	X2.GND/BM60_J2_+Vdc/BM60_J3_B7	5/10
19	OPC	Hot water coil (HWCM)	5G X 1,5mm² (shielded)	X2.G1/X2.Go1/BM60_J4_DI1/BM60_J5_Y2	6/10
20	OPC	Smoke detector (DADS)	7G X 1,5mm² (shielded)	X2.G2/X2.Go2/X2.GND/BM60_J4_DI5/14.F7/A2.K7	9/10
21	OPC	Long distance connection (LDRP)	3G x 1,5mm² (shielded)	X2.154-155	6/10

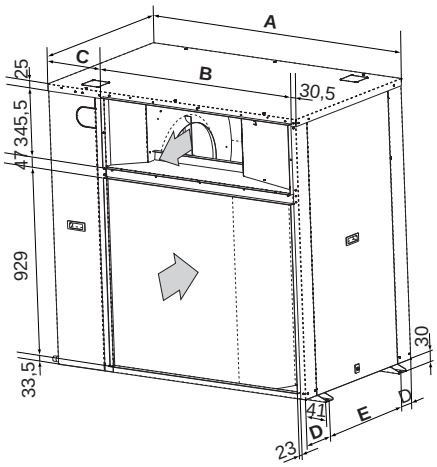
EXAMPLE OF THERMOSTAT WIRING / SENSORS IN DOUBLES CIRCUITS UNITS (CHECK THE WIRING DIAGRAM OF THE UNIT)



N°	TYPE	NAME	POWER SUPPLY	CONNECTION	SHEET
1	STD	POWER SUPPLY (CS_100)	3 X 50mm² + 1 X 25mm²	L1/L2/L3 (ISOS)	3/11
1'	OPC	POWER SUPPLY WITH E.H. (CS_100)	3 X 95mm² + 1 X 50mm²	L1/L2/L3 (ISOS)	3/11
2.1	STD	FAN (FM1)	4G X 2,5mm² (STD/HPIF1-2-3)	K7	3/11
2.2	OPC	FAN (FM2)	4G X 2,5mm² (HPIF2/HPIF3)	K10	3/11
3	OPC	ELECTRICAL HEATER (EH)	See IOM	F13	3/11
4	OPC	FREE-COOLING (ECON)	6G X 1,5mm²	X2.G2/X2.Go2/BM60_J5_Y1 /(X2.148-149)	3/11 & 7/11
5	OPC	EXHAUST FAN (EF)	4G X 1,5mm²	F8	5/11 & 8/11
6	OPC	RETURN FAN (RFM)	4G X 2,5mm²	F8	3/11 & 8/11
7	STD	Power unit 1 (K1 / K2) & K51	(4GX6)+(4GX4)+(7GX1,5)mm²	K1/K2/CH1&CH2 & K51	3/11
8	STD	Connections unit 1 (HP1/F3&RV1)	7G X 1,5mm² (shielded)	X2.G2/X2.10/X2.41/X2.42&X2.Go2/X2.7	5/11
9	STD	Transducers unit 1 (LPT1&HPT1)	6G X 1,5mm² (shielded)	X2.GND/BM60_(J3_B6/J2_+5R)&BM60_(J3_B5/J3_+5R)	5/11
10	STD	Outdoor sensor (OS)	2 X 1mm² (shielded)	X2.GND/BM60_J3_B2	5/11
11	OPC	Outdoor sensor enthalpic (ADCP)	4 X 1mm² (shielded)	X2.GND/BM60_J3_B2/BE60_J9_+Vc/BE60_J9_B2	6/11
12.1	STD	Discharge sensor circuit 1 (DS1)	2 X 1mm² (shielded)	X2.GND/BM60_J3_B3	5/11
12.2	STD	Discharge sensor circuit 2 (DS2)	2 X 1mm² (shielded)	X2.GND/BM60_J18_B12	5/11
13	OPC	Duct sensor (RS)	6G X 1mm² (shielded)	X2.GND/BM60_J3_B1	6/11
14	OPC	Duct remote sensor (ADCP)	2 X 1mm² (shielded)	X2.G1/X2.Go1/BusZ1	6/11
15	STD	Ambient sensor (AS)	2 X 1mm² (shielded)	X2.GND/BM60_J3_B1	5/11
16	OPC	Remote ambient sensor (ADCP)	6G X 1mm² (shielded)	X2.G1/X2.Go1/BusZ1	6/11
17	OPC	CO2 Air quality probe (CO2S)	4 X 1mm² (shielded)	X2.G1/X2.Go1/X2.GND/BE60_J9_B1	6/11
18	OPC	Air differential pressur (ADFS)	4 X 1mm² (shielded)	X2.GND/BM60_J2_+Vdc/BM60_J3_B7	6/11
19	OPC	Hot water coil (HWCM)	5G X 1,5mm² (shielded)	X2.G1/X2.Go1/BM60_J4_DI1/BM60_J5_Y2	7/11
20	OPC	Smoke detector (DADS)	7G X 1,5mm² (shielded)	X2.G2/X2.Go2/X2.GND/BM60_J4_DI5/14,F7/A2,K7	10/11
21	OPC	Long distance connection (LDRP)	2 X (3G x 1,5)mm² (shielded)	X2.154-155/X2.159-160	7/11

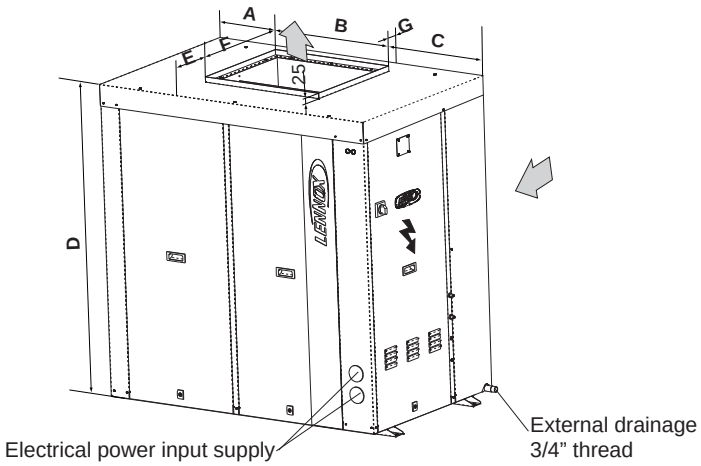
A BOX & B BOX

STANDARD HORIZONTAL DISCHARGE



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

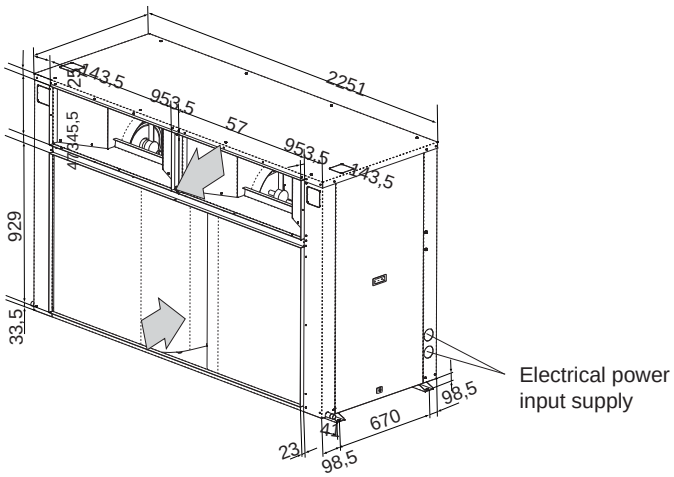
OPTIONAL VERTICAL DISCHARGE



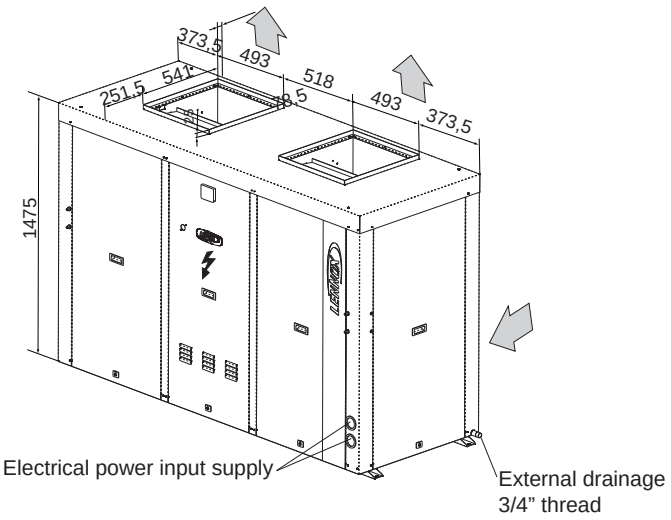
	A BOX	B BOX
	020S - 025S - 030 S	035S - 040S - 045S
A	371,5	420
B	564	622
C	288,5	403
D (1)	1410	1500
E	204,5	252,5
F	467	543
G	77,5	74,5

C BOX

STANDARD HORIZONTAL DISCHARGE

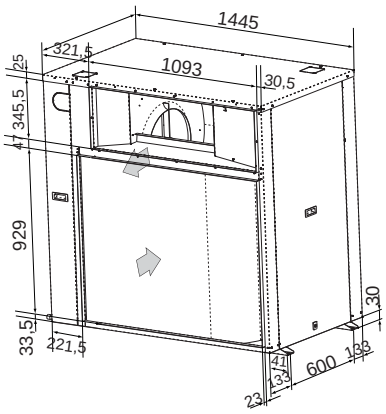


OPTIONAL VERTICAL DISCHARGE

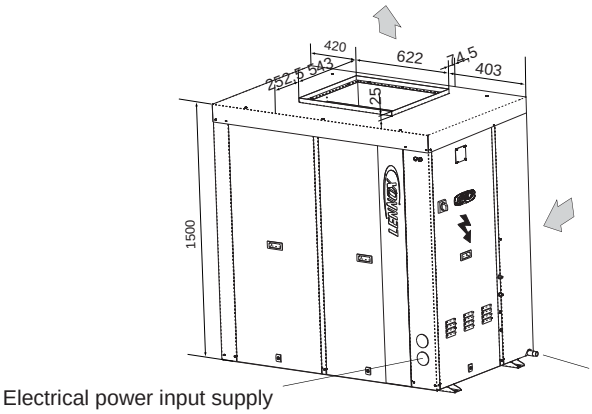


D BOX

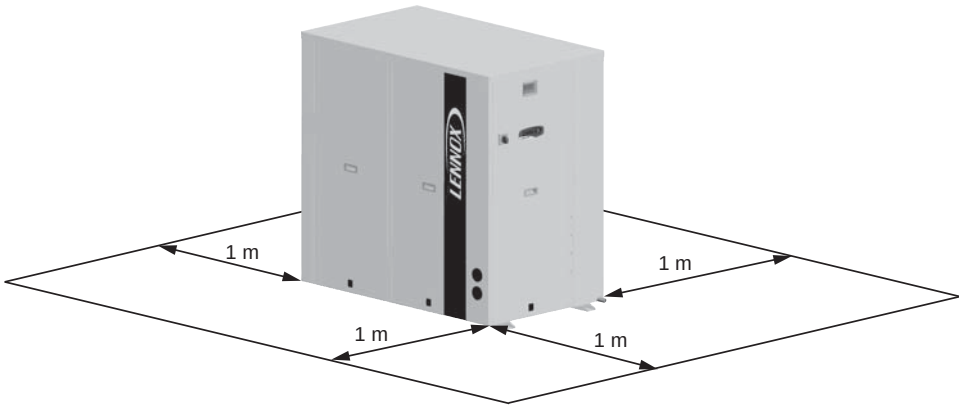
STANDARD HORIZONTAL DISCHARGE



OPTIONAL VERTICAL DISCHARGE



CLEARANCES



WEIGHT DATA

OPERATING WEIGHTS

CSC/CSH		20 S	25 S	30 S	35 S	40 S	45 D	55 D	70 D	85 D	100 D
CSC - Cooling only	kg	257	290	297	352	365	443	524	549	581	865
CSH - Heat pump	kg	262	295	302	357	370	448	529	554	586	870
Low noise	kg	2	2	2	2	2	3	4	4	7	5
Long distance refrigerant connection (65 m)	kg	2	6	6	4	4	12	12	8	8	12
Refrigerant precharge* - Cooling only	kg	5,5	5,5	6,2	8,0	8,3	10,4	12,9	16,0	18,6	23,4
Refrigerant precharge* - Heat pump	kg	5,8	6,1	6,9	8,9	9,2	11,5	14,3	17,7	20,7	25,8

* Available as an option

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