

Application guide INNOV@



- Providing indoor climate comfort



APPLICATION GUIDE

Réf : INNOV@-0907-E



INNOV@ = Design & Technology	2
INNOV@ Unit Description	3
Configuration DIGIT	7
Refrigerant Circuit	9
Main Components	11
Electrical Panel & Components	13
Application Field	14
Operating Limits	15
Thermodynamics	16
Interconnectivity Systems	17
Technical Data	21
Correction factors	36
Overall Dimensions	38
Hydraulic Diagram	49
Refrigeration Diagram	50

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LENNOX have been providing environmental solutions since 1895, our range of ranges of products 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. Information on local contacts at www.lennox europe.com.

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INNOV@ C.C.U. self-contained units are specially designed for installation in technological environments such as computer rooms laboratories and anywhere else where a high precision in climate control and a 24h/day operation is requested.

INNOV@ units represent the state of the art between technology and design as well as all LENNOX products.

Thanks to their characteristics, **INNOV@** can be installed also in office environments with people working. A depth of 449 mm for the DHADC/DHDC and 795 mm DHADR/DHCDR allows to pass through standard doors.

The internal design of the units is firstly made to achieve best efficiency and reliability and at the same time to do not loose accessibility : all components, including e-heaters, fans, compressors valve, steam pipe, etc... can be maintained from the front.

Additionally the frontdoor(s) are dismountable in just a few seconds thanks to an innovative hinge : an important advantage when units are installed in narrow corridors. The exclusive use of primary brand components and fully integrated development process [**CAD+CAM, CAE**] stands for highest possible quality level regarding efficiency, reliability, maintenance time, pre and after sales support. The DX units are available with a single circuit or with double circuits, to obtain a greater application flexibility, more efficiency at partial load and of course more reliability.

DX versions available also in :

- "W" water cooled for dry cooler applications [40°C/45°C, R.H. 30% e.g.] and for city water,
- "F" indirect Free-Cooling,
- "Q" dual cooling [DX coil + CW coil] water cooled ,
- "D" dual cooling [DX coil + CW coil] with remote condenser and
- "X" displacement version with an average discharge air speed lower than 1,1m/s.

Frame

INNOV@ units are designed with a self-supporting frame and all components are produced in-house, using sophisticated computer driven machines and specials tools. All sheet metals

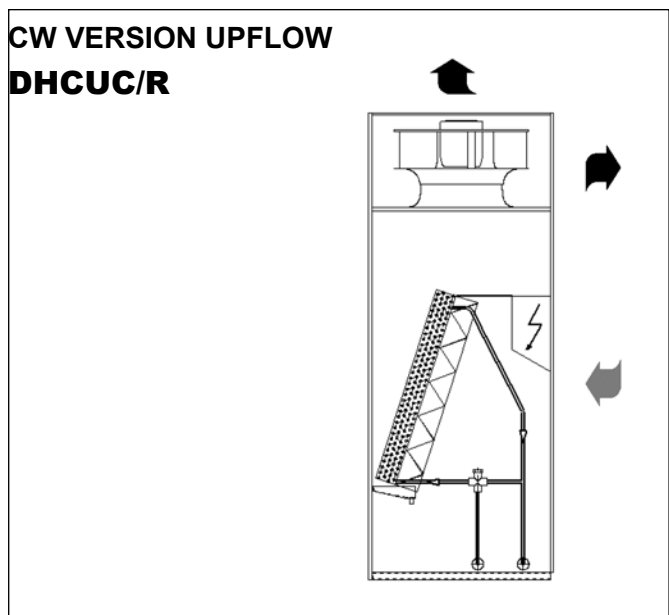
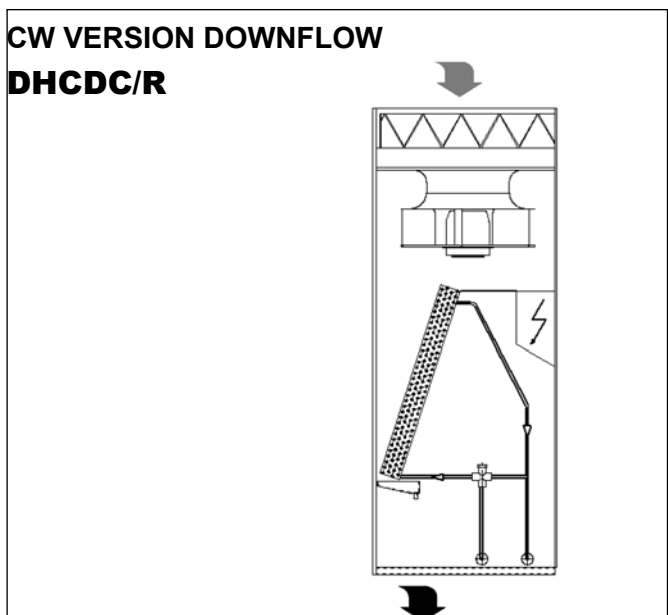
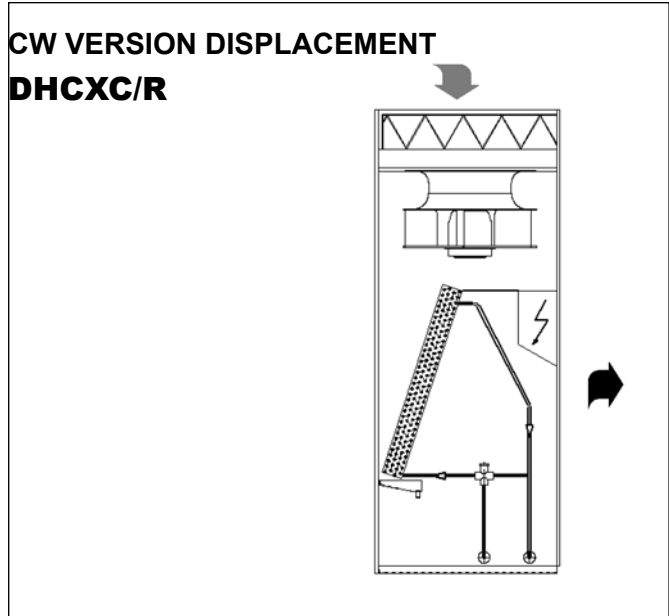
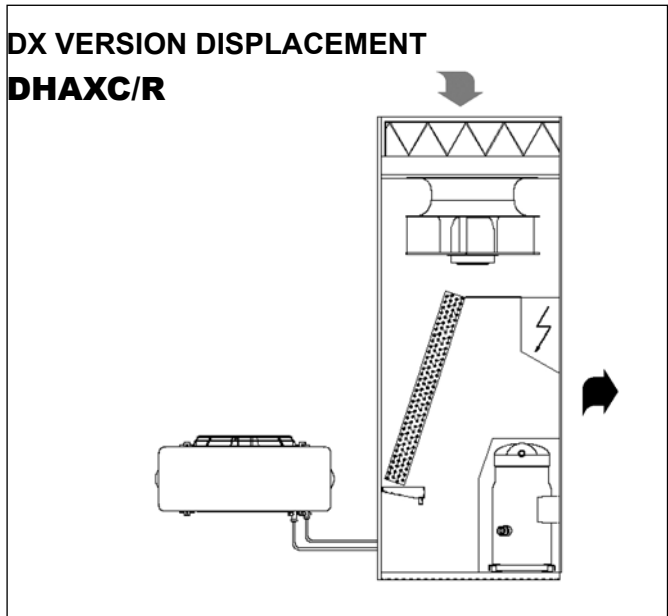
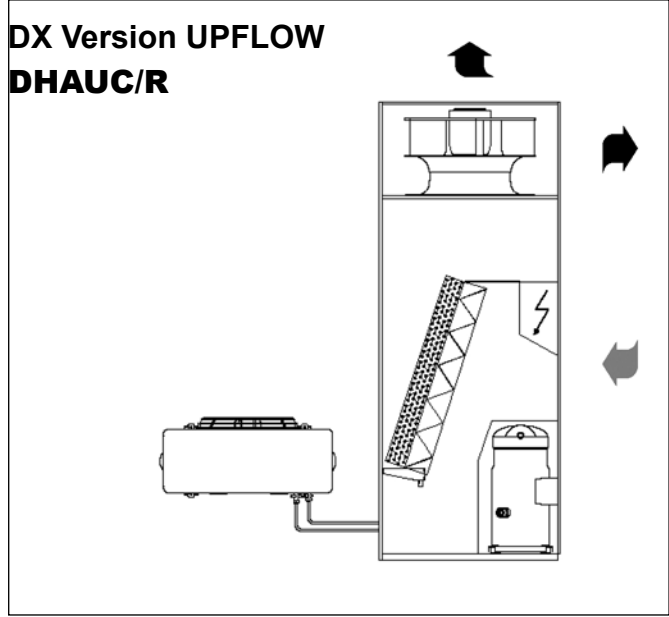
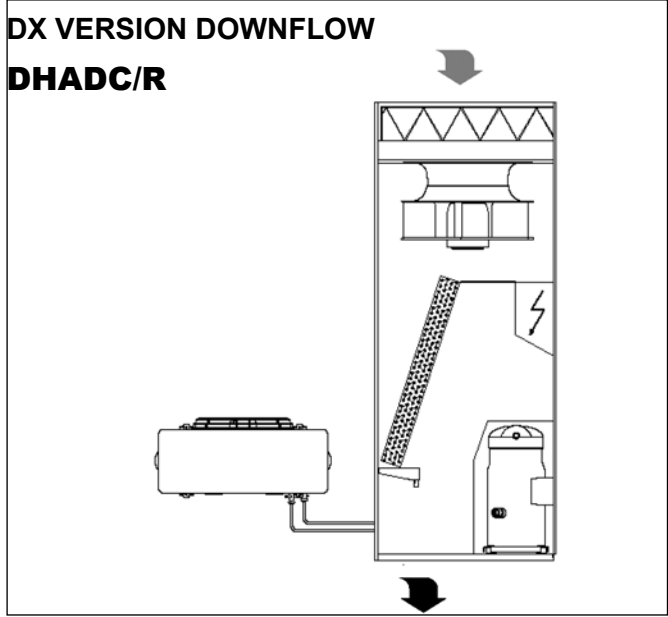
are galvanized and all external panels are powder coated in RAL 9002 colour, giving the units an image and the quality like the last generation of IT devices. The units are completely closed and only a frontal access is necessary. Nethertheless it is also possible to have side access for any additional need.

The shape of the units is characterized by bended edges with variable radius : this feature is obtained by using a special tools and gives both a good aesthetic and an avantage to prevent injuries. The compressor compartment is separated from the air flow and a special internal design allow to simply dismount the upper part of its guaranteeing an insuperable accessibility to all refrigerating components.

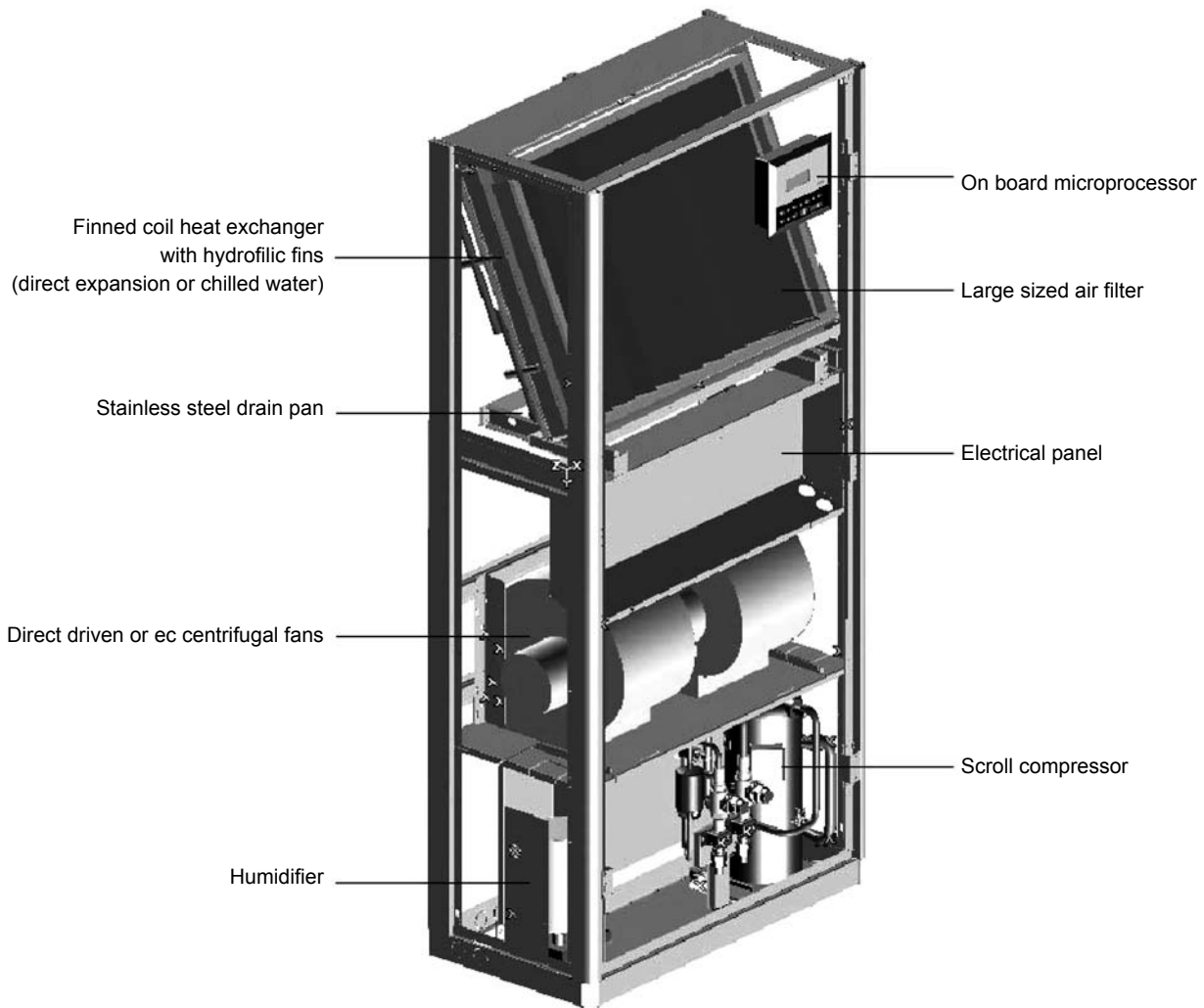
All fixing elements are made in stainless steel or in non corroding materials. The drain pan is made of stainless steel in order to ensure long life-time operation without damages.

All panels are thermally insulated with a polyurethane foam class 1 according UL 94 norms : this material, thanks to the open cells gives an excellent performance in sound absorption. Optional sandwich panels are available : in this cas mineral fibres are closed between the panel and a second sheet of metal, giving a maximum in terms of internal cleaning and resistance against fire. Double skin panels are classified amongst non flammable materials class A1 according DIN 4102 norms : the sound insulation is better than the standard solution, but the internal reflected sound power increases the Lw on delivery side [+2dB].

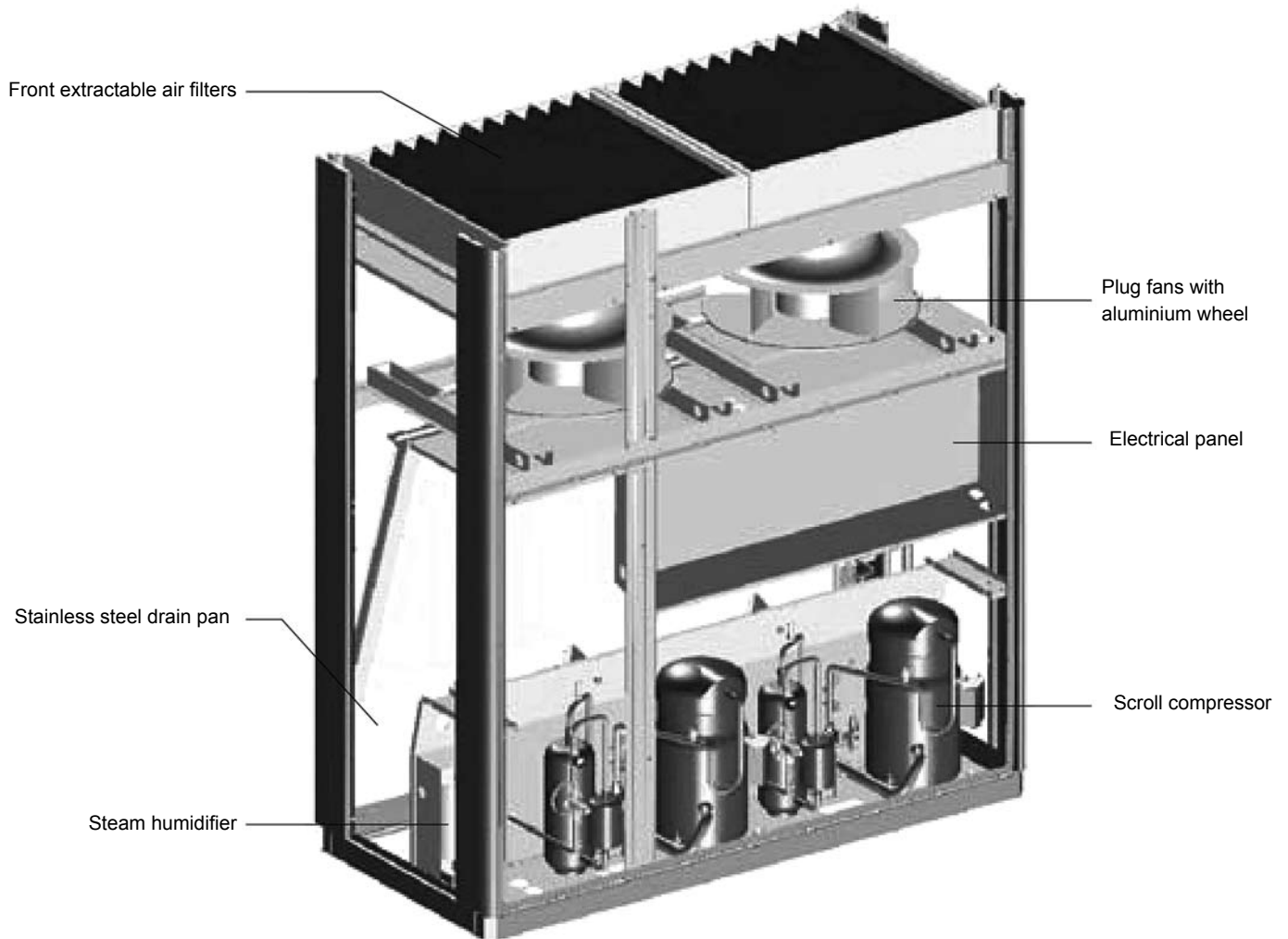




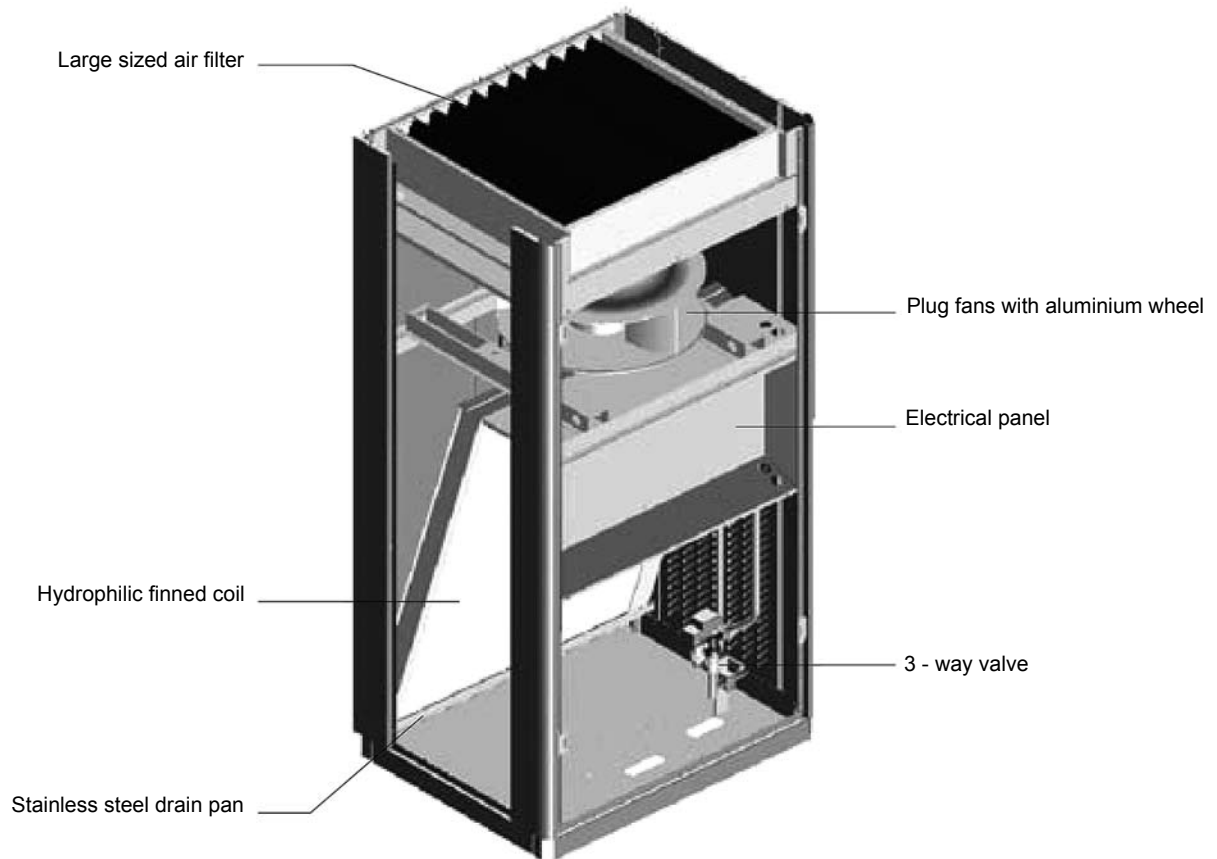
**EXAMPLE DX AIR COOLED UNIT
TYPE : DHADC**



**EXAMPLE DX AIR COOLED UNIT
TYPE : DHADR**

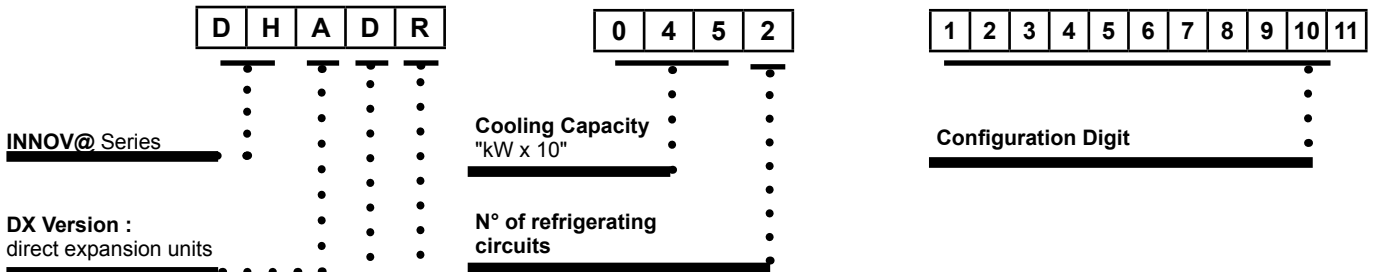


**EXAMPLE CW UNIT
TYPE : DHCDR**



INNOV@ range consists of 20 models with a cooling capacity ranging between 5,9 kW and 41,2 kW in a single circuit and between 26,9 and 76,2 kW in a double circuit version. The units are available in different air flow configuration and in DX or CW version according to the configuration DIGIT shoawn below.
 For the correct choice between possible configuration the electronic configuration software shall be applied.

DX Direct Expansion Unit



- DX Version :**
 direct expansion units
- **A** :Remote air condensed unit
 - **W** :Water condensed units (dry cooler)
 - **Z** :Water condensed unit (city water)
 - **F** :Free Cooling :
 - **D** :Dual Cooling (Water Coil + DX coil remote condensed)
 - **Q** :Dual Cooling (Water Coil + DX coil water condensed)

- Air Flow :**
- **D** : Downflow
 - **R** : Upflow
 - **X** : Displacement

- Fans :**
- **C** : Forward curved blades : 5,9 kW to 22,2 kW
 - **R** : Plug Fan : 21,2 kW to 41,2 kW
 Single Circuit
 26,9 kW to 76,2 kW
 Double Circuit

1	POWER SUPPLY	3	400V / 3Ph + N / 50Hz
2	MICROPROCESSOR	0	BASIC
		B	Advanced (programmable with extended I/O and LCD 4x20 display)
3	REFRIGERANT	0	R407C
		1	R407C with electronic valve
		2	R22(*)
		3	R22 with electronic valve(*)
4	VENTILATION	0	STANDARD
		E	Brushless <i>E-Tech</i>
5	HUMIDITY CONTROL	0	NONE
		4	Dehumidification
		5	Dehumidification + Humidification (with 400V / 3Ph + N + PE / 50Hz)
6	ELECTRIC HEATER	0	NONE
		B	Yes - 3 steps with AC, 1 step wit basic control (with 400V / 3Ph + N + PE / 50Hz)
7	RE-HEATING	0	NONE
		4	Hot gas coil On/Off
		7	Hot water coil with modulating valve
8	AIR FILTER	0	G3 (STANDARD)
		H	G4
		I	G3 + clogged filter switch
		L	G4 + clogged filter switch
9	CONDENSING CONTROL	0	NONE
		4	On/Off
		5	Modulating Condensing Pressure Control
		8	Pressostatic valve
10	PACKAGING	0	STANDARD
		M	Wooden crate with cardbox
		N	Wooden box - Seaworthy
11	SPECIALS	0	STANDARD
		S	Special

CW Chilled water Unit

D H C D R

1 0 0 0

1 2 3 4 5 6 7 8 9 10 11

INNOV@ Series

CW Version :
Chilled water units

- **C** :Basic configuration
- **S** : "Slave" unit without control

Cooling Capacity
"kW x 10"

N° of refrigerating circuits

Configuration Digit

Air Flow :

- **D** : Downflow
- **R** : Upflow
- **X** : Displacement

Fans :

- **C** : Forward curved blades
: 7,6 kW to 22,2 kW
- **R** : Plug Fan :
32,4 kW to 22,2 kW

1	POWER SUPPLY	3	400V / 3Ph + N / 50Hz
		1	230V / 3Ph + N / 50Hz
2	MICROPROCESSOR	0	BASIC
		B	Advanced (programmable with extended I/O and LCD 4x20 display)
		C	slave unit (without microprocessor)
3	3-WAY VALVE CONTROL	0	Motor driven 3-way valve with 3 point control
		3	Motor driven 3-way valve with 0...10V signal
4	VENTILATION	0	STANDARD
		E	Brushless <i>E-Tech</i>
5	HUMIDITY CONTROL	0	NONE
		4	Dehumidification
		5	Dehumidification + Humidification (with 400V / 3Ph + N + PE / 50Hz)
6	ELECTRIC HEATER	0	NONE
		B	Yes - 3 steps with AC, 1 step wit basic control (with 400V/3Ph+N+PE/50Hz)
7	RE-HEATING	0	NONE
		4	Hot water coil with modulating valve with 3 point control
		7	Hot water coil with modulating valve
8	AIR FILTER	0	G3 (STANDARD)
		H	G4
		P	G5
		I	G3 + clogged filter switch
		L	G4 + clogged filter switch
		Q	G5 + clogged filter switch
9	CONDENSING CONTROL	0	NONE
10	PACKAGING	0	STANDARD
		M	Wooden crate with cardbox
		N	Wooden box - Seaworthy
11	SPECIALS	0	STANDARD
		S	Special

The entire refrigerating circuit is assembled in LENNOX proper workshop, including all pipe work, using only primary brand for components. The workers involved in the welding and pipe work process are qualified by a third part according CEE 97/23 PED directive : necessary to underline that this qualification for workers was not request, but it was LENNOX's decision taking care about the quality and_in general_for the customer's satisfaction. The DX units are present in siingle or double circuit eexecution and are precharged with dry notrogen for "A", 3D3 or with R407C refrigerant for "W", "F", "Q", "D" versions. Refrigerant different from R407C, like R22, R134a, R410A are available on request and previous check for local rules.

COMPRESSORS

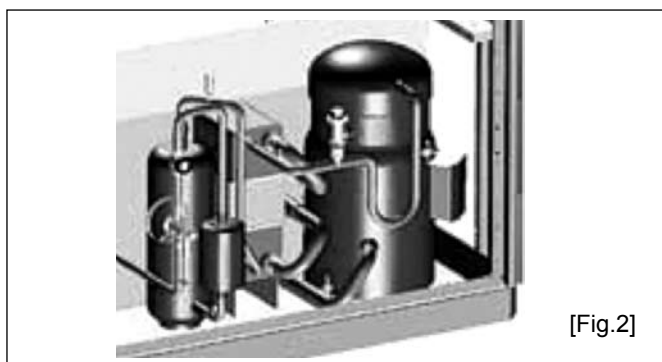
On INNOV@ only primary brand scroll compressor [Fig.1] are installed. Scroll compressors represent for C.C.U. units the best solution in terms of efficiency and reliability. The internal compression ratio is very close to the typical operating condition of C.C.U. giving the maximum in terms of COP and the perfect balanced pressure at start up gives big advantages to the e-motor in terms of reliability, mainly in this fields where frequent start ups can happens.



[Fig.1]

PLATE HEAT EXCHANGERS

Only AISI 304 BPHE with low carbon steel connections are used. The special design of the plates gives both an advantage to increase the turbulences-reducing the fouling and increasing the efficiency and a reduction of the overall dimensions : this features allows to install the BPHE behind the compressor compartment, making more space for piping and the other components



[Fig.2]

FINNED COILS HEAT EXCHANGER

All coils are made using a 25x21,65 mm geometry in combination with 9,52 mm copper pipes and 0,10 mm thickness aluminium fins. The expanding process to ensure perfect contact between pipes and fins is one of the most critical points and it is 100% monitored in the whole production process. The design criteria for R&D department and our laboratories, are summarized in 4 main points :

- Reduction of pressure drops by using a large coil front surface
- Hydrophilic treatment on the fins to allow a film condensation in dehumidification operation (typical angle water/al<10°)
- The reduction of the vertical height to avoid thickness in water film, as a consequence, the possibility to operate with high air volume and high relative humidity without dragging out of water (especially in down flow units)
- Special Corrugated Fins increase the heat transfer coefficient on air side in order improve the SHR.

In chilled water units a special attention was paid for checking the behaviour of the Reynolds number inside pipes during the modulation of three way valve : transition between laminar and turbulent flow may cause big step in heat exchanging efficiency loosing accuracy in temperature control.

Looking into advantages of spare parts : one same coil is used for both up and down flow units.

REMOTE CONDENSER

Coils are made using 25 x 21,65 mm geometry in combination with 9,52 mm copper grooved pipes and 0,10 mm thickness aluminium louvered fins : the combination of this technology allows the maximum reduction in internal volume and as a consequence a reduction of the refrigerant charge amount. The adopted fans are only with external rotor motor and 4 or 6 poles execution, depending on the selected sound power : in the catalogue two choices are already available, but special request can be examined by the R&D department.

Panels are made in galvanized precoated steel and special feet for horizontal installation are available for the whole range [option]. Looking to the destination of such units, three different type of condensing controls are available :

- None
- Modulating fan speed control in Standard alone version installed in the C.C.U. : down to -15°C
- Flooding technology in addition to the fan speed control for the temperatures below -15°C and down to -30°C. This last option will be supplied as a kit including liquid receiver, back pressure valve, safety valve, protection cabinet and needs to be installed on site next to the condensing unit.

REFRIGERANT COMPONENTS

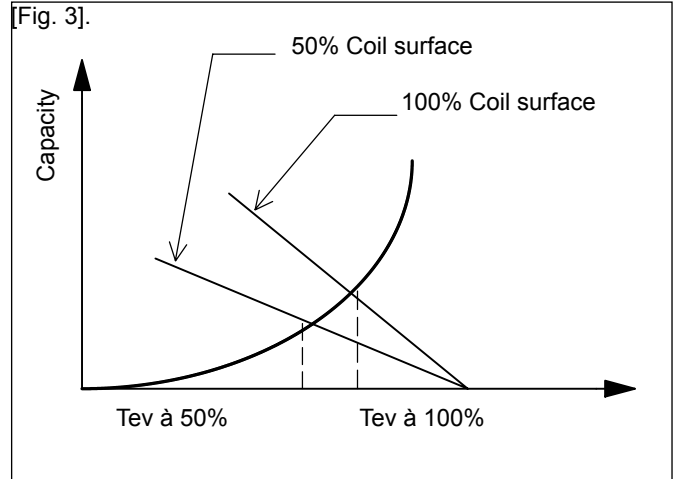
- Filter with molecular sieve and activated alumina;
- Sight glass with humidity indication;
- Thermostatic valve with MOP function and external equalisation;
- Electronic expansion valve for insuperable performances in middle and winter season: the pay back of this solution in northern Europe countries is less than 1 Year;
- Liquid receiver according CEE 97/23 PED directive;
- HP pressostat with manual reset according cat. IV CEE 97/23 PED;
- LP pressostat with automatic reset and delayed time during start up;
- Schrader valves for maintenance and or controls.

REFRIGERANT PIPES CHARACTERISTICS

On site piping has to be done by **professional and trained technicians only**. Use only "CUB" quality copper pipes. Take care when using nitrogen during all brazing operations in order to avoid humidity and dirt inside the pipes.

DEHUMIDIFICATION PHASE

During the dehumidification phase all DX units [optional] operate with a reduced heat exchanger surface in order to decrease the evaporating temperature and as a consequence to increase the latent percentage



Tab.1 — Refrigerant circuit pipes diameter

Cooling Capacity	kW	4 / 5	6 / 7	8 / 9	10/11,5	11,5/13	14/16	17/18	19/24	25/29	30/34	35/40
Refrigerant type	-	R407C										
HP Gas line (0 / 10 m)	mm	12	12	12	16	16	16	16	22	22	22	28
Liquid line (0 / 10 m)	mm	10	10	10	12	12	12	12	16	16	16	18
HP Gas line (10 / 20 m)	mm	12	12	16	16	16	18	18	22	22	28	28
Liquid line (10 / 20 m)	mm	10	10	12	12	12	12	12	16	16	18	18

Tab.2 — Standard copper pipes characteristics

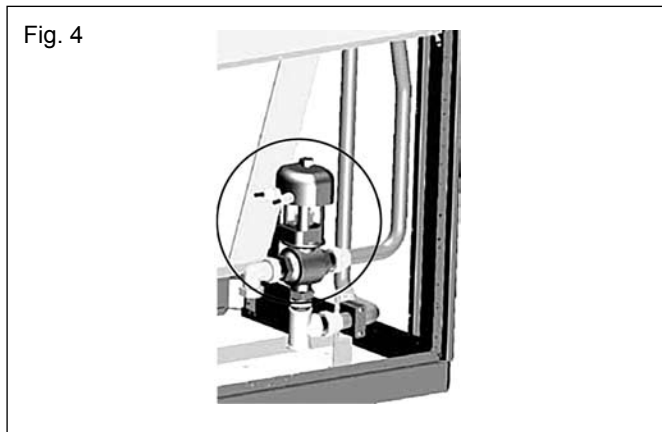
Diameter	Thickness	Minimum bending	System design	PED Category	Max Copper σ_s	Real copper σ	Safety ratio
[mm]	[mm]	[mm]	[bar]		[N/mm ²]		[N/mm ²]
10	1,0	36	28	A3P3	227	11,2	20,3
12		46				14,0	16,2
16						19,6	11,6
18		56				21,0	10,8
22	1,5	67				17,3	13,1
28		96				23,3	9,8
35		70				29,8	7,6
42	2,0	84				36,4	6,2
54		108	35,0	6,4			

Aeraulic section

Fans for all versions are radial type direct driven in combination with 4 poles motors with three phase alimentation. Fans are statically and dynamically balanced ensuring a drastic reduction in noise and vibrations. All models can be equipped with EC fans with brushless motors [optional]: this technology allows to reduce energy consumption mainly at partial load and allows to maintain the air flow independently from external conditions. The air circuit is completed with an air flow switch that checks fan's faulty situation.

Hydraulic Circuit

CW units are fully assembled and pressure tested in the factory final test. The 3-way-valves [Fig. 4] are selected by comparing the Kvs to the coil pressure drop in order to give to the valve the adequate authority for a good water flow control. The valve body is made in brass OT 58 and the shutter is plated in RILSAN for the maximum tightness: the unit system is PN16. The external connection are standard supplied with 3 parts quick connections to reduce on site working time.



Humidity Control

INNOV@ units can be supplied with Humidity sensor [option]. For an independent control between T and R.H. it is necessary to adopt one of the reheating possibilities [options].

- Electrical reheating.
- Hot Water with 3 way modulating valve.
- Hot gas reheating: this solution is only for DX version and - looking to energy consumption - it is made with zero extra energy : this option is available in On/Off version or in modulating version for more precision in parameters control. The reheating coil design criteria allows to have bigger heating than sensible cooling capacity allowing to dehumidify even when there are no thermal loads inside.

Air Filter

The filters are positioned on the Top [Down flow] or just in front of the coil [Up flow] and are made in synthetic material with metallic frame. Filtration efficiency is G4 according CEN EN 779. To exchange the filter, simply open the door(s) and remove it. As an option in the same dimension it is possible to install up to F5 filters, without any modification on the ventilation. For a higher filtration efficiency up to F9, an external plenum is needed. In this case a G4 filter will be part of the option as a prefilter. With up flow units the High filtration plenum is positioned on the discharge side.

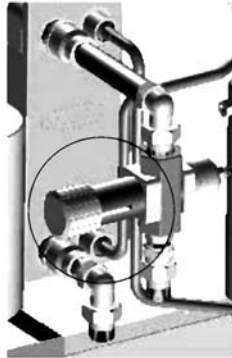
Humidifier Section

The steam humidifier is fully controlled by the mP as well as all operating parameters like water level, water conductivity, current through electrodes. Fixing the tension, the current and obviously the steam capacity depend from the water conductivity and the water level: the algorithm mixing all parameters ensures the right steam production avoiding at the same time foam grooving into the cylinder. After a certain period - depending on the water characteristics - the cylinder has to be replaced by a new one: an European average is 3 cylinders / Year for full time operation.

Water Condensed Versions

DX Units water condensed .W. .Q. .F. .D. are equipped with an AISI 304 brazed plate condenser. Units are supplied fully tested and charged with POE oil and refrigerant. During the final factory test, all operating parameters are measured and memorized, they are available on request. According to water T [city water] it is possible / needed to add a 2 way condensing control valve [Fig. 5]. In case that it is not possible to reduce the water flow, flooding technology is the alternative: in this case only refrigerant side actions occur and the water flow remains constant. *Fig. 5* The condenser is located behind the compressor compartment and is fully reachable from the front of the unit.

Fig. 5



Fresh Air Kit

Fresh air kit consists of a flexible pipe and a cartridge G3 filter and under normal conditions ensures roughly 150 m3/h independently from the unit's model. In down flow units the filter is located in the fans section and before removing the filter it is necessary to stop the unit and to remove the sheet metal of the fan's compartment. In up flow units an additional **booster fan** is provided to ensure roughly 80m3/h for all models and the relative filter is located just close to the main filter.

Plenum Kit

Fig. 6



Suction/delivery plenum with 300mm and 500mm height are available. In case of down units such plenums can be equipped with silencers cartridges, damper section for Direct free-Cooling, high efficiency filters. In case of up flow units the delivery plenum can be fitted with aluminium grills frontal air discharge [Fig.6]

Base Frames / Floorstands

Made in galvanized steel, are available in three different heights : 300, 500 and 800mm, with excursion +/- 25mm.

Electrical Heaters

Made in aluminium with a large surface for keeping the lowest possible surface temperatures [less than 130°C]. They are realized for 3 steps operation. Each elements is provided with independant safety thermostat. Despite the very small depth of the unit, the elements are mounted in a special rail order to extract them from the front of the units. This is possible with all DH models, Up and Down flow. Before any maintenance on electrical heaters, disconnect the units from power supply and wait for 30 minutes, allowing the temperature to decrease.

Electrical panel

The electrical panel is fully contained in the unit it is designed according CEE directives 72/23, 89/336 and related norms. The possibility to have access to the e-panel opening the doors is needed: with open doors the protection still remains IP30 thanks to a protecting transparent plastic panel in front of the components. All remote signals are at very low voltage 24 Vac by means of a safety transformer. All e-panels have an air circulation system in order to keep the inside temperature under control when the unit is in operation. All connected loads are protected with automatic switches in addition to those already present inside the compressors and fans. All three phase units are standard equipped with a phase sequence relay: this device checks the sequence of the phases avoiding the start of the compressors in the wrong direction.

Microprocessor

Two different type are available:

- **Basic** _ Carel μ Ac
- **Advanced** _ Carel serie pCO in combination with the semigraphic pGD Display. For this control the *LENNOX Software Development Team* is prepared to customize the software according to customer specifications.

The main functions are summarised in:

- Input of main parameters by means of the keyboard;
- Displaying of operating conditions, alarms, devices;
- Switching ON/OFF or modulating [3 way valve, humidifier] resources to keep constant the environment parameters ;
- Modulating the three way valve for hot water re-heating [option];
- Activating-deactivating the solenoid valve for hot gas re-heating in DX version only [option];
- Modulating the humidifier capacity;
- Activating the different steps in electrical heating

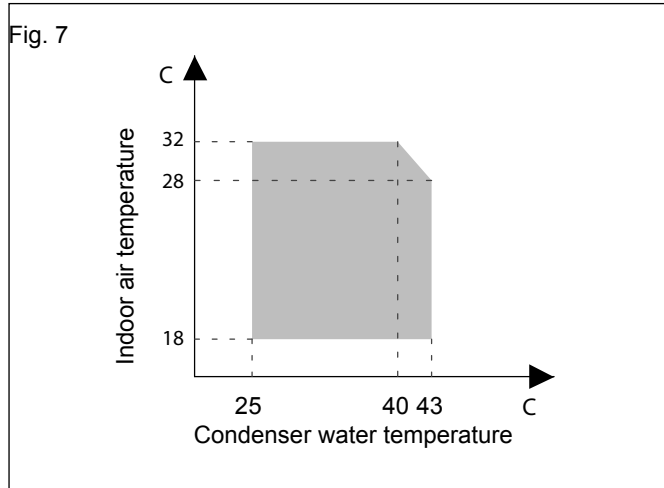
[option]

- **Alarm management** :
 - High / Low ambient temperature;
 - High / Low pressure refrigerant side;
 - Air Flow;
 - Dirty filters;
 - Electrical heating;
 - Humidifier general alarm.
- Management of maximum compressor start-up;
- Serial communications [optional] RS232 or RS485.

Remote control and connection to BMS are possible as all mP are able to be connected in serial communication [the **LSDT** (*LENNOX SoftwareDevelopment Team*) is ready to support customers in system integration]. Inter-connectivity is every day more a must:

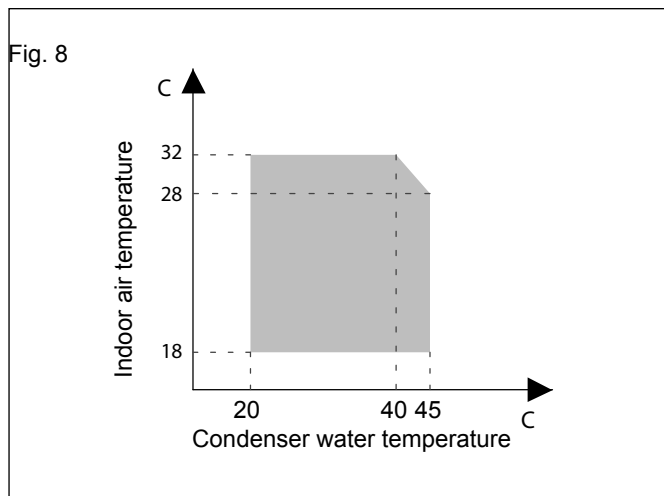
- Serial ports:
 - RS232.
 - RS485.
- Modem GSM: check with your local provider for the right contract for the SIM card. After activation, INNOV@ units are ready for a stand alone bi-directional communication [only with Advanced pCO control].
- Protocols:
 - Carel [Built In];
 - Modbus® [Built-In with Advanced mP];
 - Modbus® [with external gateway with basic mP];
 - LonWorks® [option to be selected at unit's ordering];
 - BACnet [with external gateway];
 - TCP-IP [with external gateway];

INNOV@H units are designed for indoor installation in technological environments but have been tested also under extreme conditions, typical for far East markets : the indoor temperature limits are between 18°C and 32°C with a R.H. up to 75% on the whole range. Practically indoor conditions don't play any role for a reliable operation. The application field for DX units -water or air condensed- is shown in the relative diagrams [Fig. 7 and Fig. 8]:



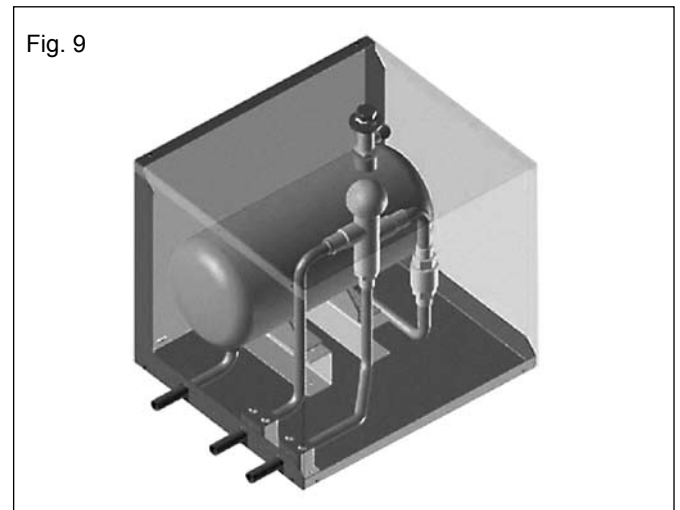
For water temperatures under 25°C a condensing control valve is needed [option] :

- Using a 2 way modulating valve water side. The valve is installed in the inlet piping to avoid that in case of broken pipe refrigerant side, a lot of water could flow into the system.
- Using the flooding technology. In this case there are no influence on water flow, but just a flooding of heat exchanging surface by means of a constant back pressure valve and a large liquid receiver.



If extended application ranges are needed, please contact the R&D department or your local dealer.

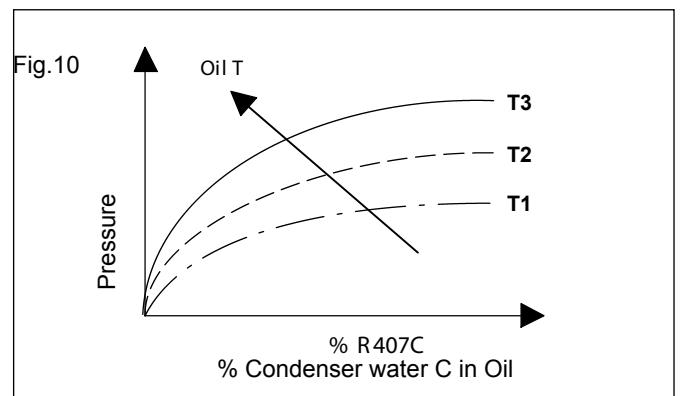
For air temperatures below 20°C, a condensing control is necessary to ensure enough pressure drops across the expansion device. For temperatures below -15°C and up to -30°C, a flooding device has to be added in order to flood the condenser internal surface allowing the right condensing temperature even in case of strong and cold wind temperatures. This device is shipped as a kit [Fig. 9] consisting of a back pressure valve, a receiver, a safety valve and mounting instructions: the installation is very simple and has to be done just close to the condensing unit at bottom side.



Compressors Oil Heaters

The "Oil" [Fig. 10] illustrates a specific property [Charles' Law] of gases, which are more soluble in liquids as the pressure increases but less soluble as the temperature increases: if the oil in the sump is held at a constant pressure, an increase in temperature will significantly reduce the amount of refrigerant dissolved in it, thus ensuring that the lubricating function desired is maintained. The problem of inadequate lubrication occurs if the crankcase is not duly heated, above all after seasonal interruptions when, due to the suction effect of the compressor, there is an abrupt drop in pressure inside the sump, which results in considerable evaporation of the refrigerant previously dissolved in the oil. If heating elements were not installed, this phenomenon would cause two problems:

- Dilution of the oil, hence inadequate lubrication.
- Migration of the oil toward the cooling circuit due to the dragging effect of the refrigerant.



Electrical heaters are necessary when units are put out of order for longer periods and remain at a temperature below 15°C. In case of crankcase heaters, please switch it on at least 12 hours before compressor start up.

Tab.3 - Operating Limits

Operating fluid	Water or e-glycol mixture
Refrigerant	R407C
water side	16 bar
Max. pressure refrigerant cycle HP side	28 bar-r
Max. piping temperature HP side	125°C
Max. pressure refrigerant cycle LP side	-10°C
Power supply	22,6 bar-r (*)
Max. storage temperature	+/-10 (to the nominal value)
Min. storage temperature	+50°C
Max. RH during storage	85%

(*) This value influences the maximum storage temperature for units with a closed refrigerant circuit, like "W" water cooled, "F" free cooling, "Q" Dual cooling" units.

Refrigerant

The selected refrigerants belong to HFC with an ODP (Ozone Depletion Potential) = 0 according to CEE 2037/00. Standard units are supplied with R407C refrigerant, a mixture of three components R32 (23%), R125(25%) and R134a(52%). Due to the presence of more than one component, condensation and evaporation don't happen at constant temperature as for pure refrigerant : this has a big impact in heat exchanger design in order to combine both temperature profiles, primary and secondary side.

the diagram (Fig.10) shows this "Temperature glide" and also the beginning condensing T (dew point) and saturated liquid/end of condensation process (bubble point).

- Begin = DEW POINT
- End = BUBBLE POINT

Expansion Valves

The expansion valve is just a mass flow regulator ensuring the right flow checking the superheating at the evaporator outlet. The mass flow depends mainly from the % of opening and from the delta pressure available across the valve. Mechanical valves have a very little modulating capacity and to ensure the mass flow, a significant delta P across it has to be maintained.

Most of the **LENNOX** product can be supplied with an electronic driven valve (Fig. 11) that ensure a big modulation capacity thank to the big stroke of their shutter : with this solution is possible to reduce the minimum delta P across the valve, reduction as in consequence the condensing temperature during middle and winter seasons.

The minimum allowed condensing T (Dew Point) is 28°C due to scroll compressor mechanical limits. In this periods the reduction in energy consumption reaches 51% giving a very short pay to the solution : the R&D department can easily calculate it for specific thermal load and outside temperature profiles. The simple schema shows how the valve is managed : a pressure transmitter is reading the evaporating pressure and temperature sensor is measuring the refrigerant temperature. The mP calculates the superheating and, using special algorithms part of them patented (pat. nr. BO2002A000785ITA), drives opening/closing of the valve by means of a stepper motor. Only two valves and only one coil cover the INNOV@ range giving important advantages for eventual spares and, in addition, the same valve is used for hot gas bypass in "Constant" units.

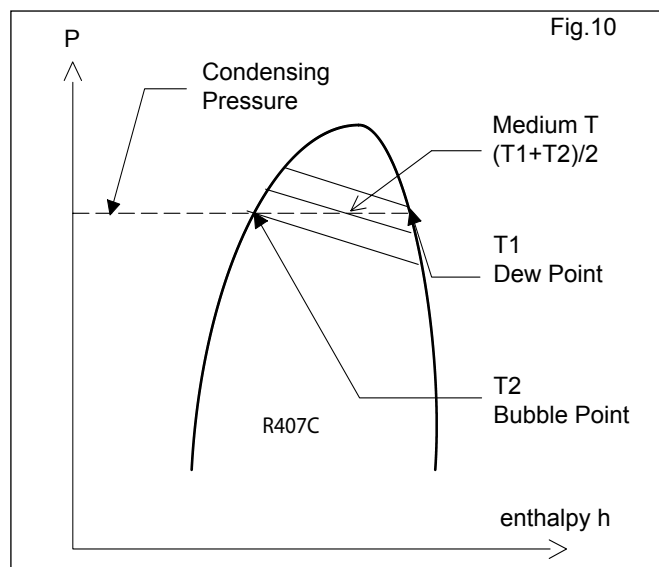
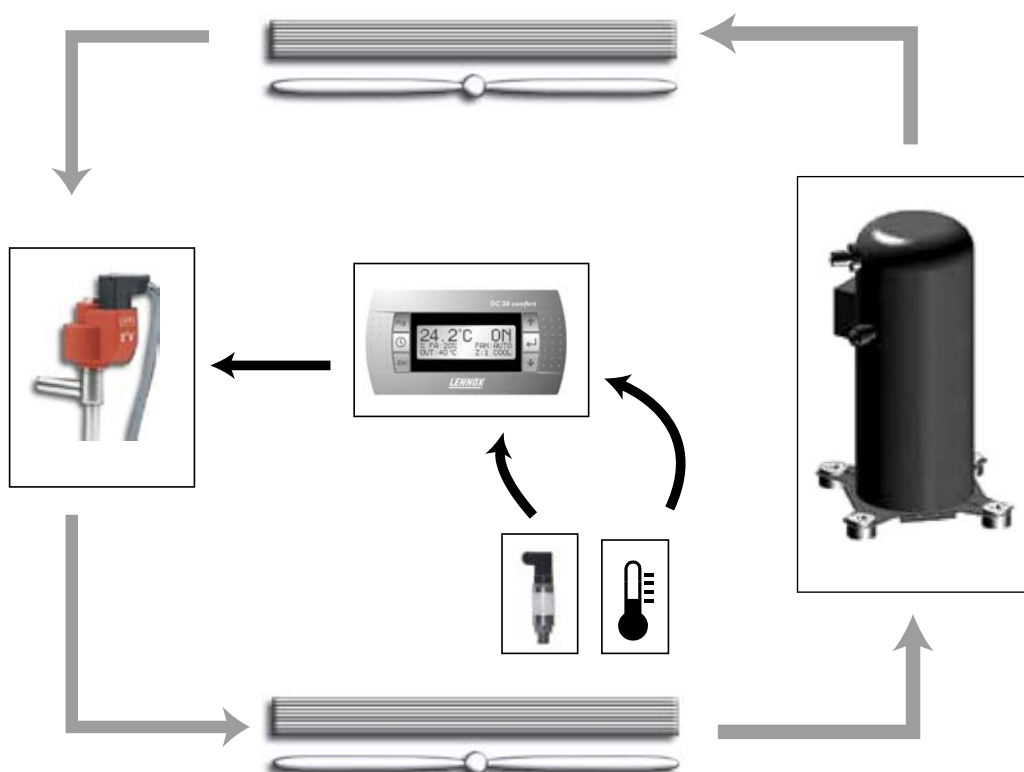
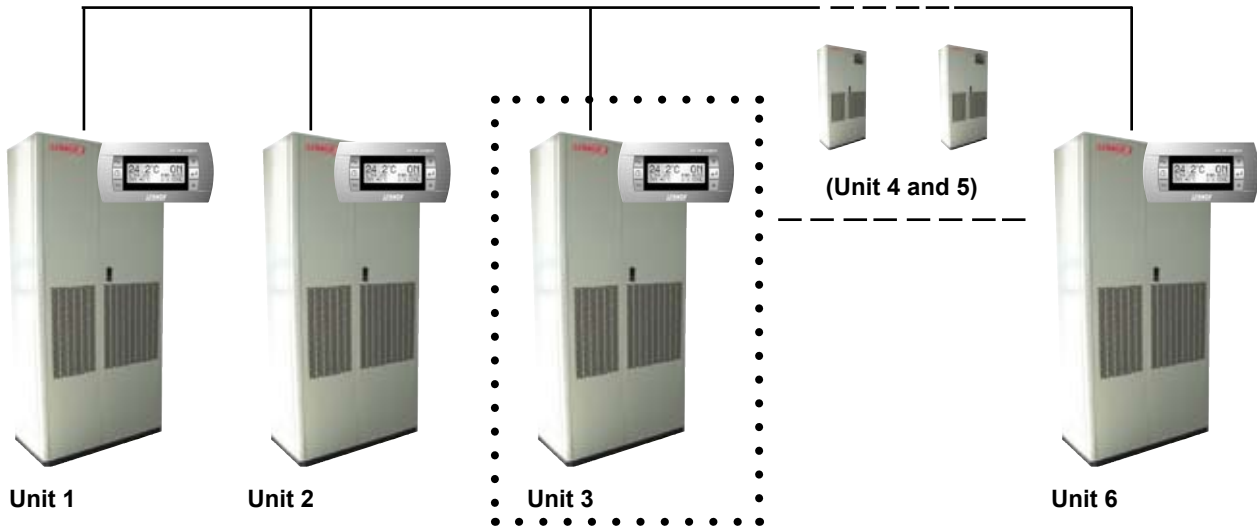


Diagram of electronic expansion valve installation



Basic Control μ AC



STAND-BY UNIT

Description

• This combination allows the timed rotation of a unit in stand-by within a group of maximum 6 units. If one of the connected units generates an alarm, the stand-by unit will be activated.

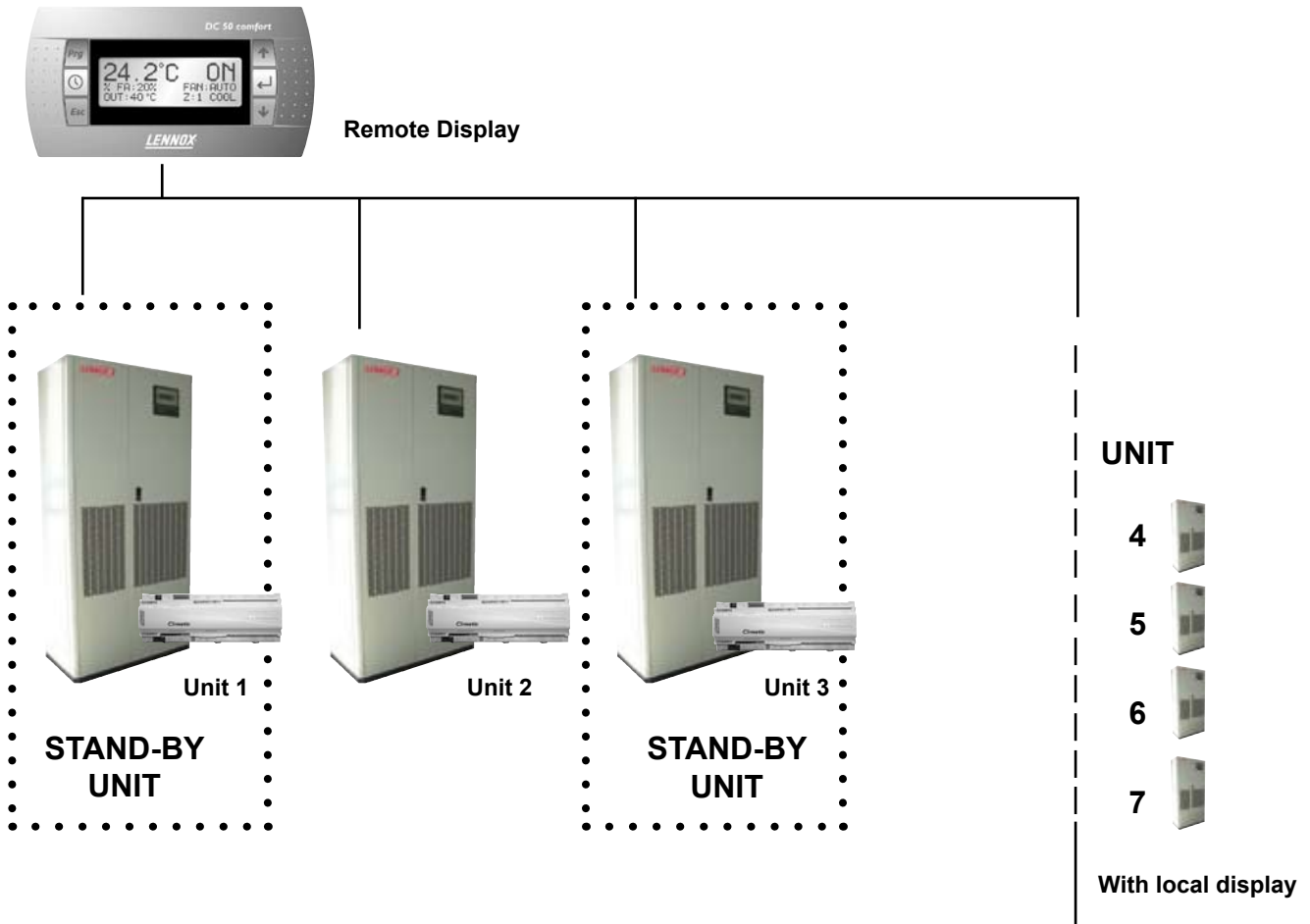
ATTENTION :

Please note that this is not a LAN.
Rotation time: 0 ÷ 250 hours.

• Master function:

Unit number 1 is defined as the master unit. This unit sends the command to activate and deactivate the unit in stand-by.

Advanced Control pCO - Local Area Network



Description

• **Master / Slave function :**

The "Master" unit's temperature and humidity probes must be located in an "intermediate" position inside the controlled environment. The "Master" unit drives the logic which is adopted by all connected units. This is important to avoid situations in which units in dehumidification and units in humidification contra-work at the same time in the same environment.

The "Master" unit modifies the working logic in case that the measured temperature or humidity are exceeding the setpoint -even by just a few decimal points. In case of a black-out or of a disconnection of the "Master" unit from the pLAN network, the connected units will start to function independently based just on their own probes.

• Stand-by & rotation activated by timing, time band or automatically on event.

• Stand-by & rotation of 1 to N units [N is the number of installed units].



HiNet Supervising systems

Description :

This system allows air-conditioning systems to be monitored and controlled using a simple Internet browser : the pages displayed on the PC are in HTML format, the used language of the worldwide web.

**Local Supervision
PC with HiNet**



Unit "Advanced Control"

Unit with "Basic" Control



Connected by :

- Analogue telephone line
- GSM line
- Ethernet
- Internet : World Wide Web "www"

**Remote Supervision
PC with HiNet**

BMS Integration

Description

units can be connected to BMS in following modes:

- Directly, without using a gateway, thanks to the ability of the advanced control pCO to select the protocol used;

- Using a gateway that converts the Carel specific protocol to the specific BMS protocol;
- Integrating the driver for the management of the Carel specific protocol into the BMS.



Following protocols are used by **LENNOX** to ensure connectivity to other systems :

- Carel specific [with HiNet supervision system, N = 200];
- Modbus [with gateway for Basic Control, N = 16; integrated with Advanced Control, N =];
- Bacnet [with gateway, N = 8];
- TCP / IP [with web-gate, N = 16];
- Echelon LonWorks [only with Advanced Control];
- Trend [only with Advanced Control];
- OPC standard [OLE for Process Control]. This allows a simple integration to SCADA OPC Client Systems [SCADA = Supervisory Control And Data Acquisition].

Tab.4 - Technical Data for Air Cooled DX Units - DHADC DHAUC

DHADC / DHAUC		0060	0080	0100	0110	0130	0160	0190	0205
<i>Unit power supply</i>					400/3ph/50Hz+N				
<i>Air Flow</i>	[m3/h]	1785	2150	3530	3530	3470	5115	4990	4990
Compressor									
<i>Type</i>					(1)				
<i>Cooling Capacity</i>	[kW]	5.9	7.7	9.3	10.6	12.6	15.6	18.2	19.9
<i>Power consumption</i>	[kW]	1.5	1.9	2.3	2.6	3.2	4.1	4.7	5.5
<i>Nominal Current</i>	[A]	2.9	3.7	4.5	5.1	6.2	8.0	8.7	10.5
<i>FLA</i>	[A]	5	6	7	7	10	13	14	15
<i>LRA</i>	[A]	24	32	40	46	50	66	74	101
<i>POE Oil charge</i>	[l]	1	1	1.1	1.1	1.36	1.95	1.65	1.65
Finned coil evaporator									
<i>Front Surface</i>	[m2]	0.29	0.29	0.47	0.47	0.47	0.65	0.65	0.65
Geometry					25 x 21,65				
<i>Rows</i>	[-]	3	4	3	3	3	3	4	4
<i>Type of fins</i>	[-]				(2)				
<i>Fin pitch</i>	[mm]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
<i>SHR</i>	[-]	1.00	1.00	1.00	1.00	0.96	0.98	0.98	0.96
Indoor fan									
<i>Type</i>					(3)				
<i>Power supply</i>	[V-ph-Hz]				400/ 3+N /50				
<i>Number of fans</i>		1	1	2	2	2	2	2	2
<i>Fans absorbed current</i>	[A]	1.2	1.6	3.2	3.2	3.2	3.8	3.8	3.8
<i>Fans absorbed power</i>	[W]	173	282	563	563	563	668	668	668
<i>AESP</i>	[Pa]	20	20	20	20	20	20	20	20
<i>AESP (maximum speed)</i>	[Pa]	244	217	253	253	250	108	118	118
Air Filter									
<i>Filtration</i>					G3				
<i>Overall surface</i>	[m2]	2.2	2.2	3.6	3.6	3.6	5.0	5.0	5.0
<i>Fire resistance class</i>		1	1	1	1	1	1	1	1
Electrical heaters									
<i>Total Heating Capacity</i>	[kW]	1.6	1.6	3.2	3.2	3.2	3.2	3.2	3.2
<i>N° of heaters</i>		1	1	2	2	2	2	2	2
<i>Material</i>	[-]				(4)				
Hot gas Reheating Coil									
<i>Heating capacity</i>	[kW]	5.5	6.3	10.2	10.79	11.7	16.9	18.0	19.2
<i>Front Surface</i>	[m2]	0.23	0.23	0.39	0.39	0.39	0.55	0.55	0.55
Hot Water reheating coil									
<i>Heating capacity @ 45/40° water T</i>	[kW]	4.1	4.9	7.4	7.9	8.6	11.8	12.6	13.3
<i>Front Surface</i>	[m2]	0.23	0.23	0.39	0.39	0.39	0.55	0.55	0.55
<i>Water flow</i>	[m3/h]	0.643	0.872	1.036	1.163	1.499	1.847	2.166	2.290
<i>Water side pressure drop</i>	[kPa]	3.6	6	12	14	23	43	57	62
<i>Water valve pressure drop</i>	[kPa]	10	10	10	10	10	13	18	20
<i>Internal volume</i>	[dm3]	0.547	0.547	0.939	0.920	0.920	1.312	1.312	1.312
Humidifier									
<i>Max theoretical capacity</i>	[kg/h]	2.80	3.17	4.45	5.22	5.01	10.09	6.90	6.50
<i>Effective capacity</i>	[kg/h]	3	3	3	3	3	3	3	3
<i>Absorbed power</i>	[kW]	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25
Frame									
<i>H</i>	[mm]	1850	1850	1850	1850	1850	1850	1850	1850
<i>L</i>	[mm]	600	600	900	900	900	1200	1200	1200
<i>D</i>	[mm]	449	449	449	449	449	449	449	449
Sound pressure level**	[dB(A)]	46	48	48	49	51	52	53	53
<i>Weight</i>	[kg]	150	157	195	210	230	245	255	257

(*) At 1,5 meters height, 2 meters frontal distance in free field; downflow units [20 Pa AESP]

(1) : Scroll

(2) : Hydrophilic

(3) : Centrifugal

(4) : Aluminium

Tab.5 - DX Unit (1 Compressor) - Air Cooled

DHADC / DHAUC		0201	0251	0261	0271	0301	0401
<i>Unit power supply</i>				400/3ph/50Hz+N			
<i>Air Flow</i>	[m3/h]	7280	7280	7280	12950	12950	12950
Compressor							
<i>Type</i>				(1)			
<i>Cooling Capacity</i>	[kW]	21.2	23.2	26.8	27.3	31.5	41.2
<i>Power consumption</i>	[kW]	5.8	6.1	7.2	7.3	8.4	11.1
<i>Nominal Current</i>	[A]	10.7	11.3	13.7	13.7	15.8	19
<i>FLA</i>	[A]	17	17	20	20	29	29
<i>LRA</i>	[A]	86	98	130	130	130	135
<i>POE Oil charge</i>	[l]	3.25	3.25	3.25	3.25	3.25	3.3
Finned coil evaporator							
<i>Front Surface</i>	[m2]	0.8	0.8	0.8	1.3	1.3	1.3
Geometry		25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65
<i>Rows</i>	[-]	4	4	5	3	3	4
<i>Type of fins</i>	[-]			(2)			
<i>Fin pitch</i>	[mm]	1.8	1.8	1.8	1.8	1.8	1.8
<i>SHR</i>	[-]	1.00	1.00	0.92	1.00	0.99	0.97
Indoor fan							
<i>Type</i>				(3)			
<i>Power supply</i>	[V-ph-Hz]			400/3/50			
<i>Number of fans</i>		1	1	1	2	2	2
<i>Fans absorbed current</i>	[A]	1,89	1,89	2,11	3,04	3,07	3,41
<i>Fans absorbed power</i>	[W]	1120	1130	1250	1810	1830	2030
<i>AESP</i>	[Pa]	30	30	30	30	30	30
<i>AESP (maximum speed)</i>	[Pa]	380	380	340	425	425	355
Air Filter							
<i>Filtration</i>		G4	G4	G4	G4	G4	G4
<i>Overall surface</i>	[m2]	1.44	1.44	1.44	2.92	2.92	2.92
<i>Fire resistance class</i>		1	1	1	1	1	1
Electrical heaters							
<i>Total Heating Capacity</i>	[kW]	6.4	6.4	6.4	9.6	9.6	9.6
<i>N° of heaters</i>		2	2	2	3	3	3
<i>Material</i>	[-]			(4)			
Hot gas Reheating Coil							
<i>Heating capacity</i>	[kW]	18.1	18.1	18.5	36.3	38.1	41.3
<i>Front Surface</i>	[m2]	0.65	0.65	0.65	1.05	1.05	1.05
Hot Water reheating coil							
<i>Heating capacity @ 45/40° water T</i>	[kW]	15,5	15,8	16,3	28,4	29	29,8
<i>Front Surface</i>	[m2]	0.65	0.65	0.65	1.05	1.05	1.05
<i>Water flow</i>	[m3/h]	2.552	2.696	2.98	3.250	3.768	4.948
<i>Water side pressure drop</i>	[kPa]	15.6	18.2	25.3	40.0	39.6	42.4
<i>Water valve pressure drop</i>	[kPa]	14.72	15.13	15.55	7.69	8.42	10.13
<i>Internal volume</i>	[dm3]	1.443	1.443	1.443	2.786	2.786	2.786
Humidifier							
<i>Max theoretical capacity</i>	[kg/h]	11.86	11.62	9.66	28.79	27.49	17.85
<i>Effective capacity</i>	[kg/h]	8	8	8	8	8	8
<i>Absorbed power</i>	[kW]	6	6	6	6	6	6
Frame							
<i>H</i>	[mm]	1998	1998	1998	1998	1998	1998
<i>L</i>	[mm]	1000	1000	1000	1750	1750	1750
<i>D</i>	[mm]	795	795	795	795	795	795
Sound pressure level**	[dB(A)]						
<i>Weight</i>	[kg]	375	385	393	570	585	595

(*) At 1,5 meters height, 2 meters frontal distance in free field; downflow units [20 Pa AESP]

(1) : Scroll

(2) : Hydrofilic

(3) : Radial EC

(4) : Aluminium

(*) At 1,5 meters height, 2 meters frontal distance in free field; downflow units [20 Pa AESP]

Tab.6 - DX Unit (2 Compressors) - Air Cooled

DHADC / DHAUC		0272	0302	0362	0422	0452	0512	0552	0602	0692	0762
<i>Unit power supply</i>		400/3ph/50Hz+N									
<i>Air Flow</i>	[m3/h]	12950	12950	12950	12950	12950	12950	19415	19415	19415	19415
Compressor											
<i>Type</i>		(1)									
<i>Cooling Capacity</i>	[kW]	26.9	31.9	35.9	41.9	44.3	50.5	54.4	61.4	68.7	76.2
<i>Power consumption</i>	[kW]	6.8	8.5	9.8	11.6	12.2	14.7	14.6	16.9	19.7	22.4
<i>Nominal Current</i>	[A]	12.2	16.2	17.4	21.4	22.6	27.4	27.2	31.6	35.6	39.4
<i>FLA</i>	[A]	10	13	14	17	17	20	20	29	29 [32]	32
<i>LRA</i>	[A]	50	66	74	86	98	130	130	130	130[135]	135
<i>POE Oil charge</i>	[l]	1.36	1.36	1.65	3.25	3.25	3.25	3.25	3.25	3.25[3.3]	3.3
Finned coil evaporator											
<i>Front Surface</i>	[m2]	1.3	1.3	1.3	1.3	1.3	1.3	2.0	2.0	2.0	2.0
Geometry		25 x 21,6									
<i>Rows</i>	[-]	3	3	3	4	4	4	3	4	4	4
<i>Type of fins</i>	[-]	(2)									
<i>Fin pitch</i>	[mm]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
<i>SHR</i>	[-]	1.00	0.99	0.98	0.97	0.98	0.92	1.00	0.96	0.95	0.93
Indoor fan											
<i>Type</i>		(3)									
<i>Power supply</i>	[V-ph-Hz]	400/3/50									
<i>Number of fans</i>		2	2	2	2	2	2	3	3	3	3
<i>Fans absorbed current</i>	[A]	3,07	3,07	3,07	3,32	3,35	3,51	4,56	4,52	5,00	4,98
<i>Fans absorbed power</i>	[W]	1830	1830	1830	1980	1990	2090	2710	2690	2980	2970
<i>AESP</i>	[Pa]	30	30	30	30	30	30	30	30	30	30
<i>AESP (maximum speed)</i>	[Pa]	425	425	425	355	355	355	405	378	378	378
Air Filter											
<i>Filtration</i>		G4	G4	G4	G4	G4	G4	G4	G4	G4	G4
<i>Overall surface</i>	[m2]	2.92	2.92	2.92	2.92	2.92	2.92	4.49	4.49	4.49	4.49
<i>Fire resistance class</i>		1	1	1	1	1	1	1	1	1	1
Electrical heaters											
<i>Total Heating Capacity</i>	[kW]	9.6	9.6	9.6	9.6	9.6	9.6	12.8	12.8	12.8	12.8
<i>N° of heaters</i>		3	3	3	3	3	3	4	4	4	4
<i>Material</i>	[-]	(4)									
Hot gas Reheating Coil											
<i>Heating capacity</i>	[kW]	34.1	33.7	33.7	41.6	42.3	43.2	59.5	63.2	65.2	68.0
<i>Front Surface</i>	[m2]	1.05	1.05	1.05	1.05	1.05	1.05	1.62	1.62	1.62	1.62
Hot Water reheating coil											
<i>Heating capacity @ 45/40° water T</i>	[kW]	28,7	29,2	30	30	30	30	44	45,5	46,1	47,5
<i>Front Surface</i>	[m2]	1.05	1.05	1.05	1.05	1.05	1.05	1.62	1.62	1.62	1.62
<i>Water flow</i>	[m3/h]	4.936	5.021	5.159	5.159	5.159	5.159	7.567	7.825	7.928	8.169
<i>Water side pressure drop</i>	[kPa]	39.6	41.0	42.0	42.0	42.0	42.0	33.4	36.9	38.5	38.5
<i>Water valve pressure drop</i>	[kPa]	7.69	8.42	9.19	10.13	10.61	11.32	21.57	22.68	24.45	26.18
<i>Internal volume</i>	[dm3]	2.786	2.786	2.786	2.786	2.786	2.786	4.358	4.358	4.358	4.358
Humidifier											
<i>Max theoretical capacity</i>	[kg/h]	26.00	21.66	22.41	21.09	23.20	23.40	45.62	33.82	34.33	32.98
<i>Effective capacity</i>	[kg/h]	8	8	8	8	8	8	8	8	8	8
<i>Absorbed power</i>	[kW]	6	6	6	6	6	6	6	6	6	6
Frame											
<i>H</i>	[mm]	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998
<i>L</i>	[mm]	1750	1750	1750	1750	1750	1750	2500	2500	2500	2500
<i>D</i>	[mm]	795	795	795	795	795	795	795	795	795	795
Sound pressure level**											
<i>Weight</i>	[kg]	565	580	590	605	615	614	905	940	958	979

(*) At 1,5 meters height, 2 meters frontal distance in free field; downflow units [20 Pa AESP]

(1) : Scroll

(2) : Hydrofilic

(3) : Radial ECI

(4) : Aluminium

(*) At 1,5 meters height, 2 meters frontal distance in free field; downflow units [20 Pa AESP]

Tab.7 - Technical Data for water Cooled DX Units - DHW/ZDC/DHW/ZUC

DHW/ZDC/DHW/ZUC	0060	0080	0100	0110	0130	0160	0190	0205
Unit power supply	400/3ph/50Hz+N							
Air Flow [m3/h]	1785	2150	3530	3530	3470	5115	4990	4990
DHZ - T water 15°C / 30°C								
Cooling Capacity [kW]	6.59	8.48	10.70	12.15	14.21	17.98	20.86	21.50
Power consumption [kW]	1.25	1.61	1.92	2.21	2.77	3.46	4.07	4.73
DHW - T water 40°C / 45°C (30% e.g.)								
Cooling Capacity [kW]	5.66	7.16	9.04	10.27	12.00	14.90	17.55	19.02
Power consumption [kW]	1.65	2.17	2.60	2.99	3.70	4.63	5.35	6.11
Compressor								
Type	(1)							
Power supply [V-ph-Hz]	400/ 3+N /50							
Nominal Current [A]	2.9	3.7	4.48	5.13	6.16	8.01	8.66	11.35
FLA [A]	5	6	7	7	10	13	14	15
LRA [A]	24	32	40	46	50	66	74	101
POE Oil charge [l]	1	1	1.1	1.1	1.36	1.95	1.65	1.65
Finned coil evaporator								
Front Surface [m2]	0.29	0.29	0.48	0.48	0.48	0.66	0.66	0.66
Geometry	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65
Rows [-]	3	4	3	3	4	3	4	4
Type of fins [-]	(2)							
Fin piDHCh [mm]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
SHR [-]	1.00	1.00	1.00	1.00	0.96	0.98	0.98	0.96
Indoor fan								
Type	(3)							
Number of fans	1	1	2	2	2	2	2	2
Fans absorbed current [A]	1.2	1.6	3.2	3.2	3.2	3.8	3.8	3.8
Fans absorbed power [W]	173	282	563	563	563	668	668	668
AESP [Pa]	20	20	20	20	20	20	20	20
AESP (maximum speed) [Pa]	200	190	220	205	185	108	118	118
Air Filter								
Filtration	G3	G3	G3	G3	G3	G3	G3	G3
Overall surface [m2]	2.2	2.2	3.6	3.6	3.6	5.0	5.0	5.0
Fire resistance class	1	1	1	1	1	1	1	1
Electrical heaters								
Total Heating Capacity [kW]	1.6	1.6	3.2	3.2	3.2	3.2	3.2	3.2
N° of heaters	1	1	2	2	2	2	2	2
Material [-]	(4)							
Hot gas Reheating Coil								
Heating capacity [kW]	5.5	6.3	10.2	10.79	11.7	16.9	18.0	19.2
Front Surface [m2]	0.23	0.23	0.39	0.39	0.39	0.55	0.55	0.55
Hot Water reheating coil								
Heat. capacity@45/40°water T [kW]	4.1	4.9	7.4	7.9	8.6	11.8	12.6	13.3
Front Surface [m2]	0.23	0.23	0.39	0.39	0.39	0.55	0.55	0.55
Water flow [m3/h]	0.643	0.872	1.036	1.163	1.499	1.847	2.166	2.290
Water side pressure drop [kPa]	3.6	6	12	14	23	43	57	62
Water valve pressure drop [kPa]	10	10	10	10	10	13	18	20
Internal volume [dm3]	0.547	0.547	0.939	0.920	0.920	1.312	1.312	1.312
Humidifier								
Max theoretical capacity [kg/h]	2.80	3.17	4.45	5.22	5.01	10.09	6.90	6.50
Effective capacity [kg/h]	3	3	3	3	3	3	3	3
Absorbed power [kW]	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25
Frame								
H [mm]	1875	1875	1875	1875	1875	1875	1875	1875
L [mm]	600	600	900	900	900	1200	1200	1200
D [mm]	449	449	449	449	449	449	449	449
Sound pressure level** [dB(A)]	46	48	48	49	51	52	53	53
Weight [kg]	162	169	207	232	265	273	285	287

Tab.8 - Technical Data for water Cooled DX Units - DHW/ZDC/DHW/ZUC

DHW/ZDC/DHW/ZUC		0201	0251	0261	0271	0301	0401
Unit power supply		400/3ph/50Hz+N					
Air Flow	[m3/h]	7280	7280	7280	12950	12950	12950
DHZ - T water 15°C / 30°C							
Cooling Capacity	[kW]	24.00	25.30	30.50	30.50	35.40	46.50
Power consumption	[kW]	4.76	4.99	5.95	5.95	6.85	9.15
DHW - T water 40°C / 45°C (30% e.g.)							
Cooling Capacity	[kW]	19.97	21.06	25.37	25.37	29.45	39.16
Power consumption	[kW]	6.36	6.67	8.03	8.03	9.27	12.27
Compressor							
Type		(1)					
Power supply	[V-ph-Hz]	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Nominal Current	[A]	10.7	11.3	13.7	13.7	15.8	19.0
FLA	[A]	17	17	20	20	29	29
LRA	[A]	86	98	130	130	130	135
POE Oil charge	[l]	3.25	3.25	3.25	3.25	3.25	3.3
Finned coil evaporator							
Front Surface	[m2]	0.8	0.8	0.8	1.3	1.3	1.3
Geometry		25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65
Rows	[-]	4	4	4	3	3	4
Type of fins	[-]	(2)					
Fin pitch	[mm]	1.8	1.8	1.8	1.8	1.8	1.8
SHR	[-]	1.00	1.00	0.92	1.00	0.99	0.97
Indoor fan							
Type		(3)					
Number of fans		1	1	1	2	2	2
Fans absorbed current	[A]	1,89	1,89	2,11	3,04	3,07	3,41
Fans absorbed power	[W]	1120	1130	1250	1810	1830	2030
AESP	[Pa]	30	30	30	30	30	30
AESP (maximum speed)	[Pa]	380	380	340	425	425	355
Air Filter							
Filtration		G4	G4	G4	G4	G4	G4
Overall surface	[m2]	1.44	1.44	1.44	2.92	2.92	2.92
Fire resistance class		1	1	1	1	1	1
Electrical heaters							
Total Heating Capacity	[kW]	6.4	6.4	6.4	9.6	9.6	9.6
N° of heaters		2	2	2	3	3	3
Material	[-]	(4)					
Hot gas Reheating Coil							
Heating capacity	[kW]	18.1	18.1	18.5	36.3	38.1	41.3
Front Surface	[m2]	0.65	0.65	0.65	1.05	1.05	1.05
Hot Water reheating coil							
Heat. capacity@45/40°water T	[kW]	15,5	15,8	16,3	28,4	29	29,8
Front Surface	[m2]	0.65	0.65	0.65	1.05	1.05	1.05
Water flow	[m3/h]	2.552	2.696	2.98	3.250	3.768	4.948
Water side pressure drop	[kPa]	15.6	18.2	25.3	40.0	39.6	42.4
Water valve pressure drop	[kPa]	14.72	15.13	15.55	7.69	8.42	10.13
Internal volume	[dm3]	1.443	1.443	1.443	2.786	2.786	2.786
Humidifier							
Max theoretical capacity	[kg/h]	11.86	11.62	9.66	28.79	27.49	17.85
Effective capacity	[kg/h]	8	8	8	8	8	8
Absorbed power	[kW]	6	6	6	6	6	6
Frame							
H	[mm]	1998	1998	1998	1998	1998	1998
L	[mm]	1000	1000	1000	1750	1750	1750
D	[mm]	795	795	795	795	795	795
Sound pressure level**							
Weight	[kg]	375	385	393	570	585	595

(*) At 1,5 meters height, 2 meters frontal distance in free field; downflow units [20 Pa AESP]

(1) : Scroll

(2) : Hydrophilic

(3) : Radial EC

(4) : Aluminium

Tab.9 - Technical Data for water Cooled DX Units - DHW/ZDC/DHW/ZUC

DHW/ZDC/DHW/ZUC	0272	0302	0362	0422	0452	0512	0552	0602	0692	0762
Unit power supply	400/3ph/50Hz+N									
Air Flow [m3/h]	12950	12950	12950	12950	12950	12950	19415	19415	19415	19415
DHZ - T water 15°C / 30°C										
Cooling Capacity [kW]	27.90	34.60	40.60	48.00	50.60	57.10	60.92	70.70	81.87	93.06
Power consumption [kW]	5.42	6.96	7.94	9.52	9.98	5.98	11.91	13.70	16.00	18.30
DHW - T water 40°C / 45°C (30% e.g.)										
Cooling Capacity [kW]	23.50	28.90	34.00	39.94	42.12	48.80	50.74	58.90	68.61	78.32
Power consumption [kW]	7.42	9.26	10.70	12.72	13.34	8.04	16.06	18.54	21.54	24.54
Compressor										
Type	(1)									
Power supply [V-ph-Hz]	400/3/50									
Nominal Current [A]	12.2	16.2	17.4	21.4	22.6	12.2	27.2	31.6	35.6	39.4
FLA [A]	10	13	14	17	17	20	20	29	29 [32]	32
LRA [A]	50	66	74	86	98	130	130	130	130 [135]	135
POE Oil charge [l]	1.36	1.36	1.65	3.25	3.25	3.25	3.25	3.25	3.25 [3.3]	3.3
Finned coil evaporator										
Front Surface [m2]	1.3	1.3	1.3	1.3	1.3	1.3	2.0	2.0	2.0	2.0
Geometry	25 x 21,65									
Rows [-]	3	3	3	4	4	4	3	4	4	4
Type of fins [-]	(2)									
Fin piDHCh [mm]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
SHR [-]	1.00	0.99	0.98	0.97	0.98	0.93	1.00	0.96	0.95	0.93
Indoor fan										
Type	(3)									
Number of fans	2	2	2	2	2	2	3	3	3	3
Fans absorbed current [A]	3,07	3,07	3,07	3,32	3,35	3,51	4,56	4,52	5	4,98
Fans absorbed power [W]	1830	1830	1830	1980	1990	2090	2710	2690	2980	2970
AESP [Pa]	30	30	30	30	30	30	30	30	30	30
AESP (maximum speed) [Pa]	425	425	425	355	355	355	405	378	378	378
Air Filter										
Filtration	G4	G4	G4	G4	G4	G4	G4	G4	G4	G4
Overall surface [m2]	2.92	2.92	2.92	2.92	2.92	2.92	4.49	4.49	4.49	4.49
Fire resistance class	1	1	1	1	1	1	1	1	1	1
Electrical heaters										
Total Heating Capacity [kW]	9.6	9.6	9.6	9.6	9.6	9.6	12.8	12.8	12.8	12.8
N° of heaters	3	3	3	3	3	3	4	4	4	4
Material [-]	(4)									
Hot gas Reheating Coil										
Heating capacity [kW]	34.1	33.7	33.7	41.6	42.3	43.2	59.5	63.2	65.2	68.0
Front Surface [m2]	1.05	1.05	1.05	1.05	1.05	1.05	1.62	1.62	1.62	1.62
Hot Water reheating coil										
Heat. capacity@45/40°water T [kW]	39.6	41	42	42	42	30	33.4	36.9	38.5	38.5
Front Surface [m2]	1.05	1.05	1.05	1.05	1.05	1.05	1.62	1.62	1.62	1.62
Water flow [m3/h]	4.936	5.021	5.159	5.159	5.159	5.159	7.567	7.825	7.928	8.169
Water side pressure drop [kPa]	39.6	41.0	42.0	42.0	42.0	42.0	33.4	36.9	38.5	38.5
Water valve pressure drop [kPa]	7.69	8.42	9.19	10.13	10.61	11.32	21.57	22.68	24.45	26.18
Internal volume [dm3]	2.786	2.786	2.786	2.786	2.786	2.786	4.358	4.358	4.358	4.358
Humidifier										
Max theoretical capacity [kg/h]	26.00	21.66	22.41	21.09	23.20	23.40	45.62	33.82	34.33	32.98
Effective capacity [kg/h]	8	8	8	8	8	8	8	8	8	8
Absorbed power [kW]	6	6	6	6	6	6	6	6	6	6
Frame										
H [mm]	1998	1998	1998	1998	1998	1998	1998	1998	1998	1998
L [mm]	1750	1750	1750	1750	1750	1750	2500	2500	2500	2500
D [mm]	795	795	795	795	795	795	795	795	795	795
Sound pressure level** [dB(A)]										
Weight [kg]	565	580	590	605	615	615	905	940	958	979

(*) At 1,5 meters height, 2 meters frontal distance in free field; downflow units [20 Pa AESP]

(1) : Scroll

(2) : Hydrophilic

(3) : Centrifugal

(4) : Aluminium

Tab.10 - Technical Data for Chilled water CW Units - DHDC / DHCUC

DHDC DHCUC		0080	0110	0140	0160	0200	0230
Unit power supply		230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Total. cooling cap. @ 7/12° Water T°	[kW]	7.6	10.6	13.9	15.6	19.3	22.2
Total. cooling cap. @ 10°/15° Water T°	[kW]	5.3	6.2	9.8	11.3	14.0	15.7
Air Flow	[m3/h]	1785	2150	3530	3470	5115	4990
Water flow	[l/s]	0.36	0.50	0.66	0.74	0.92	1.06
Total water pressure drop	[kPa]						
Finned coil evaporator							
Front Surface	[m2]	0.29	0.29	0.47	0.47	0.65	0.65
Geometry		25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65	25 x 21,65
Rows	[-]	3	4	3	4	3	4
Type of fins	[-]				(1)		
Fin piDHCh	[mm]	1.8	1.8	1.8	1.8	1.8	1.8
SHR (air 7/12°C)	[-]	0.83	0.83	0.84	0.83	0.84	0.83
SHR (air 10/15°C)	[-]	1	0.96	1	0.97	1	0.96
Indoor fan							
Type					(2)		
Power supply	[V-ph-Hz]	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Number of fans		1	1	2	2	2	2
Fans absorbed current	[A]	1.5	1.6	1.6	1.6	1.9	1.9
Fans absorbed power	[W]	216	282	282	282	334	334
AESP with std fan	[Pa]	20	20	20	20	20	20
AESP (maximum speed)	[Pa]	244	167	242	206	115	100
Air Filter							
Filtration		G3	G3	G3	G3	G3	G3
Overall surface	[m2]	2.2	2.2	3.6	3.6	5.0	5.0
Fire resistance class		1	1	1	1	1	1
Electrical heaters							
Total Heating Capacity	[kW]	1.6	1.6	3.2	3.2	3.2	3.2
N° of heaters		1	1	2	2	3	3
Material	[-]				(4)		
Hot Water reheating coil							
Heating capacity @ 45/40° water T°	[kW]	5.3	7.2	9.7	10.8	13.6	15.5
Front Surface	[m2]	0.23	0.23	0.39	0.39	0.55	0.55
Water flow	[m3/h]	0.91	1.24	1.67	1.86	2.33	2.67
Water side pressure drop	[kPa]	6	11	27	32	22	26
Water valve pressure drop	[kPa]	12	16	19.5	22.5	24.5	28
Internal volume	[dm3]	0.547	0.547	0.920	0.920	1.293	1.293
Humidifier							
Max theoretical capacity	[kg/h]	2.92	3.55	6.44	5.83	9.87	8.66
Effective capacity	[kg/h]	3	3	3	3	3	3
Absorbed power	[kW]	2.25	2.25	2.25	2.25	2.25	2.25
Sound pressure level	[dB(A)]	48	50	51	51	52	52
Power Supply*	V/Ph/H			400/3ph/50Hz+N			
Frame							
H	[mm]	1875	1875	1875	1875	1875	1875
L	[mm]	600	600	900	900	1200	1200
D	[mm]	449	449	449	449	449	449
Weight	[kg]	125	135	150	160	170	175

* 400V/3Ph+N/50Hz with Humidifier or Electrical heater option

** At 1,5 meters height, 2 meters frontal distance in free field – downflow units (20 Pa AESP)

(1) : Scroll

(2) : Hydrophilic

(3) : Centrifugal

(4) : Aluminium

Tab.11 - Technical Data for Chilled water CW Units - DHCDR / DHCUR

DHCDC DHCUC		0300	0380	0400	0500	0650	0750	0900	1000	1200
Unit power supply		400/3ph/50Hz+N								
Total. cooling cap. @ 7/12° Water T°	[kW]	32.4	47.6	37.5	51.8	63.8	83.1	87.4	101.4	137.9
Total. cooling cap. @ 10°/15° Water T°	[kW]	23.5	30.5	33.3	41.8	19.1	51.9	65.3	92.3	84.5
Air Flow	[m3/h]	8120	8120	14500	14500	14500	14500	22450	22450	22450
Water flow	[l/s]	1.55	2.27	1.80	2.47	3.05	3.97	4.17	4.84	6.59
Total water pressure drop	[kPa]	46	55.8	37	39	71	73.3	52	80	129.4
Finned coil evaporator										
Front Surface	[m2]	1.10	1.05	1.90	1.90	1.90	1.85	2.80	2.80	2.8
Geometry		25 x 21,65								
Rows	[-]	3	6	2	3	4	6	3	4	6
Type of fins	[-]	(1)								
Fin pitch	[mm]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
SHR (air 7/12°C)	[-]	0.83	0.77	0.84	0.83	0.82	0.8	0.84	0.82	0.78
SHR (air 10/15°C)	[-]	1.00	0.99	1.00	0.97	0.92	1	0.91	0.83	0.99
Indoor fan										
Type		(3)								
Power supply	[V-ph-Hz]	400/3/50								
Number of fans		1	1	2	2	2	2	3	3	3
Fans absorbed current	[A]	1,75	2,22	2,73	3,18	3,48	4,04	4,98	5,44	5,7
Fans absorbed power	[W]	1040	1320	1620	1890	2070	2410	2960	3240	3555
AESP with std fan	[Pa]	30	30	30	30	30	30	30	30	30
AESP (maximum speed)	[Pa]	380	330	430	405	385	350	405	405	353
Air Filter										
Filtration		G4	G4	G4	G4	G4	G4	G4	G4	G4
Overall surface	[m2]	1.44	1.44	2.92	2.92	2.92	2.92	4.49	4.49	4.49
Fire resistance class		1	1	1	1	1	1	1	1	1
Electrical heaters										
Total Heating Capacity	[kW]	3.2	6.4	6.4	6.4	6.4	9.6	9.6	9.6	12.8
N° of heaters		2	2	3	3	3	3	4	4	4
Material	[-]	(4)								
Hot Water reheating coil										
Heating capacity @ 45/40° water T°	[kW]	14.5	14,7	14.9	25,8	27	29,6	25,8	27	27
Front Surface	[m2]	0.65	0.65	1.05	1.05	1.05	1.05	1.61	1.61	1.61
Water flow	[m3/h]	2.494	2.528	2.563	4.438	4.644	5.091	4.438	4.644	4.644
Water side pressure drop	[kPa]	13	13	13	33	35	42	33	35	35
Water valve pressure drop	[kPa]	14.72	15.13	15.55	7.69	8.42	10.13	7.69	8.42	8.42
Internal volume	[dm3]	1.44	1.44	2.78	2.78	2.78	2.78	4.36	4.36	4.36
Humidifier										
Max theoretical capacity	[kg/h]	19.6	19.6	41.1	35.4	23.6	23.6	54.7	36.4	36.4
Effective capacity	[kg/h]	8	8	8	8	8	8	8	8	8
Absorbed power	[kW]	6	6	6	6	6	6	6	6	6
Sound pressure level	[dB(A)]	58	60	60	61	61.5	62	63	63.5	65
Power Supply*	V/Ph/H	400/3ph/	400/3ph/	400/3ph/	400/3ph/	400/3ph/	400/3ph/	400/3ph/	400/3ph/	400/3ph/
Frame										
H	[mm]	1998	1998	1998	1998	1998	1998	1998	1998	1998
L	[mm]	1000	1010	1750	1750	1750	1760	2500	2500	2510
D	[mm]	795	795	795	795	795	795	795	795	795
Weight	[kg]	310	350	370	410	430	475	490	510	530

* 400V/3Ph+N/50Hz with Humidifier or Electrical heater option

** At 1,5 meters height, 2 meters frontal distance in free field – downflow units (20 Pa AESP)

(1) : Scroll
 (2) : Hydrophilic
 (3) : Centrifugal
 (4) : Aluminium

Tab.12 - CW Unit (Maximum Airflow)

DHCDR DHCUR		0300	0380	0400	0500	0650	0750	0900	1000	1200
Unit power supply		400/3ph/50Hz+N								
Total cooling capacity @ 7/12° Water T°	[kW]	37.90	58.0	47.50	61.20	69.80	101.0	94.70	118.60	164.3
Total cooling capacity @ 15°/10° Water T°	[kW]	28.40	37.9	39.50	50.20	60.00	101.0	77.50	91.60	103.8
Air Flow	[m3/h]	10400	10000	18615	18615	18615	18615	28145	28145	28145
Water flow	[l/s]	1.80	2.27	2.40	3.16	4.30	3.97	5.05	6.58	7.85
Finned coil evaporator										
Front Surface	[m2]	1.10	1.05	1.90	1.90	1.90	1.85	2.80	2.80	2.8
Geometry		25 x 21,65								
Rows	[-]	3	6	2	3	4	6	3	4	6
Type of fins	[-]	(2)								
Fin piDHCh	[mm]	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
SHR (air 7/12°C)	[-]	0.82	0.78	0.85	0.84	0.83	0.81	0.85	0.83	0.79
SHR (air 10/15°C)	[-]	1.00	0.94	1.00	0.98	0.94	0.81	0.92	0.85	1
Indoor fan										
Type		(3)								
Power supply	[V-ph-Hz]	400/3/50								
Number of fans		1	1	2	2	2	2	3	3	3
Fans absorbed current	[A]	2,6	2,89	4,4	4,8	5,1	5,8	7,05	7,62	8,52
Fans absorbed power	[W]	1440	1600	2450	2660	1420	3220	3910	4220	4720
AESP with std fan	[Pa]	22	29	30	30	30	30	30	30	30
AESP (maximum speed)	[Pa]	22	29	210	180	150	88	175	150	95
Air Filter										
Filtration		G4	G4	G4	G4	G4	G4	G4	G4	G4
Overall surface	[m2]	1.44	1.44	2.92	2.92	2.92	2.92	4.49	4.49	4.49
Fire resistance class		1	1	1	1	1	1	1	1	1
Electrical heaters										
Total Heating Capacity	[kW]	3.2	3.2	6.4	6.4	6.4	9.6	9.6	9.6	12.8
N° of heaters		2	2	3	3	3	3	4	4	4
Material	[-]	(4)								
Hot Water reheating coil										
Heating capacity @ 45/40° water T	[kW]	14.5	14,7	14.9	25,8	27	29,6	25,8	27	27
Front Surface	[m2]	0.65	0.65	1.05	1.05	1.05	1.05	1.61	1.61	1.61
Water flow	[m3/h]	2.552	2.552	3.250	3.768	4.948	4.948	7.928	8.169	8.169
Water side pressure drop	[kPa]	18	18	40	39	42	42	38	38	38
Water valve pressure drop	[kPa]	12.2	12.2	7.0	13.1	20.0	20.0	15.2	19.3	19.3
Internal volume	[dm3]	1.44	1.44	2.78	2.78	2.78	2.78	4.36	4.36	4.36
Humidifier										
Max theoretical capacity	[kg/h]	19.6	19.6	41.1	35.4	23.6	23.6	54.7	36.4	36.4
Effective capacity	[kg/h]	8	8	8	8	8	8	8	8	8
Absorbed power	[kW]	6	6	6	6	6	6	6	6	6
Sound pressure level										
Power Supply	[dB(A)]	58	64	60	61	61.5	66	63	63.5	65
Power Supply	V/Ph/H	230/1/50								
Frame										
H	[mm]	1998	1998	1998	1998	1998	1998	1998	1998	1998
L	[mm]	1000	1000	1750	1750	1750	1750	2500	2500	2510
D	[mm]	795	795	795	795	795	795	795	795	795
Weight	[kg]	310	350	370	410	430	475	490	510	530

* 400V/3Ph+N/50Hz with Humidifier or Electrical heater option

** At 1,5 meters height, 2 meters frontal distance in free field – downflow units (20 Pa AESP)

(1) : Scroll

(2) : Hydrofilic

(3) : Radial EC

(4) : Aluminium

Tab.13 - Remote Condenser - Standard Execution - SVHN

M O D E L : SVHN		7/7	13/9	13/9	13/9	20/4	20/4	23/2
Model	Mod.	0060	0080	0100	0110	0130	0160	0190
Power supply	V/Ph/Hz	230V / 1Ph / 50Hz						
Air flow	m3/h	2400	3200			4600		7200
Absorbed power	W	180	270			360		540
Absorbed current	A	0,85	1,20			1,70		2,50
Fans	Nr.	1	2			2		3
	Ø	350	330			350		350
Sound pressure level	dB(A)	40	41			43		45
Dimensions	L mm	1294	1057			1294		1853
[vertical air flow]	P mm	600	500			600		600
	H mm	763	600			763		763
Dimensions	L mm	1294	1057			1294		1853
[horizontal air flow]	P mm	363	305			363		363
	H mm	560	460			560		560
Weight	kg	16	25			37		42

L = Length, P = Depth, H = Height

Tab.14 - Remote Condenser - Standard Execution - SHVN

M O D E L : SVHN		38/1	38/1	38/1	38/1	46/5	61V	38/1	46/5
Model	Mod.	0201/0205	0251	0261	0271	0301	0401	0272	0302
Power supply	V/Ph/Hz	230 V / 1 Ph / 50 Hz							
Air flow	m3/h	8400				14400	14900	8400	14400
Absorbed power	W	720				1080	1370	720	1080
Absorbed current	A	3.4				5.1	6.4	3.4	5.1
Fans	Nr.	4				6	2	4	6
	Ø	350				350	500	350	
Sound pressure level	dB(A)	46				48	56	46	48
Dimensions	L mm	1298				1853	2393	1298	1853
[vertical air flow]	P mm	1150				1150	1110	1150	1150
	H mm	863				1230	863	863	863
Dimensions	L mm	1298				1853	2373	1298	1853
[horizontal air flow]	P mm	380				380	705	380	380
	H mm	1130				1130	1040	1130	1130
Weight	kg	64				81	177	64	81

L = Length, P = Depth, H = Height

Tab.15 - Remote Condenser - Standard Execution - SHVN

MO D E L : SVHN		46/5	61V	61V	79V	79V	94V	94V	106V
Model	Mod.	0362	0422	0452	0512	0552	0602	0692	0762
Power supply	V/Ph/Hz	230 V / 1 Ph / 50 Hz							
Air flow	m3/h	14400	14900		23460		22360		31280
Absorbed power	W	1080	1370		2050		2050		2740
Absorbed current	A	5.1	6.4		9.6		9.6		12.8
Fans	Nr.	6	2		3		3		4
	Ø	350			500				
Sound pressure level		48	56		58		58		59
[at 10min free field]	dB(A)								
Dimensions	L mm	1853	2393		3393		3393		4393
[vertical air flow]	P mm	1150	1110		1110		1110		1110
	H mm	863	1230		1230		1230		1230
Dimensions	L mm	1853	2373		3373		3373		4373
[horizontal air flow]	P mm	380	705		705		705		705
	H mm	1130	1040		1040		1040		1040
Weight	kg	81	177		214		239		282

L = Length, P = Depth, H = Height

Tab.16 - Remote Condense - Low Noise Execution - SVHS

MO D E L : SVHS		8/2	18/0	18/0	18/0	20/2	20/2	27/1
Model	Mod.	0060	0080	0100	0110	0130	0160	0190
Power supply	V/Ph/Hz	230V / 1Ph / 50Hz						
Air flow	m3/h	2200			4500		3900	5200
Absorbed power	W	130			210		210	280
Absorbed current	A	0,6			1,0		1,0	1,3
Fans	Nr.	2			3		3	4
	Ø	330			350		350	
Sound pressure level	dB(A)	32			35		35	36
Dimensions	L mm	1057			1853		1853	1298
[vertical air flow]	P mm	500			600		600	1150
	H mm	600			736		736	863
Dimensions	L mm	1057			1853		1853	1298
[horizontal air flow]	P mm	305			363		363	380
	H mm	460			560		560	1130
Weight	kg	21			42		48	64

L = Length, P = Depth, H = Height

Tab.17 - Remote Condenser - Low Noise Execution - SHVS

MODEL : SVHS		36/0	36/0	36/0	36/0	48/1	70V	36/0	48/1	
Model	Mod.	0201/0205	0251	0261	0271	0301	0401	0272	0302	
Power supply	V/Ph/Hz	230 V / 1 Ph / 50 Hz								
Air flow	m3/h	8400				9000	12000	18000	9000	
Absorbed power	W	720				420	560	1125	420	
Absorbed current	A	3.4				0.2	6.5	1	2.0	
Fans	Nr.	4				6	8	3	6	
	Ø	350				350	630	350	350	
Sound pressure level	dB(A)	46				39	46	38	39	
Dimensions	L mm	1853				2408	3393	1853	2408	
[vertical air flow]	P mm	1150				1150	1110	1150	1150	
	H mm	863				1270	863	863	863	
Dimensions	L mm	2408				3373	1853	2408	1298	
[horizontal air flow]	P mm	380				380	705	380	380	
	H mm	1130				1130	1040	1130	1130	
Weight	kg	81				104	226	81	104	

L = Length, P = Depth, H = Height

Tab.18 - Remote Condenser - Low Noise Execution - SHVS

MODEL : SVHS		48/1	70V	70V	87V	87V	97V	97V	111V
Model	Mod.	0362	0422	0452	0512	0552	0602	0692	0762
Power supply	V/Ph/Hz	230 V / 1 Ph / 50 Hz							
Air flow	m3/h	12000	18000		24000		22400		30000
Absorbed power	W	560	1125		1500		1500		1875
Absorbed current	A	2.6	5.1		6.8		6.8		8.5
Fans	Nr.	8	3		4		4		5
	Ø	350	630						
Sound pressure level	dB(A)	39	46		47		47		48
Dimensions	L mm	2408	3393		4393		4393		5393
[vertical air flow]	P mm	1150	1110		1110		1110		1110
	H mm	1270	1270		1270		1270		863
Dimensions	L mm	3373	3373		4373		5373		1298
[horizontal air flow]	P mm	380	705		705		705		705
	H mm	1130	1040		1040		1040		1040
Weight	kg	104	226		298		328		355

L = Length, P = Depth, H = Height

Tab.19 - Remote Condenser - Standard Execution - SHVN

MODEL : SVHN		2x20/4	2x20/4	2x23/2	2x38/1	2x38/1	2x38/1	2x38/1	2x46/5	2x61V	2x61V
Model	Mod.	0272	0302	0362	0422	0452	0512	0552	0602	0692	0762
Power supply	V/Ph/Hz	230 V / 1 Ph / 50 Hz									
Air flow	m3/h	4600		7200		8400			14400	14900	
Absorbed power	W	360		540		720			1080	1370	
Absorbed current	A	1.7		2.5		3.4			5.1	6.4	
Fans	Nr.	2		3		4			6	2	
	Ø	350		350		350			350	500	
Sound pressure level	dB(A)	43		45		46			48	56	
Dimensions	L mm	1298		1853		1298			1853	2393	
[vertical air flow]	P mm	600		600		1150			1150	1110	
	H mm	763		763		863			1230	863	
Dimensions	L mm	1298		1853		1298			1853	2373	
[horizontal air flow]	P mm	380		380		380			380	705	
	H mm	570		570		1130			1130	1040	
Weight	kg	37		42		64			81	177	

L = Length, P = Depth, H = Height

Tab.20 - Remote Condenser - Low Noise Execution - SHVS

MODEL : SVHS		2x20/2	2x20/2	2x27/1	2x36/0	2x36/0	2x36/0	2x36/0	2x48/1	2x70V	2x70V
Model	Mod.	0272	0302	0362	0422	0452	0512	0552	0602	0692	0762
Power supply	V/Ph/Hz	230 V / 1 Ph / 50 Hz									
Air flow	m3/h	3900		6200		8400			9000	12000	
Absorbed power	W	210		280		720			420	560	
Absorbed current	A	1.00		1.32		3.40			2.00	2.60	
Fans	Nr.	3		4		4			6	8	
	Ø	350		350		350			350	350	
Sound pressure level	dB(A)	35		36		38			39	46	
Dimensions	L mm	1853		1298		1853			2408	3393	
[vertical air flow]	P mm	600		1150		1150			1150	1110	
	H mm	763		863		863			1270	863	
Dimensions	L mm	1853		1298		2408			3373	1853	
[horizontal air flow]	P mm	380		380		380			380	705	
	H mm	570		1130		1130			1130	1040	
Weight	kg	48		64		81			104	226	

L = Length, P = Depth, H = Height

Tab.21 - Dry Cooler - Standard Execution - SHLR/N

M O D E L : SHLRN/N		SHLR15M	SHLN24D	SHLN24D	SHLN29L	SHLN30D	SHLN50C	SHLN58D
Model	Mod.	0060	0080	0100	0110	0130	0160	0190
Power supply	V/Ph/Hz	230V / 1Ph / 50Hz						
Air flow	m3/h	2820	6440			7800	12700	12900
Absorbed power	W	136	740			620	1480	1480
Absorbed current	A	0,6	3,3			2,8	6,6	6,6
Fans	Nr.	1	1			1	2	2
	Ø	500	500			630	500	500
Sound pressure level	dB(A)	30	49			45	52	52
Dimensions	L mm	1085	1085			1373	1895	1895
[vertical air flow]	P mm	810	810			1110	810	810
	H mm	1070	1070			1270	1070	1070
Dimensions	L mm	1085	1085			1373	1895	1895
[horizontal air flow]	P mm	470	470			705	470	470
	H mm	830	830			1040	830	830
Weight	kg	56	56			123	94	102

L = Length, P = Depth, H = Height

Tab.22 -Dry Cooler- Standard Execution- SHLN

M O D E L : SHLN		50C	50C	50C	58D	73C	50D	58D
INNOV@ Heat Rejection	kW	26.7	29.1	34.2	39.5	51.7	33.6	40.0
Dry Cooler capacity	kW		38.5		41.5	60.5	38.5	41.5
INNOV@ Models	Mod.	0201/0205	0251	0271	0301	0401	0272	0302
Power supply	V/Ph/Hz	230 V / 1 Ph /						
Air flow	m3/h		13800		14000	20700	13800	14000
Absorbed power	W		1560		1560	2340	1560	1560
Absorbed current	A		3.4		3.4	5.1	3.4	3.4
Fans	Nr.		2		2	3	2	2
	Ø		500		500	500	500	500
Sound pressure level	dB(A)		52		52	53	52	52
Dimensions	L mm		1895		1895	2705	1895	1895
[vertical air flow]	P mm		810		810	810	810	810
	H mm		1070		1070	1070	1070	1070
Dimensions	L mm		1895		1895	2705	1895	1895
[horizontal air flow]	P mm		470		470	470	470	470
	H mm		830		830	830	830	830
Weight	kg		94		102	132	94	94

L = Length, P = Depth, H = Height

Tab.23 - Dry Cooler- Standard Execution - SHLN

MODEL : SHLN		73C	73C	73C	98D	98D	98D	118F	118F
INNOV@ Heat Rejection	kW	45.2	52.9	55.9	68.3	68.3	77.5	87.4	97.5
Dry Cooler capacity	V/Ph/Hz		60.5			77.0		98.0	
INNOV@ Models	Mod.	0362	0422	0452	0512	0552	0602	0692	0762
Power supply	V/Ph/Hz	230 V / 1 Ph / 50 Hz							
Air flow	m3/h		20700			27600		31200	
Absorbed power	W		2340			3120		2280	
Absorbed current	A		5.10			6.80		4.64	
Fans	Nr.		3			4		4	
	Ø		500			500		650	
Sound pressure level	dB(A)		53			55		50	
Dimensions	L mm		2705			1895		4393	
[vertical air flow]	P mm		810			1625		650	
	H mm		1070			1070		1270	
Dimensions	L mm		2705			1895		4393	
[horizontal air flow]	P mm		470			363		1110	
	H mm		830			1645		2120	
Weight	kg		132			174		328	

L = Length, P = Depth, H = Height

Tab.24- Dry Cooler- Low Noise Execution - SHLR/S

MODEL : SHLR/S		SHLR 15M	SHLS 19M	SHLS 19M	SHLS 38D	SHLS 38D	SHLS 38D	SHLS 59D
Model	Mod.	0060	0080	0100	0110	0130	0160	0190
Power supply	V/Ph/Hz	230V / 1Ph / 50Hz						
Air flow	m3/h	2820	4140	8280	12400			
Absorbed power	W	136	272	544	816			
Absorbed current	A	0.6	1.2	2.4	3.6			
Fans	Nr.	1	1	2	3			
	Ø	500	500	500	500			
Sound pressure level								
[at 10min free field]	dB(A)	30	38	42	42			
Dimensions	L mm							
[vertical air flow]	P mm	1085	1085	1895	2705			
	H mm	810	810	810	810			
Dimensions	L mm	1070	1070	1070	1070			
[horizontal air flow]	P mm	1085	1085	1895	2705			
	H mm	470	470	470	470			
Weight	kg	830	830	830	830			
		56	56	94	132			

L = Length, P = Depth, H = Height

Tab.25 - Dry Cooler- Low Noise Execution - SHLS

MODEL : SHLS		38D	38D	59C	59C	72C	59C	59C
INNOV@ Heat Rejection	kW	26.7	29.1	34.2	39.5	51.7	33.6	40.0
Dry Cooler capacity	kW	30.5	45.5	59.0	45.5			
Model	Mod.							
Power supply	V/Ph/Hz	0201/0205	0251	0271	0301	0401	0272	0302
Air flow	m3/h	8800	13200	16800	13200			
Absorbed power	W	640	960	840	960			
Absorbed current	A	1.8	2.7	2.4	2.7			
Fans	Nr.	2	3	3	3			
	Ø	500		500	630	500		
Sound pressure level	dB(A)							
[at 10min free field]		42	43	42	43			
Dimensions	L mm	1895	2705	3393	2705			
[vertical air flow]	P mm	470	470	705	470			
	H mm	830	830	1270	830			
Dimensions	L mm	1895	2705	3393	2705			
[horizontal air flow]	P mm	810	810	1110	810			
	H mm	1070	1070	1040	1070			
Weight	kg	94	132	251	132			

L = Lenght, P = Depth, H = Heigh

Tab.26 - Dry Cooler- Low Noise Execution - SHLS

MODEL : SHLS		59C	72C	72C	111B	111B	111B	111B	114D
INNOV@ Heat Rejection	kW	45.2	52.9	55.9	68.3	68.3	77.5	87.4	97.5
Dry Cooler capacity	kW	45.5	59.0	87.0	88.0	96.0			
Model	Mod.	0362	0422	0452	0512	0552	0602	0692	0762
Power supply	V/Ph/Hz				230 V / 1				
Air flow	m3/h	13200	16800	30000	26400				
Absorbed power	W	960	840	1400	1920				
Absorbed current	A	2.7	2.4	3.9	5.4				
Fans	Nr.	3	3	5	6				
	Ø	500	630	630	500				
Sound pressure level	dB(A)	43	42	44	38				
Dimensions	L mm	2705	3393	5393	2705				
[vertical air flow]	P mm	470	705	705	470				
	H mm	830	1270	1040	1645				
Dimensions	L mm	2705	3393	5393	2705				
[horizontal air flow]	P mm	810	1110	1110	1625				
	H mm	1070	1040	1270	1070				
Weight	kg	132	251	355	250				

L = Lenght, P = Depth, H = Heigh

Tab.27 - Cooling Capacity

		<i>T amb. (°C)⁽¹⁾</i>				
		20	22	24	26	28
<i>T out. (°C)⁽¹⁾</i>	25	0,97	1,04	1,13	1,19	1,30
	30	0,91	0,98	1,07	1,13	1,23
	35	0,85	0,91	1,00	1,05	1,15
	40	0,79	0,85	0,93	0,98	1,08
	45	0,72	0,78	0,85	0,90	0,99

⁽¹⁾ Relative Humidity 50% R.H.

Tab.30 - Cooling Capacity

		<i>T amb. (°C)⁽¹⁾</i>				
		20	22	24	26	28
<i>T out. (°C)⁽¹⁾</i>	15	0,97	1,04	1,13	1,19	1,30
	0,91	0,98	1,07	1,13	1,23	
	0,85	0,91	1,00	1,05	1,15	
	0,79	0,85	0,93	0,98	1,08	
	0,72	0,78	0,85	0,90	0,99	

⁽¹⁾ Relative Humidity 50% R.H.

Tab.28 - Absorbed Current

		<i>T amb. (°C)⁽¹⁾</i>				
		20	22	24	26	28
<i>T out. (°C)⁽¹⁾</i>	25	0,809	0,804	0,795	0,789	0,774
	30	0,906	0,900	0,891	0,886	0,874
	35	1,015	1,009	1,000	0,997	0,985
	40	1,135	1,132	1,123	1,120	1,111
	45	1,279	1,276	1,270	1,267	1,258

⁽¹⁾ Relative Humidity 50% R.H.

Tab.31 - Absorbed Current

		<i>T amb. (°C)⁽¹⁾</i>				
		20	22	24	26	28
<i>T H2O-in. (°C)</i>	15	1,017	1,010	1,000	0,990	0,976

⁽¹⁾ Relative Humidity 50% R.H.

Tab.29 - Absorbed Power

		<i>T amb. (°C)⁽¹⁾</i>				
		20	22	24	26	28
<i>T out. (°C)⁽¹⁾</i>	25	0,878	0,873	0,795	0,863	0,855
	30	0,939	0,936	0,929	0,926	0,919
	35	1,008	1,005	1,000	0,997	0,990
	40	1,087	1,084	1,079	1,076	1,071
	45	1,179	1,177	1,174	1,171	1,166

⁽¹⁾ Relative Humidity 50% R.H.

Tab.32 - Absorbed Power

		<i>T amb. (°C)⁽¹⁾</i>				
		20	22	24	26	28
<i>T H2O-in. (°C)</i>	15	1,013	1,007	1,000	0,995	0,986

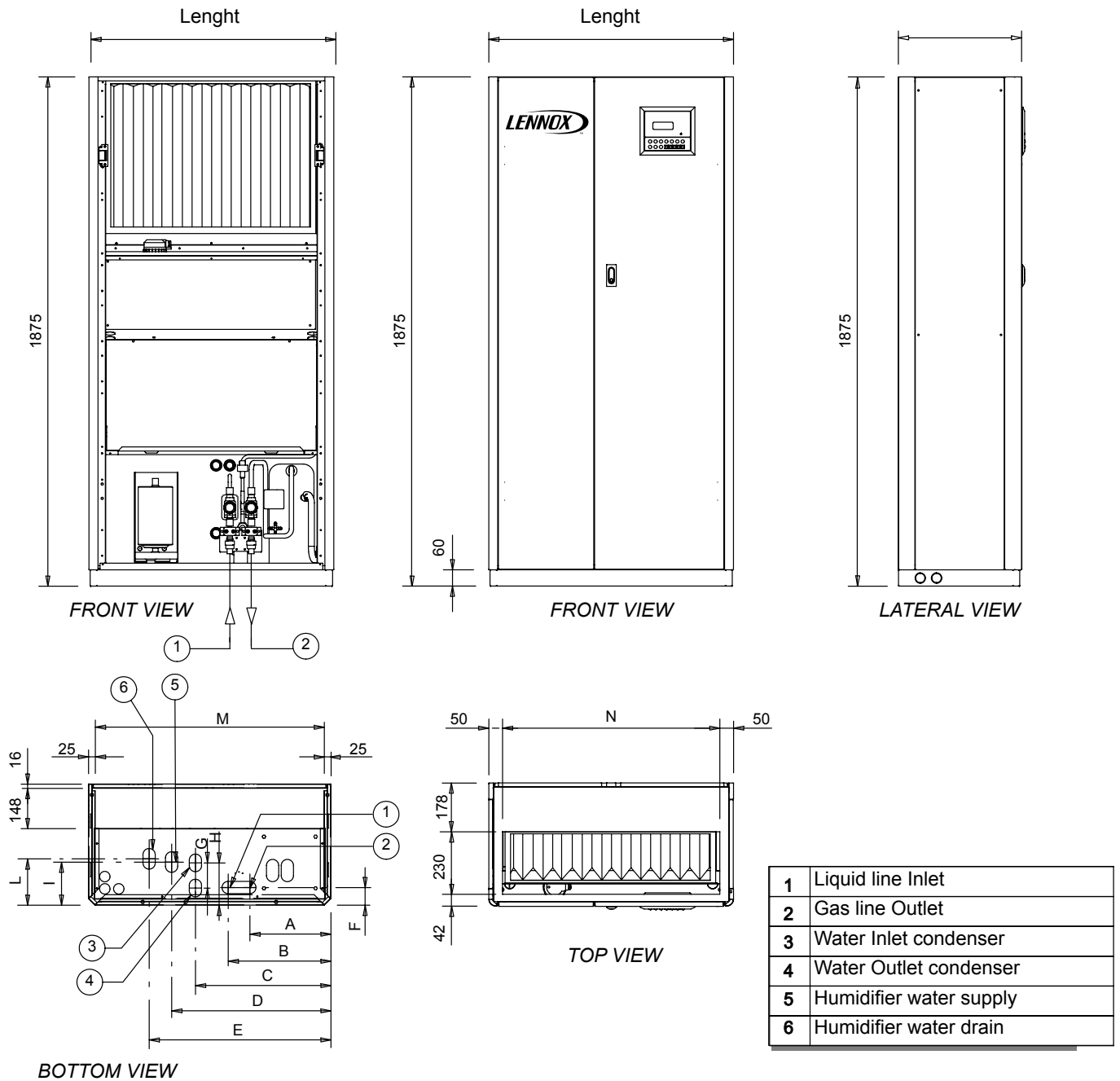
⁽¹⁾ Relative Humidity 50% R.H.

Tab.30 - Absorbed Power

		<i>T amb. (°C)⁽¹⁾</i>					
		20	22	24	26	28	
<i>T H2O-in. (°C)</i>	7	12	0,878	0,873	0,866	0,863	0,855
	8	13	0,939	0,936	0,936	0,926	0,919
		15	1,008	1,005	1,000	0,997	0,990
	10	13	1,087	1,084	1,079	1,076	1,071
		15	1,179	1,177	1,174	1,171	1,166

⁽¹⁾ Relative Humidity 50% R.H.

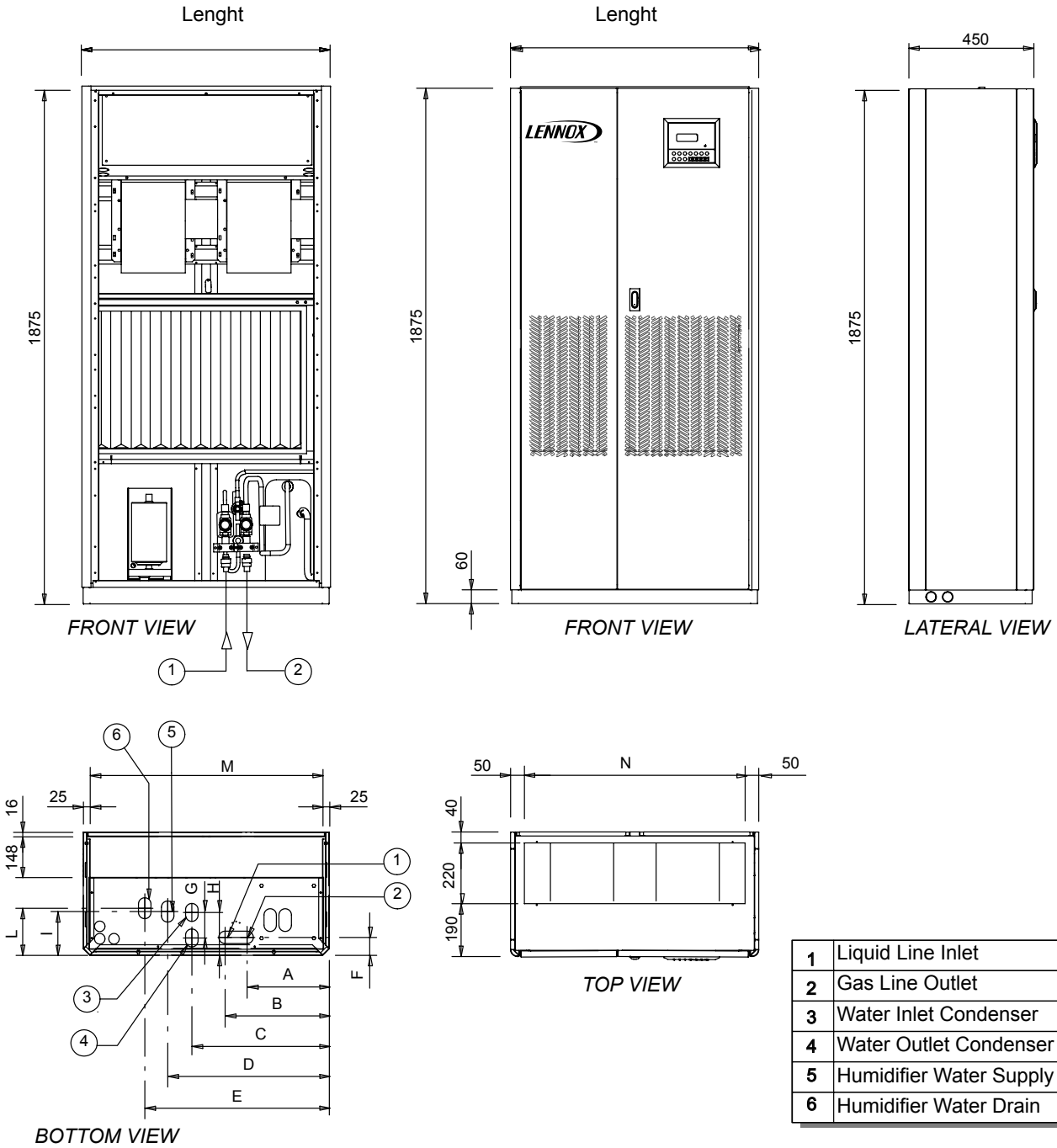
Direct Expansion DX unit : DHADC



DHADC	0060	0080	0100	0110	0130	0160	0190	0205
A	298		298				298	
B	378		378				378	
C	378		500				500	
D	436		586				736	
E	519		670				820	
F	65		65				65	
G	-		63				63	

DHAUC	0060/0080	0100	0110	0130	0160	0190	0205
H	155		155			155	
I	158		158			158	
L	170		170			170	
M	542		842			1142	
N	500		800			1100	
Lenght	600		900			1200	
Frame	1		2			3	

Direct Expansion DX unit : DHAUC

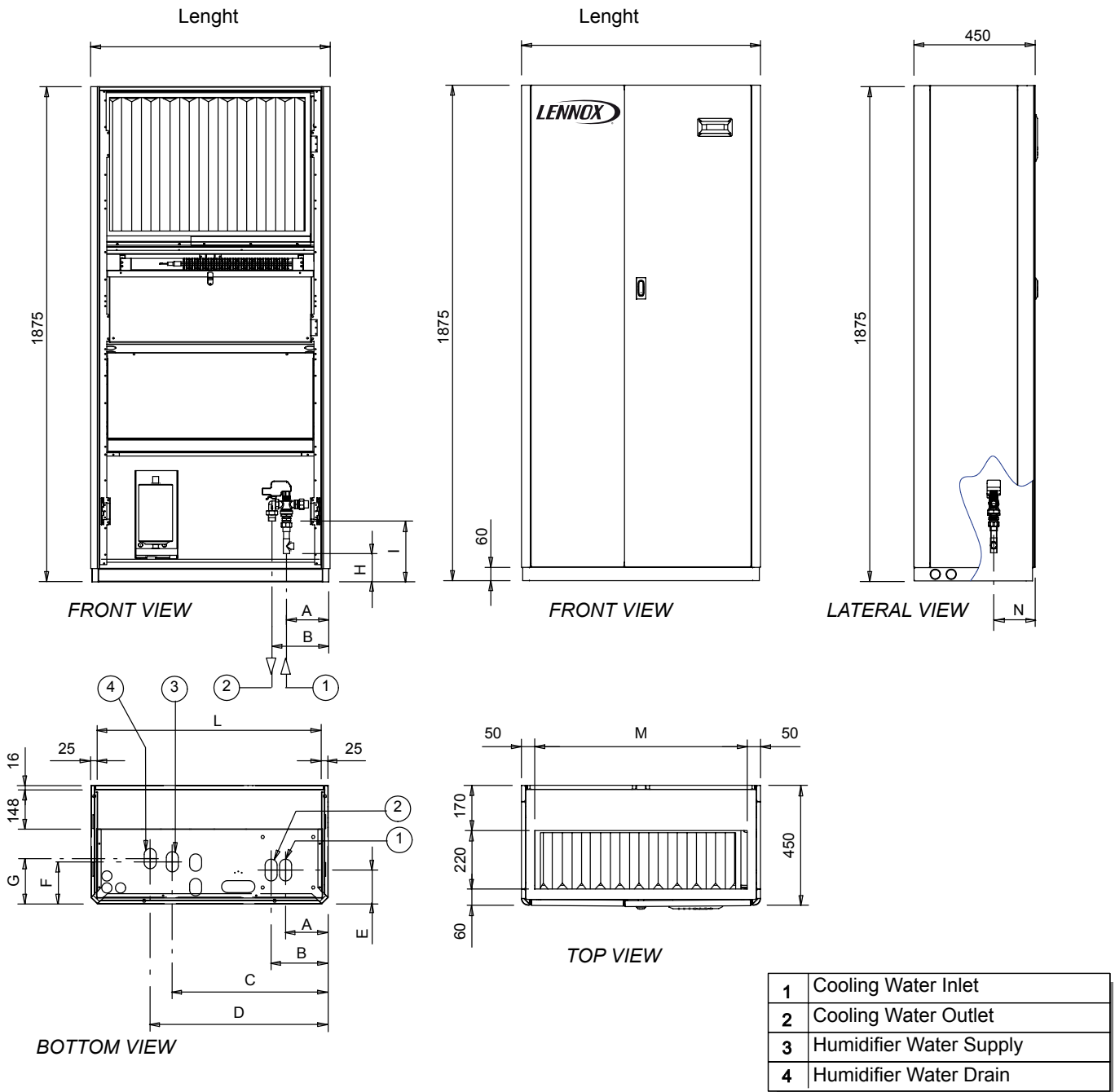


1	Liquid Line Inlet
2	Gas Line Outlet
3	Water Inlet Condenser
4	Water Outlet Condenser
5	Humidifier Water Supply
6	Humidifier Water Drain

DHADC	0060	0080	0100	0110	0130	0160	0190	0205
A	298		298				298	
B	378		378				378	
C	378		500				500	
D	436		586				736	
E	519		670				820	
F	65		65				65	
G	-		63				63	

DHAUC	0060	0080	0100	0110	0130	0160	0190	0205
H	155		155				155	
I	158		158				158	
L	170		170				170	
M	542		842				1142	
N	500		800				1100	
Lenght	600		900				1200	
Frame	1		2				3	

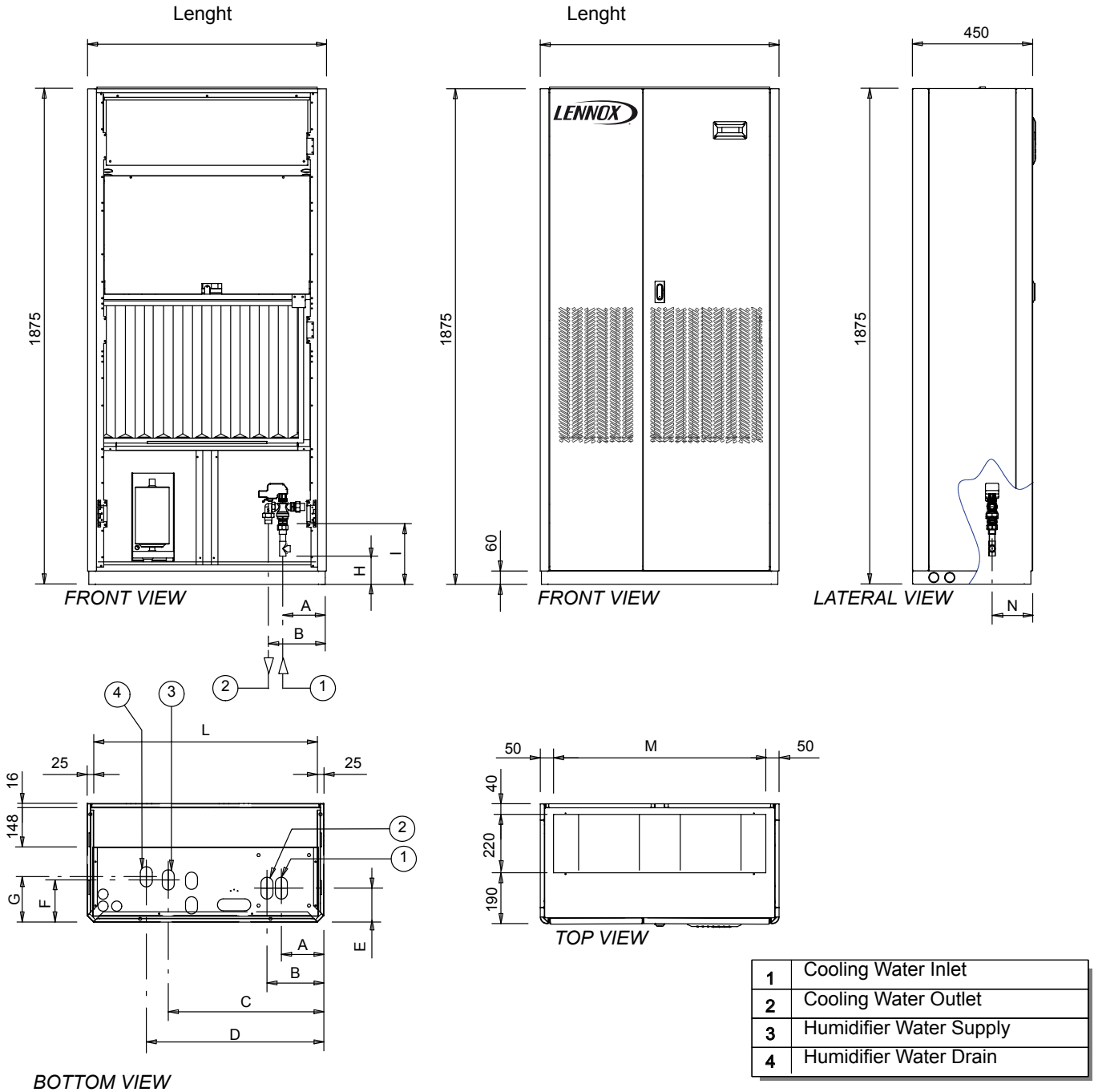
Chilled Water CW unit : DHCDC



DHCDC	0080	0110	0140	0160	0200	0230
A	160	160	160	160		
B	215	215	215	215		
C	436	586	736			
D	520	670	820			
E	130	130	130			
F	160	160	160			
G	170	170	170			

DHCDC	0080	0110	0140	0160	0200	0230
H	105	105	105			
I	230	230	230			
L	542	842	1142			
M	500	800	1100			
N	155	155	155			
Lenght	600	900	1200			
Frame	1	2	3			

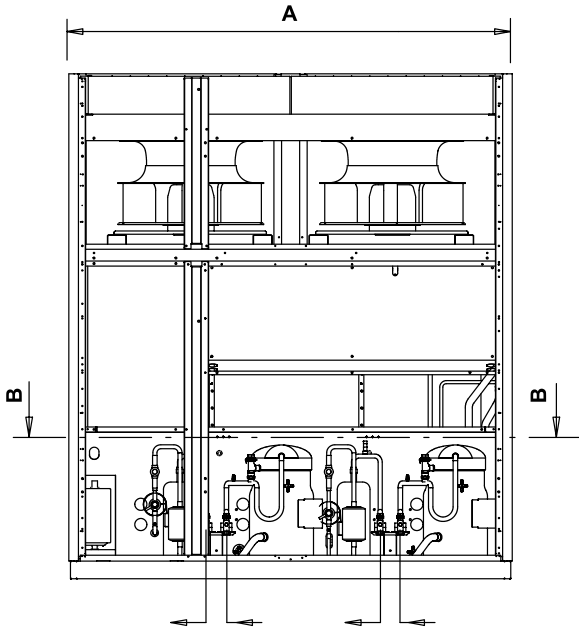
Chilled Water CW unit : DHCUC



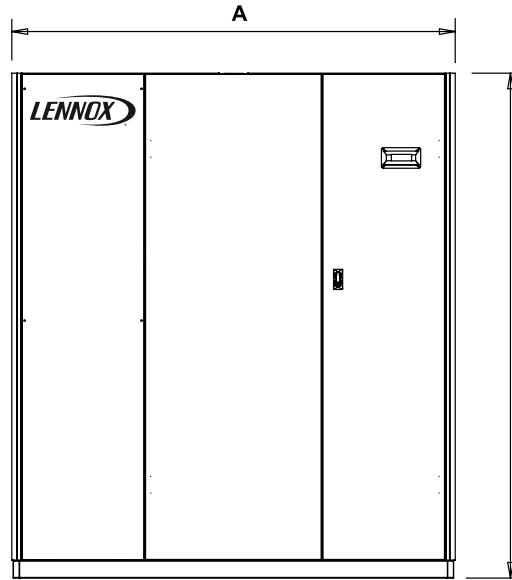
DHCUC	0080	0110	0140	0160	0200	0230
A	160	160	160	160	160	160
B	215	215	215	215	215	215
C	436	586	586	586	736	736
D	520	670	670	670	820	820
E	130	130	130	130	130	130
F	160	160	160	160	160	160
G	170	170	170	170	170	170

DHCUC	0080	0110	0140	0160	0200	0230
H	105	105	105	105	105	105
I	230	230	230	230	230	230
L	542	842	842	842	1142	1142
M	500	800	800	800	1100	1100
N	155	155	155	155	155	155
Lenght	600	900	900	900	1200	1200
Frame	1	2	2	2	3	3

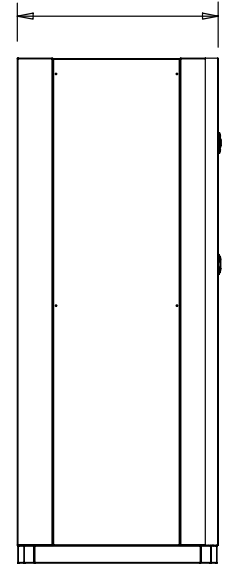
Direct Expansion DX unit : DHADR / DHAUR



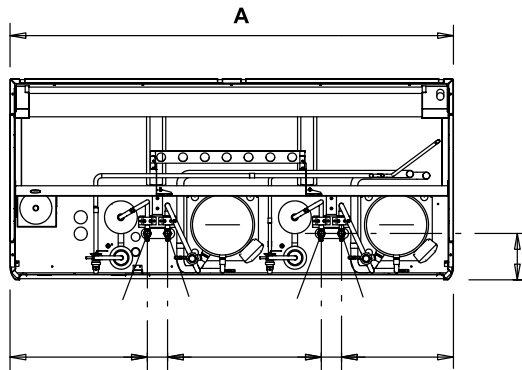
FRONT VIEW



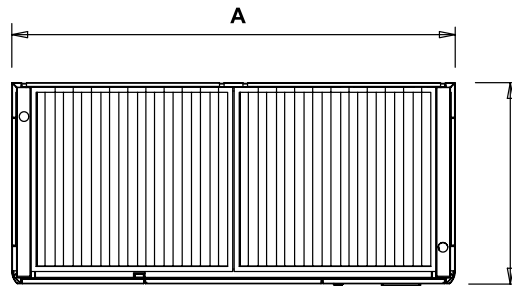
FRONT VIEW



LATERAL VIEW



B-B CROSS VIEW

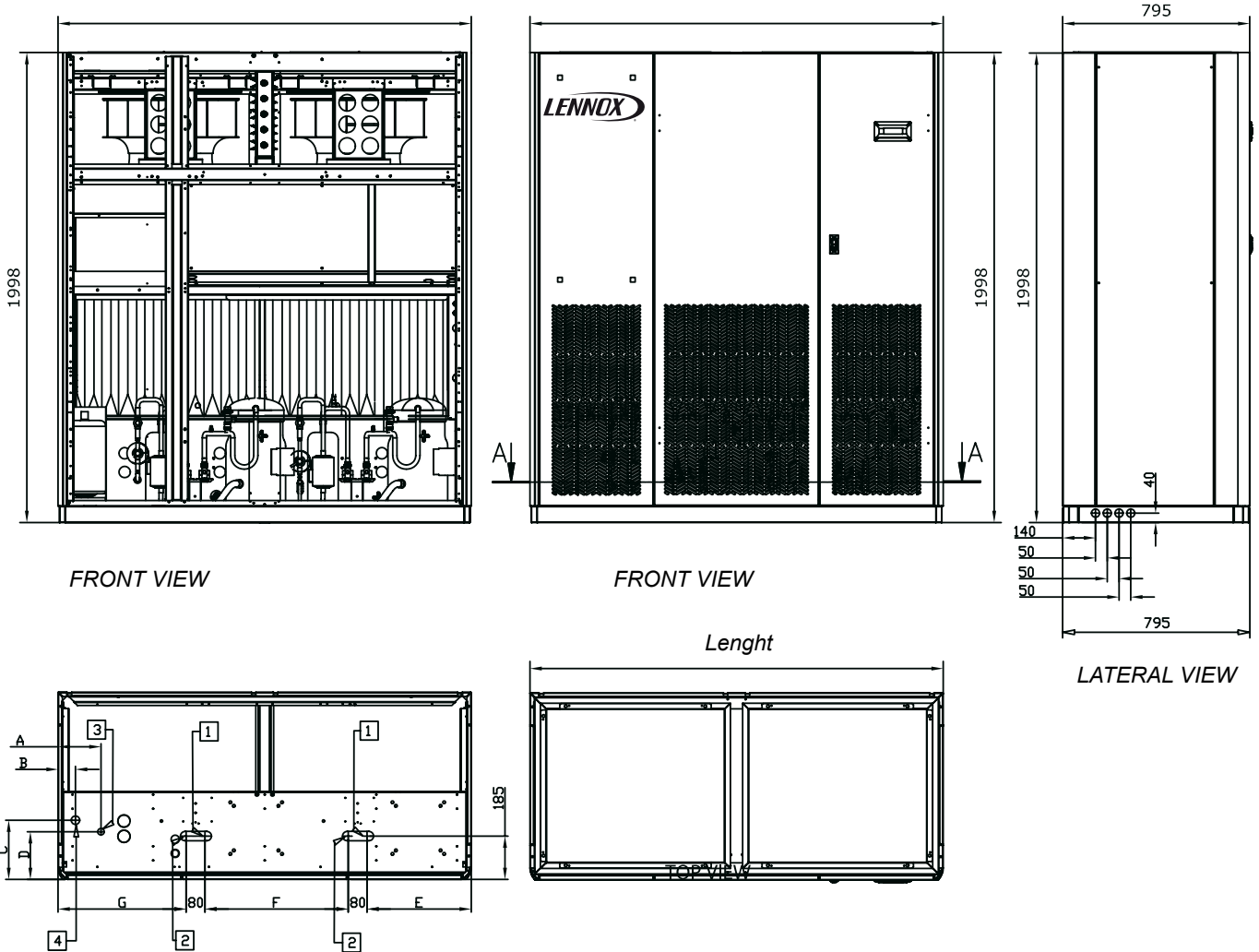


TOP VIEW

1	Cooling Water Inlet
2	Cooling Water Outlet
3	Humidifier Water Supply
4	Humidifier Water Drain

DHADR	0201	0205	0251	0261	0271	0301	0401	0272	0302	0362	0422	0452	0512	0552	0602	0692	0762
A	170						180						193				
B	85						74						85				
C	280						252						252				
D	265						203						203				
E	444						440						624				
F							610						1000				
G							540						726				
Liquid line inlet	1" - Φ 16						1" - Φ 16						1" - Φ 16				
Gaz line outlet	1" 1/4 - Φ 18						1" 1/4 - Φ 18						1" 1/4 - Φ 18				
Frame	1						2						3				
Length	1010						1750						2510				

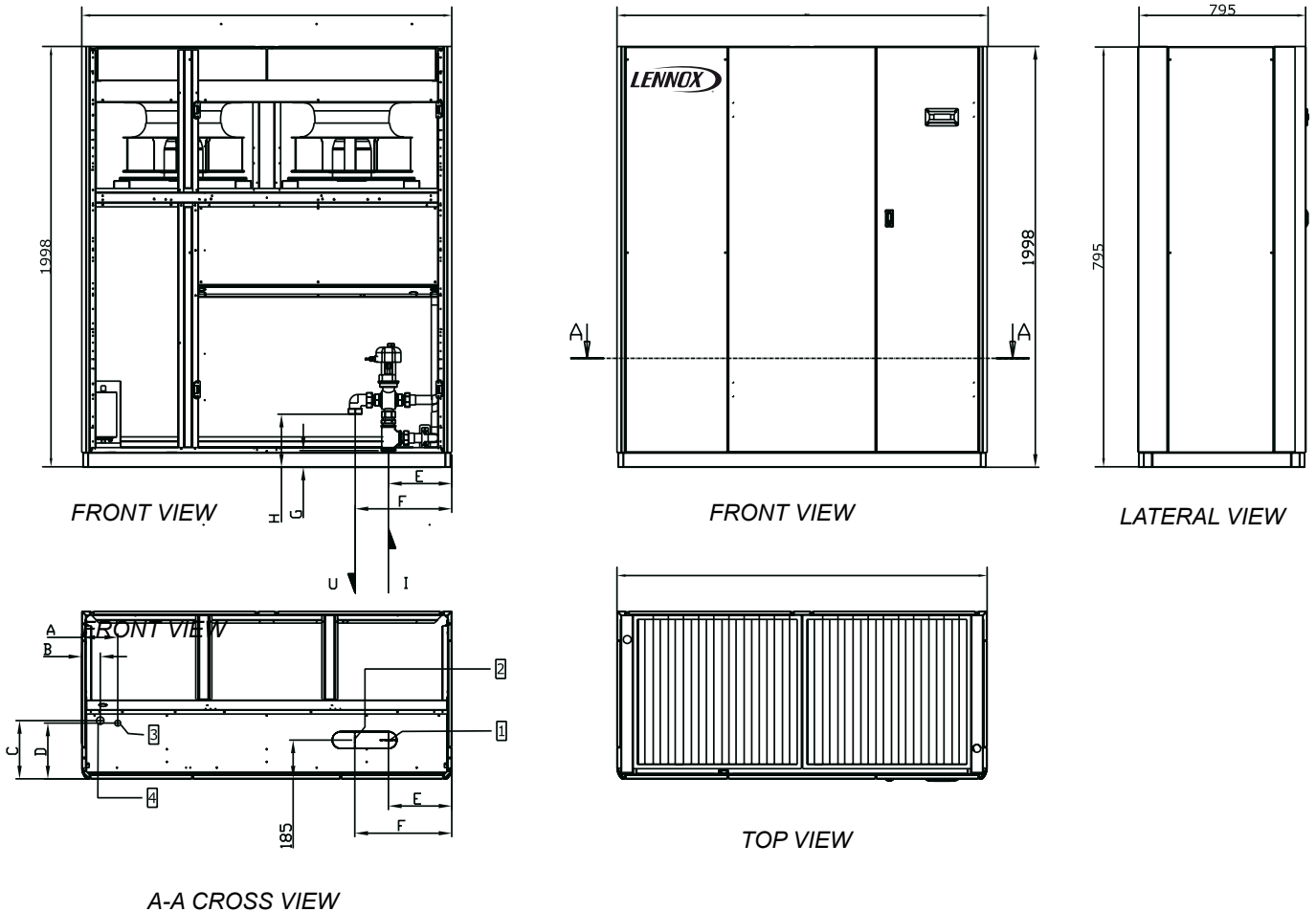
Direct Expansion DX unit : DHAUR



1	Cooling Water Inlet
2	Cooling Water Outlet
3	Humidifier Water Supply
4	Humidifier Water Drain

DHAUR	0201	0205	0251	0261	0271	0301	0401	0272	0302	0362	0422	0452	0512	0552	0602	0692	0762
A		170							182						193		
B		74							74						85		
C		270							251,5						252		
D		250							202,5						203		
E		444							444						624		
F									610						1000		
G									536						726		
Liquid line inlet		1" - Φ 16							1" - Φ 16						1" - Φ 16		
Gaz line outlet		1" 1/4 - Φ 18							1" 1/4 - Φ 18						1" 1/4 - Φ 18		
Frame		1							2						3		
Length		1010							1750						2510		

Direct Expansion DX unit : DHCDR



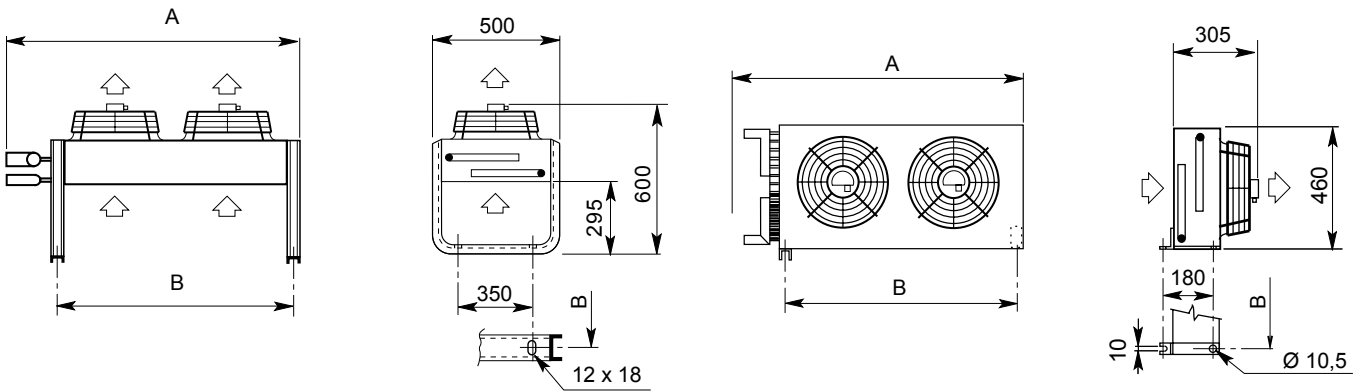
1	Cooling Water Inlet
2	Cooling Water Outlet
3	Humidifier Water Supply
4	Humidifier Water Drain

DHCDR	0300	0400	0500	0650	0900	1000
A	170		180		195	
B	85		75		85	
C	280		250		250	
D	265		200		200	
E	300		300		300	
F	435		470		500	
G	95		90		80	
H	230		255		245	
Liquid line inlet	1" 1/4		1" 1/2		2"	
Gaz line outlet	1" 1/4		1" 1/2		2"	
Frame	1		2		3	
Length	1010		1760		2510	

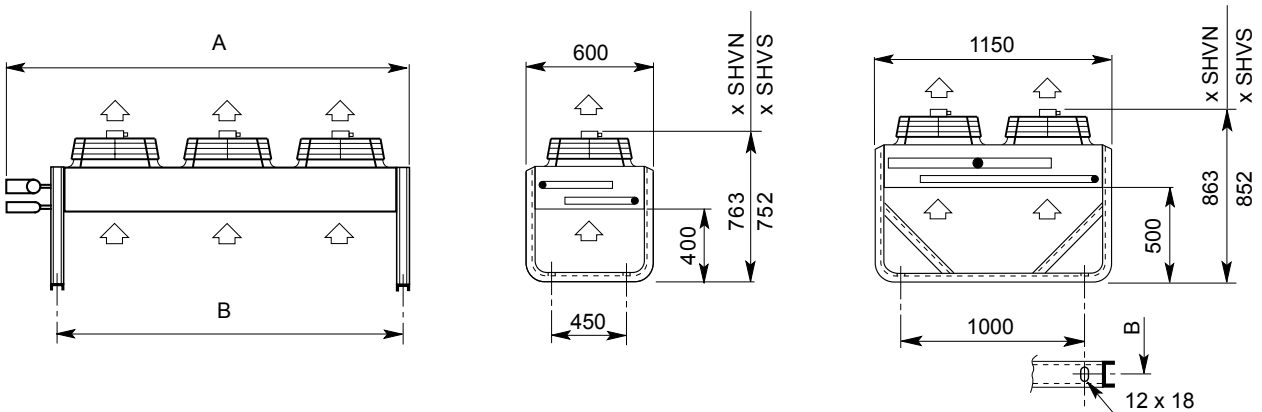
CONDENSER : SHVN / SHVS

HORIZONTAL INSTALLATION		
SHVN 13/9 SHVS 8/2		
Fan	Ø 330 mm	2
(H)	A mm	1057
	B mm	920

HORIZONTAL INSTALLATION		
SHVN 13/9 SHVS 8/2		
Fan	Ø 330 mm	2
(V)	A mm	1057
	B mm	920

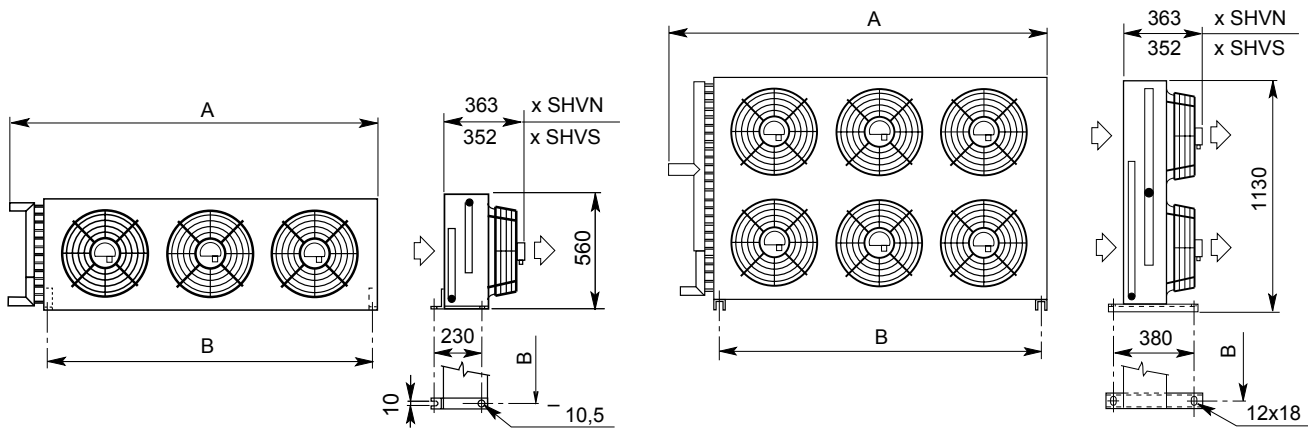


HORIZONTAL INSTALLATION							
		SHVN 23/2 SHVS 18/0			SHVN 46/5 SHVS 36/0		
		SHVN 7/7	SHVS 20/4	SHVS 20/2	SHVN 31/8	SHVS 36/6	SHVS 48/1
Fan	Ø 350 mm	1	2	3	4	6	8
(H)	A mm	723	1294	1853	1298	1853	2408
	B mm	585	1140	1695	1140	1695	2550



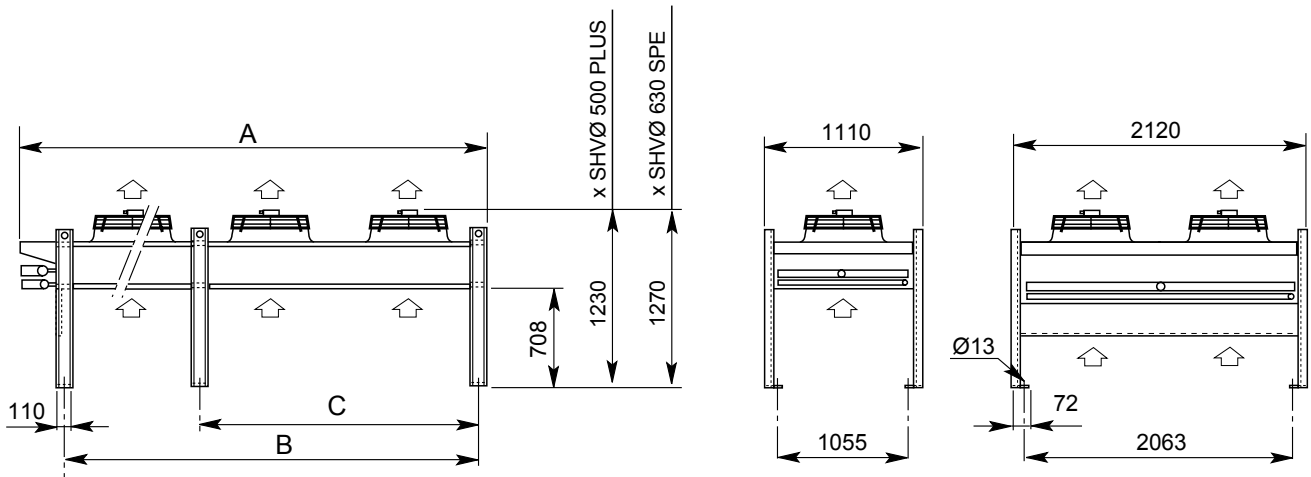
CONDENSER : SHVN / SHVS

HORIZONTAL INSTALLATION				SHVN 23/2	SHVN 46/5		
				SHVS 18/0	SHVS 27/1	SHVS 36/0	
		SHVN 7/7	SHVS 20/4	SHVS 20/2	SHVN 31/8	SHVS 36/6	SHVS 48/1
Fan	Ø 350 mm	1	2	3	4	6	8
(V)	A mm	723	1294	1853	1298	1853	2408
	B mm	585	1140	1695	1140	1695	2550

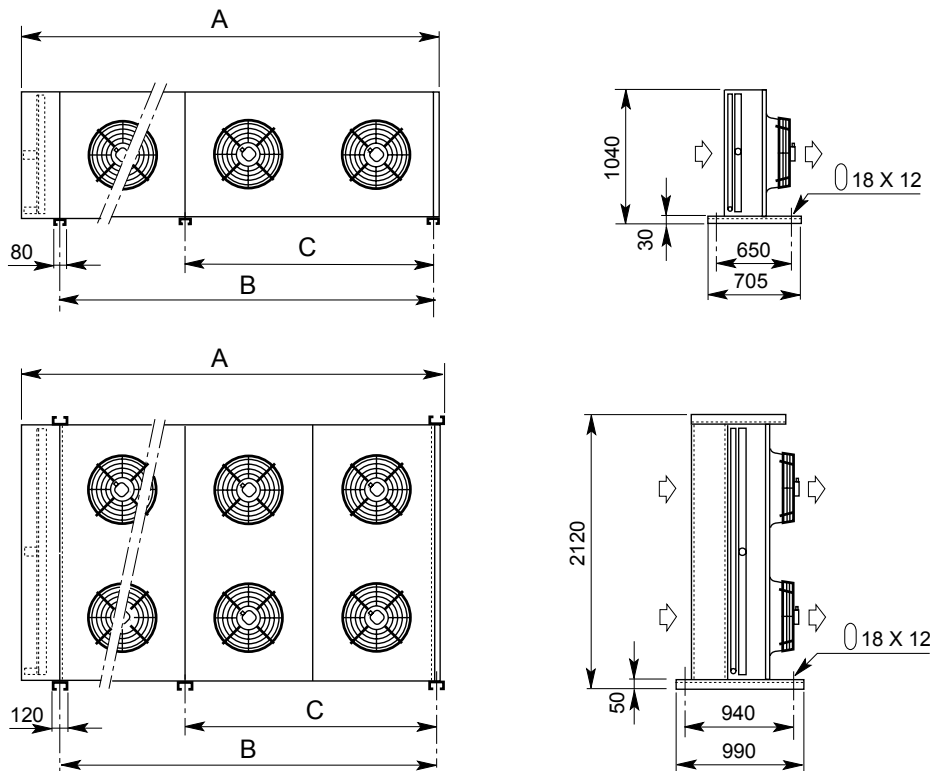


CONDENSER : SHVN / SHVS

HORIZONTAL INSTALLATION		SHVN 61	SVHS 70	SHVS 87-97	SHVS 111
FAN	Ø 500-630 mm		SHVN 79-94	SHVN 106/	
(H)	A mm	2393	3393	4393	5393
	B mm	2000	3000	4000	5000
	B mm	---	---	2000	2000

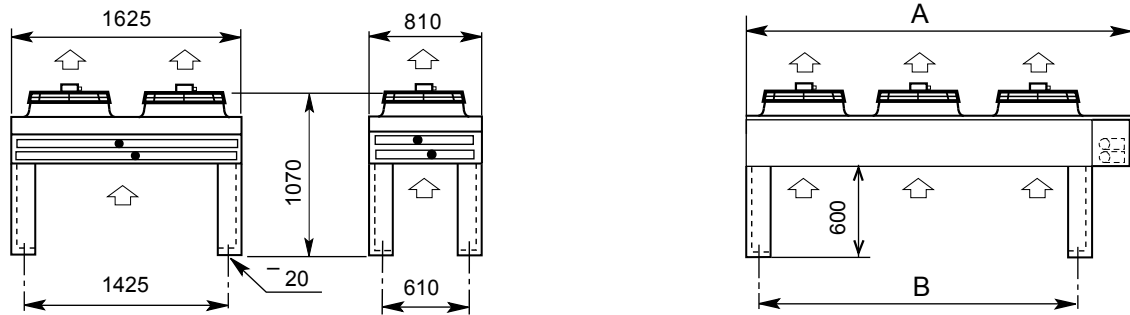


HORIZONTAL INSTALLATION		SHVN 61	SVHS 70	SHVS 87-97	SHVS 111
FAN	Ø 500-630 mm		SHVN 79-94	SHVN 106/	
(V)	A mm	2393	3393	4393	5393
	B mm	2000	3000	4000	5000
	B mm	---	---	2000	2000

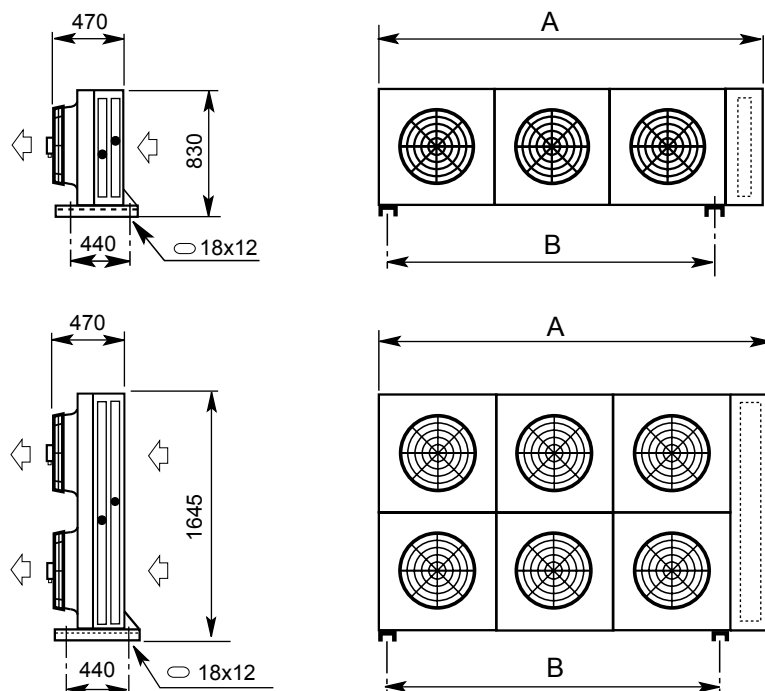


CONDENSER : SHLN / SHLS

HORIZONTAL INSTALLATION		SHLR 15 M				
FAN		SHLN 24D/29M	SHLN 50C/58D	SHLS 59D/SHLN 73C	SHLN 98C	SHLN 147C
	Ø 500 mm	SHLS 19M	SHLS 38D	SHLN 83C/SHLS 59C	SHLN 110D	SHLC 114D
(H)		1	2	3	4	6
	A mm	1085	1895	2705	1895	2705
	B mm	810	1620	2430	1620	2430



HORIZONTAL INSTALLATION		SHLR 15 M				
FAN		SHLN 24D/29M	SHLN 50C/58D	SHLS 59D/SHLN 73C	SHLN 98C	SHLN 147C
	Ø 500 mm	SHLS 19M	SHLS 38D	SHLN 83C/SHLS 59C	SHLN 110D	SHLC 114D
(V)		1	2	3	4	6
	A mm	1085	1895	2705	1895	2705
	B mm	810	1620	2430	1620	2430

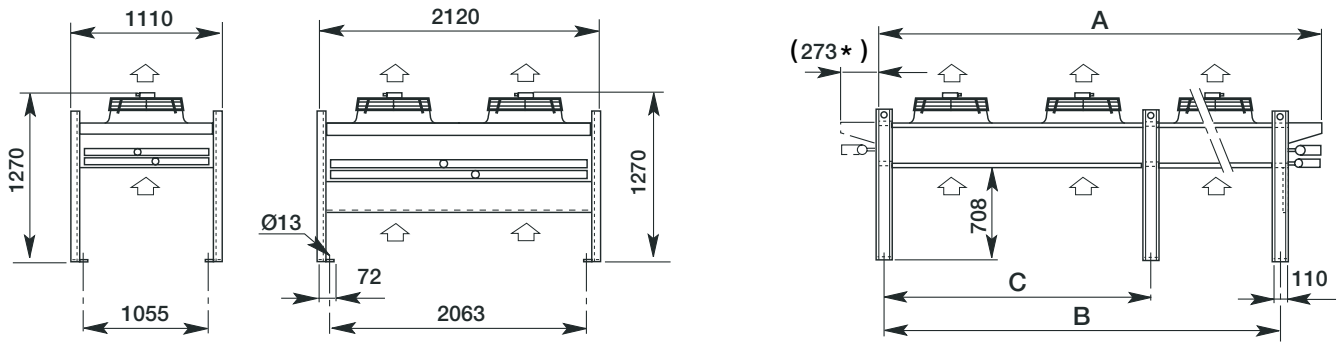


OVERALL DIMENSIONS

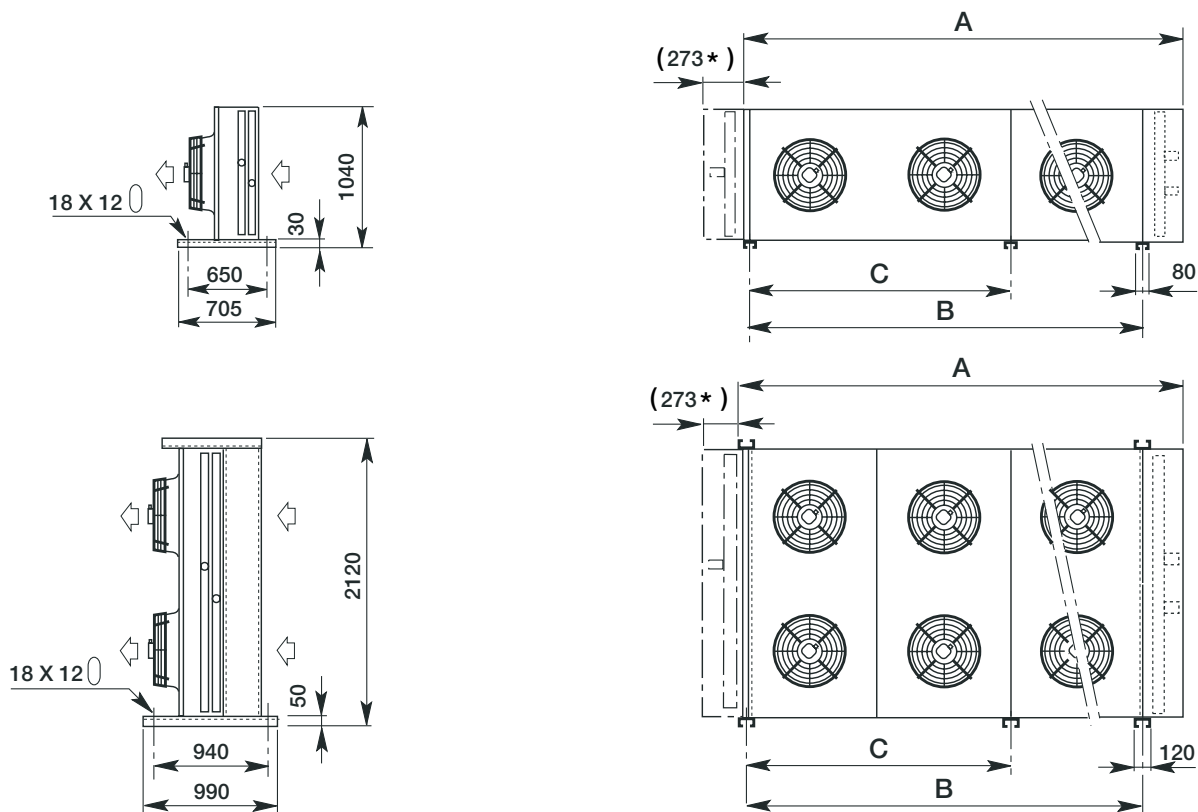


CONDENSER : SHLN / SHLS

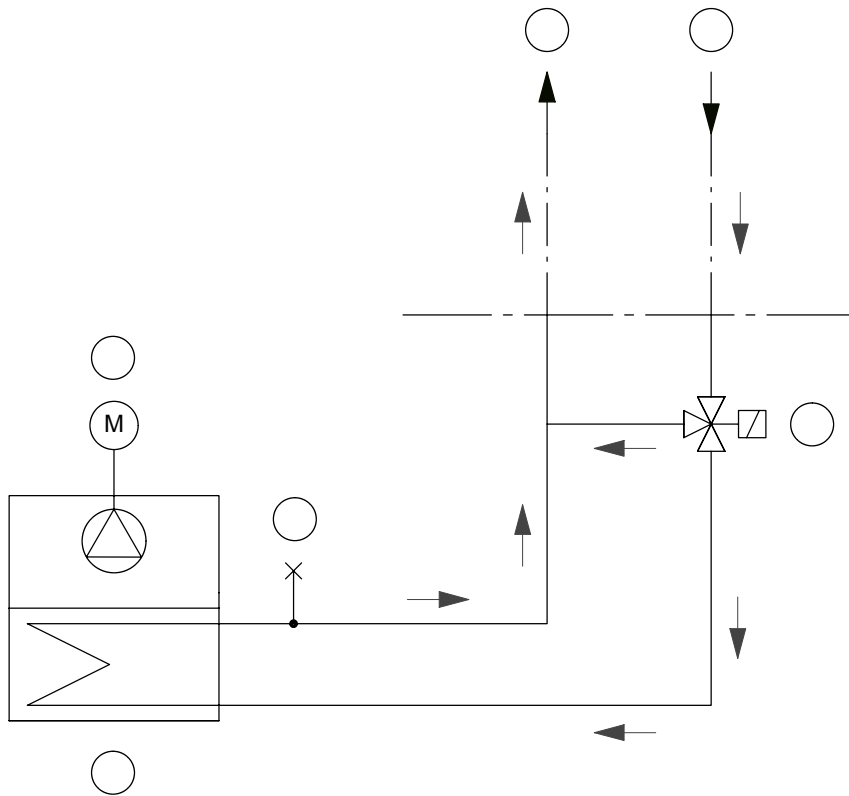
HORIZONTAL INSTALLATION :	SHLN 30D	SHLS 72C	SHLN 118F	SHLS 111B
Ø 630 mm	1 FAN	3 FANS	4 FANS	5 FANS
(H) A mm	1393	3393	4393	5393
B mm	1000	3000	4000	5000
C mm	-	-	2000	2000



HORIZONTAL INSTALLATION :	SHLN 30D	SHLS 72C	SHLN 118F	SHLS 111B
Ø 630 mm	1 FAN	3 FANS	4 FANS	5 FANS
A mm	1393	3393	4373	5373
(V) B mm	1000	3000	4000	5000
C mm	-	-	2000	2000

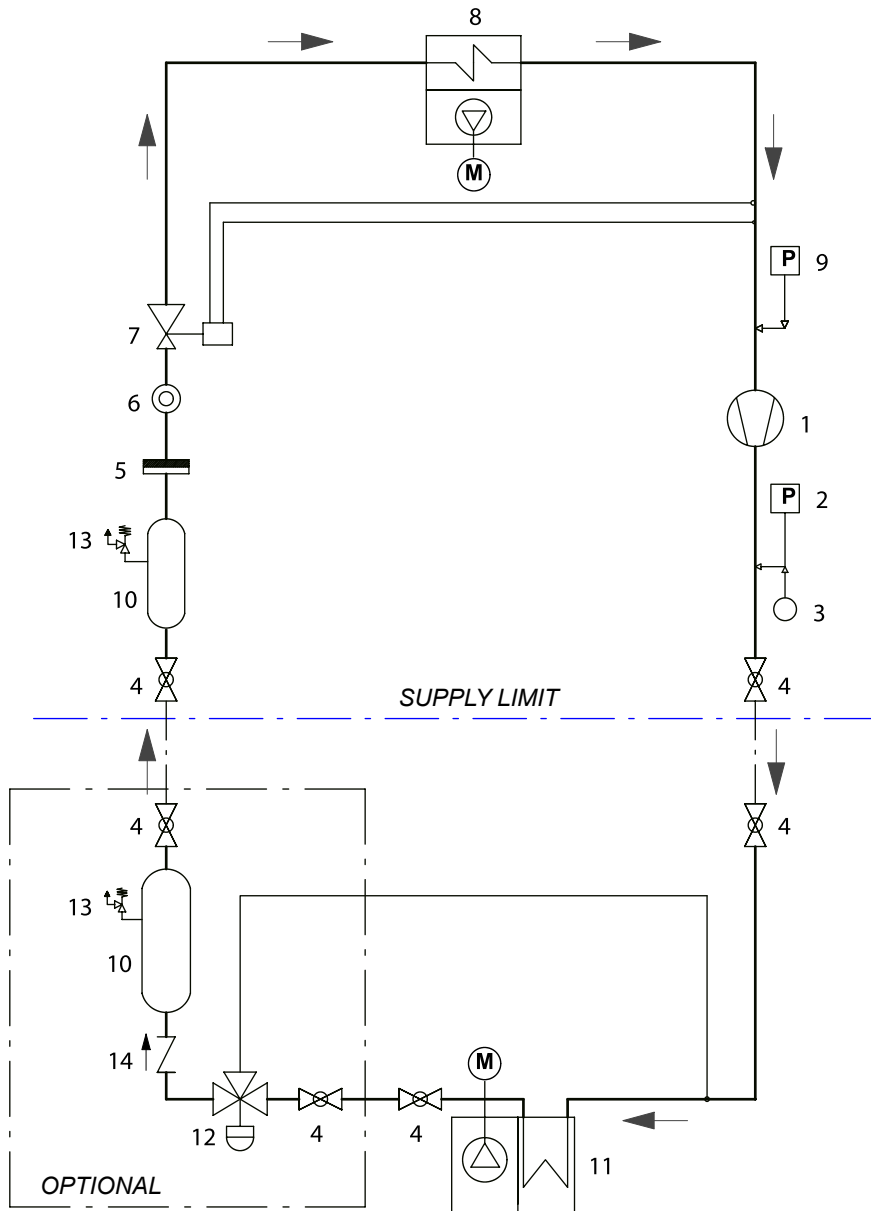


CHILLED WATER UNIT



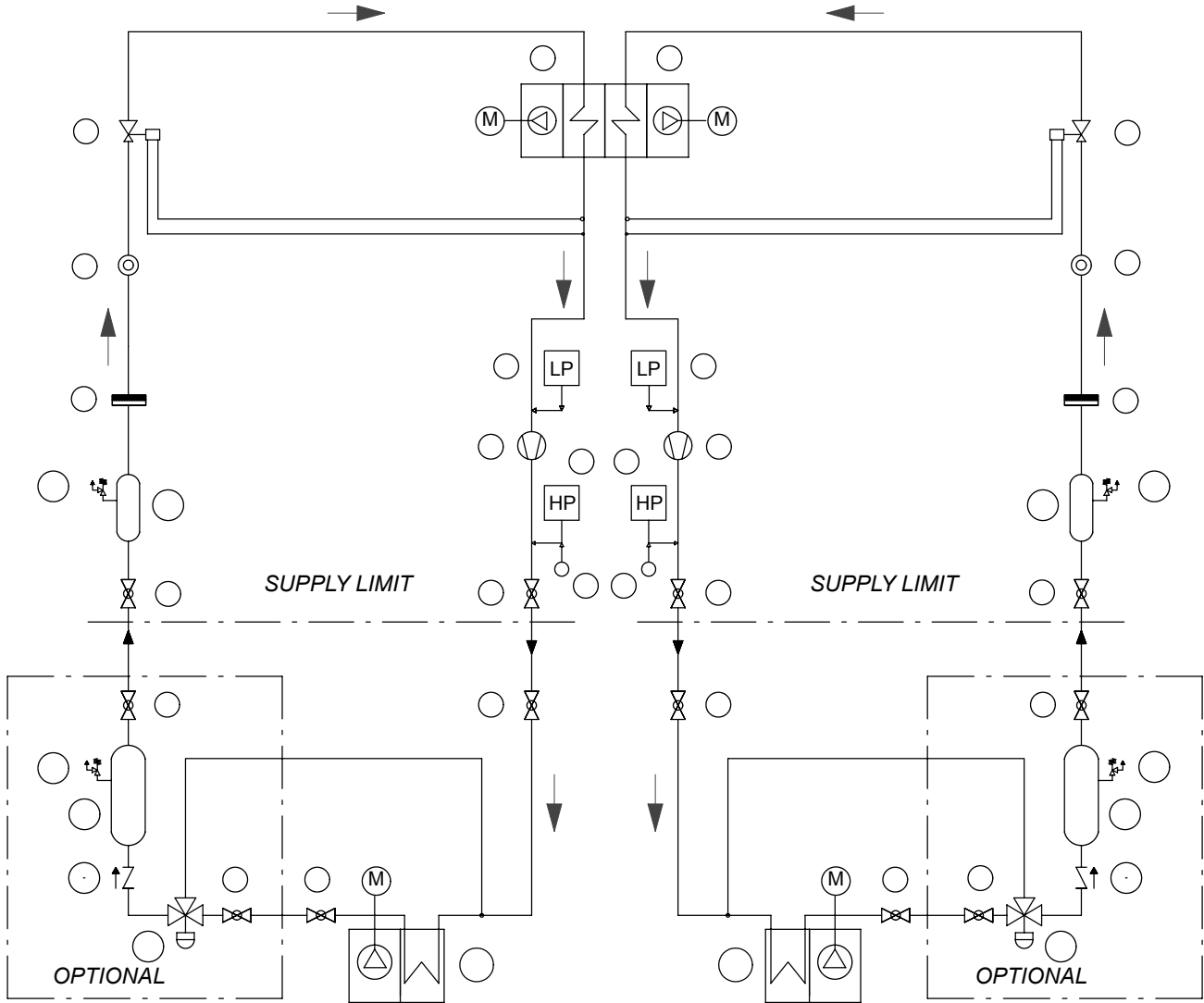
REF	DESCRIPTION
1	Chilled water inlet
2	Chilled water outlet
3	3-way valve
4	Motoventilator
5	Chilled water exchanger

DX UNIT (1 COMPRESSOR)



REF	DESCRIPTION	REF	DESCRIPTION
1	Compressor	8	Evaporator
2	High pressure switch [HP]	9	Low pressure switch [LP]
3	Pressure probe [Opt.]	10	Liquid receiver
4	Ball valve	11	Condenser
5	Filter dryer	12	Flooding valve
6	Sight glass	13	Safety valve
7	Thermostatic valve	14	Check valve

DX UNIT (2COMPRESSOR)



REF	DESCRIPTION	REF	DESCRIPTION
1	Compressor	8	Evaporator
2	High pressure switch [HP]	9	Low pressure switch [LP]
3	Pressure probe [Opt.]	10	Liquid receiver
4	Ball valve	11	Condenser
5	Filter dryer	12	Flooding valve
6	Sight glass	13	Safety valve
7	Thermostatic valve	14	Check valve



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