LENNOX®

APPLICATION GUIDE

PROVIDING GLOBAL SYSTEM SOLUTIONS

EcoLogic

09 - 2002

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Our company is a member of the Eurovent Certification Programme. The ECOLOGIC™ Lennox chillers are tested and rated in accordance with Eurovent certification program.

Our products comply with the European standards.

The manufacturing ECOLOGIC™ family of chillers answers to ISO 9001 control quality system. A copy of the certificate can be get on request.

Due to LENNOX on going commitment to quality, specifications subject to change without notice and without incurring liability

LENNOX have been providing environnemental solutions since 1895, our range of air cooled Chillers 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.

The new ECOLOGIC™ chiller range from 40 to 360 kW has been engineered and designed to meet the needs of our customers while minimising the Environmental impact.

LENNOX ECOLOGIC™ CHILLERS - ENGINEERED FOR FLEXIBILITY, ENVIRONMENTAL SENSITIVITY AND HIGH PERFORMANCE.

LENNOX ECOLOGIC™ Chillers are engineered for flexibility and with advanced environmental protection technology to accommodate the most demanding of industrial and commercial applications.

To meet your specific design requirements, LENNOX ECOLOGIC™ Chillers are semi-customized so you purchase what you need for your application.

LENNOX engineers have designed the ECOLOGIC™ Chillers to reduce negative impacts on the environment by incorporating green refrigerants, recyclable materials, intelligent control for lower energy consumption, and noise reduction technology.

Our company is a member of the Eurovent Certification Programme. Lennox chillers are Tested & Rated in accordance with Eurovent Certification Programme.

The LENNOX ECOLOGIC™ range utilises the latest technology in heat exchanger and compressor design, controls and materials. This enable LENNOX to offer a unique combination of packages and options meeting the needs of the users while significantly reducing the environmental impact. This is evident in the following characteristics :

- Use of ozone benign refrigerants as standard
- Option to use high efficiency machines
- Recycling of the applied materials
- Ability to reduce energy consumption upto 30% compared to traditional systems
- Minimising the refrigerant charge by using and plate heat exchangers
- Opportunity to reduce noise emission with the Low noise and super low noise versions

Unique design philosophy - Going green right from the drawing board

LENNOX's commitment to environmental responsibility is reflected in the re-engineering of our chillers and the development of the ECOLOGIC™ line.
These chillers maximize opportunities to reduce negative environmental impacts while maintaining exceptional performance :

Efficiency

LENNOX ECOLOGIC™ Chillers are engineered for high energy efficiency to reduce power consumption and thus contribute to lower CO2 generation at power supply sources.

Refrigerant

The LENNOX ECOLOGIC™ mid-range chillers are among the first to be designed specifically for high performance using a green refrigerant.
The LENNOX ECOLOGIC™ utilizes HFC 407C, a zero ozone depleting refrigerant, and requires minimum refrigerant charge.

Reduced leakage

Computer-aided design and pipe-bending technology permits fewer mechanical points in the refrigerant circuit. Refrigerant carrying tubes never touch any metal end or center supports. This innovative condenser coil design significantly reduces refrigerant leakage caused by end plate chafing and reduces costs of refrigerant replacement, emergency service calls and unit downtime.

Intelligent control technology

The LENNOX ECOLOGIC™ line of chillers incorporates intelligent control with CLIMATIC control system.
- providing up to 30% savings in energy consumption at partial loads as well as at full load (with Climatic II).

With its predictive control logic, CLIMATIC™ II reduces compressor cycle times, reducing operating costs as well as noise pollution.

Acoustic treatment

Noise from vibration and machinery movement is aggressively addressed by the LENNOX ECOLOGIC™ line of chillers. Rotary compressors in most models minimize vibrational noise transmission.
Advanced aerodynamic fan design insures quieter operation. Noise abatement can be further enhanced with LENNOX's economic noise reduction option.

Recyclable components

The ECOLOGIC™ Chiller is constructed from recyclable materials including sheet steel, plastics and copper.
At the end of the unit's useful life (mini 10 years), the components can be recycled and the refrigerant recovered.

The LENNOX ECOLOGIC™ range is available as a chiller or condensing unit.
All with a low profile and small installed footprint.

Standard	to provide LENNOX quality and value on a standard unit with the flexability of multiple options.
Standard plus	for the same flexibility and value as the standard range but for operation at higher ambient.
Low noise	for those installations where acoustic requirements and value are paramount.
High efficiency	a range that is the bench mark for lowest operating costs.
Super low noise	when the chiller installation must have virtually no audible sound output.

Factory Testing

Factory testing of all the EcoLogic range means trouble free start ups.
Each individual refrigerant circuit is pressure tested, evacuated and vacuum tested before being charged with refrigerant and oil.
The system is then subject to a complete functional test via the Climatic controller that is self diagnostic on all its external sensors. The unit is then placed on the test stand and given a full operational run test to ensure that the unit is fully functional and operating correctly before leaving the factory. This detailed testing insures that the Climatic has the standard operating parameters, communication and control sequence are installed. All the electrical wiring and connections are checked, condenser fans and compressors are operated and checked. The refrigeration system operation is checked for the correct refrigerant charge, setting of the expansion valves and the operation of the safety and protection devices are fully functional. Each and every EcoLogic unit spends a minimum of two hours in the test stand. All options that are factory fitted are tested to insure that they operate correctly and any customer external connections such as flow switch or remote on/off are simulated. After testing and recording the operation the unit is then given a final refrigerant leak test before passing for cleaning and finishing. All the external components are given a final coat of a clear epoxy coating to help maintain the appearance and corrosion resistance of the complete chiller (optional).

The new LENNOX ECOLOGIC™ chiller range is made up of chillers packaged to meet the different market needs. Flexibility, performance and quality From LENNOX.

All the chillers are built with high quality construction and are fully tested in our test stand before packing and shipping. This assures you that when the unit arrives at your project you can simply hook up the power supply and chilled water connections and be ready to operate.
ECOLOGIC™ chillers are built using CE guidlines to minimise refrigerant leakage potential and are part of the Eurovent chiller testing program.
ECOLOGIC™ chillers are available with option packages for TUV & STEK certification.

- The standard unit is a range of chillers that provides cooling at the lowest first cost.
- The Standard Plus is the standard unit with the addition of high performance condenser fans this allows the unit to operate at full load in ambients above 35°C the nominal limit of the unit at full load capacity is 42°C. Apart from the addition of the higher performance fan the unit is identical to the STANDARD unit. The power absorbed will increase and the sound level will be slightly higher. This unit is intended for use in Southern European applications.
- A low noise range that uses the basic platform but is enhanced with features to reduce the external sound level
- Where a customer requires the lowest operating costs then select from the ECOLOGIC™ HIGH Efficiency range of units engineered to provide the highest COP, which in turn gives the lowest operating costs.
- For those applications that demand the lowest sound levels then the ECOLOGIC™ Super low noise chiller range is there to meet your needs. This range of units breaks new ground using the latest technology and materials to give the minimum audible sound emissions.

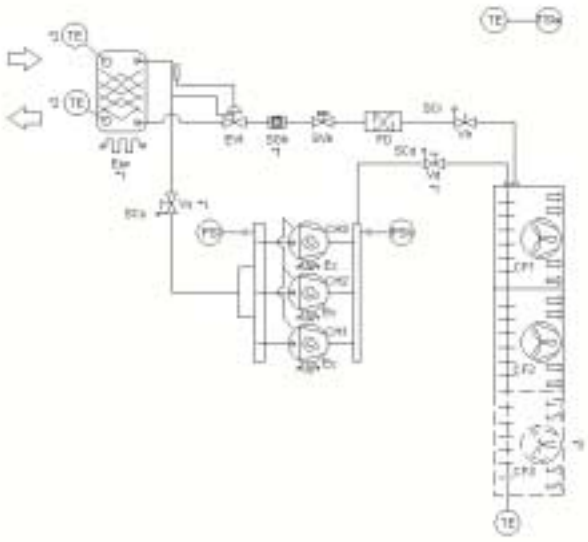
The LENNOX ECOLOGIC™ chiller range features High efficiency fully hermetic scroll compressors through out. This offer the benefits of high-energy efficiency, low noise and vibration partnered with the high reliability levels expected from LENNOX products. The scroll compressors are utilised in multiple refrigerant circuits that further enhances the reliability of this chiller range.
The LENNOX ECOLOGIC™ chiller range uses plate heat exchanger technology to maximise the thermodynamic properties of HFC refrigerants. When used with HFC407C the plate heat exchangers have a better performance than similar shell and tube evaporators and also benefit from the impact of the refrigerant glide.

The use of plate heat exchangers and multiple compressors on dual refrigerant circuits make these chillers excellent performers when operating under part load conditions.

The LENNOX ECOLOGIC™ units feature multiple option packages that can be added to the basic chiller platforms to insure that the chiller matches the users needs.

Ecologic

Ecologic



Single refrigerant circuit of WA range

Multiple control platforms are available from the compact advance microprocessor digital display unit up to the full LCD graphic display and diagnostic package. All the control platforms are able to communicate with each other to form a network or with a BMS system. Controls can communicate both locally or remotely to service centres to insure trouble free operation and the possibility of preventive intervention.

The STD, STD Plus, LN units all come supplied with the standard microprocessor controller.

This gives the information via a digital screen display for the operation, chilled water temperature and alarm conditions. The controller can be scrolled through various menu modes for both reading and to set operating parameters. Full details are in the specification listed at the back of this catalogue.

There is the option for this controller of a remote display screen.

The High Efficiency unit (HE) and SLN comes with the advanced microprocessor controller (Climatic II) that is fitted digital interface (KP02) as standard with a LCD graphic display screen (KP07) as option. This has additional functionality and information reporting of all the operating conditions on the system both pressure and temperature. The full details are in the specification at the back of this catalogue.

This is available as an option on the STD, STD Plus, LN units to replace the standard microprocessor with more sophisticated controller with a full visual display, which is unique to Lennox. At a glance all the operating conditions of the unit can be seen on one screen, which is ideal for operators and service personal.

Additional options can be applied to the Climatic II advanced microprocessor to have remote control and display upto 1km of cable away from the units. To have a remote sequence panel to control and sequence upto 8 identical chillers. This controller can also fully interface with most major BMS systems via a J bus interface communications card available as a further option.

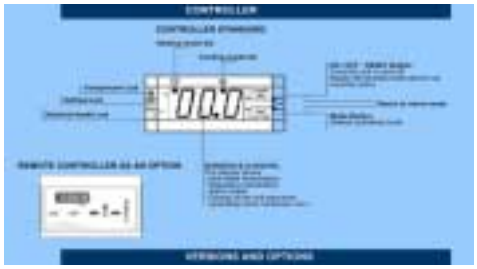
The LENNOX ECOLOGIC™ chillers come with options designed to meet the challenges faced by engineers owners and installers. In installations where electrical power consumption and maximum inrush currents represent a problem. The ECOLOGIC™ range has options such as soft start on the compressors significantly reducing current drawn on start up. Other options can be added to further reduce running costs to the already High COP on the High efficiency units.

Options are available to allow the chiller to operate down to -18°C complete with anti freeze protection on the evaporator and hydraulic module if selected.

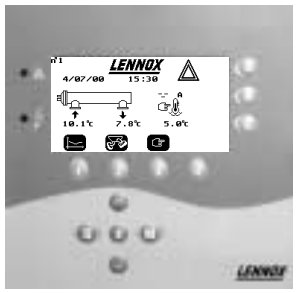
Separate crankcase heater electrical supply is used if there is the requirement to isolate the main electrical supply. The customer brings a two core supply to the unit that allows the unit to be isolated at the mains while keeping the crankcase heaters energized. This allows the unit to be started as soon as the main power is available. It is possible to have the full chilled water hydraulic package consisting of, pumps, expansion vessel, relief valve vent and fill points together with isolation valves integral with in the basic chiller footprint. A buffer tank is integral up to WA150D and available as a stand alone option on the rest of the range.

Bottom Entry for cable connections

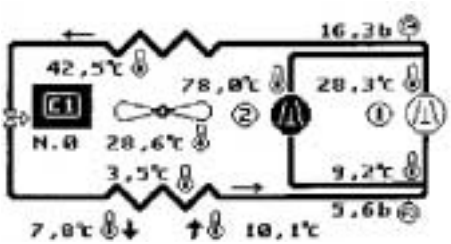
Bottom Entry for cable connections allows the contractor to run the supply cables at ground level and connect into the chiller with out the need to support the cable. It is necessary to correctly support the power and control cables when entering at high level. Low level connection also reduces the weight of cable the power panel has to support. To greater weight could cause the panel to deform.



Climatic Standard Controller

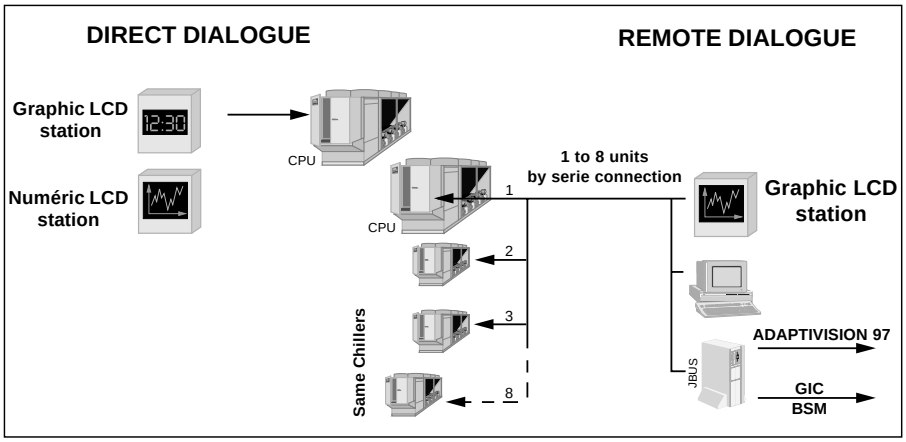


Climatic II KP07



KP07 display

Climatic II



STANDARD

The Ecologic Standard range of Air cooled helical rotary scroll chillers from LENNOX bring to specifiers, owners and operators performance and reliability in a compact package.
The Ecologic standard range consists of 9 units with a capacity from 80 to 370kW. This range of units is intended to offer the lowest cost per kW cooling solution. It will operate up to a nominal ambient limit of 35°C with the basic condenser fan. The Standard unit uses all the basic components of the ECOLOGIC range. Scroll compressors in single or on larger units dual refrigerant circuits. A single plate heat exchanger, Cu/Al air cooled condenser, mechanical thermal expansion valve, solenoid stop valve, brazed refrigerant drier and liquid line isolation and charging valve. The control and power sections are mounted in a single wardrobe weatherproof panel, all the compressor and condenser fan power supplies are individually fitted with thermal overloads. The three phase power and earth connections is via a low level gland plate and connects to a fused thermal overload ensuring complete discrimination. The unit provided with our basic microprocessor controller as the standard. The frame and base are galvanised and the external sheet metal surfaces are fully painted with Epoxy paint to RAL9002. The evaporator includes a drain, and is insulated with 13 mm (1/2 inch) (K-0.26) fire classification M1. This unit is intended to be used in Central and Northern European applications. The Ecologic standard range has a large number of customer configurable options to meet the local legislative requirements and specific customer needs.

STANDARD PLUS

The Standard Plus is the standard unit with the addition of high performance condenser fans this allows the unit to operate at full load in ambients above 35°C the nominal limit of the unit at full load capacity is 42°C. Apart from the addition of the higher performance fan the unit is identical to the STANDARD unit. The sound level will be slightly higher. This unit is intended for use in Southern European applications.

LOW NOISE

The Ecologic Low Noise range of units uses the same range of Quality components that are utilised in the Standard range previously detailed. In addition the Low Noise range uses larger condenser surface with low speed fans to achieve similar capacity range as the Standard units. The already low noise rotary scroll compressors are enclosed in an acoustical jacket, which is constructed of sound attenuating material. This combination significantly reduces the sound power from the chiller. The utilisation of low speed rotary scroll compressors and the management of the oil system within the compressor combined with the acoustic compressor treatment results in an extremely low emitted sound level radiated from the chiller. The Ecologic Low Noise range is supplied with both low speed fans and the compressor acoustic enclosure as the standard.The addition of additional condenser surface area means there is no compromise in performance when selecting an Ecologic Low Noise chiller. These units are built and factory tested to the same demanding quality standards that the Lennox brand is renown for. This range has 9 units and capacity range 90 to 370kW. This version is positioned to give an alternative to the Super Low Noise units. It has a lower sound level than the Standard and Standard Plus units. It is intended to be used in applications that are sound sensitive but that do not need the performance of the super low noise version.

Acoustical Jacket

SUPER LOW NOISE

The super low noise version is the leading low noise chiller in Europe of those listed in the 2001 Eurovent directory. It has a range of 13 units with capacities from 40 to 360kW. It has a larger footprint than the Standard and LN versions it is always one size larger to accommodate the larger condenser surface required. The super low noise uses the same compressors and basic unit assembly as the standard unit. It is fitted as standard with the advanced ClimaticII controller with a KP02 user interface. In addition the unit is fitted with low speed low noise condenser fans and the compressors are housed in an acoustic ventilated enclosure. The acoustic housing is constructed of removable galvanised sheet metal sections the outer surface is painted with Epoxy paint to RAL 9002. The inner surfaces have acoustic waffle foam attached to prevent noise breakout and vibration in the panels. Compartment in covered with sound-insulated foam: PAE 28 mm, 3 kg/m2 mass, protection films, fire classification M1. This unit is also fitted with a thermostatic controlled ventilation fan to prevent heat build up in the acoustic housing

HIGH EFFICIENCY

The Ecologic high efficiency range of units is designed to ensure that cooling both at full and part load is provided at the minimum electrical power absorbed. This provides the owner with the lowest operating costs and by reducing power consumption the indirect global warming impact is minimised. The indirect global warming is the generation of CO2 in producing the electrical power to operate the chiller by selecting from Ecologic high efficiency range CO2 production is minimised. The HE range is made up of 13 units capacity from 40 to 380 kW.
When selecting an Ecologic high efficiency unit the additional costs associated with the additional components required can be recovered in the first few years of operation. A Lennox Ecologic unit has a life expectancy in access of 15 years so after the initial capital difference is recovered in the first few years the continued cost savings can be utilised for other purposes.
The Ecologic high efficiency range uses oversized heat exchanger surfaces in both condenser to get the highest efficiencies. The Climatic II controller is supplied with KP02 LED graphic display screen. The unit is fitted with the very latest in Electronic expansion valve technology that is controlled by the Climatic II and uses Lennox unique control algorithms to operate the compressors, condenser fans and expansion valve to provide the best operating efficiency at all operating conditions. The Climatic II controller is looking at 2050 different operating parameters every minute and making adjustments to ensure the efficient and safe operation of the chiller.

The Ecologic uses the same range of components as the Ecologic Standard range of chillers and is also fully factory tested to insure trouble free start up.

CONSTRUCTION

The Lennox Ecologic™ Chiller is designed for outdoor use. Its rugged chassis is constructed of heavy gauge, pre-painted, hot-dipped galvanized steel for superior corrosion resistance and appearance. Removable panels, made of galvanize, permit easy access to all maintenance and service components.

COMPRESSORS

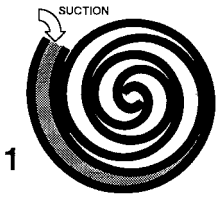
Lennox Ecologic™ Chillers employ a scroll compressor.

SCROLL COMPRESSOR :

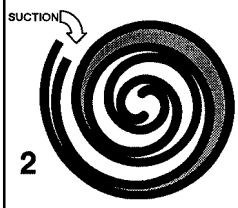
Scroll compressors are comprised of two identical scrolls mated together to form concentric spiral shapes. During compression, one scroll remains stationery while the other orbits around it. The orbiting scroll draws gas into the pocket formed by the two scrolls. As the orbiting continues, the gas is forced toward the center of the scroll and the gas pockets become compressed. When the compressed gas reaches the center, it is discharged vertically into a chamber and discharge port in the top of the compressor.

During a single orbit, several pockets of gas are compressed simultaneously providing smooth, continuous compression. Precisely designed, manufactured and balanced scrolls ensure high efficiency, no wasted motion and long term optimal performance. Scroll compressors are simple, efficient, durable and quiet.

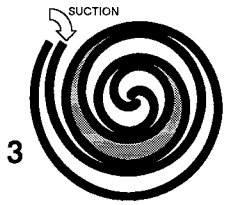
SCROLL GAS FLOW



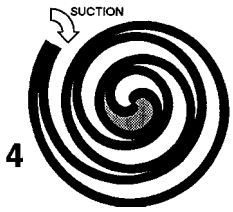
Compression in the scroo is created by the interaction of an orbiting scroll ans a stationary scroll.
Gas enters ans outer opening as one of the scrolls orbits.



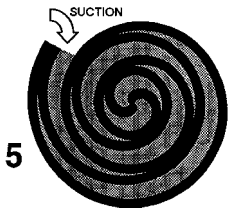
The open pasage is sealed off as gas in drawn into the scroll.



As the scroll continues to orbit, the gas is compressed into an increasingly smaller pocket.



By the time the gas arrives at the center port, discharge pressure has been reached.



Actually, during operation, all six gas passages are in various stages of compression at all times, resulting in nearly continuous suction and discharge.

R22

The units are supplied with HCFC22 as the refrigerant. This is only available as an option outside of the EEC.

When specified with R22 the unit is supplied with operational set points and components that are suitable for operation with the refrigerant.

Sight Glass

A sight glass is provided for determining refrigerant condition if on the liquid line, one sight glass per circuit is provided.

Sight Glass

Low Ambient kit (all seasons)

Allows start-up and operating of the unit up to outside temperature down to -15°C (recommended for outside temperatures below +6°C).

Units equipped with basic Climatic control (Std, Std Plus & LN)

The unit is generally equipped with a low pressure switch and an antifreeze thermostat. The thermostatic expansion valve is by-passed by a solenoid valve on start-up.

Also included with this option is the compressor oil heaters and antifreeze protection heaters.

Units equipped with advanced Climatic II control (HE & SLN)

For units equipped with electronic expansion valves and CLIMATIC II, the standard programme enables the control of the start-up down to -20°C with no additional cost.

Alucoat 507 on condensers (Epoxy coating)

This is a anti corrosion sprayed coating that offers additional protection to the condenser fins for salt laden atmospheres such as seashores and in areas of industrial pollution.

This is not suitable for heavy industrial pollution, strong alkalis, oxidizers, wet bromine and chlorine and fluorine in heavy concentrations.

www.altena.com for additional data.

BlyGold Plus on condensers

This is an anti-corrosion coating that the coils are fully dipped in that offers additional protection to the condenser coil for salt and mild industrial pollution.Two standards are available BlyGold Plus Tropic the traditional gold finish for mild marine, industrial and Middle East applications. For a higher level of protection for heavy industrial and marine applications BlyGold PoluAl a silver finish.

www.blygold.com for additional data.

Replaceable Core filter drier

Installed after the condensers, allows the replacement of the hygroscopic cores without having to remove the body of the core filter.

Replaceable Core filter drier

Compressor Isolation valves

The supply and fitting of manual suction and discharge isolation valves on either side of each circuit to allow service on the compressors with out removal of the full refrigerant charge. This is recommended if it is proposed that LENNOX carry out the service and maintenance work.

Compressor Isolation valves

HP/LP gauge set

Liquid filled gauges that measures the evaporating Low pressure (LP) and condensing high pressure (HP) on each refrigerant circuit. Gauges are "glycerin" filled to damp gas pulsation and are mounted externally.

The gauges are compound gauges that display the saturated refrigerant temperature for the various refrigerants available.

The same information is available on the Climatic II controller. Be careful not to duplicate functions. Display of high and low pressure is available from the Climatic II controller and it is not necessary to add gauges.

HP/LP gauge set

Dual pressure Relief valves UDT

Refrigerant pressure relief valves are fitted on the HP and a single pressure relief valve on LP side of the refrigeration system. This option has twin valves connected on a common HP or LP header with an isolation valve. This allows one valve to be on line at all times while the remaining valve is serviced, replaced or calibrated.

Condenser coil Guards

Removable polyester coated metal guards that protect the entire condenser coil outer surface from light accidental damage during shipping and on site.

Also prevents to direct contact by hand of the condenser coil sharp edges. The condenser coil guard is removable for cleaning of the condenser coil. The condenser coils guard's acts as a deterrent but do not offer total protection.

Condenser coil Guards

NB : This option add 40 mm on the total unit width.

Mains Transformer 400V/230V

Avoids the separated power supply 230V/1/50Hz for the compressor crankcase heaters and the optional antifreeze heater on evaporator. This enables the customer to make just one power connection at the main switch the remaining power to the control circuit and heaters is provided by the transformer. The mains transformer comes fully wired and tested. This option can reduce customer's installation costs and does not require a customer to use a neutral cable.

Connection for External Trace heating

This option allows for a customer to make a connection in the LENNOX panel for external trace heating for pipe work etc. This would be activated by the antifreeze protection thermostat mounted on the Lennox unit. This is only possible if Antifreeze option is selected for the chiller.

Power and control panel to IP55

Standard control panel rating is IP43 which is suitable for external operation. In some countries the standard panel rating for external operation is to IP55. The IP55 rating ensures that the panel is waterproof when a water jet is directed directly onto the panel. The panel also has a higher mechanical strength for impact resistance.

The panel is supplied with Hinged doors, multipoint door latching and door seals. The wire connections are all have gland seals to maintain the IP55 sealing rating.

NB :This option adds length.

Main ON/OFF switch (Door interlocked)

Main ON/OFF switch

It allows the general cut-off and isolation of the main 3-phase power supply, when the machine is running or stopped. The main isolator also acts as a thermal overload device to protect from excess current draw. If the mains transformer is fitted this switch will also cut power from the control and anti freeze Heaters. CAUTION If the mains switch is in the off position and a separate power supply is NOT provided to the anti freeze heaters Freezing can occur.

The mains switch is supplied with covers on the connections

The mains switch is used to isolated power from the unit for safe working on the electrical system.

Flow switch

Paddle Flow switch

According to the unit type, 2 different flow switch types of switch are available: - differential flow switch or a paddle flow switch.

In the case when a differential flow switch has been selected and the option "antifreeze heater" is selected the lines to the flow switch are protected from freezing.

This switch comes piped and fitted on the evaporator and is tested by the factory.

The paddle switch is supplied loose for fitting in the CHILLED water off line by the customer. It is also required that the customer wire the flow switch directly back to the control panel terminals provided.

When a unit is selected with the pump module a paddle flow switch is supplied fitted as standard.

If a chiller is operated with out a flow switch then Freezing of the evaporator will occur if the chiller is operated with no water flow warranty will be voided if no flow switch is present in the chilled water system.

Compressor acoustic enclosure

Compressor acoustic enclosure

A compressor compartment in Aluzinc steel, the internal sides are lined with accoustic sound-insulating foam: PAE 28 mm, 3 kg/m2 mass, protection films, fire classification M1.

The compartment is fitted with lift off doors to allow access to the compressors.

The compartment is fitted with a forced air ventilation fan to control the temperature inside the compressor acoustic cabinet. Standard on SLN, option on High Efficiency only.

TUV/VDE

Units manufacturing according to the TÜV/VDE norm (electrical components, pressure devices, safety valves...). This norm is no longer required as from May 2002 the Pressure Equipment Directive PED required for CE marking this supercedes all EU local pressure certification standards (TUV, ISPESL, SDM, UDT and BS).

Reinforced evaporator insulation

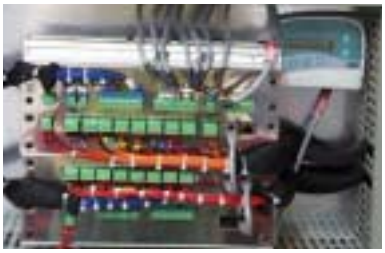
One additional layer of thermal insulation of the evaporator increases the insulation from12.7mm to 26mm closed cell foam that is resistant to water. Classification for fire: M1.

Double water gauges

Double water gauges

Water gauges that measure the pressure on the inlet and outlet of the water circuits. The standard is to have one pressure gauge on the water pressure relief valve.

Climatic II (advanced controller)



Climatic II (advanced controller)

On the Std, Std plus and LN units the standard controller is the basic Climatic.

Option is to have Climatic II advanced controller, which offers additional control and functionality over the basic Climatic controller.

Low ambient start down to -20°C and high pressure unloading are standard features together with high and low refrigerant pressure display on each circuit as standard.

Climatic II is supplied with KP02 removable customer interface.

KP07 Graphic Display

The KP07 Climatic II graphic display replaces the KP02 and gives a full LCD display and keyboard for customer interface. This offers additional functionality and control features that are not on the KP02 (see separate specification sheet).

KP07 Graphic Display

Water Strainer filter

Water Strainer/ filter to be installed upstream to the water inlet, to protect the evaporator from any possible impurities (80 microns efficiency). Recommended for shell and tube and must be fitted for Plate heat exchangers.

Water Strainer filter

Anti-vibration mounts

Elastic supports (Rubber) made of 2 flat and parallel frames, connected together via a rubber ring, fixed under the unit at the points specified by our technical drawings. Reduces the transmission of vibration to the ground and the general sound level. The diameter and strength vary in accordance with the model. Delivered loose not fitted.

Anti-vibration mounts

Service Panels

This option is to provide a full panel enclosure on the Std, Std plus and LN 100E to 150D versions.

The side of the unit which contains the Compressors is fully enclosed from the base to the top of the unit with painted RAL 9002 removable sheet metal panels.

Service Panels

Chilled water connections

The chilled water connections on all units are Victaulic connections each unit is supplied with a Victaulic connector and seal for the chilled water connections as standard.

In the event the customer needs to have a grooved Victaulic pipe stub, which he can weld, screw or fit flanges too. This option provides the two additional pipe stubs sections groove at one end for the Victaulic connector and unfinished at the other end for the customer to make the connection of his choice.

Chilled water connections

Electronic Expansion valves

On the Std, Std plus and LN unit's thermostatic expansion valves are fitted as the standard.

There is the option to fit electronic expansion valve(s) (EEV) with this option the Liquid line solenoid valve is also not required as the EEV acts as a isolation valve.

When selecting the option of electronic expansion valve it is also necessary to select the Climatic II controller.

Electronic Expansion valves

Compressor Soft Starter

This option available on all models is to provide for the lowest starting current on the compressors. The overall starting current is reduced by 25% to 35% depending on the number of compressors and model selected.

STEK

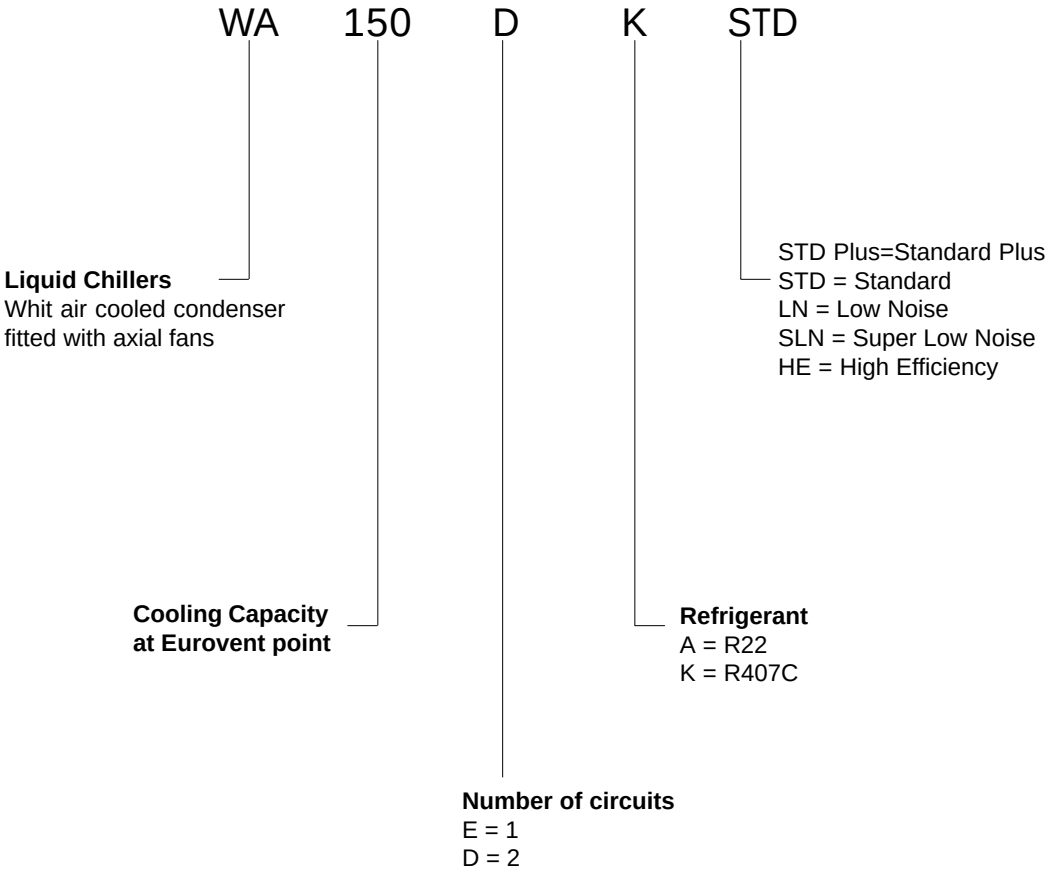
If this option is selected the chiller is built to respect the STEK regulations. The unit is fitted with refrigerant circuit isolation valves one in the main suction and one in discharge line of the main distributor to the compressors and a sight glass is fitted in each refrigerant circuit.

Also included is the required paperwork and certification documentation.

None standard options available

Power factor Correction; Plexy glass in the panel; Emergency stop buttons; 3 phase +neural mains isolator; Phase reversal protection; earth leakage breaker; Architectural louvers; Chilled water pressurization unit; IP65 control panel; High pressure condenser fans; remote power hook up for remote hydraulic module.

For these and other none standard options contact the sales team.


WA 150 D K STD
Liquid Chillers
Whit air cooled condenser
fitted with axial fans
STD Plus=Standard Plus
STD = Standard
LN = Low Noise
SLN = Super Low Noise
HE = High Efficiency
Cooling Capacity
at Eurovent point
Refrigerant
A = R22
K = R407C
Number of circuits
E = 1
D = 2

ALTITUTE CORRECTION FACTOR

ELEVATION -M.	CORRECTION
Sea Level	1.000
305	0.996
610	0.992
915	0.988
1220	0.984
1525	0.980

FOULING FACTORS (M^2-°C/W)

FOULING	CORRECTION
$0.044\ 10^{-3}$	1.00
$0.0132\ 10^{-3}$	0.98

ETHYLENE GLYCOL CORRECTION FACTOR

% BY WEIGHT	FREEZE POINT °C	PRESSURE DROP MULTIPLIER	CAPACITY FACTOR	FLOW CORRECTION FACTOR
10	-4	1.05	0,99	1.02
20	-10	1.10	0,98	1.05
30	-18	1.15	0,97	1.08

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ECOLOGIC Standard unit

Ecologic Standard

The Ecologic Standard range of Air cooled helical rotary scroll chillers from LENNOX bring to specifiers, owners and operators performance and reliability in a compact package. The Ecologic standard range consists of 9 units with a capacity from 90 to 370kW. This range of units is intended to offer the lowest cost per kW cooling solution. It will operate up to a nominal ambient limit of 35°C with the basic condenser fan. The Standard unit uses all the basic components of the ECOLOGIC range. Scroll compressors in single or on larger units dual refrigerant circuits. A single plate heat exchanger, Cu/Al air cooled condenser, mechanical thermal expansion valve, solenoid stop valve, brazed refrigerant drier and liquid line isolation and charging valve. The control and power sections are mounted in a single electrical box with a weatherproof panel. All the compressor and condenser fan power supplies are individually fitted with thermal overloads. The three phases power and earth connections is via a low level gland plate. The unit provided with our basic microprocessor controller as the standard. The frame and base are galvanised and the external sheet metal surfaces are fully painted with Epoxy paint to RAL9002. The evaporator includes a drain, and is insulated with 13 mm (1/2 inch) (K-0.26) fire classification M1. This unit is intended to be used in Central and Northern European applications. The Ecologic standard range has a large number of customer configurable options to meet the local legislative requirements and specific customer needs.

ECOLOGIC Standard unit with service panels option

ECOLOGIC STD	°C Water outlet temp.°C	Air inlet temperature													
		28°C		30°C		32°C		35°C		38°C		40°C		42°C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
100E	6	94,4	36,7	92,7	38	90,9	39,3	88,2	41,4	85,5	43,6	-	-	-	-
	7	97	37,1	95,1	38,4	93,3	39,7	90,6	41,8	87,8	44,1	-	-	-	-
	9	102,1	38	100,2	39,3	98,3	40,6	95,4	42,8	-	-	-	-	-	-
	11	107,4	38,9	105,4	40,2	103,4	41,6	100,3	43,8	-	-	-	-	-	-
	12	112,8	39,8	110,7	41,2	108,6	42,6	-	-	-	-	-	-	-	-
110E	6	105,9	45,2	103,8	46,8	101,7	48,4	98,5	51,1	-	-	-	-	-	-
	7	108,6	45,7	106,5	47,4	104,4	49,1	-	-	-	-	-	-	-	-
	9	114,2	47	112	48,6	109,7	50,4	-	-	-	-	-	-	-	-
	11	119,9	48,3	117,5	50	-	-	-	-	-	-	-	-	-	-
	12	125,7	49,6	123,2	51,4	-	-	-	-	-	-	-	-	-	-
90D	6	92,6	32,4	90,9	33,5	89,2	34,7	86,7	36,4	84,1	38,4	82,4	39,7	80,7	41,1
	7	95,2	32,7	93,4	33,8	91,7	35	89,1	36,8	86,5	38,7	84,7	40,1	82,9	41,5
	9	100,4	33,4	98,6	34,5	96,8	35,7	94	37,5	91,3	39,5	89,4	40,9	-	-
	11	105,8	34,1	103,9	35,2	102	36,4	99,1	38,3	96,2	40,3	94,3	41,7	-	-
	12	111,4	34,8	109,4	36	107,4	37,2	104,4	39,1	101,3	41,1	-	-	-	-
130D	6	128,2	48,8	125,8	50,4	123,4	52,1	119,8	54,9	116,1	57,8	113,6	59,8	-	-
	7	131,7	49,3	129,2	51	126,7	52,7	123	55,5	119,3	58,4	-	-	-	-
	9	138,7	50,4	136,2	52,1	133,6	53,9	129,7	56,7	125,7	59,7	-	-	-	-
	11	146	51,5	143,3	53,3	140,6	55,1	136,5	58	-	-	-	-	-	-
	12	153,5	52,8	150,7	54,6	147,8	56,4	143,4	59,4	-	-	-	-	-	-
150D	6	144,1	59,7	141,3	61,7	138,5	63,9	134,2	67,3	-	-	-	-	-	-
	7	147,9	60,4	145,1	62,5	142,2	64,7	137,8	68,2	-	-	-	-	-	-
	9	155,6	62	152,6	64,1	149,6	66,4	-	-	-	-	-	-	-	-
	11	163,5	63,6	160,3	65,8	157,1	68,1	-	-	-	-	-	-	-	-
	12	171,6	65,3	168,2	67,6	-	-	-	-	-	-	-	-	-	-
200D	6	192,6	78,8	189	81,6	185,3	84,5	179,7	89	174,1	93,9	-	-	-	-
	7	197,7	79,7	194	82,5	190,2	85,5	184,5	90,1	-	-	-	-	-	-
	9	208,1	81,6	204,2	84,5	200,2	87,5	194,2	92,2	-	-	-	-	-	-
	11	218,8	83,7	214,6	86,6	210,5	89,6	204,2	94,5	-	-	-	-	-	-
	12	229,7	85,8	225,4	88,8	221	91,9	-	-	-	-	-	-	-	-
230D	6	236,3	98,4	231,7	102	227,2	105,7	220,2	111,5	-	-	-	-	-	-
	7	242,5	99,6	237,8	103,2	233,1	107	226,1	112,9	-	-	-	-	-	-
	9	255	102,1	250,2	105,8	245,2	109,7	237,8	115,7	-	-	-	-	-	-
	11	267,8	104,8	262,7	108,5	257,6	112,5	-	-	-	-	-	-	-	-
	12	281	107,6	275,6	111,4	270,1	115,5	-	-	-	-	-	-	-	-
300D	6	285,1	119,1	279,7	123,3	274,2	127,7	265,9	134,6	-	-	-	-	-	-
	7	292,6	120,5	287,1	124,7	281,5	129,2	273	136,2	-	-	-	-	-	-
	9	307,9	123,4	302,1	127,8	296,2	132,3	287,3	139,5	-	-	-	-	-	-
	11	323,5	126,5	317,4	130,9	311,2	135,6	-	-	-	-	-	-	-	-
	12	339,5	129,7	333	134,3	326,5	139	-	-	-	-	-	-	-	-
370D	6	354,4	148,4	347,5	153,7	340,7	159,3	330,3	168,1	-	-	-	-	-	-
	7	363,7	150,2	356,7	155,6	349,6	161,3	339	170,2	-	-	-	-	-	-
	9	382,5	154	375,2	159,6	367,8	165,3	-	-	-	-	-	-	-	-
	11	401,7	158	394	163,7	386,3	169,6	-	-	-	-	-	-	-	-
	12	421,4	162,3	413,3	168,1	405,2	174,1	-	-	-	-	-	-	-	-

Qo : *Net cooling capacity in kW*

P : *Total power (including compressors fans and control) in Kw*

Fouling factor **:** 0,044 m^2C/kW

XXX $\triangle T = 5°C$

COMPRESSORS AND REFRIGERANT CIRCUITS

TYPE ECOLOGIC STD		100E	110E	90D	130D	150D
Compressor type		Scroll				
Number of compressors / Number of circuits		3/1	3/1	4/2	4/2	4/2
Capacity steps for the unit	%	0-33 67-100	0-33- 67-100	0-25-50- 75-100	0-25-50- 75-100	0-25-50- 75-100
Refrigerant charge per circuit	kg	19	20	15	15	19
Oil charge per compressor	l	4	6,6	3,8	4	6,6

		200D	230D	300D	370D
Compressor type		Scroll			
Number of compressors / Number of circuits		4/2	4/2	6/2	6/2
Capacity steps for the unit	%	0-25-50 75-100	0-25-50- 75-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100
Refrigerant charge per circuit	kg	20	28	34	43
Oil charge per compressor	l	8	8	8	8

EVAPORATORS

TYPE ECOLOGIC STD		100E	110E	90D	130D	150D
Number		1				
Water volume	l	10,5	12	9	12,4	14,1
Water piping connection		2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic

		200D	230D	300D	370D
Number		1			
Water volume	l	19,1	22,9	27,3	36,5
Water piping connection		2" Victaulic	2" Victaulic	2"1/2 Victaulic	2"1/2 Victaulic

CONDENSERS

TYPE ECOLOGIC STD		100E	110E	90D	130D	150D
Ventilation type		Axial - Direct coupling 900 tr/mn				
Fan number		2	2	2	3	3
Air flow rate	m^3/h	32 000	32 000	32 600	47 800	47 800
Total fan power absorbed	kW	3	3	3	4,5	4,5
Each fan nominal load current	A	3,1	3,1	3,1	3,1	3,1

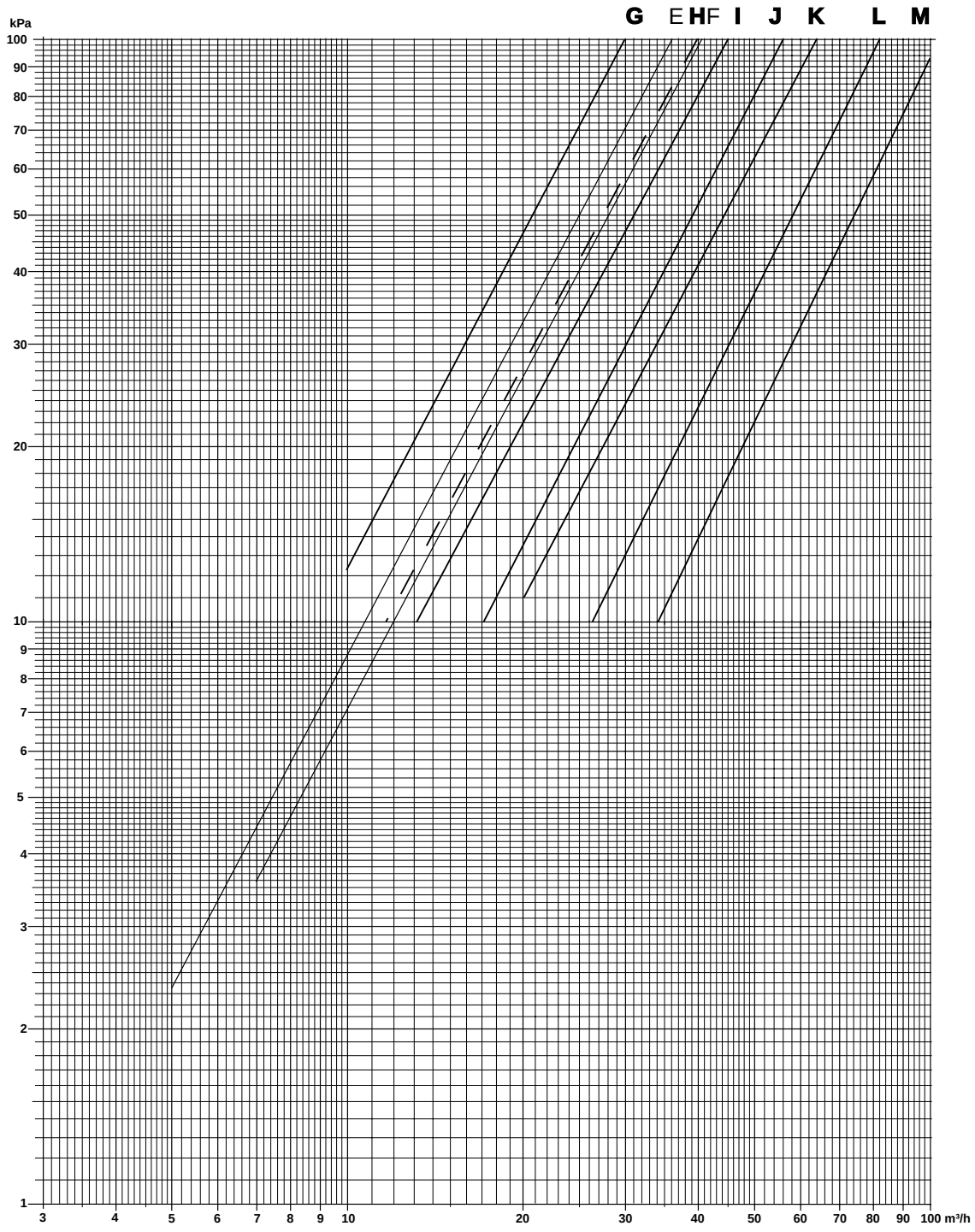
		200D	230D	300D	370D
Ventilation type		Axial - Direct coupling 900 tr/mn			
Fan number		4	4	6	6
Air flow rate	m^3/h	64 000	62 000	96 000	93 000
Total fan power absorbed	kW	6	6	9	9
Each fan nominal load current	A	3,1	3,1	3,1	3,1

ELECTRICAL DATA

TYPE ECOLOGIC STD		100E	110E	90D	130D	150D
Maximum power	*kW*	43	50	45	57	67
Maximum current	*A*	75	89	77	100	119
Start-up current	*A*	215	250	195	240	280
Start-up current with Softstarter (option)	*A*	155	180	145	180	210

		200D	230D	300D	370D
Maximum power	*kW*	91	110	137	165
Maximum current	*A*	155	187	231	279
Start-up current	*A*	350	430	425	520
Start-up current with Softstarter (option)	*A*	265	320	340	410

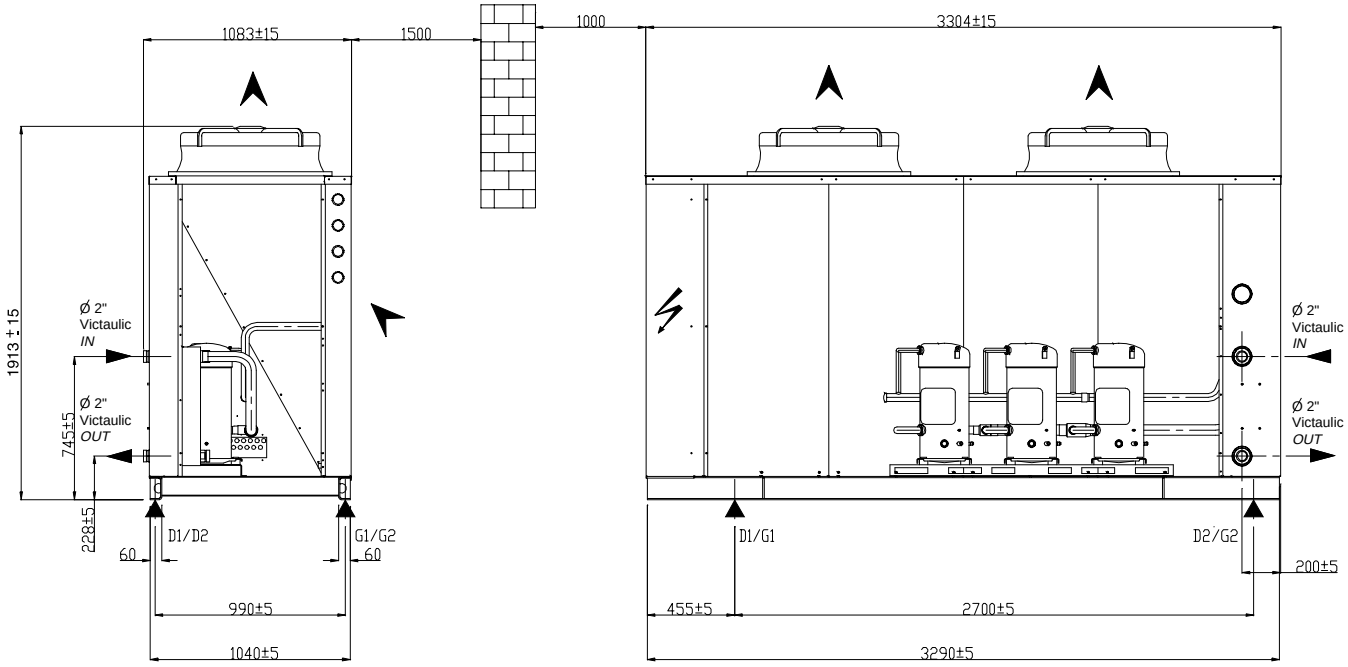
Maximum Current : current of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Maximum Power : power of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Start-up current : (n-1) compressors running current at full load with necessary fans currents plus 1 compressor starting current.



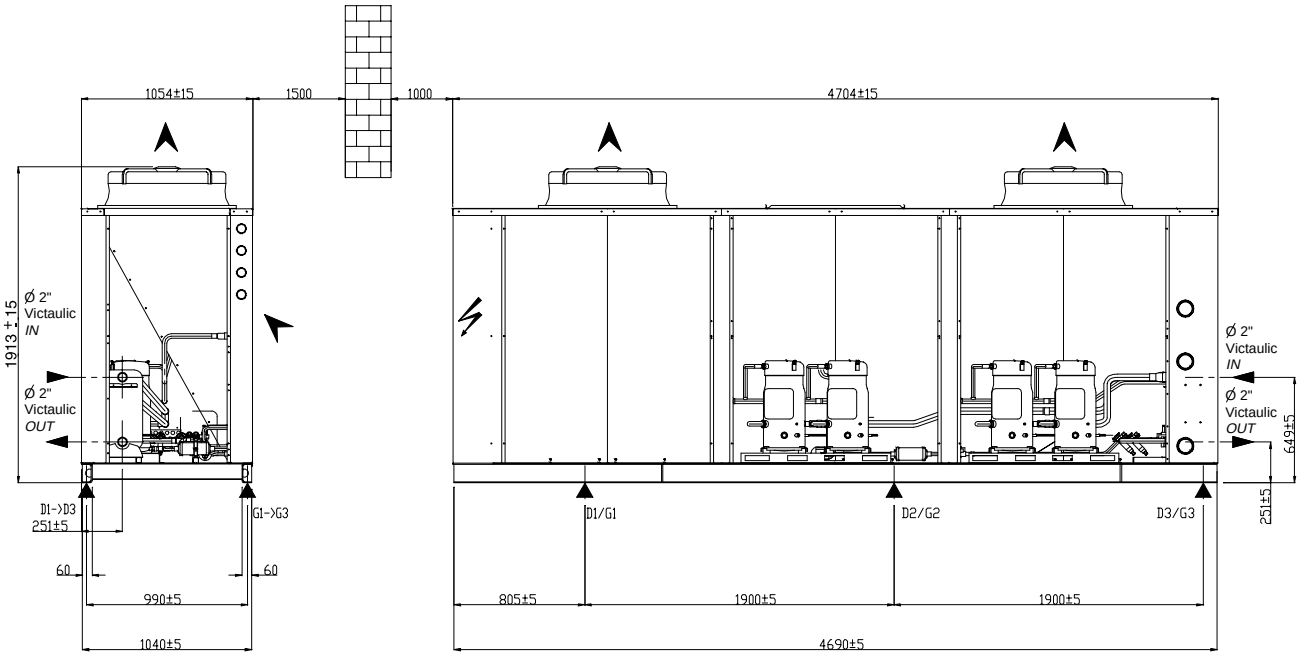
MODEL	ECOLOGIC STD	100E	110E	90D	130D	150D
Curve		E	F	G	H	I
		200D	**230D**	**300D**	**370D**	
Curve		J	K	L	M	

Pressure drops are given for informations only. A tolerance of +/- 20kPa must be considered when selecting water pumps.

100 E / 110 E *

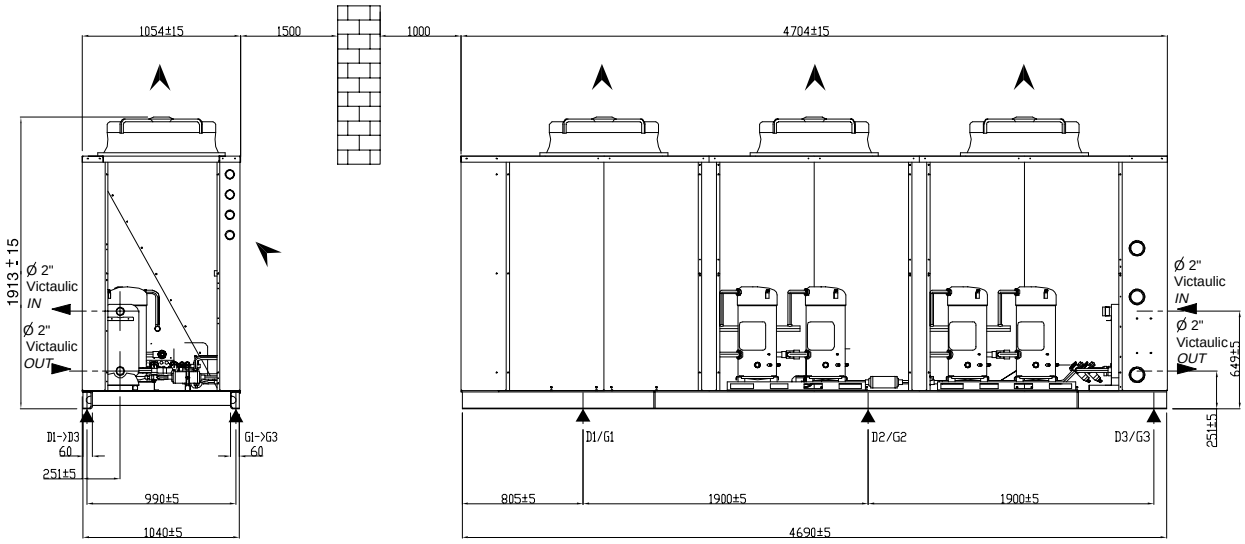


90 D *

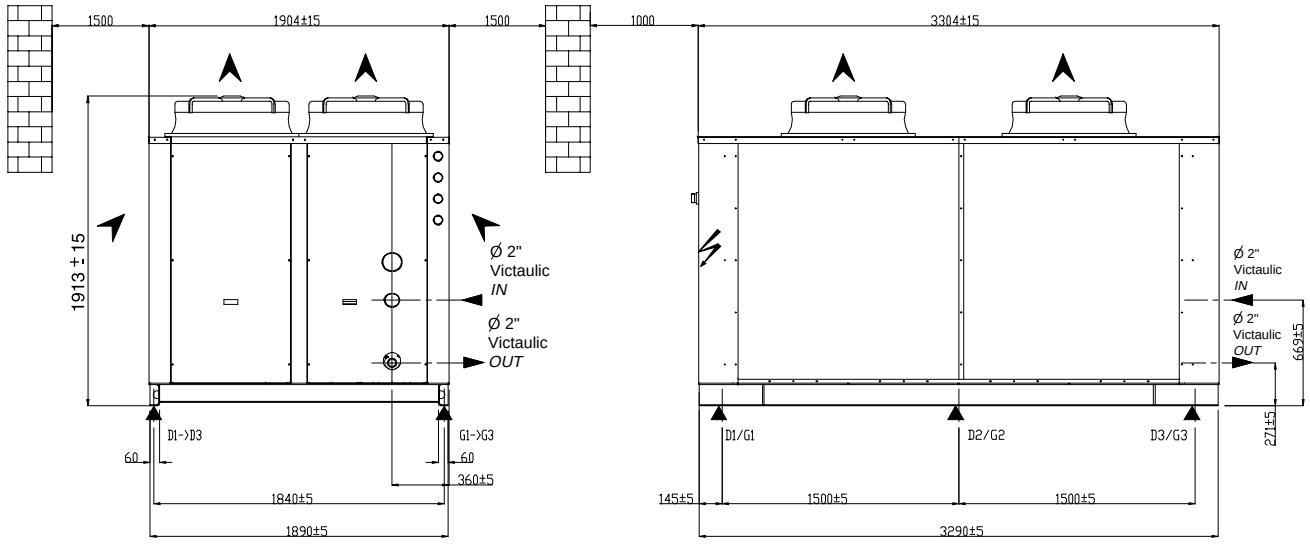


** Fan is pictorial representation*

130D / 150 D *

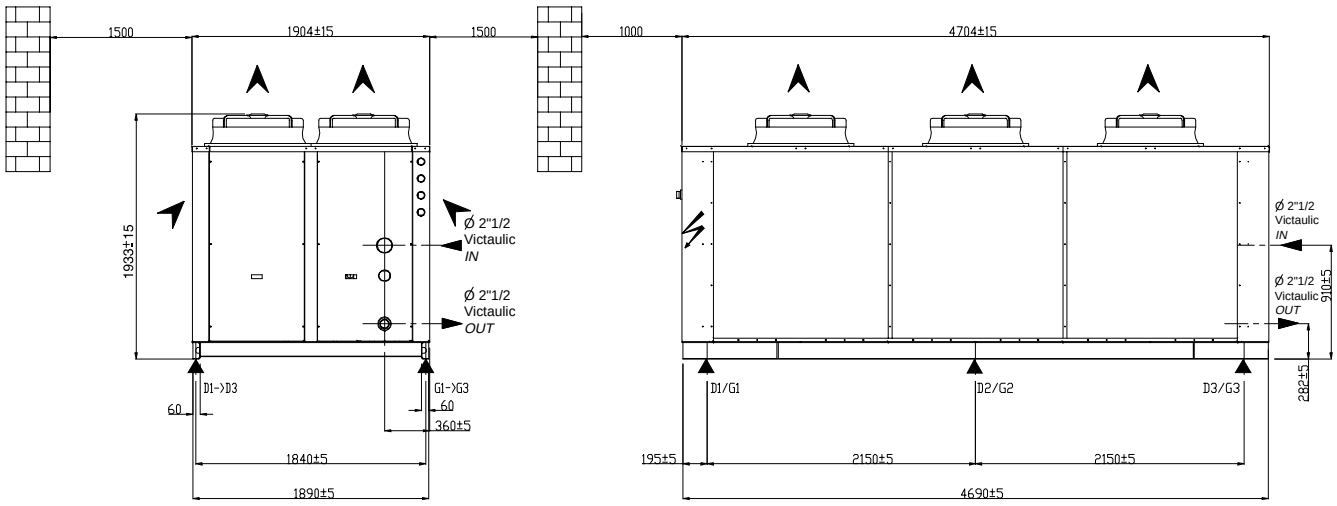


200D / 230D *



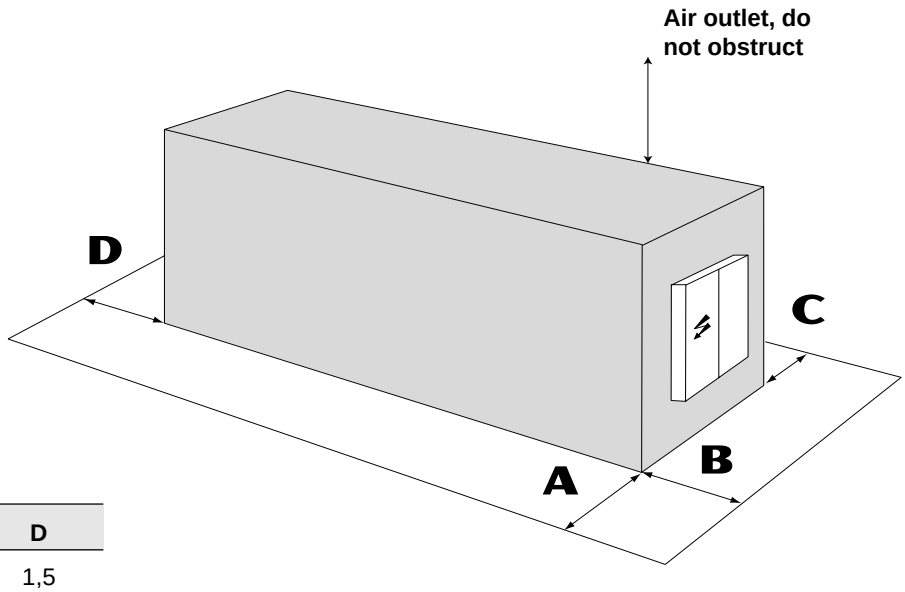
** Fan is pictorial representation*

300D / 370D*

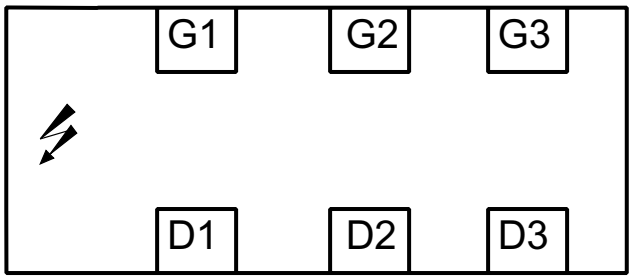


** Fan is pictorial representation*

clearances



A	B	C	D
(m) 1,5	1	1,5	1,5



Load distribution is calculated for antivribating mounts rubber with static resistance of 2200 N/mm

Unit without option

ECOLOGIC	STD	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	931	969	1194	1283	1332	1803	1902	2547	2687
Operating weight	(Kg)	942	981	1203	1296	1346	1822	1925	2574	2724
Point Load (Kg)	D1	251	260	224	240	246	271	282	348	361
	D2	277	282	251	275	297	339	361	561	585
	D3	-	-	180	202	216	251	264	330	350
	G1	224	238	213	222	218	290	301	352	367
	G2	189	202	202	218	224	381	407	598	640
	G3	-	-	132	139	145	290	310	385	420

Unit with service panels (option up to WA 150 D)

ECOLOGIC	STD	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+ 66	+ 66	+ 93	+ 93	+ 93	-	-	-	-
Operating weight	(Kg)	+ 66	+ 66	+ 93	+ 93	+ 93	-	-	-	-
Point Load (Kg)	D1	+ 33	+ 33	+ 31	+ 31	+ 31	-	-	-	-
	D2	+ 33	+ 33	+ 31	+ 31	+ 31	-	-	-	-
	D3	-	-	+ 31	+ 31	+ 31	-	-	-	-
	G1	0	0	0	0	0	-	-	-	-
	G2	0	0	0	0	0	-	-	-	-
	G3	0	0	0	0	0	-	-	-	-

Unit with coil guard grill (option)

ECOLOGIC	STD	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+ 26	+ 26	+ 39	+ 39	+ 39	+ 54	+ 54	+ 78	+ 78
Operating weight	(Kg)	+ 26	+ 26	+ 39	+ 39	+ 39	+ 54	+ 54	+ 78	+ 78
Point Load (Kg)	D1	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	D2	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	D3	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	G1	+ 13	+ 13	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13
	G2	+ 13	+ 13	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13
	G3	-	-	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13

Noise levels : unit without option

ECOLOGIC STD	*Spectrum per octave band (dBA)* 63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	*Global sound power* dBA
100E	47	69	75	84	87	87	85	72	**92**
110E	47	69	75	83	88	87	85	72	**92**
90D	52	69	75	83	87	87	85	72	**92**
130D	48	71	77	85	89	87	86	74	**94**
150D	49	71	77	85	89	89	87	74	**94**
200D	53	72	78	87	91	90	88	75	**96**
230D	51	72	78	88	91	90	88	75	**96**
300D	55	74	80	89	93	92	90	77	**97**
370D	52	74	80	90	93	92	90	77	**97**

Noise levels : unit with service panelS (option up to 150D)

ECOLOGIC STD	*Spectrum per octave band (dBA)* 63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	*Global sound power* dBA
100E	47	69	75	84	87	86	84	72	**92**
110E	47	69	75	83	87	87	85	72	**92**
90D	52	69	75	83	87	86	84	72	**92**
130D	48	71	77	85	89	88	86	74	**94**
150D	49	71	77	85	89	88	86	74	**94**

Global sound power level measured in compliance with ISO standard 3744.
Only the sound power spectrum and the global sound power value are used in determining pressure characteristics at owner land limit.

MODEL ECOLOGIC STD	100E	110E	90D	130D	150D
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C				
Chilled water entering temperature	Minimum : (2) Maximum : +20°C				
Difference chilled water inlet/outlet	Minimum : 3°C Maximum : +8 °C				

	200D	230D	300D	370D
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C			
Chilled water entering temperature	Minimum : (2) Maximum : +20°C			
Difference chilled water inlet/outlet	Minimum : 3°C Maximum : +8 °C			

(1) *Below +5°C, add glycol to the water circuit.*

(2) *Value corresponding to the minimum of 5°C chilled water leaving temperature at considered flow rate*

APART FROM THESE VALUES, PLEASE CONSULT US

MAXIMUM STARTING AMBIENT CONDITIONS

Temperatures are calculated according to start-up units conditions, with two differents configurations

❶ Full load starting* : **without** CLIMATIC II ™ controller (offloading not available)

❷ HP offloading starting* **with** CLIMATIC II ™ controller (optional)

* Based on max discharge condition of 62°C.

Ambient air temperature (°C)

ECOLOGIC STD	100E	110E	90D	130D	150D
Configuration ❶	33	31,5	38	35,5	31,5
Configuration ❷	42,5	39,5	49	48	46

	200D	230D	300D	370D
Configuration ❶	31	32	30	30
Configuration ❷	46	47	40	41

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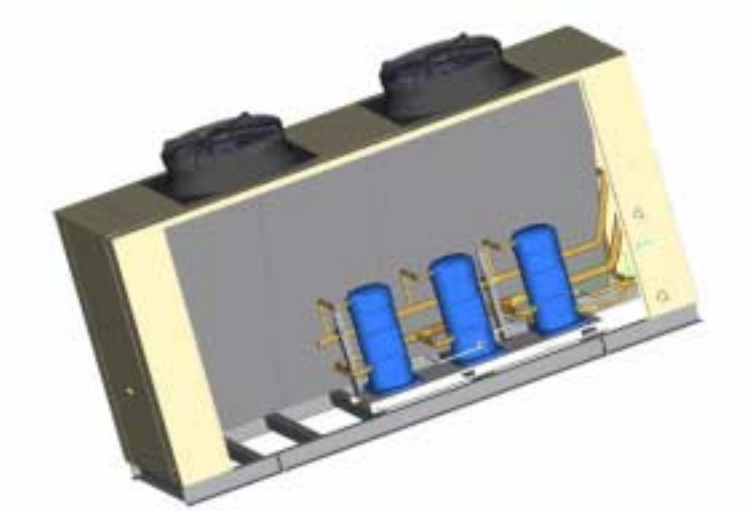
Operating limits *35*



ECOLOGIC STD Plus unit

The Standard Plus is the standard unit with the addition of high performance condenser fans this allows the unit to operate at full load in ambients above 35°C the nominal limit of the unit at full load capacity (see Table Operating Limits). Apart from the addition of the higher performance fan the unit is identical to the STANDARD unit. The sound level will be slightly higher. This unit is intended for use in Southern European applications.

ECOLOGIC STD Plus unit with service panels option

ECOLOGIC STD Plus	°C Water outlet temp.°C	Air inlet temperature																	
		28°C		30°C		32°C		35°C		38°C		40°C		42°C		45°C		46°C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
100E	6	97,4	36,4	95,6	37,6	93,8	38,9	91,2	40,8	88,4	42,9	86,6	44,4	84,8	45,9	-	-	-	-
	7	100	36,8	98,2	38	96,4	39,2	93,7	41,2	90,9	43,3	89	44,8	-	-	-	-	-	-
	9	105,5	37,5	103,6	38,7	101,7	40	98,8	42	95,9	44,2	93,9	45,7	-	-	-	-	-	-
	11	111,1	38,2	109,1	39,5	107,1	40,8	104,1	42,9	101	45	-	-	-	-	-	-	-	-
	12	116,9	39	114,8	40,3	112,7	41,6	109,5	43,7	106,3	46	-	-	-	-	-	-	-	-
110E	6	109,9	44	107,8	45,5	105,7	47	102,6	49,5	99,4	52,1	-	-	-	-	-	-	-	-
	7	112,8	44,5	110,7	46	108,6	47,5	105,4	50	102,1	52,6	-	-	-	-	-	-	-	-
	9	118,8	45,5	116,6	47	114,3	48,6	111	51,1	-	-	-	-	-	-	-	-	-	-
	11	124,9	46,5	122,6	48,1	120,2	49,7	116,7	52,3	-	-	-	-	-	-	-	-	-	-
	12	131,2	47,7	128,8	49,3	126,3	51	-	-	-	-	-	-	-	-	-	-	-	-
90D	6	95	32,7	93,3	33,7	91,7	34,8	89,1	36,5	86,6	38,3	84,8	39,6	83,1	40,9	80,5	43	79,6	43,7
	7	97,7	33	96	34	94,3	35	91,7	36,8	89	38,6	87,3	39,9	85,5	41,2	82,8	43,3	-	-
	9	103,2	33,5	101,4	34,5	99,6	35,6	96,9	37,4	94,1	39,2	92,2	40,5	90,4	41,9	-	-	-	-
	11	108,9	34,1	107	35,1	105,1	36,2	102,2	38	99,3	39,9	97,4	41,2	95,4	42,6	-	-	-	-
	12	114,8	34,7	112,8	35,7	110,8	36,9	107,8	38,7	104,7	40,6	102,7	42	100,6	43,4	-	-	-	-
130D	6	131,6	49,1	129,2	50,7	126,8	52,3	123,2	54,9	119,5	57,7	117,1	59,6	114,6	61,6	-	-	-	-
	7	135,2	49,6	132,8	51,2	130,3	52,8	126,6	55,4	122,8	58,2	120,3	60,2	117,8	62,2	-	-	-	-
	9	142,6	50,5	140,1	52,1	137,5	53,8	133,6	56,5	129,7	59,3	127	61,3	-	-	-	-	-	-
	11	150,3	51,5	147,6	53,2	144,9	54,9	140,8	57,6	136,6	60,5	133,9	62,5	-	-	-	-	-	-
	12	158,2	52,6	155,4	54,2	152,5	56	148,2	58,8	143,8	61,7	-	-	-	-	-	-	-	-
150D	6	156	54,3	153,2	56,1	150,4	57,9	146,2	60,8	141,9	63,9	139	66,1	136,2	68,4	-	-	-	-
	7	160,3	54,8	157,5	56,6	154,6	58,4	150,3	61,3	145,9	64,5	143	66,7	140,1	69	-	-	-	-
	9	169,2	55,8	166,2	57,6	163,2	59,5	158,7	62,5	154,1	65,6	151	67,9	147,9	70,2	-	-	-	-
	11	178,4	56,8	175,3	58,6	172,1	60,6	167,4	63,6	162,5	66,9	159,3	69,1	156	71,5	-	-	-	-
	12	188	57,9	184,7	59,8	181,4	61,7	176,4	64,8	171,3	68,2	167,8	70,5	-	-	-	-	-	-
200D	6	198,9	77,8	195,3	80,3	191,6	83	186,1	87,3	180,5	91,9	176,7	95,1	-	-	-	-	-	-
	7	204,3	78,5	200,6	81,1	196,8	83,9	191,2	88,2	185,4	92,8	181,6	96	-	-	-	-	-	-
	9	215,3	80,1	211,4	82,8	207,5	85,6	201,6	90	195,5	94,7	-	-	-	-	-	-	-	-
	11	226,7	81,8	222,6	84,5	218,5	87,3	212,2	91,8	205,9	96,6	-	-	-	-	-	-	-	-
	12	238,4	83,6	234,1	86,3	229,7	89,2	223,2	93,8	-	-	-	-	-	-	-	-	-	-
230D	6	245,2	95,2	240,7	98,5	236,2	101,9	229,3	107,4	222,4	113,2	217,7	117,2	-	-	-	-	-	-
	7	251,8	96,2	247,2	99,5	242,6	103	235,6	108,5	228,5	114,3	223,7	118,4	-	-	-	-	-	-
	9	265,3	98,3	260,4	101,6	255,6	105,2	248,2	110,8	240,8	116,7	-	-	-	-	-	-	-	-
	11	279,1	100,4	274	103,9	268,9	107,5	261,2	113,2	253,4	119,3	-	-	-	-	-	-	-	-
	12	293,3	102,7	288	106,2	282,6	109,9	274,5	115,7	-	-	-	-	-	-	-	-	-	-
300D	6	294,6	117,3	289,2	121,2	283,8	125,3	275,6	131,8	267,3	138,7	261,7	143,5	-	-	-	-	-	-
	7	302,6	118,5	297,1	122,4	291,5	126,5	283,1	133,1	274,6	140,1	268,9	144,9	-	-	-	-	-	-
	9	318,8	120,9	313	124,9	307,2	129,1	298,4	135,8	289,5	142,9	-	-	-	-	-	-	-	-
	11	335,4	123,4	329,4	127,5	323,3	131,9	314	138,7	304,6	145,9	-	-	-	-	-	-	-	-
	12	352,6	126,1	346,2	130,3	339,8	134,7	330	141,7	-	-	-	-	-	-	-	-	-	-
370D	6	367,9	143,5	361,2	148,4	354,3	153,6	344	161,8	333,6	170,5	326,6	176,5	-	-	-	-	-	-
	7	377,8	145	370,9	150	363,9	155,2	353,4	163,5	342,7	172,2	335,6	178,4	-	-	-	-	-	-
	9	398	148,1	390,8	153,2	383,5	158,5	372,4	166,9	361,2	175,9	-	-	-	-	-	-	-	-
	11	418,7	151,4	411,1	156,6	403,4	162	391,8	170,6	-	-	-	-	-	-	-	-	-	-
	12	440,1	154,8	432,1	160,1	424	165,7	411,8	174,5	-	-	-	-	-	-	-	-	-	-

Qo : *Net cooling capacity in kW*

P : *Total power (including compressors fans and control) in Kw*

***Fouling factor* :** 0,044 m²C/kW

XXX $\triangle T = 5°C$

COMPRESSORS AND REFRIGERANT CIRCUITS

TYPE ECOLOGIC STD Plus		100E	110E	90D	130D	150D
Compressor type		Scroll				
Number of compressors / Number of circuits		3/1	3/1	4/2	4/2	4/2
Capacity steps for the unit	%	0-33 67-100	0-33- 67-100	0-25-50- 75-100	0-25-50- 75-100	0-25-50- 75-100
Refrigerant charge per circuit	kg	19	20	15	15	19
Oil charge per compressor	l	4	6,6	3,8	4	6,6
		200D	**230D**	**300D**	**370D**	
Compressor type		Scroll				
Number of compressors / Number of circuits		4/2	4/2	6/2	6/2	
Capacity steps for the unit	%	0-25-50 75-100	0-25-50- 75-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100	
Refrigerant charge per circuit	kg	20	28	34	43	
Oil charge per compressor	l	8	8	8	8	

EVAPORATORS

TYPE ECOLOGIC STD Plus		100E	110E	90D	130D	150D
Number		1				
Water volume	l	10,5	12	9	12,4	14,1
Water piping connection		2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic
		200D	**230D**	**300D**	**370D**	
Number		1				
Water volume	l	19,1	22,9	27,3	36,5	
Water piping connection		2" Victaulic	2" Victaulic	2"1/2 Victaulic	2"1/2 Victaulic	

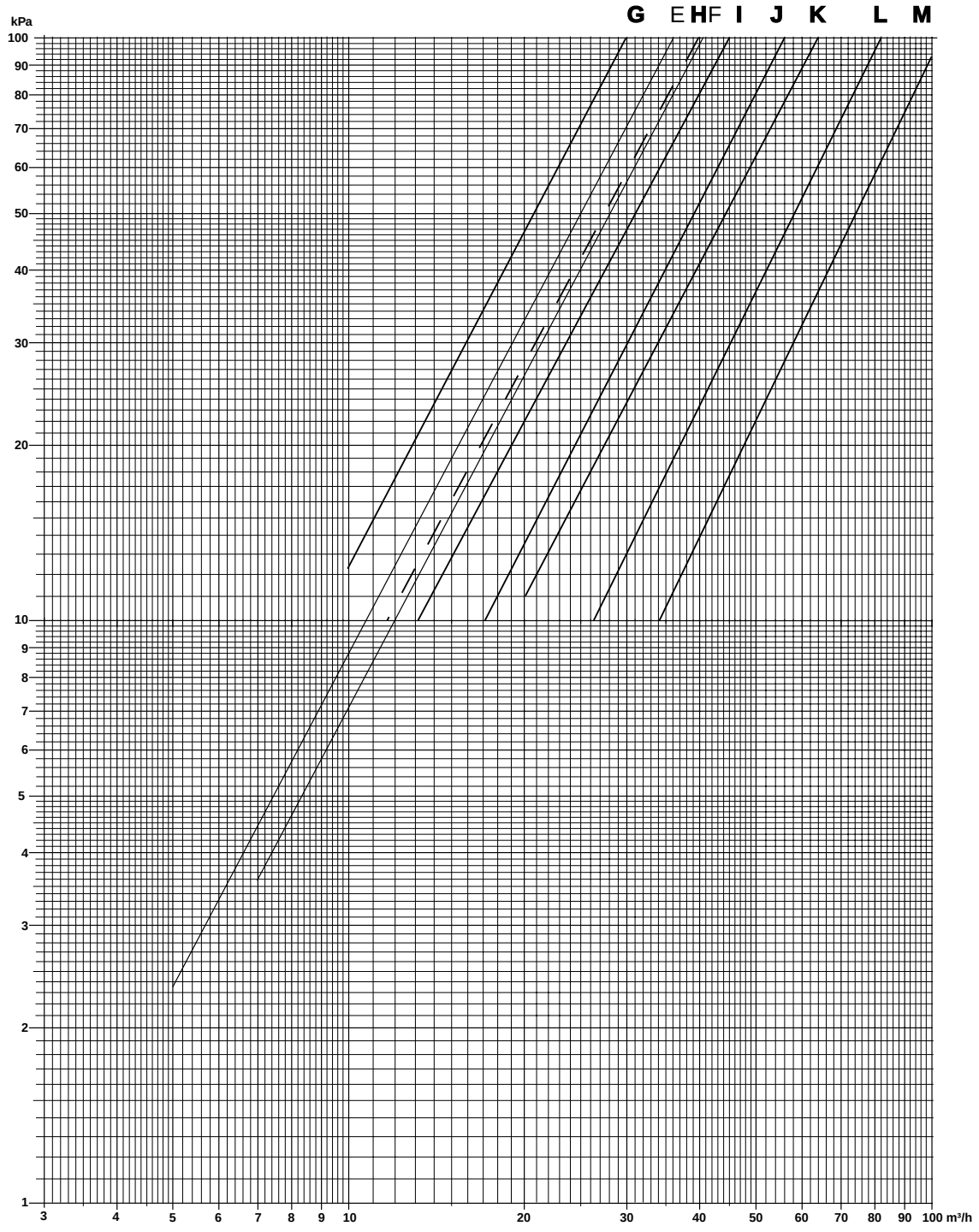
CONDENSERS

TYPE ECOLOGIC STD PLUS		100E	110E	90D	130D	150D
Ventilation type		Axial - Direct coupling 1350 tr/mn				
Fan number		2	2	2	3	3
Air flow rate	m^3/h	41 000	41 000	42 000	61 000	59 000
Total fan power absorbed	kW	5	5	5	7,5	7,5
Each fan nominal load current	A	4,7	4,7	4,7	4,7	4,7
		200D	**230D**	**300D**	**370D**	
Ventilation type		Axial - Direct coupling 1350 tr/mn				
Fan number		4	4	6	6	
Air flow rate	m^3/h	82 000	80 000	123 000	119 600	
Total fan power absorbed	kW	10	10	15	15	
Each fan nominal load current	A	4,7	4,7	4,7	4,7	

ELECTRICAL DATA

TYPE ECOLOGIC STD PLUS		100E	110E	90D	130D	150D
Maximum power	*kW*	45	52	47	60	70
Maximum current	*A*	78	92	80	105	123
Start-up current	*A*	225	260	200	250	290
Start-up current with Softstarter (option)	*A*	165	190	155	190	220
		200D	**230D**	**300D**	**370D**	
Maximum power	*kW*	95	114	143	171	
Maximum current	*A*	161	193	241	289	
Start-up current	*A*	360	440	440	535	
Start-up current with Softstarter (option)	*A*	275	330	350	425	

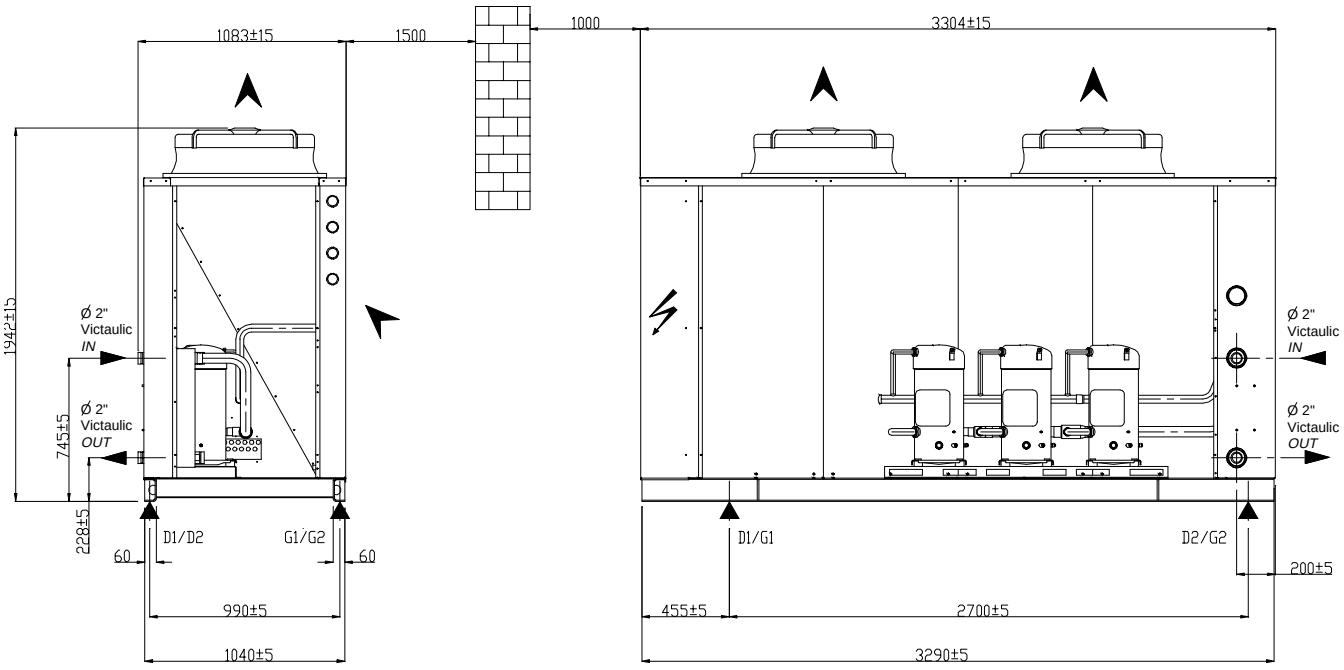
Maximum Current : current of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Maximum Power : power of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Start-up current : (n-1) compressors running current at full load with necessary fans currents plus 1 compressor starting current.



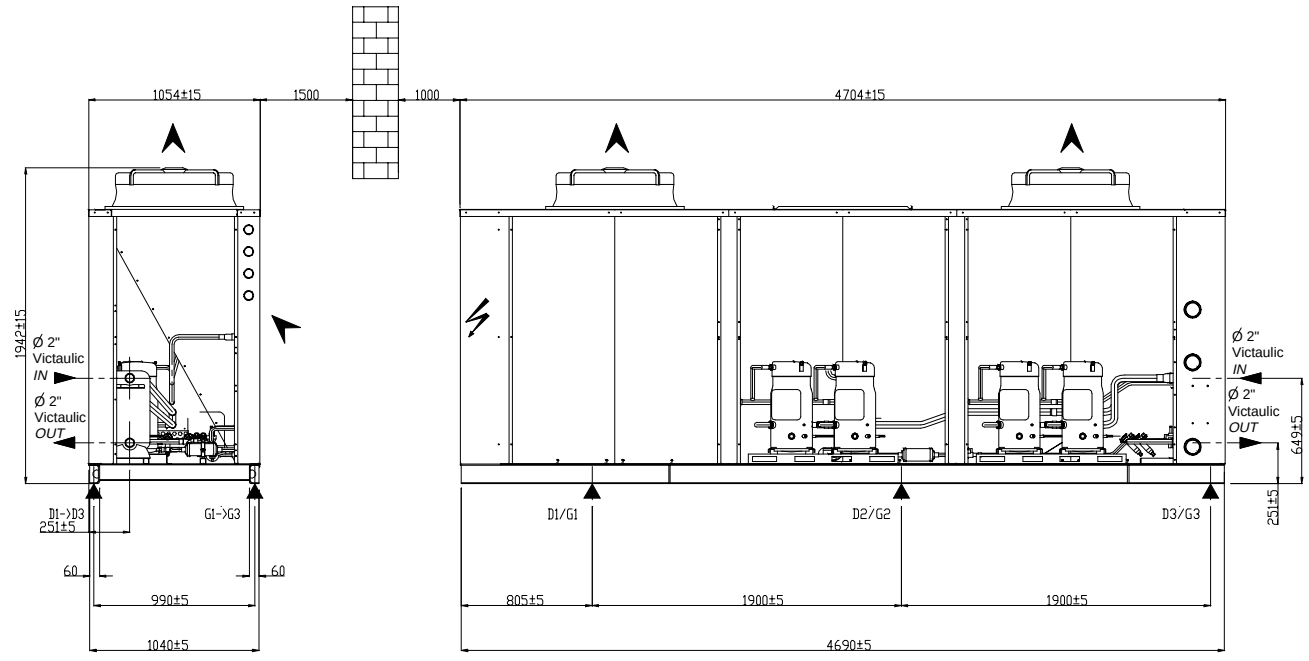
MODEL ECOLOGIC STD Plus	100E	110E	90D	130D	150D
Curve	E	F	G	H	I
	200D	**230D**	**300D**	**370D**	
Curve	J	K	L	M	

Pressure drops are given for informations only. A tolerance of +/- 20kPa must be considered when selecting water pumps.

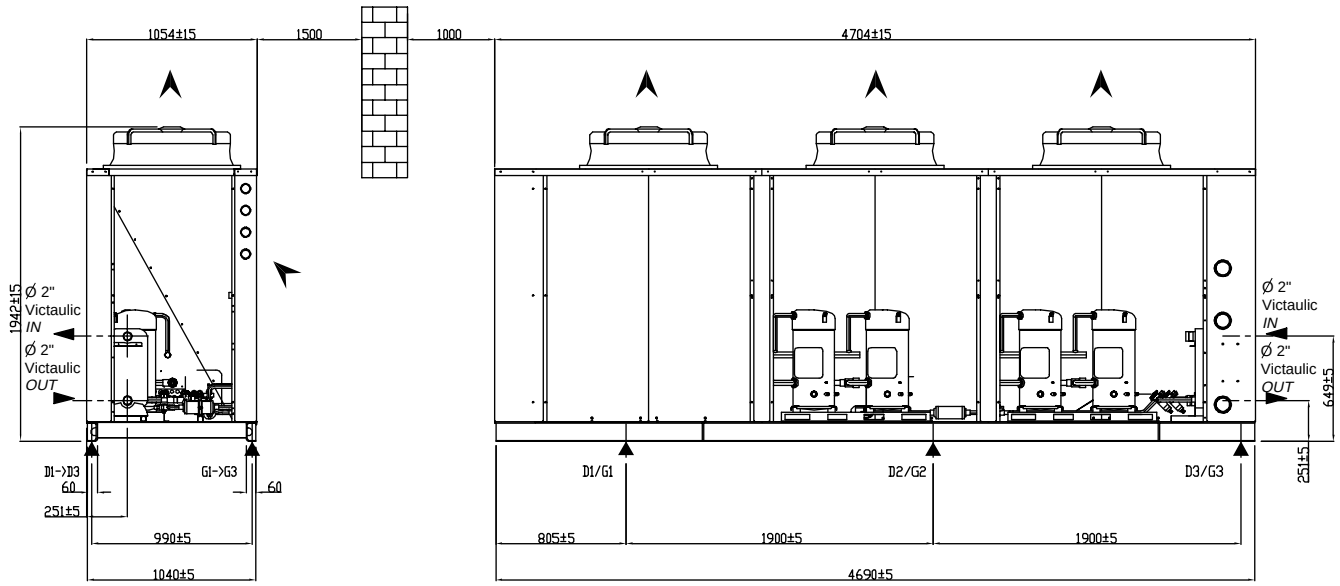
100 E / 110 E



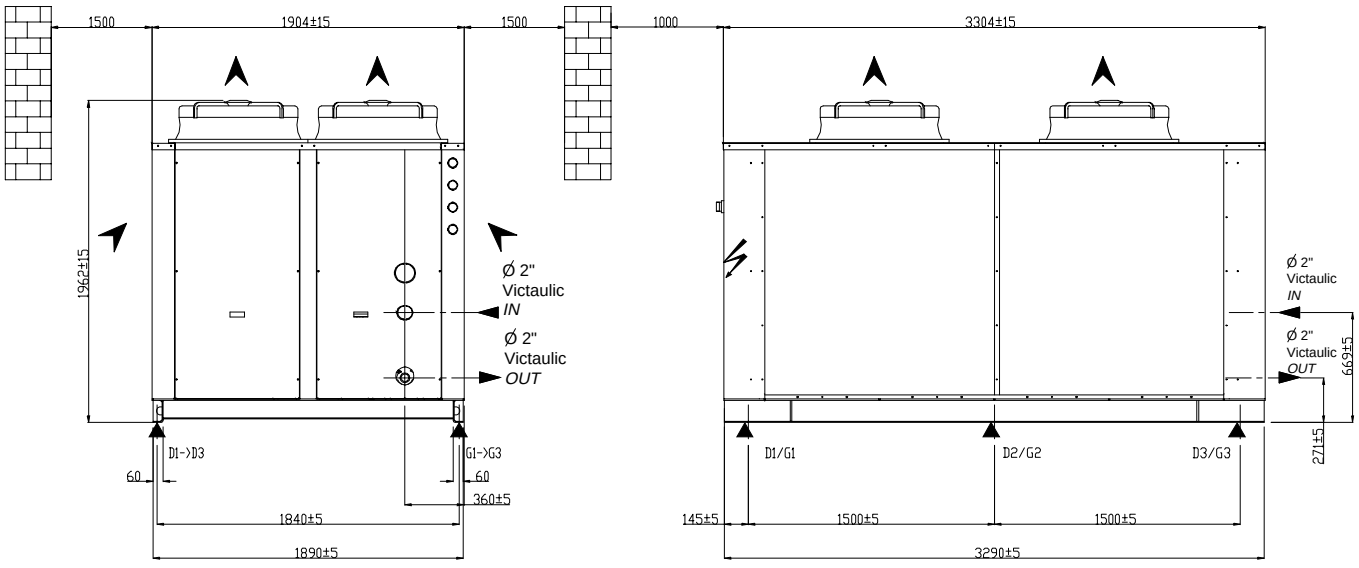
90 D



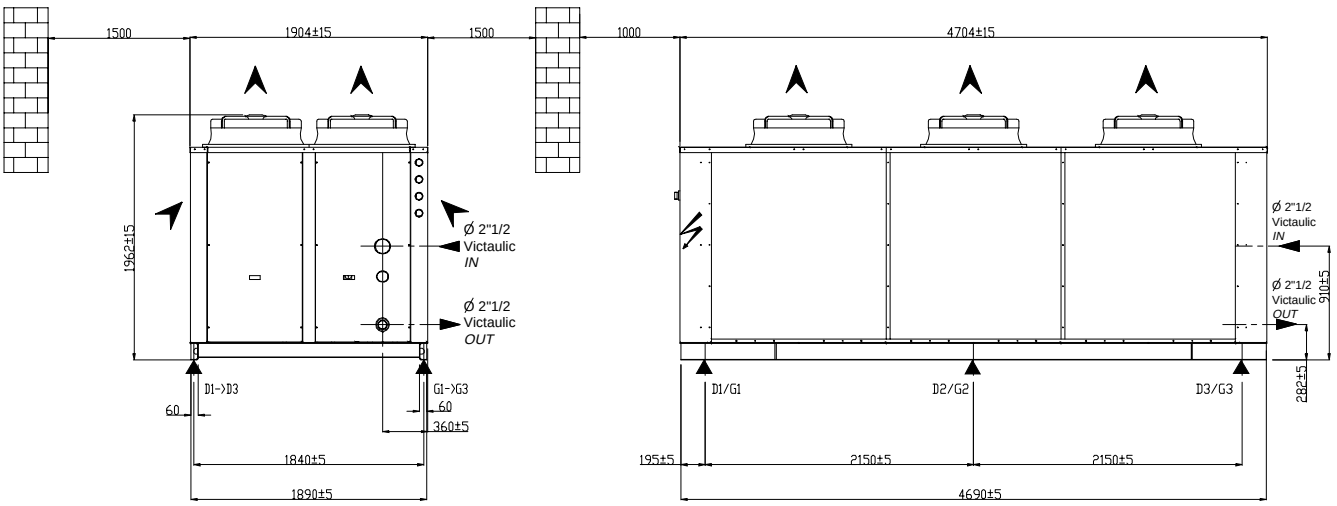
130 D / 150 D



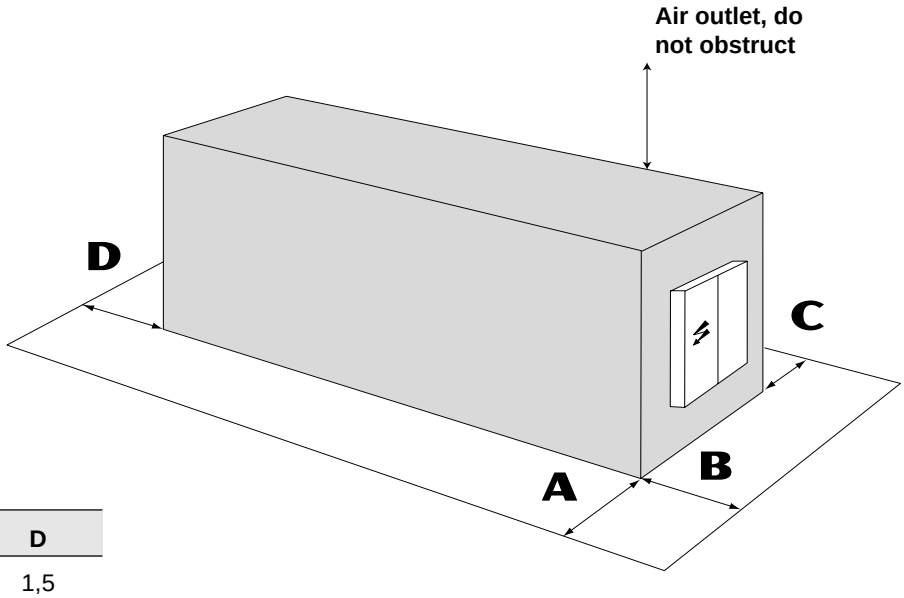
200 D / 230 D



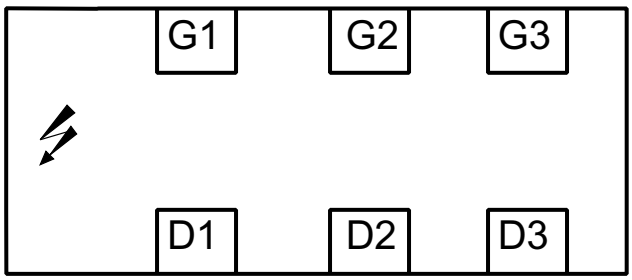
300 D / 370 D



clearances



A	B	C	D
(m) 1,5	1	1,5	1,5



Load distribution is calculated for antivribating mounts rubber with static resistance of 2200 N/mm

Unit without option

ECOLOGIC STD Plus		100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1002	1031	1208	1294	1405	1985	2107	2817	3017
Operating weight	(Kg)	1012	1034	1217	1307	1419	2004	2130	2845	3054
Point Load (Kg)	D1	260	268	229	242	249	308	293	385	367
	D2	279	304	253	282	299	381	394	616	649
	D3	-	-	180	205	216	288	286	370	383
	G1	257	246	216	222	242	328	321	392	381
	G2	216	224	205	216	253	425	473	656	750
	G3	-	-	134	141	161	275	363	427	524

Unit with service panels (option up to WA 150 D)

ECOLOGIC STD Plus		100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+ 66	+ 66	+ 93	+ 93	+ 93	-	-	-	-
Operating weight	(Kg)	+ 66	+ 66	+ 93	+ 93	+ 93	-	-	-	-
Point Load (Kg)	D1	+ 33	+ 33	+ 31	+ 31	+ 31	-	-	-	-
	D2	+ 33	+ 33	+ 31	+ 31	+ 31	-	-	-	-
	D3	-	-	+ 31	+ 31	+ 31	-	-	-	-
	G1	0	0	0	0	0	-	-	-	-
	G2	0	0	0	0	0	-	-	-	-
	G3	0	0	0	0	0	-	-	-	-

Unit with coil guard grill (option)

ECOLOGIC STD Plus		100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+ 26	+ 26	+ 39	+ 39	+ 39	+ 54	+ 54	+ 78	+ 78
Operating weight	(Kg)	+ 26	+ 26	+ 39	+ 39	+ 39	+ 54	+ 54	+ 78	+ 78
Point Load (Kg)	D1	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	D2	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	D3	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	G1	+ 13	+ 13	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13
	G2	+ 13	+ 13	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13
	G3	-	-	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13

NOISE LEVELS : unit without option

ECOLOGIC	*Spectrum per octave band (dBA)*								*Global sound power*
STD Plus	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
100E	47	70	76	84	89	87	85	72	**93**
110E	48	70	76	84	89	89	85	72	**94**
90D	52	70	76	83	89	88	85	72	**93**
130D	49	72	78	86	91	90	86	74	**95**
150D	50	72	78	86	91	90	87	74	**95**
200D	53	73	79	88	93	92	88	75	**97**
230D	51	73	79	89	93	92	88	75	**97**
300D	55	75	81	90	94	93	90	77	**99**
370D	53	75	81	91	94	93	90	77	**99**

NOISE LEVELS : unit with service panels (option up to 150D)

ECOLOGIC	*Spectrum per octave band (dBA)*								*Global sound power*
STD Plus	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
100E	47	70	76	84	89	88	84	72	**93**
110E	48	70	76	84	89	88	85	72	**93**
90D	52	70	76	83	89	88	84	72	**93**
130D	49	72	78	86	91	90	86	74	**95**
150D	50	72	78	86	91	90	86	74	**95**

Global sound power level measured in compliance with ISO standard 3744.
Only the sound power spectrum and the global sound power value are used in determining pressure characteristics at owner land limit.

MODEL ECOLOGIC STD Plus	100E	110E	90D	130D	150D
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C				
Chilled water entering temperature	Minimum : (2) Maximum : +20°C				
Difference chilled water inlet/outlet	Minimum : 3°C Maximum : +8 °C				

	200D	230D	300D	370D
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C			
Chilled water entering temperature	Minimum : (2) Maximum : +20°C			
Difference chilled water inlet/outlet	Minimum : 3°C Maximum : +8 °C			

(1) *Below +5°C, add glycol to the water circuit.*

(2) *Value corresponding to the minimum of 5°C chilled water leaving temperature at considered flow rate*

APART FROM THESE VALUES, PLEASE CONSULT US

MAXIMUM STARTING AMBIENT CONDITIONS

Temperatures are calculated according to start-up units conditions, with two differents configurations

❶ Full load starting : **without** CLIMATIC II ™ controller (offloading not available)

❷ HP offloading starting **with** CLIMATIC II ™ controller (optional)

* Based on max discharge condition of 62°C.

Ambient air temperature (°C)

ECOLOGIC STD Plus	100E	110E	90D	130D	150D
Configuration ❶	36	32	42,5	38	41
Configuration ❷	44,5	42	50,5	49	51

	200D	230D	300D	370D
Configuration ❶	34,5	36	30,5	31
Configuration ❷	47,5	49	42	42,5

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ECOLOGIC Low Noise unit

Ecologic Low Noise

The Ecologic Low Noise range of units uses the same range of Quality components that are utilised in the Standard range previously detailed. In addition the Low Noise range uses larger condenser surface with low speed fans to achieve similar capacity range as the Standard units. The already low noise rotary scroll compressors are enclosed in an acoustical jacket, which is constructed of sound attenuating material.

This combination significantly reduces the sound power from the chiller. The utilisation of low speed rotary scroll compressors and the management of the oil system within the compressor combined with the acoustic compressor treatment results in an extremely low emitted sound level radiated from the chiller.

The addition of additional condenser surface area means there is no compromise in performance when selecting an Ecologic Low Noise chiller. These units are built and factory tested to the same demanding quality standards that the Lennox brand is renown for.

This range has 9 units and capacity range 90 to 370kW. This version is positioned to give an alternative to the Super Low Noise units. It has a lower sound level than the Standard and Standard Plus units. It is intended to be used in applications that are sound sensitive but that do not need the performance of the super low noise version.

ECOLOGIC Low Noise unit with service panels option

ECOLOGIC LN	°C Water outlet temp.°C	Air inlet temperature													
		28°C		30°C		32°C		35°C		38°C		40°C		42°C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
100E	6	98,9	33,8	97,2	35	95,4	36,2	92,7	38	90	40,1	88,2	41,5	86,4	43
	7	101,7	34,1	99,9	35,3	98,1	36,5	95,3	38,4	92,6	40,4	90,7	41,9	88,8	43,4
	9	107,3	34,8	105,4	36	103,5	37,2	100,6	39,1	97,7	41,2	95,8	42,7	93,8	44,2
	11	113,1	35,5	111,1	36,7	109,1	37,9	106,1	39,9	103	42	101	43,5	-	-
	12	119,1	36,2	117	37,4	114,9	38,7	111,7	40,7	108,5	42,8	106,3	44,3	-	-
110E	6	112	40,9	109,9	42,3	107,9	43,8	104,7	46,2	101,6	48,7	99,4	50,4	-	-
	7	115	41,4	112,9	42,8	110,8	44,3	107,6	46,7	104,4	49,2	102,2	51	-	-
	9	121,2	42,3	119	43,7	116,8	45,3	113,4	47,7	110	50,3	-	-	-	-
	11	127,6	43,2	125,3	44,7	122,9	46,3	119,4	48,8	115,8	51,4	-	-	-	-
	12	134,1	44,2	131,7	45,8	129,2	47,4	125,5	49,9	-	-	-	-	-	-
90D	6	93,6	32	91,9	33	90,2	34,1	87,7	35,9	85,1	37,8	83,4	39,1	81,7	40,4
	7	96,2	32,3	94,5	33,3	92,7	34,4	90,1	36,2	87,5	38,1	85,7	39,4	84	40,8
	9	101,5	32,9	99,7	33,9	97,9	35,1	95,2	36,9	92,4	38,8	90,6	40,2	88,7	41,6
	11	107	33,5	105,2	34,6	103,3	35,8	100,4	37,6	97,5	39,6	95,5	40,9	-	-
	12	112,8	34,2	110,8	35,3	108,8	36,5	105,8	38,4	102,7	40,3	100,6	41,7	-	-
130D	6	129,2	48,3	126,8	49,9	124,4	51,6	120,8	54,3	117,1	57,2	114,7	59,2	-	-
	7	132,7	48,8	130,3	50,4	127,8	52,1	124,1	54,9	120,3	57,7	117,8	59,8	-	-
	9	139,9	49,8	137,3	51,5	134,8	53,3	130,8	56	126,9	59	-	-	-	-
	11	147,3	50,9	144,6	52,7	141,9	54,4	137,8	57,3	133,6	60,3	-	-	-	-
	12	154,9	52,1	152,1	53,9	149,2	55,7	144,9	58,6	-	-	-	-	-	-
150D	6	152,9	53,9	150,1	55,7	147,3	57,6	143	60,7	138,8	63,9	135,9	66,2	133	68,5
	7	157,1	54,4	154,2	56,3	151,3	58,2	147	61,3	142,6	64,5	139,7	66,8	-	-
	9	165,6	55,5	162,7	57,4	159,7	59,4	155,1	62,5	150,5	65,9	147,4	68,2	-	-
	11	174,5	56,7	171,4	58,6	168,2	60,7	163,4	63,9	158,6	67,2	-	-	-	-
	12	183,7	58	180,4	59,9	177,1	62	172	65,3	166,9	68,7	-	-	-	-
200D	6	202,3	72,3	198,6	74,8	195	77,4	189,4	81,5	183,9	85,9	180,1	89	176,4	92,2
	7	207,8	73	204,1	75,5	200,4	78,1	194,7	82,3	189	86,7	185,2	89,8	181,3	93
	9	219,2	74,4	215,3	76,9	211,4	79,6	205,4	83,9	199,4	88,4	195,4	91,6	-	-
	11	230,9	75,9	226,8	78,5	222,7	81,2	216,5	85,6	210,2	90,2	205,9	93,4	-	-
	12	243	77,5	238,7	80,2	234,4	82,9	227,8	87,3	221,2	92	-	-	-	-
230D	6	244,6	92,5	240,1	95,8	235,5	99,3	228,7	104,7	221,7	110,5	217,1	114,6	-	-
	7	251,1	93,5	246,5	96,8	241,9	100,3	234,9	105,8	227,8	111,7	223	115,8	-	-
	9	264,5	95,6	259,7	99	254,8	102,5	247,5	108,2	240	114,2	-	-	-	-
	11	278,2	97,7	273,2	101,2	268,1	104,9	260,3	110,6	-	-	-	-	-	-
	12	292,4	100,1	287,1	103,6	281,7	107,3	273,5	113,2	-	-	-	-	-	-
300D	6	300	108,8	294,6	112,5	289,2	116,5	281	122,7	272,7	129,3	267,2	134	261,6	138,8
	7	308,2	109,8	302,7	113,6	297,1	117,6	288,7	123,9	280,3	130,6	274,6	135,3	268,9	140,2
	9	324,9	112	319,1	115,8	313,3	119,9	304,5	126,3	295,7	133,1	289,7	137,9	-	-
	11	342,1	114,3	336,1	118,2	330	122,3	320,8	128,9	311,5	135,8	305,2	140,7	-	-
	12	359,9	116,7	353,5	120,7	347,2	124,9	337,5	131,6	327,7	138,6	-	-	-	-
370D	6	366,9	139,4	360,2	144,4	353,3	149,6	343	157,8	332,6	166,5	325,6	172,6	-	-
	7	376,8	140,9	369,9	146	362,9	151,2	352,3	159,5	341,7	168,3	-	-	-	-
	9	396,9	144,1	389,6	149,2	382,3	154,6	371,2	163	360,1	172	-	-	-	-
	11	417,5	147,4	409,9	152,6	402,2	158,1	390,6	166,8	-	-	-	-	-	-
	12	438,7	150,9	430,7	156,3	422,6	161,9	410,4	170,7	-	-	-	-	-	-

Qo : *Net cooling capacity in kW*

P : *Total power (including compressors fans and control) in Kw*

***Fouling factor* :** 0,044 m^2C/kW

XXX $\triangle T = 5°C$

COMPRESSORS AND REFRIGERANT CIRCUITS

TYPE ECOLOGIC LN		100E	110E	90D	130D	150D
Compressor type		Scroll				
Number of compressors / Number of circuits		3/1	3/1	4/2	4/2	4/2
Capacity steps for the unit	%	0-33 67-100	0-33- 67-100	0-25-50- 75-100	0-25-50- 75-100	0-25-50- 75-100
Refrigerant charge per circuit	kg	26	26	15	15	19
Oil charge per compressor	l	4	6,6	3,8	4	6,6

		200D	230D	300D	370D
Compressor type		Scroll			
Number of compressors / Number of circuits		4/2	4/2	6/2	6/2
Capacity steps for the unit	%	0-25-50 75-100	0-25-50- 75-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100
Refrigerant charge per circuit	kg	27	34	41	53
Oil charge per compressor	l	8	8	8	8

EVAPORATORS

TYPE ECOLOGIC LN		100E	110E	90D	130D	150D
Number		1				
Water volume	l	10,5	12	9	12,4	14,1
Water piping connection		2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic

		200D	230D	300D	370D
Number		1			
Water volume	l	19,1	22,9	27,3	36,5
Water piping connection		2" Victaulic	2" Victaulic	2"1/2 Victaulic	2"1/2 Victaulic

CONDENSERS

TYPE ECOLOGIC LN		100E	110E	90D	130D	150D
Ventilation type		Axial - Direct coupling 1090 tr/mn				
Fan number		2	2	2	3	3
Air flow rate	m^3/h	33 200	33 200	35 200	51 000	49 200
Total fan power absorbed	kW	3,4	3,4	3,4	5,1	5,1
Each fan nominal load current	A	2,9	2,9	2,9	2,9	2,9

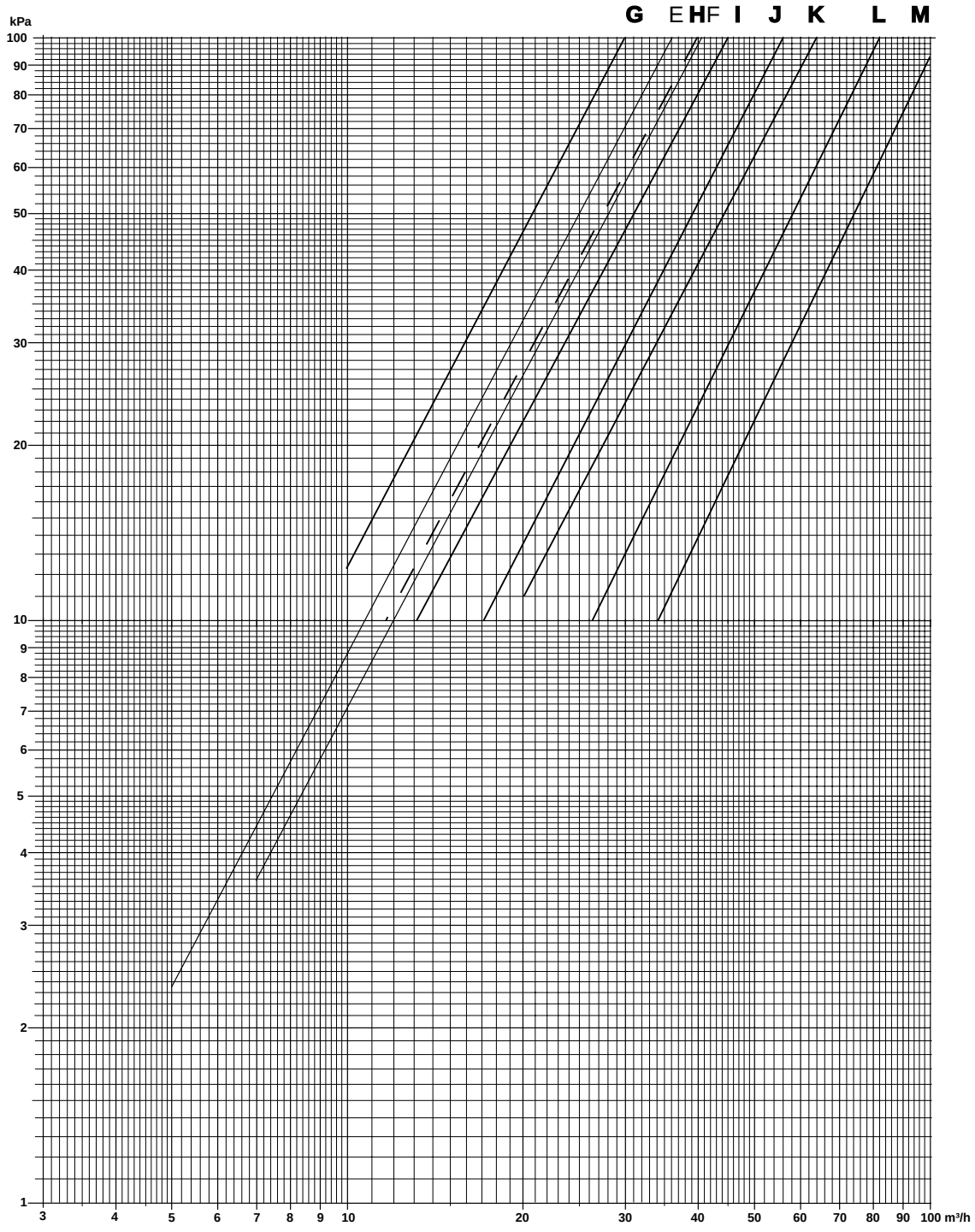
		200D	230D	300D	370D
Ventilation type		Axial - Direct coupling 1090 tr/mn			
Fan number		4	4	6	6
Air flow rate	m^3/h	66 400	64 600	100 000	97 000
Total fan power absorbed	kW	6,8	6,8	10,2	10,2
Each fan nominal load current	A	2,9	2,9	2,9	2,9

ELECTRICAL DATA

TYPE ECOLOGIC LN		100E	110E	90D	130D	150D
Maximum power	*kW*	43	50	45	58	68
Maximum current	*A*	75	88	77	100	118
Start-up current	*A*	215	250	195	240	280
Start-up current with Softstarter (option)	*A*	155	180	145	180	210

		200D	230D	300D	370D
Maximum power	*kW*	92	111	138	167
Maximum current	*A*	154	186	230	278
Start-up current	*A*	350	425	425	520
Start-up current with Softstarter (option)	*A*	260	320	340	410

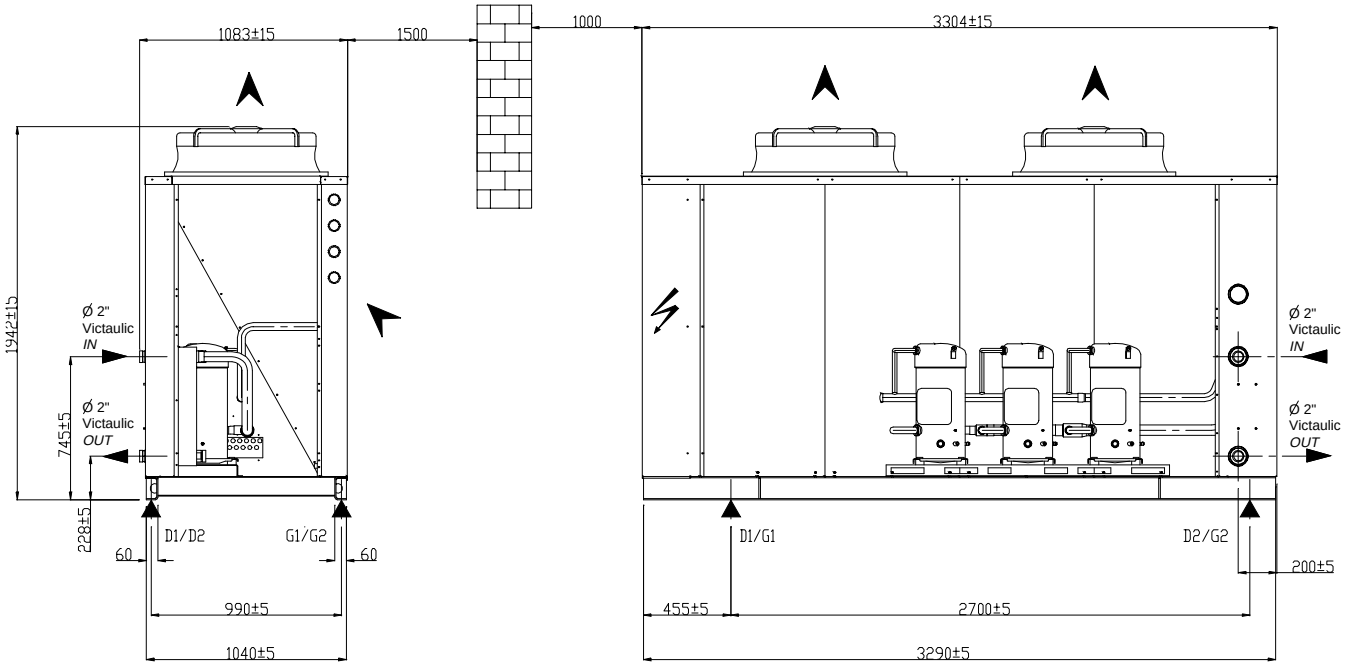
Maximum Current : current of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Maximum Power : power of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Start-up current : (n-1) compressors running current at full load with necessary fans currents plus 1 compressor starting current.



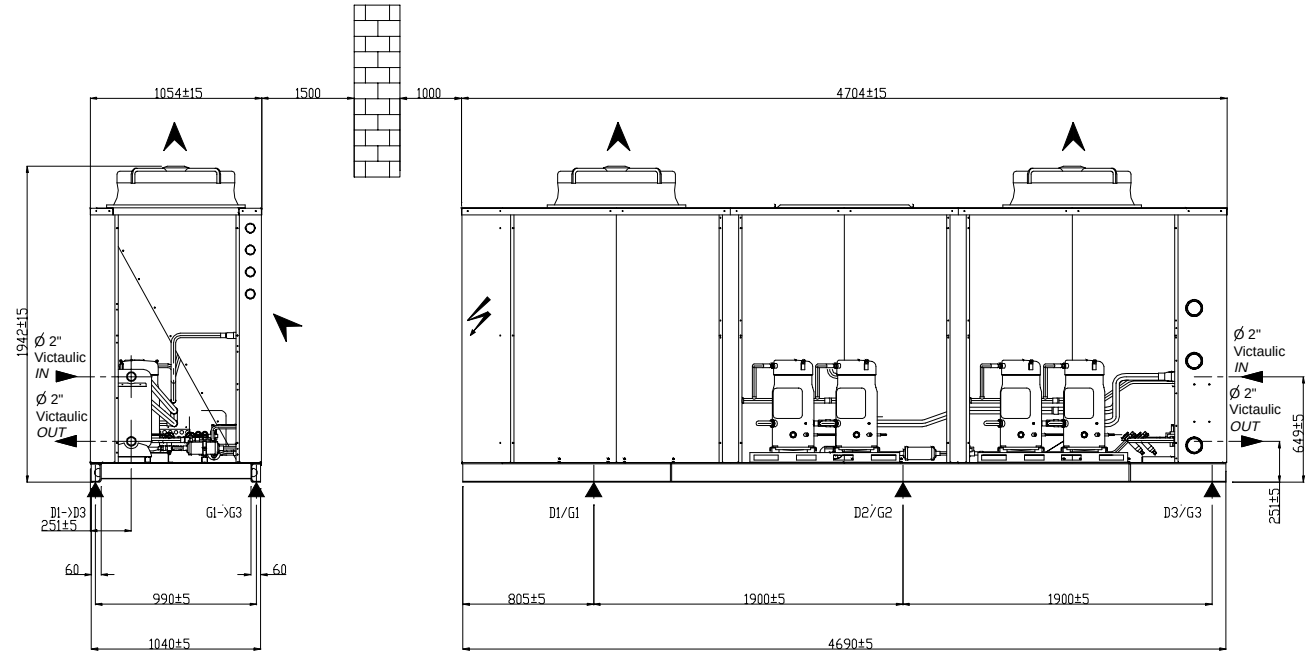
MODEL	ECOLOGIC LN	100E	110E	90D	130D	150D
Curve		E	F	G	H	I
		200D	**230D**	**300D**	**370D**	
Curve		J	K	L	M	

Pressure drops are given for informations only. A tolerance of +/- 20kPa must be considered when selecting water pumps.

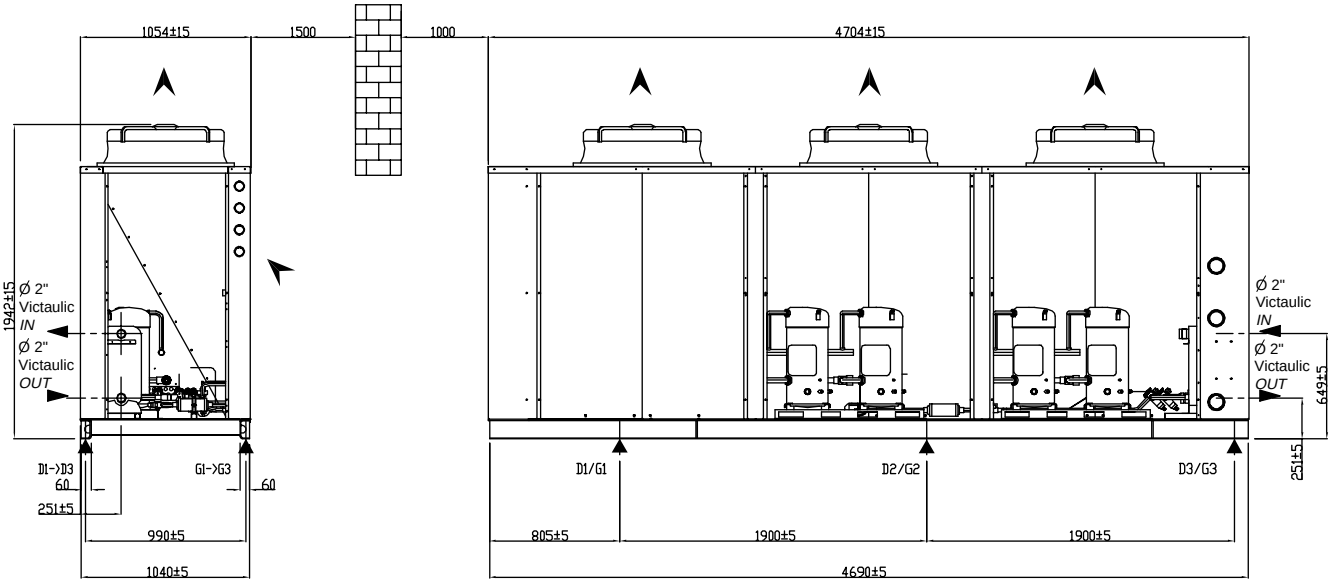
100 E / 110 E



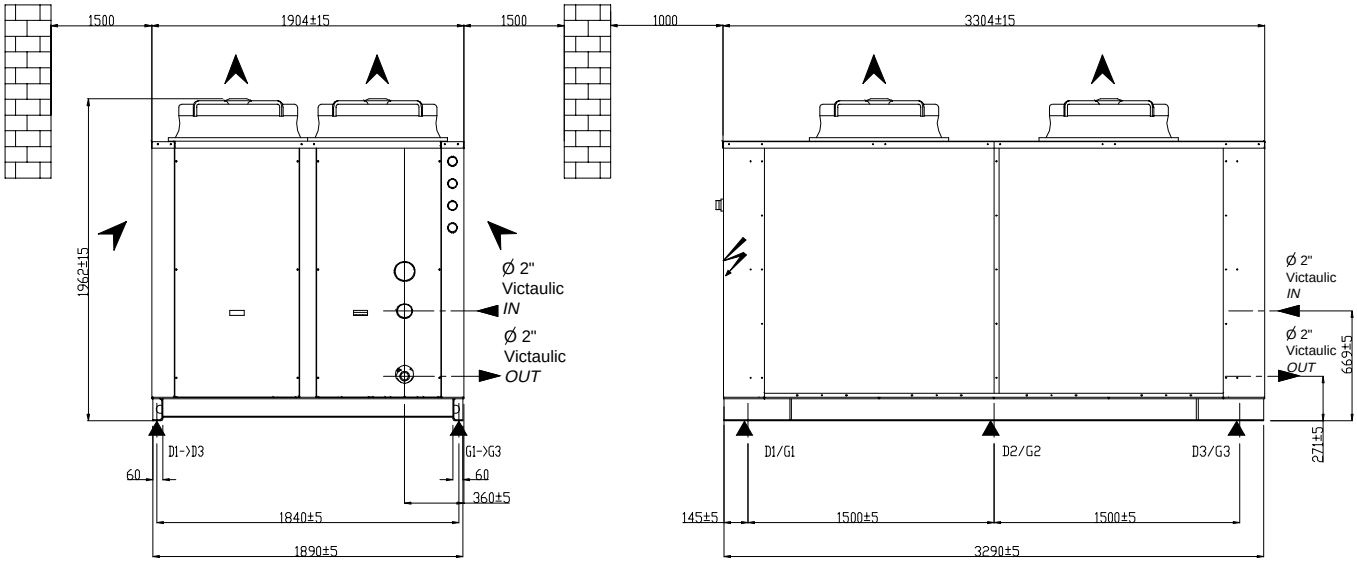
90 D



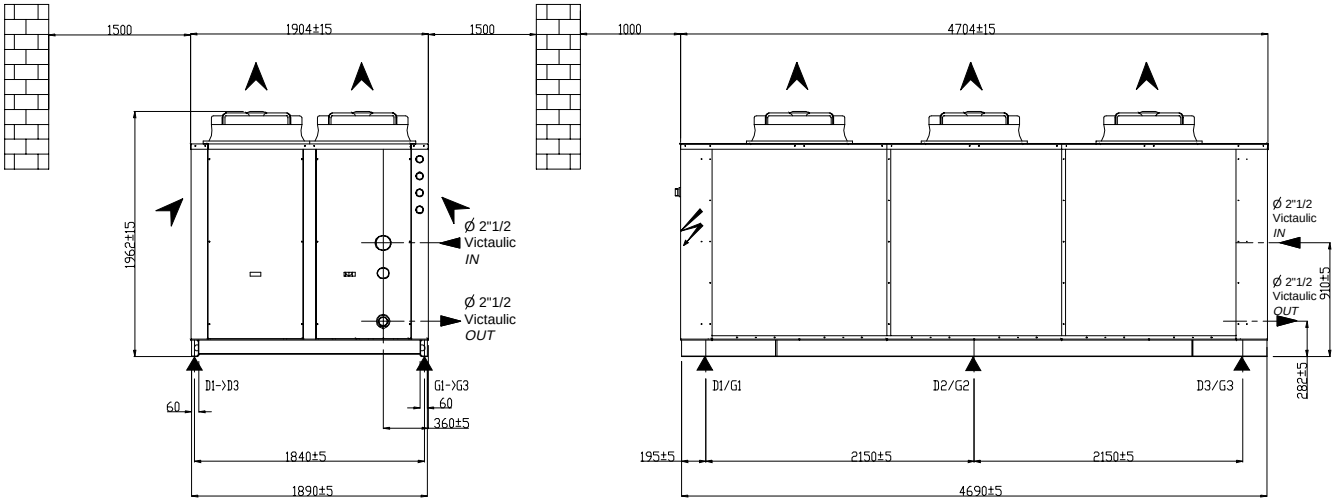
130 D / 150 D

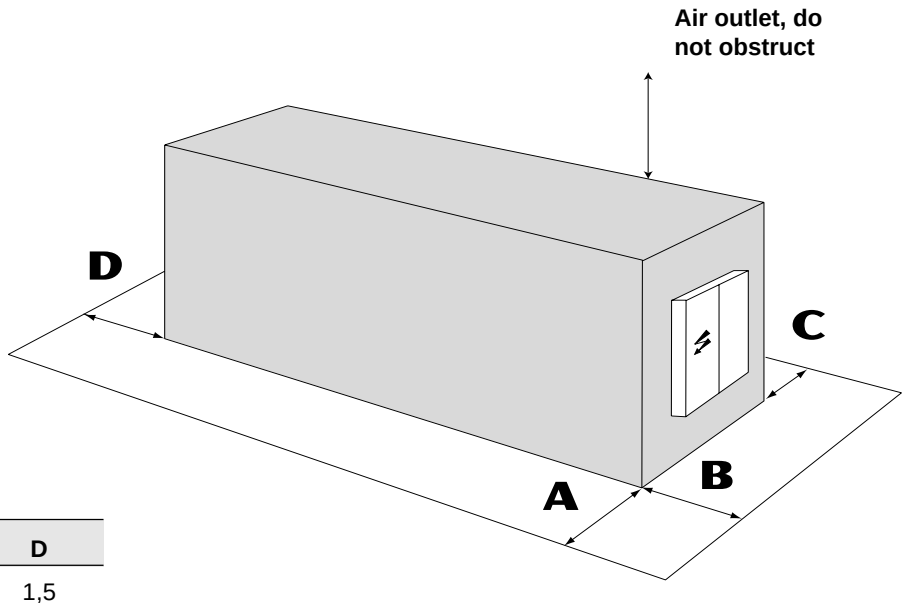


200 D / 230 D

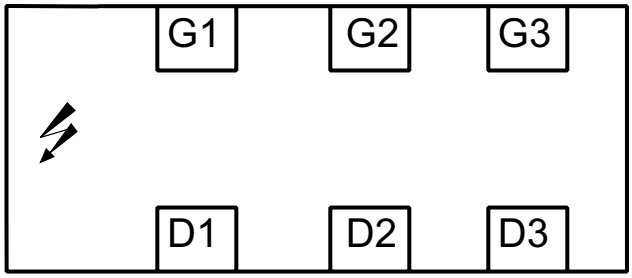


300 D / 370 D





	A	B	C	D
(m)	1,5	1	1,5	1,5



Load distribution is calculated for antivribating mounts rubber with static resistance of 2200 N/mm

Unit without option

ECOLOGIC	LN	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1002	1031	1208	1294	1405	1985	2107	2817	3017
Operating weight	(Kg)	1012	1034	1217	1307	1419	2004	2130	2845	3054
Point Load (Kg)	D1	260	268	229	242	249	308	293	385	367
	D2	279	304	253	282	299	381	394	616	649
	D3	-	-	180	205	216	288	286	370	383
	G1	257	246	216	222	242	328	321	392	381
	G2	216	224	205	216	253	425	473	656	750
	G3	-	-	134	141	161	275	363	427	524

Unit with service panels (option up to WA 150 D)

ECOLOGIC	LN	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+ 66	+ 66	+ 93	+ 93	+ 93	-	-	-	-
Operating weight	(Kg)	+ 66	+ 66	+ 93	+ 93	+ 93	-	-	-	-
Point Load (Kg)	D1	+ 33	+ 33	+ 31	+ 31	+ 31	-	-	-	-
	D2	+ 33	+ 33	+ 31	+ 31	+ 31	-	-	-	-
	D3	-	-	+ 31	+ 31	+ 31	-	-	-	-
	G1	0	0	0	0	0	-	-	-	-
	G2	0	0	0	0	0	-	-	-	-
	G3	0	0	0	0	0	-	-	-	-

Unit with coil guard grill (option)

ECOLOGIC	LN	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+ 26	+ 26	+ 39	+ 39	+ 39	+ 54	+ 54	+ 78	+ 78
Operating weight	(Kg)	+ 26	+ 26	+ 39	+ 39	+ 39	+ 54	+ 54	+ 78	+ 78
Point Load (Kg)	D1	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	D2	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	D3	0	0	0	0	0	+ 9	+ 9	+ 13	+ 13
	G1	+ 13	+ 13	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13
	G2	+ 13	+ 13	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13
	G3	-	-	+ 13	+ 13	+ 13	+ 9	+ 9	+ 13	+ 13

NOISE LEVELS : unit without option

ECOLOGIC	*Spectrum per octave band (dBA)*								*Global sound power*
LN	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
100E	46	67	72	79	83	83	78	67	**87**
110E	46	67	72	79	83	83	78	67	**88**
90D	51	67	72	78	83	83	78	67	**87**
130D	47	68	73	80	85	84	80	69	**89**
150D	48	68	74	80	85	84	80	69	**91**
200D	53	70	75	83	86	86	82	70	**91**
230D	50	70	75	84	86	86	81	70	**91**
300D	54	71	77	84	88	87	83	72	**92**
370D	52	71	77	86	88	87	83	72	**93**

NOISE LEVELS : unit with service panels (option up to 150D)

ECOLOGIC	*Spectrum per octave band (dBA)*								*Global sound power*
LN	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
100E	46	67	72	79	83	83	78	67	**87**
110E	46	67	72	79	83	83	78	67	**87**
90D	51	67	72	78	82	83	78	67	**87**
130D	47	68	73	80	84	84	80	69	**89**
150D	48	68	74	80	84	84	80	69	**89**

Global sound power level measured in compliance with ISO standard 3744.
Only the sound power spectrum and the global sound power value are used in determining pressure characteristics at owner land limit.

MODEL ECOLOGIC LN	100E	110E	90D	130D	150D
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C				
Chilled water entering temperature	Minimum : (2) Maximum : +20°C				
Difference chilled water inlet/outlet	Minimum : 3°C Maximum : +8 °C				

	200D	230D	300D	370D
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C			
Chilled water entering temperature	Minimum : (2) Maximum : +20°C			
Difference chilled water inlet/outlet	Minimum : 3°C Maximum : +8 °C			

(1) *Below +5°C, add glycol to the water circuit.*

(2) *Value corresponding to the minimum of 5°C chilled water leaving temperature at considered flow rate*

APART FROM THESE VALUES, PLEASE CONSULT US

MAXIMUM STARTING AMBIENT TEMPERATURE

Temperatures are calculated according to start-up units conditions, with two differents configurations

❶ Full load starting : **without** CLIMATIC II ™ controller (offloading not available)

❷ HP offloading starting **with** CLIMATIC II ™ controller (optional)

* Based on max discharge condition of 62°C.

Ambient air temperature (°C)

ECOLOGIC LN	100E	110E	90D	130D	150D
Configuration ❶	40,5	37	39	36	39
Configuration ❷	47	45	49,5	48,5	50

	200D	230D	300D	370D
Configuration ❶	40	38	35,5	35,5
Configuration ❷	50	49,5	45	45

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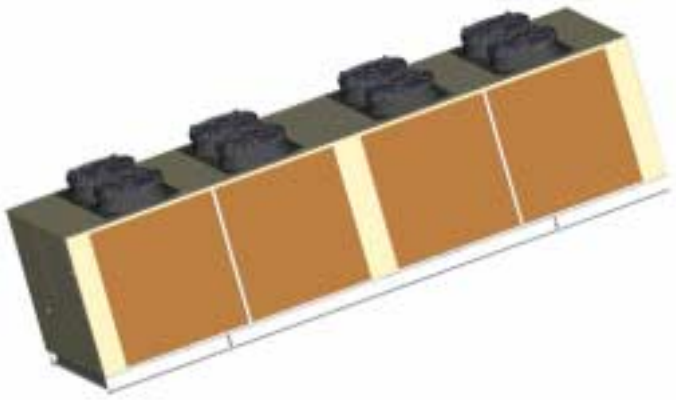


ECOLOGIC High Efficiency

The Ecologic high efficiency range of units is designed to ensure that cooling both at full and part load is provided at the minimum electrical power absorbed. This provides the owner with the lowest operating costs and by reducing power consumption the indirect global warming impact is minimised. The indirect global warming is the generation of CO2 in producing the electrical power to operate the chiller by selecting from Ecologic high efficiency range CO2 production is minimised. The HE range is made up of 13 units capacity from 40 to 380 kW.

When selecting an Ecologic high efficiency unit the additional costs associated with the additional components required can be recovered in the first few years of operation. A Lennox Ecologic unit has a life expectancy in access of 15 years so after the initial capital difference is recovered in the first few years the continued cost savings can be utilised for other purposes.

The Ecologic high efficiency range uses oversized condenser surfaces to get the highest efficiencies. The Climatic II controller is supplied with graphic display screen. The unit is fitted with the very latest in Electronic expansion valve technology that is controlled by the Climatic II and uses Lennox unique control algorithms to operate the compressors, condenser fans and expansion valve to provide the best operating efficiency at all operating conditions. The Climatic II controller is looking at 2050 different operating parameters every minute and making adjustments to ensure the efficient and safe operation of the chiller.

The Ecologic uses the same range of components as the Ecologic Standard range of chillers and is also fully factory tested to insure trouble free start up.

ECOLOGIC HE		Air inlet temperature																			
		28°C		30°C		32°C		35°C		38°C		40°C		42°C		45°C		46°C		48° C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
40E	6	41,5	12,5	40,8	12,9	40,1	13,3	39,1	13,9	38	14,6	37,3	15,1	36,6	15,6	35,5	16,4	35,1	16,6	34,4	17,2
	7	42,7	12,6	42	13	41,3	13,4	40,2	14	39,1	14,7	38,4	15,2	37,7	15,7	36,6	16,5	36,2	16,7	35,5	17,3
	9	45,2	12,8	44,5	13,1	43,7	13,5	42,6	14,2	41,5	14,8	40,7	15,3	39,9	15,8	38,8	16,6	38,4	16,9	37,6	17,5
	10	46,5	12,8	45,8	13,2	45	13,6	43,8	14,2	42,7	14,9	41,9	15,4	41,1	15,9	39,9	16,7	39,5	17	38,7	17,6
	12	50,6	13	49,8	13,4	49	13,8	47,7	14,5	46,5	15,2	45,6	15,7	44,8	16,2	43,5	17	43	17,3	42,2	17,9
45E	6	48,2	14,7	47,4	15,1	46,6	15,6	45,3	16,4	44,1	17,2	43,3	17,8	42,4	18,4	41,1	19,3	40,7	19,7	39,9	20,4
	7	49,6	14,8	48,8	15,2	48	15,7	46,7	16,5	45,4	17,3	44,5	17,9	43,7	18,5	42,4	19,5	41,9	19,8	41,1	20,5
	9	52,5	15	51,6	15,4	50,8	15,9	49,4	16,7	48,1	17,5	47,2	18,1	46,3	18,7	44,9	19,7	44,4	20,1	43,5	20,8
	10	54	15,1	53,1	15,5	52,2	16	50,8	16,8	49,5	17,6	48,5	18,2	47,6	18,9	46,2	19,9	45,7	20,2	44,8	20,9
	12	58,7	15,4	57,7	15,8	56,7	16,3	55,3	17,2	53,8	18	52,8	18,6	51,8	19,3	50,2	20,3	49,7	20,6	48,7	21,3
65E	6	68,6	21,5	67,4	22,2	66,2	23	64,4	24,2	62,6	25,5	61,3	26,4	60,1	27,4	58,3	28,9	57,7	29,4	56,4	30,4
	7	70,5	21,7	69,3	22,4	68,1	23,2	66,2	24,4	64,4	25,7	63,1	26,6	61,9	27,6	60	29,1	59,3	29,6	-	-
	9	74,5	22	73,3	22,8	72	23,5	70	24,8	68,1	26,1	66,8	27	65,5	28	63,5	29,5	62,8	30,1	-	-
	10	76,6	22,2	75,3	22,9	74	23,7	72	25	70	26,3	68,7	27,2	67,3	28,2	65,3	29,8	64,6	30,3	-	-
	12	83,1	22,8	81,7	23,5	80,2	24,3	78,1	25,6	75,9	27	74,5	27,9	73	28,9	70,8	30,5	-	-	-	-
75E	6	80,3	24,1	78,9	24,9	77,5	25,8	75,3	27,2	73,2	28,6	71,8	29,6	70,4	30,7	68,2	32,4	67,5	33	-	-
	7	82,5	24,3	81,1	25,1	79,7	26	77,5	27,4	75,3	28,8	73,9	29,9	72,4	31	70,2	32,7	69,4	33,3	-	-
	9	87,2	24,7	85,7	25,6	84,2	26,4	81,9	27,8	79,6	29,3	78,1	30,4	76,6	31,5	74,2	33,2	73,4	33,8	-	-
	10	89,6	24,9	88,1	25,8	86,5	26,7	84,2	28,1	81,9	29,6	80,3	30,6	78,7	31,8	76,3	33,5	-	-	-	-
	12	97,1	25,6	95,5	26,5	93,8	27,4	91,3	28,8	88,7	30,4	87	31,5	85,3	32,6	-	-	-	-	-	-
100E	6	102,3	30,9	100,6	31,9	98,8	33	96,2	34,8	93,5	36,6	91,7	37,9	89,9	39,3	87,1	41,4	86,2	42,2	84,4	43,7
	7	105,2	31,2	103,4	32,2	101,6	33,3	98,9	35	96,2	36,9	94,3	38,2	92,5	39,6	89,7	41,8	88,8	42,5	86,9	44,1
	9	111,2	31,6	109,3	32,7	107,4	33,8	104,6	35,6	101,7	37,5	99,8	38,8	97,8	40,2	94,9	42,4	93,9	43,2	-	-
	11	117,4	32,1	115,4	33,2	113,4	34,3	110,5	36,1	107,4	38,1	105,4	39,4	103,4	40,8	100,3	43,1	99,2	43,8	-	-
	12	123,8	32,7	121,8	33,8	119,7	34,9	116,6	36,7	113,4	38,7	111,2	40,1	109,1	41,5	105,8	43,8	-	-	-	-
110E	6	119,4	35,9	117,3	37,1	115,2	38,4	112,1	40,5	109	42,7	106,8	44,2	104,7	45,8	101,5	48,4	100,4	49,3	-	-
	7	122,7	36,2	120,6	37,4	118,5	38,7	115,3	40,8	112,1	43	109,9	44,6	107,8	46,2	104,5	48,8	103,4	49,7	-	-
	9	129,6	36,8	127,4	38	125,2	39,4	121,9	41,5	118,5	43,7	116,2	45,3	113,9	47	110,5	49,6	109,3	50,5	-	-
	11	136,8	37,4	134,5	38,7	132,2	40	128,6	42,2	125,1	44,5	122,7	46,1	120,3	47,8	116,7	50,4	-	-	-	-
	12	144,2	38,1	141,8	39,4	139,4	40,7	135,7	42,9	131,9	45,3	129,4	46,9	126,9	48,6	-	-	-	-	-	-
90D	6	96,6	29,2	95	30,1	93,3	31,1	90,8	32,6	88,3	34,2	86,7	35,4	85	36,6	82,4	38,6	81,6	39,2	79,9	40,6
	7	99,4	29,4	97,7	30,3	96,1	31,3	93,5	32,8	90,9	34,5	89,2	35,6	87,5	36,9	84,9	38,8	84	39,5	82,3	40,9
	9	105,2	29,8	103,4	30,7	101,7	31,7	99	33,2	96,3	34,9	94,5	36,1	92,7	37,4	89,9	39,3	89	40	87,2	41,4
	10	108,2	30	106,4	30,9	104,6	31,9	101,8	33,5	99,1	35,2	97,2	36,4	95,3	37,6	92,5	39,6	91,6	40,3	89,7	41,7
	12	117,5	30,6	115,6	31,6	113,6	32,6	110,7	34,2	107,7	35,9	105,7	37,1	103,7	38,4	100,6	40,5	99,6	41,2	97,5	42,6

Qo : *Net cooling capacity in kW*

P : *Total power (including compressors fans and control) in Kw*

Fouling factor **:** 0,044 m^2C/kW

XXX $\triangle T = 5°C$

ECOLOGIC HE	°C Water outlet Temperature	Air inlet temperature																			
		28°C		30°C		32°C		35°C		38°C		40°C		42°C		45°C		46°C		48° C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
130D	6	137,4	41,3	135	42,7	132,6	44,2	129	46,5	125,4	48,9	123	50,7	120,5	52,5	116,8	55,4	115,6	56,4	113,1	58,4
	7	141,3	41,7	138,9	43	136,4	44,5	132,7	46,8	129	49,3	126,5	51,1	124	52,9	120,3	55,8	119	56,8	-	-
	9	149,3	42,3	146,8	43,7	144,2	45,2	140,4	47,6	136,5	50,1	133,9	51,9	131,2	53,7	127,3	56,7	125,9	57,7	-	-
	11	157,7	43	155	44,4	152,3	45,9	148,3	48,3	144,2	50,9	141,4	52,7	138,7	54,6	134,5	57,6	133,1	58,6	-	-
	12	166,4	43,7	163,6	45,2	160,8	46,7	156,5	49,2	152,2	51,8	149,3	53,6	146,4	55,5	142	58,6	-	-	-	-
150D	6	160,5	48,2	157,7	49,8	154,9	51,5	150,7	54,2	146,4	57,2	143,6	59,2	140,7	61,4	136,3	64,8	134,9	66	-	-
	7	165	48,5	162,2	50,2	159,3	51,9	155	54,7	150,6	57,6	147,7	59,7	144,8	61,9	140,3	65,3	138,8	66,5	-	-
	9	174,4	49,3	171,4	51	168,4	52,8	163,9	55,6	159,3	58,6	156,2	60,7	153,1	62,9	148,4	66,4	146,9	67,6	-	-
	11	184,1	50,2	180,9	51,9	177,8	53,7	173	56,6	168,2	59,6	165	61,8	161,7	64	156,8	67,5	-	-	-	-
	12	194,2	51,1	190,9	52,8	187,6	54,7	182,5	57,6	177,5	60,7	174	62,9	170,6	65,2	-	-	-	-	-	-
200D	6	204,5	61,5	201	63,6	197,5	65,7	192,2	69,2	186,8	72,9	183,2	75,5	179,6	78,2	174,2	82,5	172,3	84	168,7	87,1
	7	210,3	62	206,7	64	203,1	66,2	197,7	69,7	192,2	73,4	188,5	76,1	184,8	78,8	179,3	83,1	177,4	84,6	173,6	87,7
	9	222,2	62,9	218,5	65	214,7	67,2	209	70,8	203,3	74,6	199,4	77,2	195,5	80	189,7	84,4	187,7	85,9	-	-
	11	234,6	63,9	230,7	66,1	226,7	68,3	220,8	71,9	214,7	75,8	210,7	78,5	206,6	81,3	200,4	85,8	198,3	87,3	-	-
	12	247,5	65	243,4	67,2	239,2	69,5	233	73,1	226,6	77	222,3	79,8	218	82,7	211,5	87,2	-	-	-	-
230D	6	239,3	71,8	235,2	74,2	231	76,8	224,8	80,9	218,5	85,3	214,2	88,4	210	91,6	203,5	96,7	201,4	98,5	-	-
	7	246	72,4	241,8	74,8	237,6	77,4	231,2	81,6	224,7	86	220,4	89,1	216	92,4	209,5	97,5	207,3	99,3	-	-
	9	259,9	73,5	255,5	76,1	251	78,7	244,3	82,9	237,6	87,4	233	90,6	228,4	93,9	221,5	99,1	219,2	100,9	-	-
	11	274,2	74,8	269,6	77,3	264,9	80	257,9	84,3	250,8	88,9	246	92,1	241,2	95,5	233,9	100,8	-	-	-	-
	12	289,1	76,1	284,3	78,7	279,4	81,5	272	85,8	264,5	90,5	259,5	93,8	254,4	97,2	-	-	-	-	-	-
300D	6	307,8	100,8	302,5	104,2	297,1	107,9	288,9	113,8	280,7	120,1	275,2	124,5	269,6	129,1	261,2	136,3	-	-	-	-
	7	316,4	101,6	310,9	105,1	305,4	108,9	297	114,8	288,6	121,1	283	125,5	277,3	130,2	268,7	137,5	-	-	-	-
	9	333,9	103,4	328,1	107	322,4	110,8	313,6	116,8	304,8	123,2	298,9	127,8	292,9	132,5	-	-	-	-	-	-
	11	351,9	105,3	345,9	109	339,9	112,8	330,7	118,9	321,5	125,5	315,3	130,1	309	134,9	-	-	-	-	-	-
	12	370,7	107,3	364,4	111	358	114,9	348,4	121,2	338,7	127,9	332,1	132,5	325,5	137,4	-	-	-	-	-	-
370D	6	378,4	128,6	371,7	133,2	364,9	138,1	354,6	145,7	344,3	153,9	337,3	159,7	330,3	165,6	-	-	-	-	-	-
	7	388,8	129,9	381,9	134,5	375	139,4	364,5	147,1	353,9	155,4	346,8	161,2	339,6	167,2	-	-	-	-	-	-
	9	410	132,5	402,8	137,2	395,5	142,2	384,5	150,1	373,4	158,5	366	164,4	358,4	170,5	-	-	-	-	-	-
	11	431,8	135,2	424,3	140	416,7	145,1	405,1	153,1	393,5	161,7	385,6	167,7	-	-	-	-	-	-	-	-
	12	454,5	138	446,5	143	438,5	148,2	426,4	156,4	414,1	165,1	405,8	171,2	-	-	-	-	-	-	-	-

Qo : *Net cooling capacity in kW*

P : *Total power (including compressors fans and control) in Kw*

***Fouling factor* :** 0,044 m^2C/kW

XXX $\triangle T = 5°C$

COMPRESSORS AND REFRIGERANT CIRCUITS

ECOLOGIC HE		40E	45E	65E	75E	100E	110E
Compressor type		Scroll					
Number of compressors / Number of circuits		2/1	2/1	2/1	2/1	3/1	3/1
Capacity steps for the unit	%	0-50 100	0-50 100	0-50 100	0-50 100	0-33 67-100	0-33 67-100
Refrigerant charge per circuit	kg	19	19	24	32	36	45
Oil charge per compressor	l	3,25	3,8	4	6,6	4	6,6

		90D	130D	150D	200D	230D	300D	370D
Compressor type		Scroll						
Number of compressors / Number of circuits		4/2	4/2	4/2	6/2	6/2	6/2	6/2
Capacity steps for the unit	%	0-25-50-75-100	0-25-50-75-100	0-25-50-75-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100
Refrigerant charge per circuit	kg	19	24	32	36	47	56	65
Oil charge per compressor	l	3,8	4	6,6	4	6,6	8	8

EVAPORATORS

ECOLOGIC HE		40E	45E	65E	75E	100E	110E
Number		1					
Water volume	l	4,6	5,3	7,4	8,4	10,5	12
Water piping connnection		2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic

		90D	130D	150D	200D	230D	300D	370D
Number		1						
Water volume	l	9	12,4	14,1	19,1	22,9	27,3	36,5
Water piping connnection		2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2"1/2 Victaulic	2"1/2 Victaulic

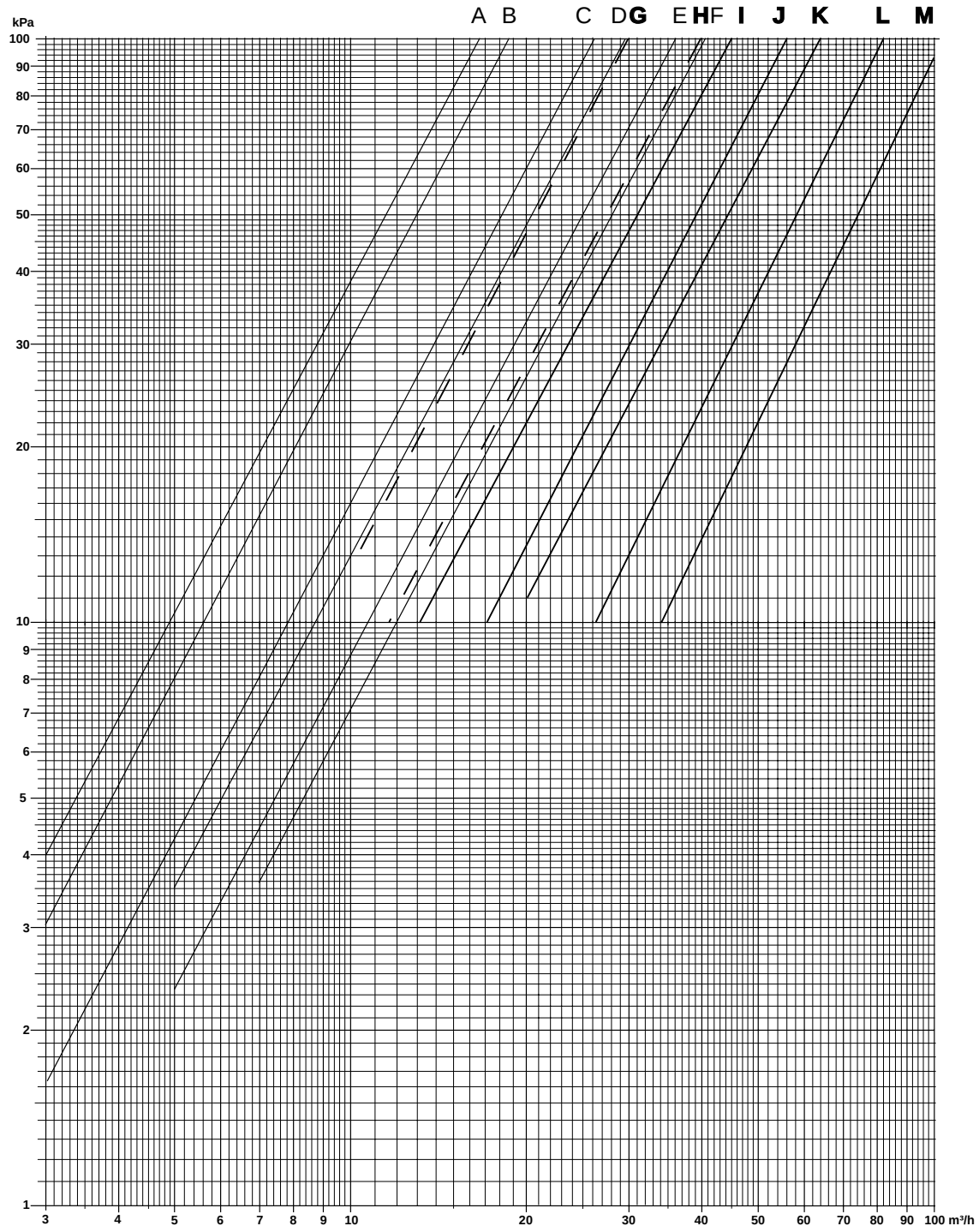
CONDENSERS

ECOLOGIC HE		40E	45E	65E	75E	100E	110E	90D
Ventilation type		Axial - Direct coupling 900 tr/mn						
Fan number		2	2	2	2	3	3	4
Air flow rate	m^3/h	27 700	27 700	27 700	26 300	45 000	39 450	55 400
Total fan power absorbed	kW	1,96	1,96	1,96	1,96	2,94	2,94	3,92
Each fan nominal load current	A	1,75	1,75	1,75	1,75	1,75	1,75	1,75
		130D	**150D**	**200D**	**230D**	**300D**	**370D**	
Ventilation type		Axial - Direct coupling 900 tr/mn						
Fan number		4	4	6	6	8	8	
Air flow rate	m^3/h	54 000	52 600	90 000	78 900	108 000	105 200	
Total fan power absorbed	kW	3,92	3,92	5,88	5,88	7,84	7,84	
Each fan nominal load current	A	1,75	1,75	1,75	1,75	1,75	1,75	

ELECTRICAL DATA

ECOLOGIC HE		40E	45E	65E	75E	100E	110E	90D
Maximum power	*kW*	17	23	29	33	43	50	46
Maximum current	*A*	32	40	50	59	74	88	78
Start-up current	*A*	125	150	185	215	210	245	90
Start-up current with Softstarter (option)	*A*	85	100	125	145	150	175	80
		130D	**150D**	**200D**	**230D**	**300D**	**370D**	
Maximum power	*kW*	57	66	85	99	136	164	
Maximum current	*A*	98	116	146	173	226	274	
Start-up current	*A*	230	270	280	330	415	510	
Start-up current with Softstarter (option)	*A*	170	200	220	260	325	400	

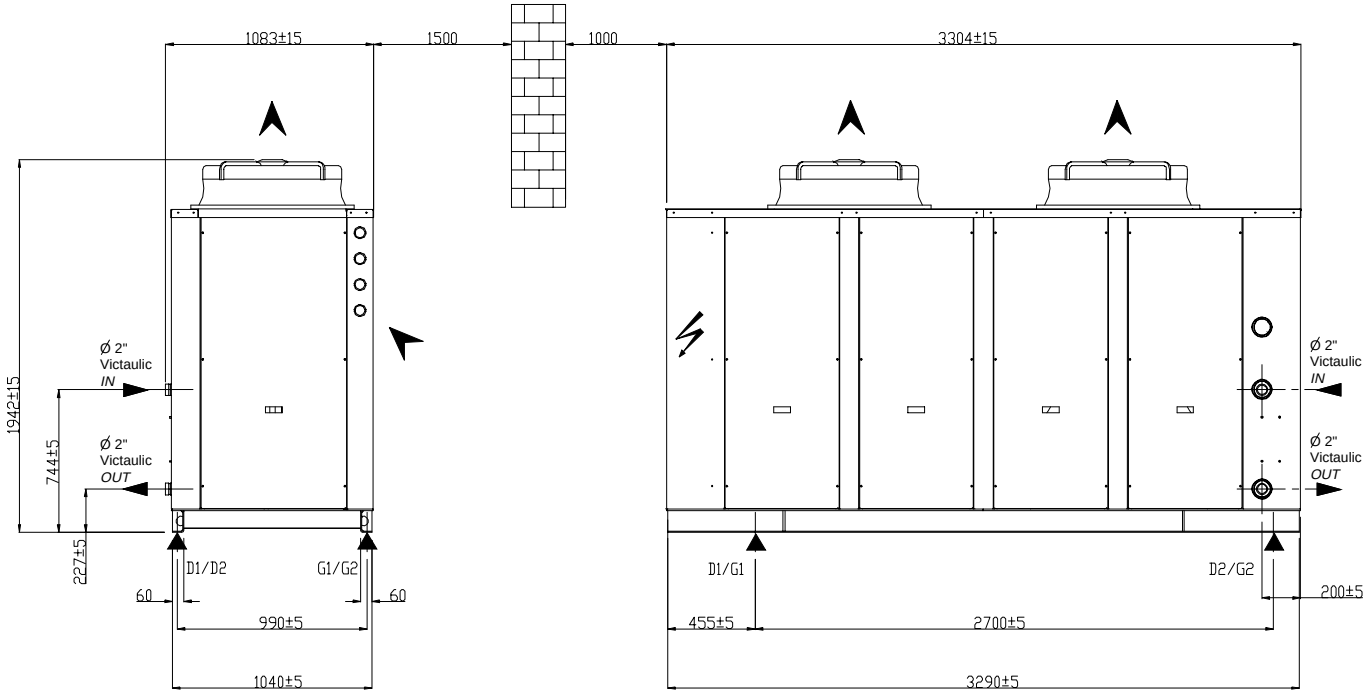
Maximum Current : current of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Maximum Power : power of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Start-up current : (n-1) compressors running current at full load with necessary fans currents plus 1 compressor starting current.



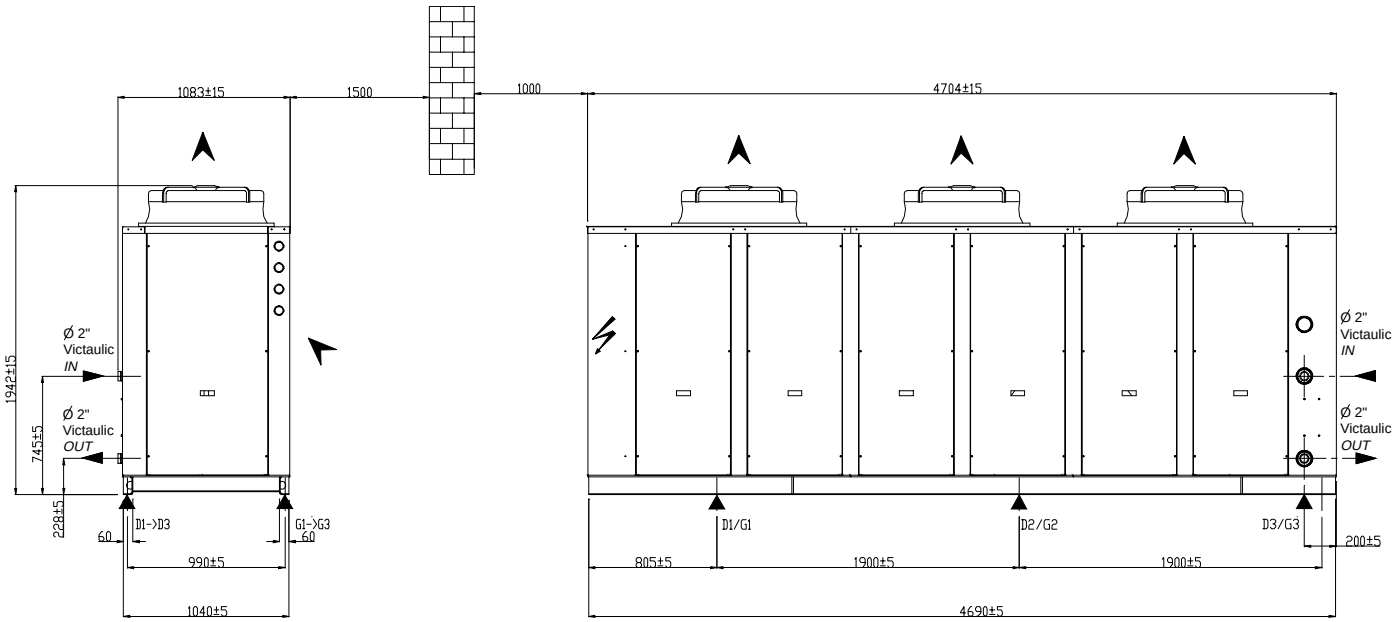
ECOLOGIC HE	40E	45E	65E	75E	100E	110E	90D
Curve	A	B	C	D	E	F	G
	130D	**150D**	**200D**	**230D**	**300D**	**370D**	
Curve	H	I	J	K	L	M	

Pressure drops are given for informations only. A tolerance of +/- 20kPa must be considered when selecting water pumps.

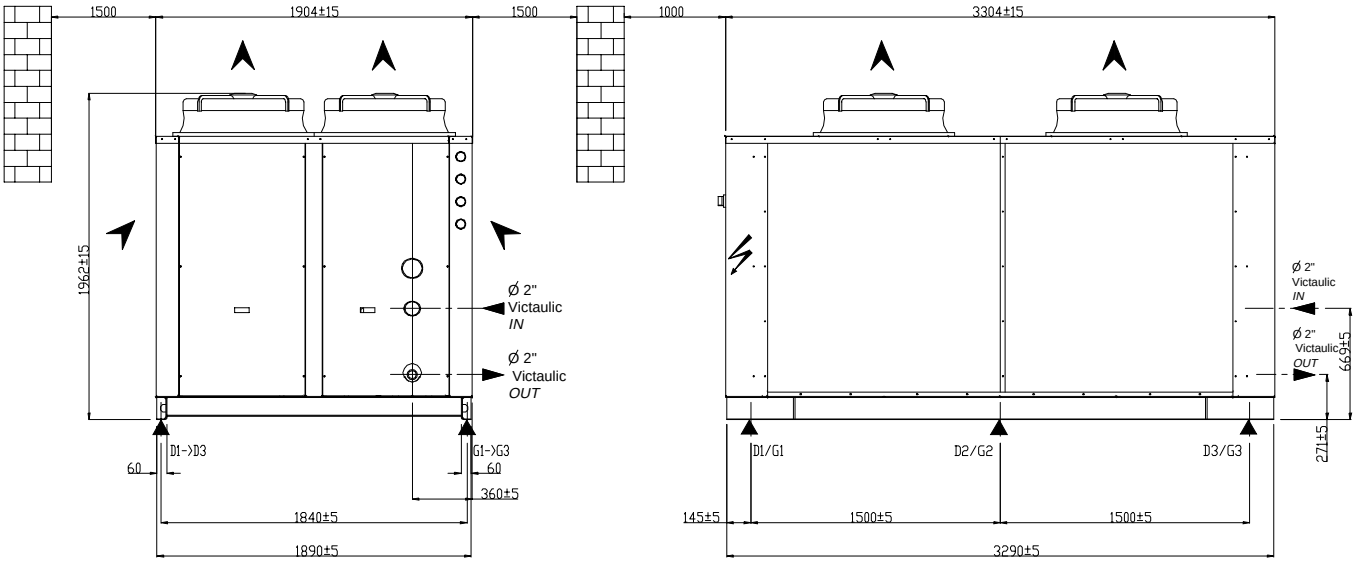
40 E / 45 E / 65 E / 75 E



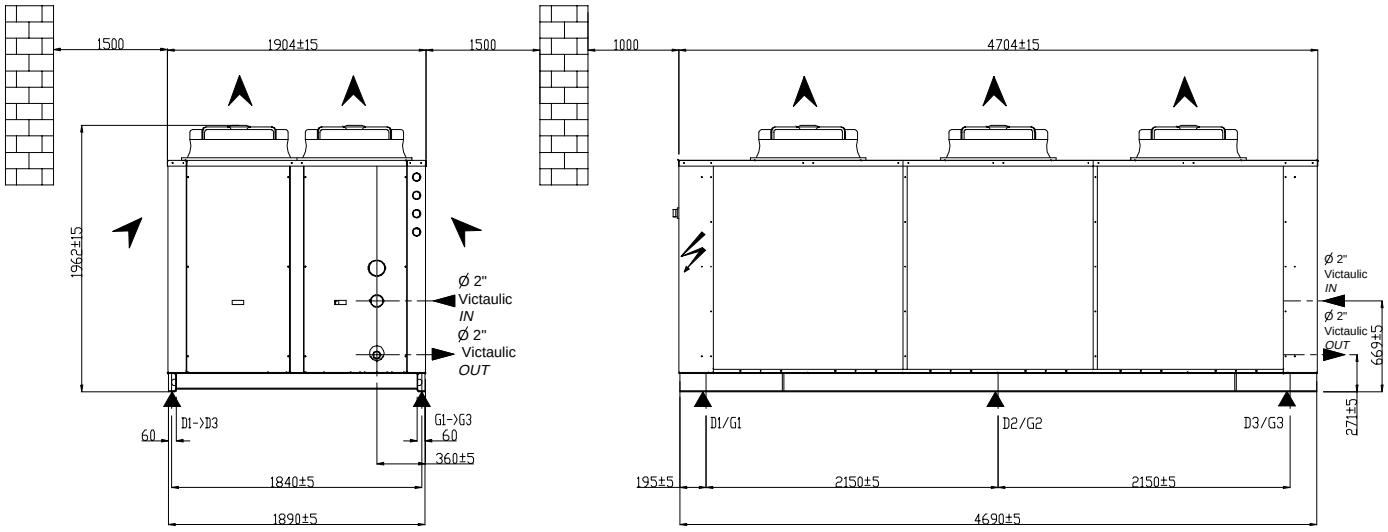
100 E / 110 E



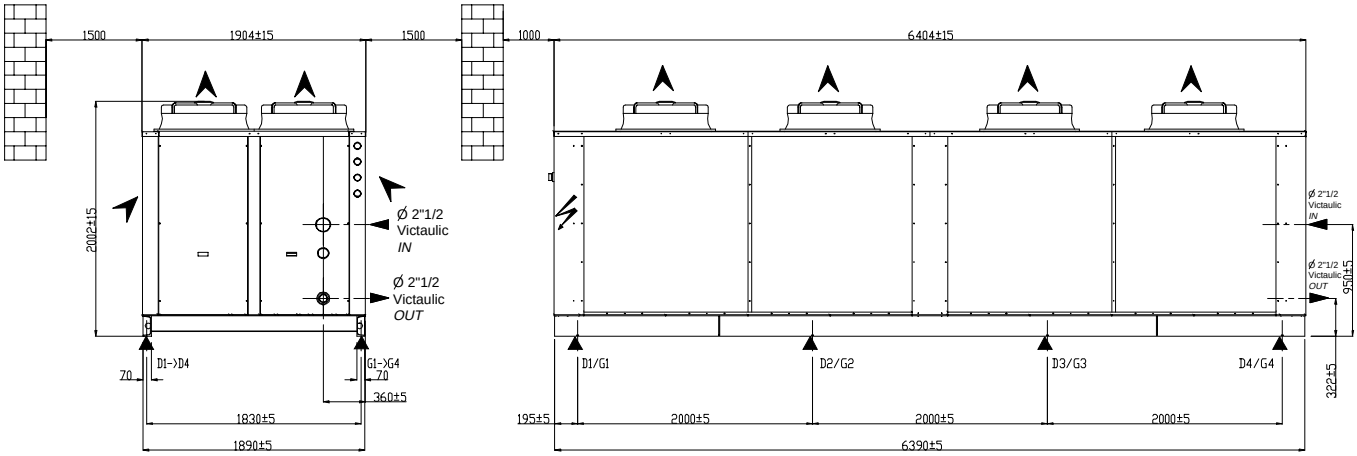
90 D / 130 D / 150 D



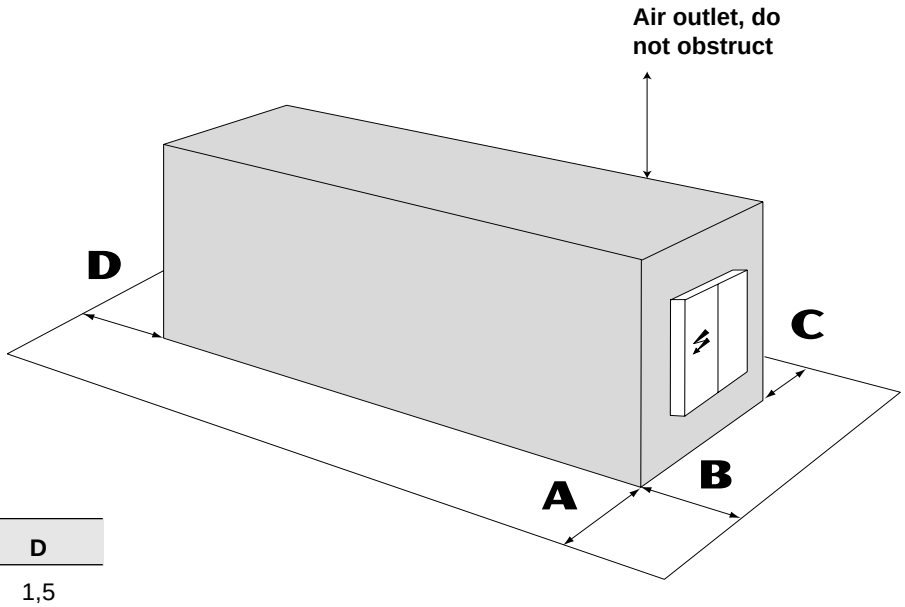
200 D / 230 D



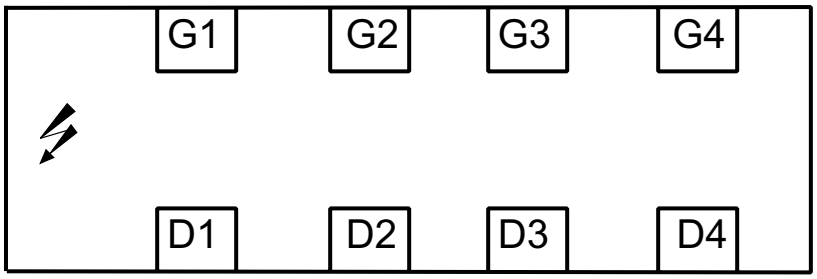
300D / 370 D



clearances



	A	B	C	D
(m)	1,5	1	1,5	1,5



Load distribution is calculated for antivribating mounts rubber with static resistance of 2200 N/mm

Unit without option

ECOLOGIC	HE	40E	45E	65E	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	794	818	902	973	1189	1295	1356	1524	1684	2091	2322	3317	3367
Operating weight	(Kg)	799	823	909	981	1199	1307	1368	1536	1696	2110	2345	3344	3403
Point Load (Kg)	D1	229	235	246	251	191	189	218	235	260	290	312	365	367
	D2	227	238	253	375	266	284	253	293	330	469	537	491	493
	D3	-	-	-	-	202	216	187	207	209	262	284	480	484
	D4	-	-	-	-	-	-	-	-	-	-	-	279	290
	G1	189	191	222	244	167	185	227	246	271	297	317	361	367
	G2	154	158	187	211	235	279	277	321	361	495	570	502	508
	G3	-	-	-	-	136	154	207	233	266	297	326	526	537
	G4	-	-	-	-	-	-	-	-	-	-	-	341	356

Unit with service compressor acoustic enclosure (option)

ECOLOGIC	HE	40E	45E	65E	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+84	+79	+81	+86	+103	+108	+127	+120	+117	+182	+170	+136	+222
Operating weight	(Kg)	+83	+79	+81	+86	+103	+108	+124	+121	+119	+182	+170	+136	+223
Point Load (Kg)	D1	+24	+9	+20	+24	+18	+22	+22	+18	+11	+25	+22	+126	+20
	D2	+17	+6	+26	+20	+20	+22	+24	+24	+26	+44	+42	+0	+35
	D3	-	-	-	-	+16	+11	+22	+17	+35	+24	+22	+0	+35
	D4	-	-	-	-	-	-	-	-	-	-	-	279	290
	G1	+22	+36	+18	+24	+20	+20	+24	+18	+15	+24	+24	+9	+20
	G2	+20	+29	+18	+18	+20	+22	+24	+24	+24	+42	+37	+0	+31
	G3	-	-	-	-	+11	+11	+6	+20	+7	+24	+22	-5	+39
	G4	-	-	-	-	-	-	-	-	-	-	-	+0	+22

Unit with coil guard grill (option)

ECOLOGIC	HE	40E	45E	65E	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+26	+26	+26	+26	+39	+39	+54	+54	+54	+78	+78	+104	+104
Operating weight	(Kg)	+26	+26	+26	+26	+39	+39	+54	+54	+54	+78	+78	+104	+104
Point Load (Kg)	D1	+0	+0	+0	+0	+0	+0	+9	+9	+9	+13	+13	+13	+13
	D2	+0	+0	+0	+0	+0	+0	+9	+9	+9	+13	+13	+13	+13
	D3	-	-	-	-	+0	+0	+9	+9	+9	+13	+13	+13	+13
	D4	-	-	-	-	-	-	-	-	-	-	-	+13	+13
	G1	+13	+13	+13	+13	+13	+13	+9	+9	+9	+13	+13	+13	+13
	G2	+13	+13	+13	+13	+13	+13	+9	+9	+9	+13	+13	+13	+13
	G3	-	-	-	-	+13	+13	+9	+9	+9	+13	+13	+13	+13
	G4	-	-	-	-	-	-	-	-	-	-	-	+13	+13

NOISE LEVELS : unit without option

ECOLOGIC	*Spectrum per octave band (dBA)*								*Global sound power*
HE	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
40E	50	75	75	80	74	70	67	52	**83**
45E	51	75	75	80	74	75	71	52	**84**
65E	49	75	75	82	76	76	73	52	**85**
75E	49	75	75	81	77	77	74	52	**85**
100E	51	77	77	83	78	78	75	54	**87**
110E	51	77	77	83	79	79	76	54	**87**
90D	54	78	78	83	77	78	74	55	**87**
130D	52	78	78	85	79	79	76	55	**88**
150D	52	78	78	84	80	80	77	55	**88**
200D	54	80	80	86	81	81	78	57	**90**
230D	54	80	80	86	82	82	79	57	**90**
300D	57	81	81	89	84	83	82	58	**92**
370D	56	81	81	90	84	82	81	58	**93**

NOISE LEVELS : unit with "compressor acoustic enclosure" (option)

ECOLOGIC	*Spectrum per octave band (dBA)*								*Global sound power*
HE	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
40E	49	75	75	80	74	69	61	52	**83**
45E	49	75	75	80	74	70	63	52	**83**
65E	49	75	75	80	74	71	64	52	**83**
75E	49	75	75	80	75	71	65	52	**83**
100E	51	77	77	82	76	72	66	54	**85**
110E	51	77	77	82	76	73	67	54	**85**
90D	52	78	78	83	77	73	66	55	**86**
130D	52	78	78	83	77	74	74	55	**86**
150D	52	78	78	83	78	74	68	55	**86**
200D	54	80	80	85	79	75	69	57	**88**
230D	54	80	80	85	79	76	70	57	**88**
300D	55	81	81	86	81	77	72	58	**89**
370D	55	81	81	86	81	77	71	58	**89**

Global sound power level measured in compliance with ISO standard 3744.
Only the sound power spectrum and the global sound power value are used in determining pressure characteristics at owner land limit.

ECOLOGIC HE	40E	45E	65E	75E	100E	110E
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C					
Chilled water entering temperature	Minimum : (2) Maximum : +20°C					
Difference chilled water inlet/outlet	Minimum : 3° Maximum : +8 °C					

	90D	130D	150D	200D	230D	300D	370D
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C						
Chilled water entering temperature	Minimum : (2) Maximum : +20°C						
Difference chilled water inlet/outlet	Minimum : 3° Maximum : +8 °C						

1) *Below +5°C, add glycol to the water circuit.*

(2) *Value corresponding to the minimum of 5°C chilled water leaving temperature at considered flow rate*

APART FROM THESE VALUES, PLEASE CONSULT US

MAXIMUM STARTING AMBIENT CONDITIONS

Temperatures are calculated according to start-up units conditions, with two differents configurations

❶ Full load starting : **without** CLIMATIC II ™ controller (offloading not available)

❷ HP offloading starting **with** CLIMATIC II ™ controller (optional)

* Based on max discharge condition of 62°C.

Ambient air temperature (°C)

ECOLOGIC HE	40E	45E	65E	75E	100E	110E	90D
Configuration ❷	54	52,5	52,5	52,5	50,5	50	52,5
	130D	**150D**	**200D**	**230D**	**300D**	**370D**	
Configuration ❷	52,5	52,5	53,5	53	48,5	47,5	

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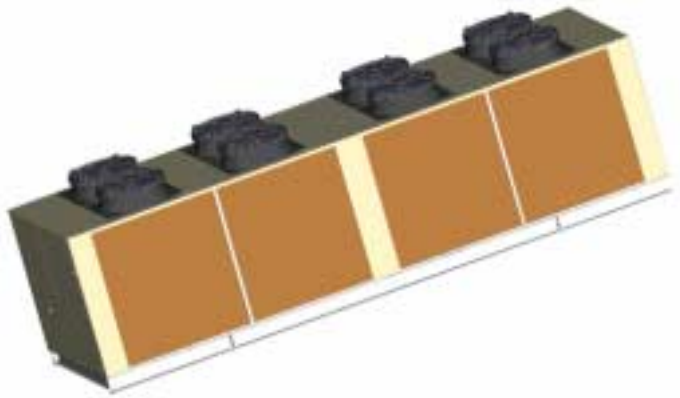


ECOLOGIC Super Low Noise

The super low noise version is the leading low noise chiller in Europe of those listed in the 2001 Eurovent directory. It has a range of 13 units with capacities from 40 to 370kW. It has a larger footprint than the Standard and LN versions it is always one size larger to accommodate the larger condenser surface required. The super low noise uses the same compressors and basic unit assembly as the standard unit. It is fitted as standard with the advanced ClimaticII controller with a KP02 user interface. In addition the unit is fitted with low speed low noise condenser fans and the compressors are housed in an acoustic ventilated enclosure.

The acoustic housing is constructed of removable galvanised sheet metal sections. The inner surfaces have acoustic waffle foam attached to prevent noise breakout and vibration in the panels. Compartment in covered with sound-insulated foam: PAE 28 mm, 3 kg/m2 mass, protection films, fire classification M1. This unit is also fitted with a thermostatic controlled ventilation fan to prevent heat build up in the acoustic housing

ECOLOGIC SLN		Air inlet temperature																			
		28°C		30°C		32°C		35°C		38°C		40°C		42°C		45°C		46°C		48° C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
40E	6	41,9	11,1	41,2	11,5	40,5	11,9	39,4	12,6	38,3	13,3	37,6	13,8	36,9	14,3	35,8	15,1	35,4	15,4	34,7	16
	7	43,2	11,2	42,4	11,6	41,7	12	40,6	12,7	39,5	13,4	38,7	13,9	38	14,4	36,8	15,2	36,5	15,5	35,7	16,1
	9	45,6	11,4	44,9	11,8	44,1	12,2	43	12,9	41,8	13,6	41	14,1	40,2	14,6	39	15,5	38,6	15,8	37,8	16,4
	11	48,2	11,5	47,4	12	46,6	12,4	45,4	13,1	44,2	13,8	43,4	14,3	42,5	14,9	41,3	15,7	40,8	16	40	16,6
	12	51	11,7	50,1	12,1	49,3	12,6	48	13,3	46,7	14	45,8	14,5	44,9	15,1	43,6	16	43,2	16,3	-	-
45E	6	48,3	13,5	47,4	14	46,6	14,5	45,3	15,3	44	16,2	43,2	16,8	42,3	17,5	41	18,5	40,6	18,8	-	-
	7	49,6	13,6	48,8	14,1	47,9	14,6	46,6	15,5	45,3	16,3	44,4	17	43,5	17,6	42,2	18,6	41,8	19	-	-
	9	52,5	13,9	51,6	14,4	50,7	14,9	49,3	15,7	47,9	16,6	47	17,3	46,1	17,9	44,7	19	44,2	19,3	-	-
	11	55,4	14,1	54,4	14,6	53,5	15,2	52,1	16	50,6	16,9	49,6	17,6	48,7	18,2	47,2	19,3	-	-	-	-
	12	58,5	14,4	57,5	14,9	56,5	15,5	55	16,3	53,4	17,2	52,4	17,9	51,4	18,6	-	-	-	-	-	-
65E	6	67	20,2	65,8	20,9	64,6	21,7	62,8	23	60,9	24,3	59,7	25,2	58,5	26,2	-	-	-	-	-	-
	7	68,8	20,4	67,6	21,1	66,4	21,9	64,5	23,2	62,7	24,5	61,4	25,5	60,2	26,4	-	-	-	-	-	-
	9	72,7	20,8	71,4	21,6	70,1	22,4	68,2	23,7	66,2	25	64,9	26	63,6	27	-	-	-	-	-	-
	11	76,6	21,2	75,3	22	73,9	22,9	71,9	24,2	69,8	25,5	68,4	26,5	67	27,5	-	-	-	-	-	-
	12	80,8	21,7	79,3	22,5	77,9	23,4	75,8	24,7	73,6	26,1	72,1	27,1	-	-	-	-	-	-	-	-
75E	6	77,3	23,9	75,9	24,8	74,5	25,8	72,4	27,2	70,3	28,8	68,9	29,9	67,4	31,1	-	-	-	-	-	-
	7	79,5	24,2	78,1	25,1	76,6	26	74,5	27,5	72,3	29,1	70,8	30,2	69,3	31,4	-	-	-	-	-	-
	9	83,9	24,7	82,4	25,6	80,9	26,6	78,6	28,1	76,3	29,7	74,8	30,9	73,2	32	-	-	-	-	-	-
	11	88,4	25,2	86,8	26,2	85,2	27,2	82,9	28,7	80,4	30,4	78,8	31,5	-	-	-	-	-	-	-	-
	12	93,1	25,8	91,4	26,8	89,8	27,8	87,3	29,4	84,7	31,1	83	32,2	-	-	-	-	-	-	-	-
100E	6	99,8	30,8	98	31,9	96,2	33	93,5	34,9	90,8	36,9	89	38,3	87,2	39,7	84,5	42	-	-	-	-
	7	102,5	31,1	100,7	32,2	98,9	33,4	96,2	35,2	93,4	37,2	91,6	38,6	89,7	40,1	-	-	-	-	-	-
	9	108,2	31,7	106,3	32,8	104,4	34	101,6	35,9	98,7	38	96,7	39,4	94,7	40,9	-	-	-	-	-	-
	11	114,1	32,3	112,1	33,5	110,1	34,7	107,1	36,6	104	38,7	102	40,2	99,9	41,7	-	-	-	-	-	-
	12	120,2	33	118,1	34,2	116	35,4	112,8	37,4	109,6	39,5	107,5	41	-	-	-	-	-	-	-	-
110E	6	115	36,4	113	37,7	110,9	39,1	107,8	41,3	104,6	43,7	102,5	45,4	100,4	47,1	-	-	-	-	-	-
	7	118,2	36,7	116,1	38,1	114	39,5	110,8	41,7	107,6	44,1	105,4	45,8	103,2	47,6	-	-	-	-	-	-
	9	124,7	37,5	122,5	38,9	120,3	40,3	116,9	42,6	113,5	45	111,3	46,8	109	48,5	-	-	-	-	-	-
	11	131,4	38,3	129,1	39,7	126,8	41,2	123,2	43,5	119,7	46	117,3	47,7	-	-	-	-	-	-	-	-
	12	138,3	39,2	135,9	40,6	133,5	42,1	129,7	44,5	126	47	123,5	48,8	-	-	-	-	-	-	-	-
90D	6	96,5	27,7	94,9	28,6	93,2	29,6	90,6	31,3	88,1	33	86,4	34,3	84,6	35,6	82	37,6	81,2	38,3	-	-
	7	99,3	27,9	97,6	28,9	95,8	29,9	93,2	31,5	90,6	33,3	88,9	34,5	87,1	35,8	84,4	37,9	83,5	38,6	-	-
	9	104,9	28,4	103,1	29,4	101,3	30,4	98,6	32,1	95,8	33,9	94	35,1	92,1	36,5	89,3	38,5	88,4	39,2	-	-
	11	110,8	28,9	108,9	29,9	107	30,9	104,1	32,7	101,2	34,5	99,3	35,8	97,3	37,1	94,4	39,2	-	-	-	-
	12	116,9	29,4	114,9	30,4	112,9	31,5	109,9	33,3	106,8	35,1	104,8	36,4	102,7	37,8	-	-	-	-	-	-

Qo : *Net cooling capacity in kW*

P : *Total power (including compressors fans and control) in Kw*

***Fouling factor* :** 0,044 m^2C/kW

XXX $\triangle T = 5°C$

ECOLOGIC SLN	°C Water outlet Temperature	Air inlet temperature																			
		28°C		30°C		32°C		35°C		38°C		40°C		42°C		45°C		46°C		48° C	
		Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P	Qo	P
130D	6	133,9	41	131,6	42,5	129,2	44,1	125,5	46,5	121,9	49,2	119,4	51,1	117	53	-	-	-	-	-	-
	7	137,7	41,4	135,2	42,9	132,8	44,5	129,1	47	125,4	49,7	122,8	51,6	120,3	53,5	-	-	-	-	-	-
	9	145,3	42,2	142,8	43,8	140,2	45,4	136,3	47,9	132,4	50,7	129,8	52,6	127,1	54,6	-	-	-	-	-	-
	11	153,3	43,1	150,6	44,7	147,9	46,3	143,8	48,9	139,7	51,7	136,9	53,6	134,1	55,7	-	-	-	-	-	-
	12	161,5	44	158,7	45,6	155,8	47,3	151,5	50	147,2	52,8	144,2	54,8	-	-	-	-	-	-	-	-
150D	6	154,7	48,5	151,9	50,3	149,1	52,1	144,9	55,1	140,6	58,2	137,7	60,5	134,9	62,8	-	-	-	-	-	-
	7	158,9	49	156,1	50,8	153,2	52,7	148,9	55,7	144,6	58,8	141,6	61,1	138,7	63,4	-	-	-	-	-	-
	9	167,7	50	164,7	51,8	161,7	53,8	157,2	56,8	152,6	60,1	149,5	62,3	146,4	64,7	-	-	-	-	-	-
	11	176,8	51,1	173,7	53	170,5	54,9	165,7	58	160,9	61,4	157,6	63,7	-	-	-	-	-	-	-	-
	12	186,2	52,3	182,9	54,2	179,6	56,2	174,5	59,3	169,4	62,7	166	65,1	-	-	-	-	-	-	-	-
200D	6	199,5	61,3	196	63,5	192,4	65,9	187,1	69,6	181,7	73,5	178,1	76,3	174,4	79,2	168,9	83,8	-	-	-	-
	7	205,1	61,9	201,5	64,1	197,8	66,5	192,4	70,2	186,8	74,2	183,1	77,1	179,4	80	-	-	-	-	-	-
	9	216,4	63,1	212,6	65,4	208,8	67,8	203,1	71,6	197,3	75,7	193,4	78,5	189,5	81,5	-	-	-	-	-	-
	11	228,2	64,4	224,2	66,7	220,2	69,2	214,2	73	208,1	77,2	204	80,1	199,9	83,1	-	-	-	-	-	-
	12	240,3	65,7	236,2	68,1	232	70,6	225,7	74,6	219,2	78,8	214,9	81,7	-	-	-	-	-	-	-	-
230D	6	230,7	72,8	226,5	75,5	222,4	78,3	216,1	82,8	209,8	87,5	205,6	90,9	201,3	94,3	-	-	-	-	-	-
	7	237	73,6	232,8	76,3	228,6	79,1	222,2	83,6	215,7	88,4	211,4	91,8	207	95,3	-	-	-	-	-	-
	9	250	75,1	245,6	77,8	241,2	80,7	234,5	85,3	227,7	90,2	223,1	93,6	218,5	97,2	-	-	-	-	-	-
	11	263,5	76,7	258,8	79,5	254,2	82,5	247,1	87,1	240	92,1	235,2	95,6	-	-	-	-	-	-	-	-
	12	277,4	78,4	272,5	81,3	267,6	84,3	260,2	89	252,7	94,1	247,6	97,6	-	-	-	-	-	-	-	-
300D	6	297,1	110,4	291,7	114,3	286,3	118,3	278,1	124,7	269,8	131,4	264,2	136,2	-	-	-	-	-	-	-	-
	7	305,1	111,5	299,6	115,4	294,1	119,5	285,7	125,9	277,2	132,8	271,5	137,6	-	-	-	-	-	-	-	-
	9	321,6	113,8	315,8	117,8	310	121,9	301,2	128,5	292,3	135,5	286,3	140,4	-	-	-	-	-	-	-	-
	11	338,5	116,3	332,4	120,3	326,3	124,5	317,1	131,2	307,8	138,3	-	-	-	-	-	-	-	-	-	-
	12	355,9	118,8	349,6	123	343,2	127,3	333,4	134,1	323,6	141,3	-	-	-	-	-	-	-	-	-	-
370D	6	362,5	142,3	355,7	147,4	348,9	152,8	338,5	161,2	328,1	170,1	-	-	-	-	-	-	-	-	-	-
	7	372,1	144	365,2	149,1	358,2	154,5	347,6	163	336,9	172,1	-	-	-	-	-	-	-	-	-	-
	9	391,8	147,3	384,5	152,6	377,2	158,1	366,1	166,8	-	-	-	-	-	-	-	-	-	-	-	-
	11	411,9	150,9	404,3	156,3	396,6	161,9	384,9	170,8	-	-	-	-	-	-	-	-	-	-	-	-
	12	432,6	154,7	424,6	160,2	416,5	165,9	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Qo : *Net cooling capacity in kW*

P : *Total power (including compressors fans and control) in Kw*

Fouling factor **:** 0,044 m^2C/kW

XXX $\triangle T = 5°C$

COMPRESSORS AND REFRIGERANT CIRCUITS

ECOLOGIC SLN		40E	45E	65E	75E	100E	110E	90D
Compressor type			Scroll					
Number of compressors / Number of circuits		2/1	2/1	2/1	2/1	3/1	3/1	4/2
Capacity steps for the unit	%	0-50 100	0-50 100	0-50 100	0-50 100	0-33 67-100	0-33 67-100	0-25-50-75-100
Refrigerant charge per circuit	kg	19	19	24	32	36	45	19
Oil charge per compressor	l	3,25	3,8	4	6,6	4	6,6	3,8

		130D	150D	200D	230D	300D	370D
Compressor type		Scroll					
Number of compressors / Number of circuits		4/2	4/2	6/2	6/2	6/2	6/2
Capacity steps for the unit	%	0-25-50-75-100	0-25-50-75-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100	0-17-33-50 67-83-100
Refrigerant charge per circuit	kg	24	32	36	47	56	65
Oil charge per compressor	l	4	6,6	4	6,6	8	8

EVAPORATORS

ECOLOGIC SLN		40E	45E	65E	75E	100E	110E	90D
Number			1					
Water volume	l	4,6	5,3	7,4	8,4	10,5	12	9
Water piping connection		2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic

		130D	150D	200D	230D	300D	370D
Number				1			
Water volume	l	12,4	14,1	19,1	22,9	27,3	36,5
Water piping connection		2" Victaulic	2" Victaulic	2" Victaulic	2" Victaulic	2"1/2 Victaulic	2"1/2 Victaulic

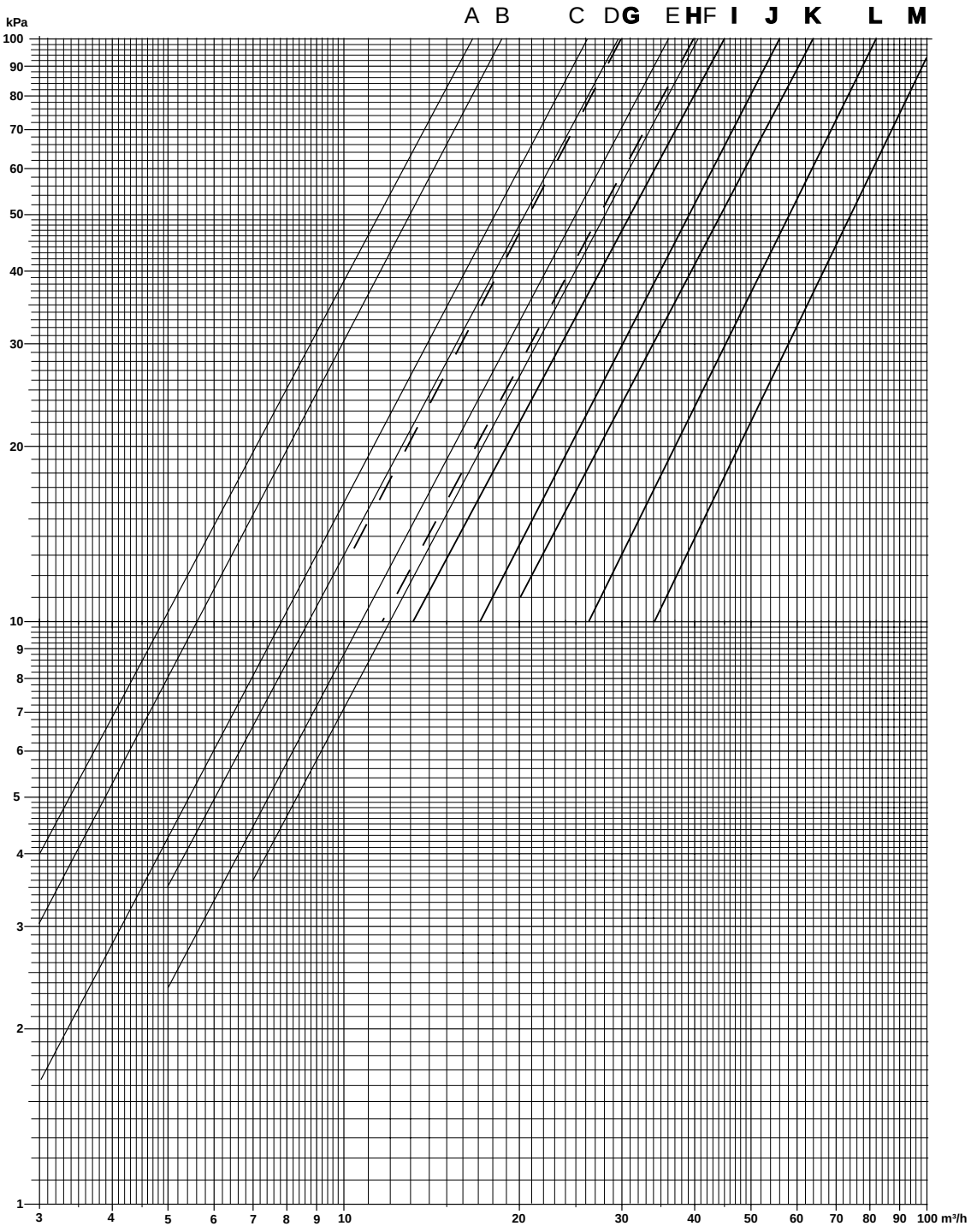
CONDENSERS

ECOLOGIC SLN		40E	45E	65E	75E	100E	110E	90D
Ventilation type		Axial - Direct coupling 700 tr/mn						
Fan number		2	2	2	2	3	3	4
Air flow rate	m^3/h	20 600	20 600	20 300	20 100	30 450	30 150	41 200
Total fan power absorbed	kW	0,84	0,84	0,84	0,84	1,26	1,26	1,68
Each fan nominal load current	A	0,94	0,94	0,94	0,94	0,94	0,94	0,94
		130D	**150D**	**200D**	**230D**	**300D**	**370D**	
Ventilation type		Axial - Direct coupling 700 tr/mn						
Fan number		4	4	6	6	8	8	
Air flow rate	m^3/h	40 600	40 200	60 900	60 300	81 200	80 400	
Total fan power absorbed	kW	1,68	1,68	2,52	2,52	3,36	3,36	
Each fan nominal load current	A	0,94	0,94	0,94	0,94	0,94	0,94	

ELECTRICAL DATA

ECOLOGIC SLN		40E	45E	65E	75E	100E	110E	90D
Maximum power	*kW*	17	23	29	33	43	50	46
Maximum current	*A*	30	39	49	58	72	85	85
Start-up current	*A*	120	145	180	210	205	240	85
Start-up current with Softstarter	*A*	80	100	120	140	145	170	75
		130D	**150D**	**200D**	**230D**	**300D**	**370D**	
Maximum power	*kW*	57	66	85	99	136	164	
Maximum current	*A*	95	113	141	168	220	268	
Start-up current	*A*	225	265	275	320	405	500	
Start-up current with Softstarter	*A*	165	195	215	250	320	390	

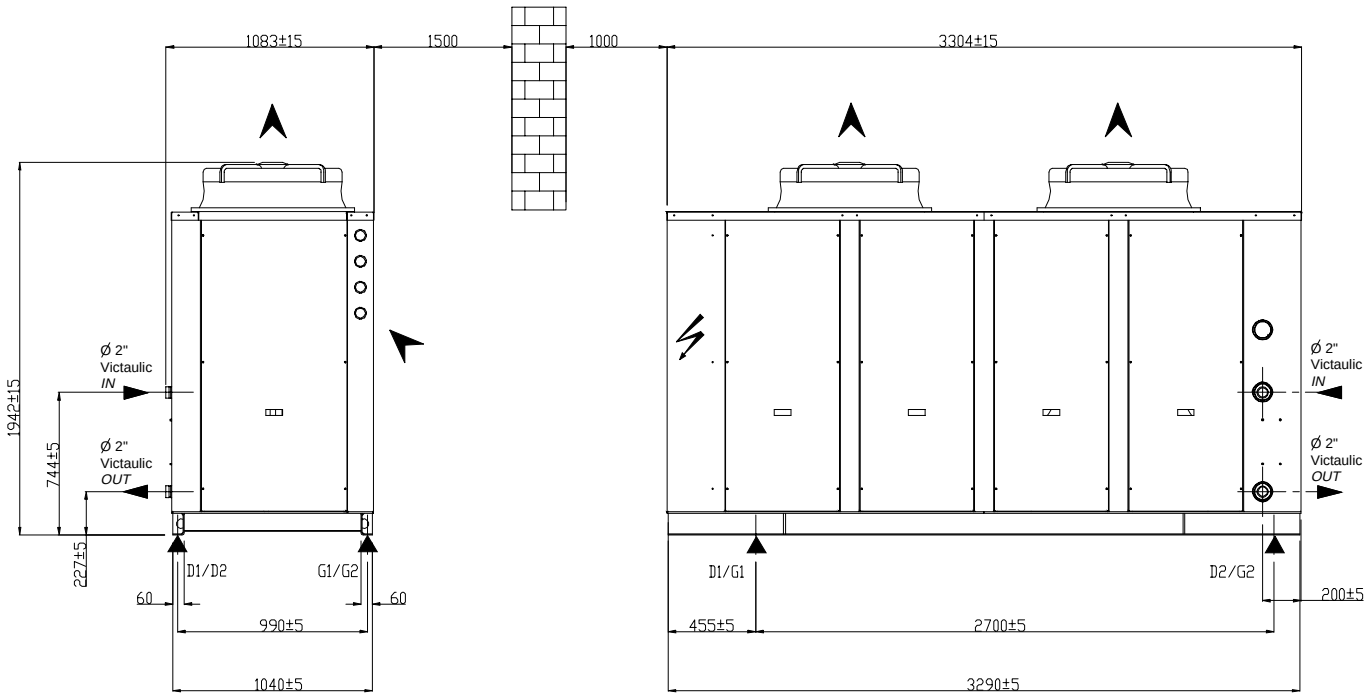
Maximum Current : current of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Maximum Power : power of the unit at maximum load all fans operating and compressors at +12°C/+65°C
Start-up current : (n-1) compressors running current at full load with necessary fans currents plus 1 compressor starting current.



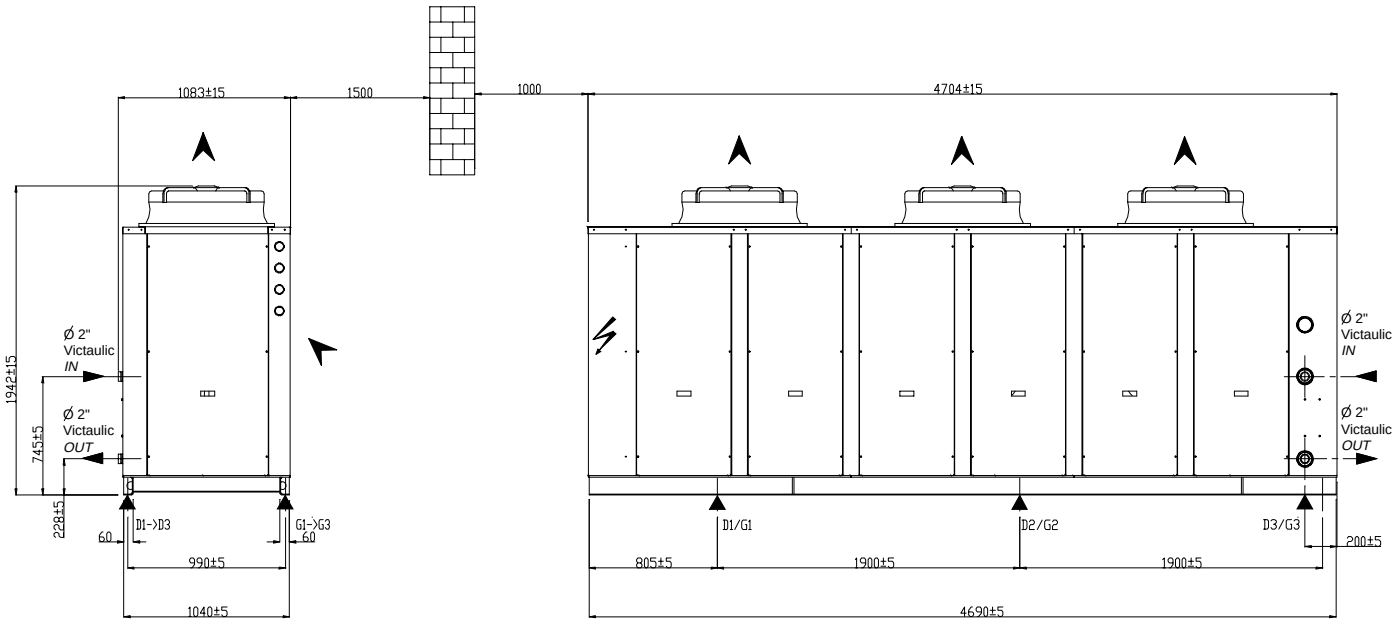
ECOLOGIC SLN	40E	45E	65E	75E	100E	110E	90D
Curve	A	B	C	D	E	F	G
	130D	**150D**	**200D**	**230D**	**300D**	**370D**	
Curve	H	I	J	K	L	M	

Pressure drops are given for informations only. A tolerance of +/- 20kPa must be considered when selecting water pumps.

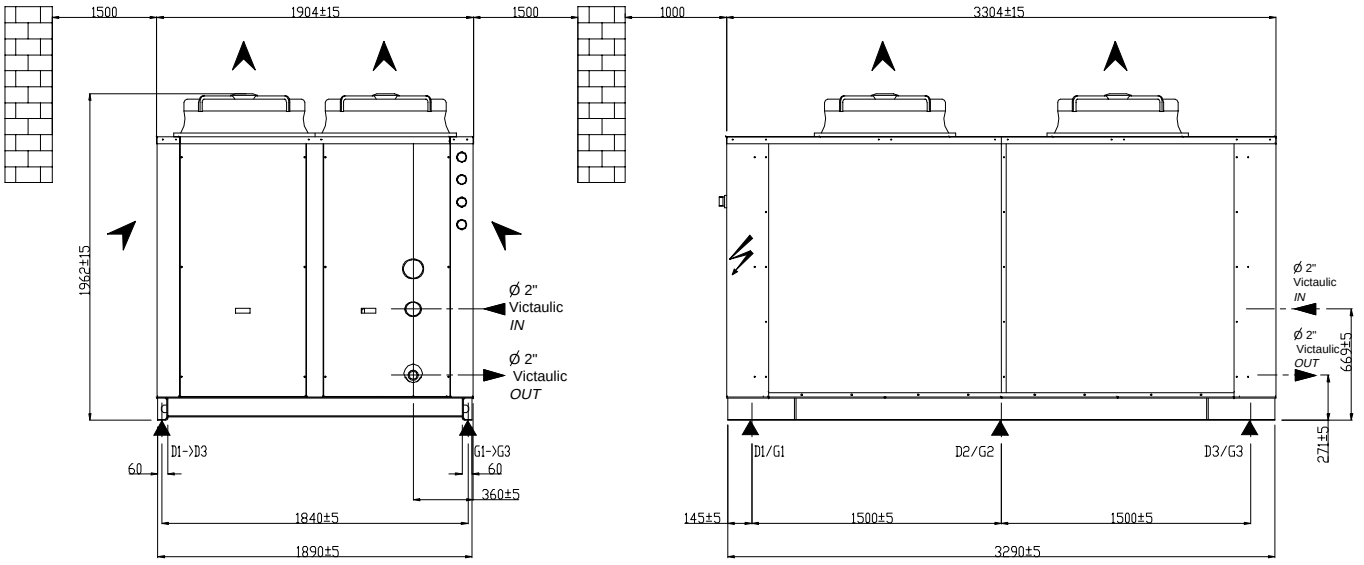
40 E / 45 E / 65 E / 75 E



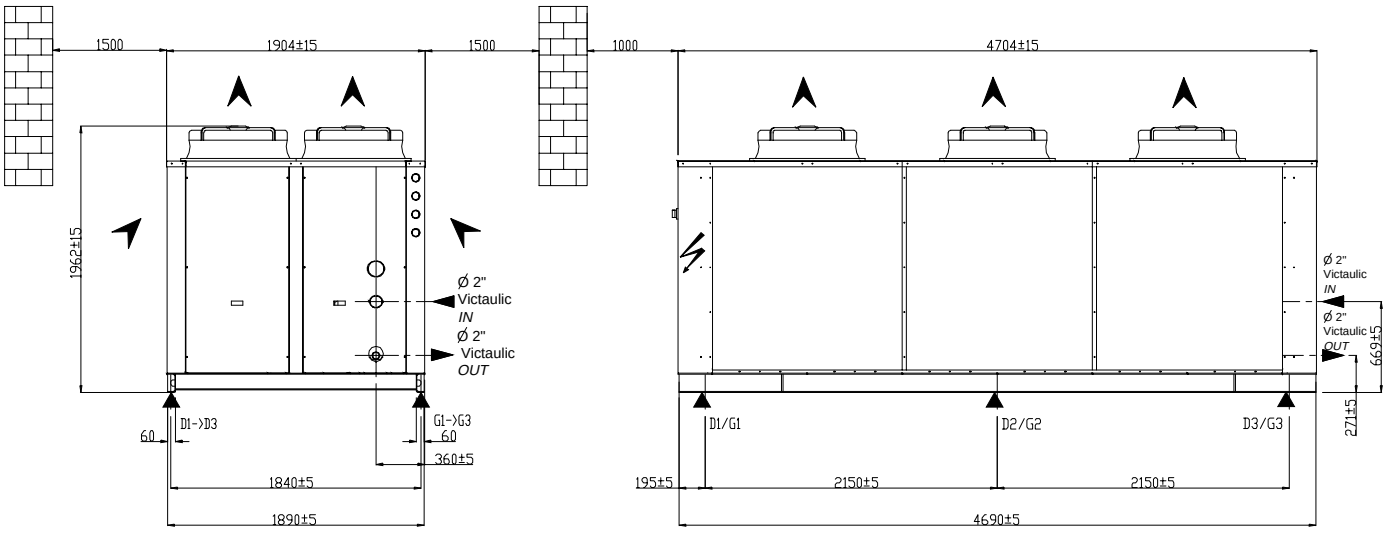
100 E / 110 E



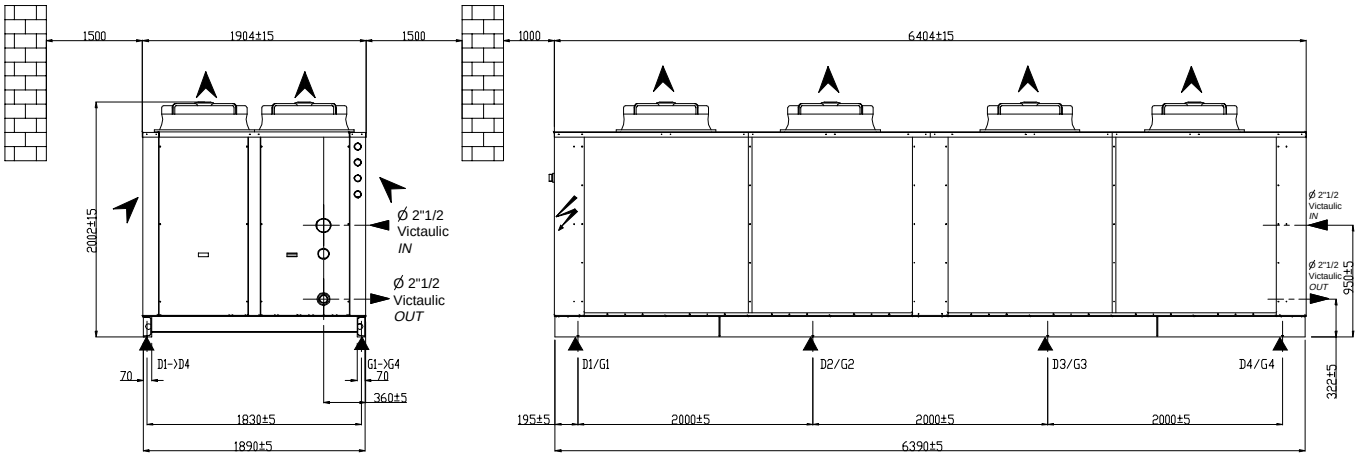
90 D / 130 D / 150 D



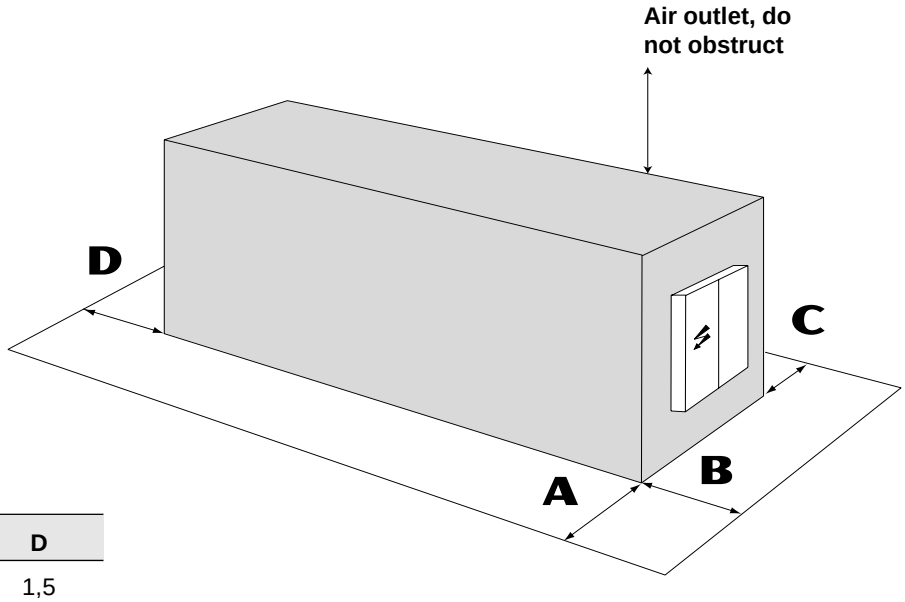
200 D / 230 D



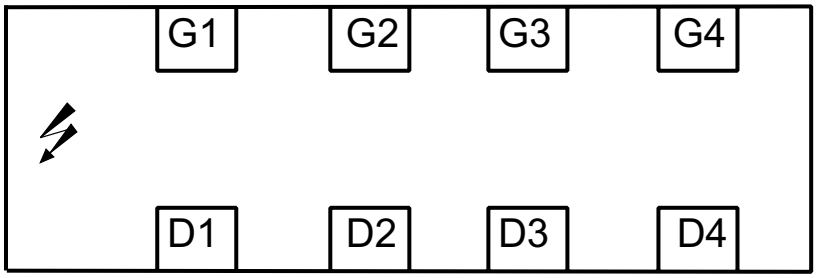
300D / 370D



clearances



	A	B	C	D
(m)	1,5	1	1,5	1,5



Load distribution is calculated for antivribating mounts rubber with static resistance of 2200 N/mm

Unit without option

ECOLOGIC	SLN	40E	45E	65E	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	878	897	983	1059	1292	1403	1483	1644	1801	2273	2492	3453	3589
Operating weight	(Kg)	882	902	990	1067	1302	1415	1492	1657	1815	2292	2515	3480	3626
Point Load (Kg)	D1	253	244	266	275	209	211	240	253	271	315	334	491	387
	D2	244	244	279	295	286	306	277	317	356	513	579	491	528
	D3	-	-	-	-	218	227	209	224	244	286	306	480	519
	D4	-	-	-	-	-	-	-	-	-	-	-	286	310
	G1	211	227	240	268	187	205	251	264	286	321	341	370	387
	G2	174	187	205	229	255	301	301	345	385	537	607	502	539
	G3	-	-	-	-	147	165	213	253	273	321	348	521	576
	G4	-	-	-	-	-	-	-	-	-	-	-	341	378

Unit with coil guard grill (option)

ECOLOGIC	SLN	40E	45E	65E	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	+26	+26	+26	+26	+39	+39	+54	+54	+54	+78	+78	+104	+104
Operating weight	(Kg)	+26	+26	+26	+26	+39	+39	+54	+54	+54	+78	+78	+104	+104
Point Load (Kg)	D1	+0	+0	+0	+0	+0	+0	+9	+9	+9	+13	+13	+13	+13
	D2	+0	+0	+0	+0	+0	+0	+9	+9	+9	+13	+13	+13	+13
	D3	-	-	-	-	+0	+0	+9	+9	+9	+13	+13	+13	+13
	D4	-	-	-	-	-	-	-	-	-	-	-	+13	+13
	G1	+13	+13	+13	+13	+13	+13	+9	+9	+9	+13	+13	+13	+13
	G2	+13	+13	+13	+13	+13	+13	+9	+9	+9	+13	+13	+13	+13
	G3	-	-	-	-	+13	+13	+9	+9	+9	+13	+13	+13	+13
	G4	-	-	-	-	-	-	-	-	-	-	-	+13	+13

NOISE LEVELS : unit without option

ECOLOGIC	*Spectrum per octave band (dBA)*								*Global sound power*
SLN	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
40E	49	62	68	74	71	65	57	46	**77**
45E	49	62	68	74	71	68	61	46	**77**
65E	49	62	68	74	72	68	63	46	**78**
75E	49	62	68	74	72	69	64	46	**78**
100E	51	64	70	76	74	70	65	48	**80**
110E	51	64	70	76	74	71	66	48	**80**
90D	52	65	71	77	74	71	64	49	**80**
130D	52	65	71	77	75	71	66	49	**81**
150D	52	65	72	77	75	72	67	49	**81**
200D	54	67	73	79	77	73	68	51	**83**
230D	54	67	73	79	77	74	69	51	**83**
300D	55	68	75	81	79	75	72	52	**84**
370D	55	68	75	81	79	75	71	71	**85**

Global sound power level measured in compliance with ISO standard 3744.
Only the sound power spectrum and the global sound power value are used in determining pressure characteristics at owner land limit.

ECOLOGIC SLN	40E	45E	65E	75E	100E	110E
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C					
Chilled water entering temperature	Minimum : (2) Maximum : +20°C					
Difference chilled water inlet/outlet	Minimum : (3) Maximum : +8 °C					

	90D	130D	150D	200D	230D	300D	370D
Leaving chilled water temperature (1)	Minimum : + 5°C / Minimum with 30% glycol : -10°C Maximum : +12°C						
Chilled water entering temperature	Minimum : (2) Maximum : +20°C						
Difference chilled water inlet/outlet	Minimum : (3) Maximum : +8 °C						

(1) *Below +5°C, add glycol to the heating fluid.*

(2) *Value corresponding to the minimum of 5°C chilled water leaving temperature at considered flow rate*

(3) *Corresponding to the evaporator acceptable maximum flow rate*

APART FROM THESE VALUES, PLEASE CONSULT US

MAXIMUM STARTING AMBIENT CONDITIONS

Temperatures are calculated according to start-up units conditions, with two differents configurations

❷ HP offloading operation **with** CLIMATIC ™ controller (optional)

❸ HP offloading operation **with** CLIMATIC ™ controller (optional)

* Based on max discharge condition of 62°C.

Ambient air temperature (°C)

ECOLOGIC SLN	40E	45E	65E	75E	100E	110E	90D
Configuration ❷	53	51	51	51	48	48	51

	130D	150D	200D	230D	300D	370D
Configuration ❷	51	51	51	51	45,5	45

CONTENTS

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Components

"hydraulic" version :

- **1** Pump (single or double)
- **2** Paddle flow switch
- **3** Safety valve (with gauge)
- **4** Water pressure gauge
- **5** Air purge valve
- Service panels (if STD, STD Plus and LN)

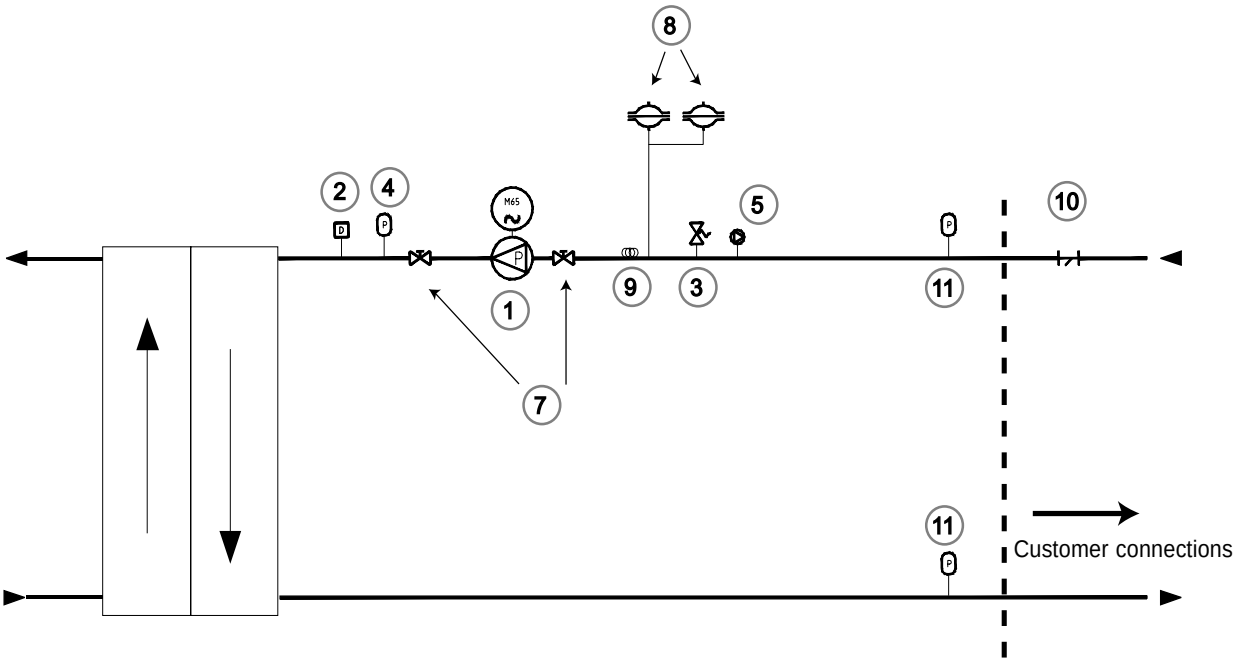
"hydronic" version :

- **1** Pump (single or double)
- **2** Paddle flow switch
- **3** Safety valve (with gauge)
- **4** Water pressure gauge
- **5** Air purge valve
- Service panels (if STD, STD Plus and LN)
- **6** Water buffer tank (insulated)

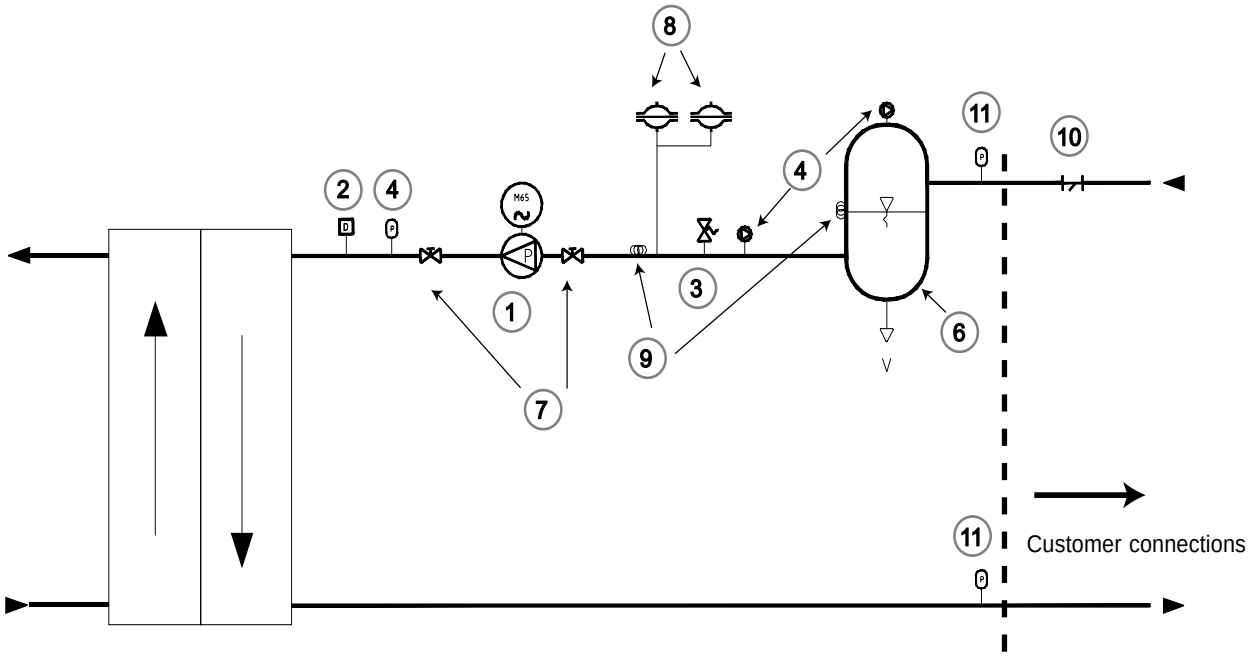
options :

- **7** ***Water isolation valve***
- **8** ***1 or 2 expansion vessels***
- **9** ***Antifreeze electrical protection***
- **10** ***Removable water filter (supplied looses)***
- **11** ***Water pressure gauges***

"hydraulic" module



"hydronic" module



Lennox Hydraulic packages are integral on Ecologic chillers. They are a compact design suitable for chilled circuits. The chiller unit can have a full "Hydronic" module that consists of all the water system and a storage tank or a "Hydraulic", that consist of just a pump set.

As the hydraulic system is integral with in the existing dimensions of the chiller it takes no additional plant space. This offers a saving to the owner as no rental space is used and there is no need for a separate pump plant room. It offers savings to the contractor as construction time is reduced and the whole pump installation including controls and electrics are supplied with the chiller.

The system can be easily coupled to the large range of terminal products offered by Lennox to complete the system. It requires only the installation of the interconnecting water pipework, flushing of the system and filling to complete the system. Lennox recommends that suitable water treatment be used to avoid damage to the heat exchangers.

The unit structure shall be of heavy gauge galvanized steel fastened with stainless steel screws and bolts. All panels shall be easily removed for access to components. External galvanized steel parts shall be painted with baked on enamel colored white (RAL 9002).

SPECIFICATION "HYDRAULIC" EQUIPMENT

Pump(s)

The pumps shall be centrifugal type with stainless steel impellers. Single or double pumps are available on all models. To select the right pump refer selection table A0 and chart A3.

Paddle Flow switch

A paddle flow switch is available suitable for various pipe sizes and flow rates. Flow switch is factory mounted.

Safety Valve

The water side high pressure valve is calibrated at 3 bar.

Air Purge Valve

The valve shall be installed at the highest point of the system in order to discharge air from the circuit.

Pipe Insulation

All the pipes and hydraulic components shall be insulated with 13 mm thick closed-cell neoprene elastomer foam.

Electrical Panel

All power and control connections will be integral within the main chiller control panel. The control of the pumps will be via the unit microprocessor. The power circuit will have thermal over load protection for each pump with on/off isolator switch. The microprocessor will control the function of the pump or this can be interlocked with a remote on/off connection. The power panel will conform to CEI EN 60204-1, and include, a main isolator (option), contactors and for the pump and electric anti freeze heater, if present. The electrical panel shall conform to IP-43 weather protection (IP 55 an option).

SPECIFICATION "HYDRONIC" EQUIPMENT

"Hydronic" module contains exactly the same equipment than "Hydraulic" module plus the possibility to add a buffer tank (200 or 500 litres).

Buffer Tank

The tank shall be manufactured from carbon steel and insulated with 13 mm thick closed-cell neoprene elastomer foam.Capacity of buffer tank is 200 litres (500 litres is an option for some units).

Drain/Charge Valve

Drain and charge valves shall be mounted as standard on the unit. The water drain will be positioned at the lowest point in the tank.

"HYDRAULIC" & "HYDRONIC" OPTIONS

Antifreeze Electrical Heater

A factory fitted 322 W or 432 W armored electric heater fitted around the buffer tank for antifreeze protection. The pipework wound with a trace heating element and insulated on the pump section.

Anti-vibration Mounts

The "Hydraulic" and "Hydronic" configuration adds additional weight and point load distribution. Please select the correct mounts by refering to Weight and load distribution tables . As the hydraulic module is integral with the chiller no additional AVMs are required.

Water Pressure Gauges

Water pressure gauges are available for the flow and return headers so that the water pressure in the network can be monitored.

Larger Buffer tank

The standard buffer tank on "Hydronic" module is 200 litres, it is possible to have a larger 500 litres buffer tank. Table **A0** shows all the possibilities.

Manual Water Isolations Valves

Flow and return manual isolation valves to prevent the flow of water through the unit and allow the unit to be serviced or drained down for the winter.

Removable Water Filter

A water filter supplied loose for fitting in the flow to the evaporator. The water filter is required to prevent dirt and debris entering the evaporator. The water filter is fitted with a removable strainer element that can be removed without dismounting the whole filter assembly.

Inlet and Outlet Thermometers

Alcohol filled thermometers are available for the inlet and outlet water connections

Expansion Vessel

A diaphragm tank with nitrogen charge (1bar) will be provided. Possibility to have one or two expansion vessel (unitary volume of 25 litres).

Chilled water Expansion vessel

Possibility to have 1 or 2 expansion vessels of 25 litres capacity each. Vessels come fitted into the Hydraulic package. This option is only possible if the Hydraulic or pump module option is selected. One is always recommended if there is no other expansion vessel in the system.

Water Pump Isolation valves

Option to have a butterfly isolation valve on the flow and return lines of the water pump (s).

This allows for isolation of the water system for maintenance on the pump (s) with out having to drain the water system.

Note :

Separate "Hydraulic" / "Hydronic" modules :

You can have the full pump module plus options integral on unit and offer a buffer tank as a remote item either to be mounted close to the chiller (fully paneled) or just the tank to go into the system inside the building (200 litres to 2000 litres).

Pumps

Additional pumps are available as special order items contact sale department service.

Water Pressure Gauges

Removable Water Filter

Chilled water Expansion vessel

A0 - SINGLE & double pump size configuration ("Hydraulic" and "Hydronic")

	Single pump						Double pump		
	A	B	C	D	E	F	L	M	N
40E	X	-	-	-	-	-	-	-	-
45E	X	-	-	-	-	-	-	-	-
65E	X	-	-	-	-	-	-	-	-
75E	X	X	-	-	-	-	X	-	-
100E	X	X	-	-	-	-	X	-	-
110E	X	X	-	-	-	-	X	-	-
90D	X	X	-	-	-	-	X	-	-
130D	-	-	X	X	-	-	-	X	-
150D	-	-	X	X	-	-	-	X	-
200D	-	-	X	-	X	-	-	X	-
230D	-	-	X	-	X	-	-	X	-
300D	-	-	-	-	-	X	-	-	X
370D	-	-	-	-	-	X	-	-	X

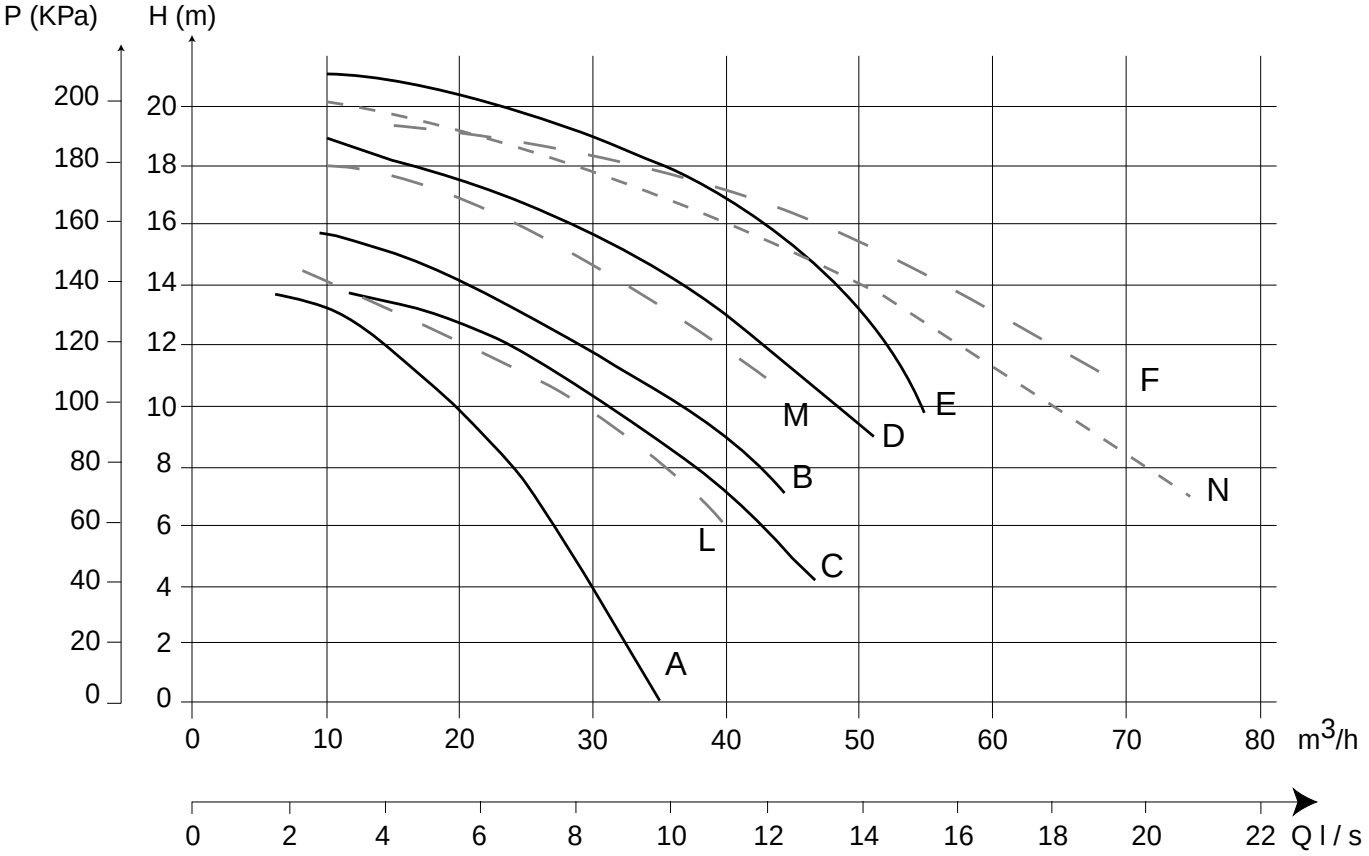
X : Available **-** : Not available

A1 - 200 litres & 500 litres buffer tank size configuration ("Hydronic")

	STD		STD Plus		LN		HE		SLN	
	200	500	200	500	200	500	200	500	200	500
40E	-	-	-	-	-	-	X	X	X	X
45E	-	-	-	-	-	-	X	X	X	X
65E	-	-	-	-	-	-	X	X	X	X
75E	-	-	-	-	-	-	X	X	X	X
100E	X	-	X	-	X	-	X	X	X	X
110E	X	-	X	-	X	-	X	X	X	X
90D	X	X	X	X	X	-	-	-	-	-
130D	X	X	X	X	X	X	-	-	-	-
150D	X	X	X	X	X	X	-	-	-	-
200D	-	-	-	-	-	-	-	-	-	-
230D	-	-	-	-	-	-	-	-	-	-
300D	-	-	-	-	-	-	-	-	-	-
370D	-	-	-	-	-	-	-	-	-	-

X : Available **-** : Not available

A3 - pump pressure curves



PUMP ELECTRICAL DATA

curves		A	B	C	D	E	F	L	M	N
Pump Type		Single pump						Double pump		
Power	*KW*	1	1,5	1,55	2,2	3	3	1,5	2,2	3
Maxi current	A	2	3,4	2,9	4,75	6,5	6,25	3,6	5,1	6,25

1 single pump (A to F)

ECOLOGIC	STD	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1043	1081	1333	1426	1475	1857	1956	2607	2747
Operating weight	(Kg)	**1054**	**1093**	**1342**	**1439**	**1489**	**1876**	**1979**	**2634**	**2784**
Point Load (Kg)	D1	284	293	255	271	277	271	282	348	361
	D2	333	338	282	306	328	339	361	561	585
	D3	-	-	234	258	272	278	291	360	380
	G1	224	238	213	222	218	290	301	352	367
	G2	212	225	202	218	224	381	407	598	640
	G3	-	-	155	164	170	317	337	415	450

1 double pump (l, m, n)

ECOLOGIC	STD	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1087	1125	1377	1478	1527	1905	2004	2677	2817
Operating weight	(Kg)	**1098**	**1137**	**1386**	**1491**	**1541**	**1924**	**2027**	**2704**	**2854**
Point Load (Kg)	D1	284	293	255	271	277	271	282	348	361
	D2	355	360	282	306	328	339	361	561	585
	D3	-	-	256	284	298	302	315	395	415
	G1	224	238	213	222	218	290	301	352	367
	G2	234	247	202	218	224	381	407	598	640
	G3	-	-	177	190	196	341	361	450	485

1 single pump (A to F) + 200 litres buffer tank

ECOLOGIC	STD	100E	110E	90D	130D	150D
Weight without water	(Kg)	1118	1156	1419	1512	1561
Operating weight	(Kg)	**1342**	**1381**	**1646**	**1743**	**1793**
Point Load (Kg)	D1	356	365	327	434	349
	D2	405	410	354	378	400
	D3	-	-	242	266	280
	G1	296	310	285	294	290
	G2	284	297	274	290	296
	G3	-	-	163	172	178

1 single pump (A to F) + 500 litres buffer tank

ECOLOGIC	STD	90D	130D	150D
Weight without water	(Kg)	1465	1548	1597
Operating weight	(Kg)	**1986**	**2079**	**2129**
Point Load (Kg)	D1	409	427	433
	D2	443	462	484
	D3	255	266	280
	G1	362	378	374
	G2	358	374	380
	G3	165	172	178

1 double pump (l, m, n) + 200 litres buffer tank

ECOLOGIC	STD	100E	110E	90D	130D	150D
Weight without water	(Kg)	1162	1200	1463	1564	1613
Operating weight	(Kg)	**1386**	**1425**	**1690**	**1795**	**1845**
Point Load (Kg)	D1	356	365	327	434	349
	D2	427	432	354	378	349
	D3	-	-	264	292	306
	G1	296	310	285	294	290
	G2	306	319	274	290	296
	G3	-	-	185	198	204

1 double pump (l, m, n) + 500 litres buffer tank

ECOLOGIC	STD	90D	130D	150D
Weight without water	(Kg)	1507	1600	1649
Operating weight	(Kg)	**2038**	**2131**	**2181**
Point Load (Kg)	D1	409	427	433
	D2	443	462	484
	D3	280	292	306
	G1	362	378	374
	G2	358	374	380
	G3	190	198	204

1 single pump (A to F)

ECOLOGIC STD PLUS		100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1114	1143	1347	1437	1548	2039	2161	2877	3077
Operating weight	(Kg)	**1124**	**1155**	**1356**	**1450**	**1562**	**2058**	**2184**	**2905**	**3114**
Point Load (Kg)	D1	293	301	260	273	280	308	293	285	367
	D2	335	360	284	313	330	381	394	616	649
	D3	-	-	234	261	272	315	313	400	413
	G1	257	246	216	222	242	328	321	392	381
	G2	239	247	205	216	253	425	473	656	750
	G3	-	-	155	166	186	302	390	457	554

1 double pump (l, m, n)

ECOLOGIC STD PLUS		100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1158	1187	1391	1489	1600	2087	2209	2947	3147
Operating weight	(Kg)	**1168**	**1199**	**1400**	**1502**	**1614**	**2106**	**2232**	**2975**	**3184**
Point Load (Kg)	D1	293	301	260	273	280	308	293	385	367
	D2	357	382	284	313	330	381	394	616	649
	D3	-	-	256	287	298	339	337	435	448
	G1	257	246	216	222	242	328	321	392	381
	G2	261	269	205	216	253	425	473	656	750
	G3	-	-	179	192	212	326	414	492	589

1 single pump (A to F) + 200 litres buffer tank

ECOLOGIC STD PLUS		100E	110E	90D	130D	150D
Weight without water	(Kg)	1189	1218	1433	1523	1634
Operating weight	(Kg)	**1412**	**1443**	**1660**	**1754**	**1866**
Point Load (Kg)	D1	365	373	332	345	352
	D2	407	432	356	385	402
	D3	-	-	242	269	280
	G1	329	318	288	294	314
	G2	311	319	277	288	325
	G3	-	-	163	174	194

1 single pump (A to F) + 500 litres buffer tank

ECOLOGIC STD PLUS		90D	130D	150D
Weight without water	(Kg)	1469	1559	1670
Operating weight	(Kg)	**2000**	**2090**	**2202**
Point Load (Kg)	D1	411	429	436
	D2	449	469	486
	D3	258	269	280
	G1	362	378	398
	G2	356	372	409
	G3	167	174	194

1 double pump (l, m, n) + 200 litres buffer tank

ECOLOGIC STD PLUS		100E	110E	90D	130D	150D
Weight without water	(Kg)	1233	1262	1477	1575	1686
Operating weight	(Kg)	**1456**	**1487**	**1704**	**1806**	**1918**
Point Load (Kg)	D1	365	373	332	345	352
	D2	429	454	356	385	402
	D3	-	-	264	295	306
	G1	329	318	288	294	314
	G2	333	341	277	288	325
	G3	-	-	187	200	220

1 double pump (l, m, n) + 500 litres buffer tank

ECOLOGIC STD PLUS		90D	130D	150D
Weight without water	(Kg)	1521	1611	1722
Operating weight	(Kg)	**2052**	**2090**	**2202**
Point Load (Kg)	D1	411	429	436
	D2	449	469	486
	D3	283	269	280
	G1	362	378	398
	G2	356	372	409
	G3	192	174	194

1 single pump (A to F)

ECOLOGIC	LN	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1114	1143	1347	1437	1548	2039	2161	2877	3077
Operating weight	(Kg)	**1124**	**1155**	**1356**	**1450**	**1562**	**2058**	**2184**	**2905**	**3114**
Point Load (Kg)	D1	293	301	260	273	280	308	293	285	367
	D2	335	360	284	313	330	381	394	616	649
	D3	-	-	234	261	272	315	313	400	413
	G1	257	246	216	222	242	328	321	392	381
	G2	239	247	205	216	253	425	473	656	750
	G3	-	-	155	166	186	302	390	457	554

1 double pump (l, m, n)

ECOLOGIC	LN	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1158	1187	1391	1489	1600	2087	2209	2947	3147
Operating weight	(Kg)	**1168**	**1199**	**1400**	**1502**	**1614**	**2106**	**2232**	**2975**	**3184**
Point Load (Kg)	D1	293	301	260	273	280	308	293	385	367
	D2	357	382	284	313	330	381	394	616	649
	D3	-	-	256	287	298	339	337	435	448
	G1	257	246	216	222	242	328	321	392	381
	G2	261	269	205	216	253	425	473	656	750
	G3	-	-	179	192	212	326	414	492	589

1 single pump (A to F) + 200 litres buffer tank

ECOLOGIC	LN	100E	110E	90D	130D	150D
Weight without water	(Kg)	1189	1218	1433	1523	1634
Operating weight	(Kg)	**1412**	**1443**	**1660**	**1754**	**1866**
Point Load (Kg)	D1	365	373	332	345	352
	D2	407	432	356	385	402
	D3	-	-	242	269	280
	G1	329	318	288	294	314
	G2	311	319	277	288	325
	G3	-	-	163	174	194

1 single pump (A to F) + 500 litres buffer tank

ECOLOGIC LN		90D	130D	150D
Weight without water	(Kg)	1469	1559	1670
Operating weight	(Kg)	**2000**	**2090**	**2202**
Point Load (Kg)	D1	411	429	436
	D2	449	469	486
	D3	258	269	280
	G1	362	378	398
	G2	356	372	409
	G3	167	174	194

1 double pump (l, m, n) + 200 litres buffer tank

ECOLOGIC	LN	100E	110E	90D	130D	150D
Weight without water	(Kg)	1233	1262	1477	1575	1686
Operating weight	(Kg)	**1456**	**1487**	**1704**	**1806**	**1918**
Point Load (Kg)	D1	365	373	332	345	352
	D2	429	454	356	385	402
	D3	-	-	264	295	306
	G1	329	318	288	294	314
	G2	333	341	277	288	325
	G3	-	-	187	200	220

1 double pump (l, m, n) + 500 litres buffer tank

ECOLOGIC LN		90D	130D	150D
Weight without water	(Kg)	1521	1559	1670
Operating weight	(Kg)	**2052**	**2090**	**2202**
Point Load (Kg)	D1	411	429	436
	D2	449	469	486
	D3	283	269	280
	G1	362	378	398
	G2	356	372	409
	G3	192	174	194

1 single pump (A to F)

ECOLOGIC	HE	40E	45E	65E	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	822	846	929	1019	1235	1341	1405	1573	1732	2145	2376	3377	3427
Operating weight	(Kg)	**827**	**851**	**937**	**1027**	**1245**	**1353**	**1414**	**1586**	**1746**	**2164**	**2399**	**3404**	**3463**
Point Load (Kg)	D1	229	235	246	251	191	189	218	235	260	290	312	365	367
	D2	241	252	267	298	266	284	253	293	330	469	537	491	493
	D3	-	-	-	-	225	239	210	232	234	289	311	480	484
	D4	-	-	-	-	-	-	-	-	-	-	-	309	320
	G1	189	191	222	244	167	185	227	246	271	297	317	361	367
	G2	168	172	201	234	235	279	277	321	361	495	570	502	508
	G3	0	0	0	0	159	177	230	258	291	324	353	526	537
	G4	-	-	-	-	-	-	-	-	-	-	-	371	386

1 double pump (l, m, n)

ECOLOGIC	HE	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1063	1279	1385	1449	1625	1784	2193	2424	3447	3497
Operating weight	(Kg)	**1071**	**1289**	**1397**	**1458**	**1638**	**1798**	**2212**	**2447**	**3474**	**3533**
Point Load (Kg)	D1	251	191	189	218	235	260	290	312	365	367
	D2	320	266	284	253	293	330	469	537	491	493
	D3	-	247	261	232	258	260	313	335	480	484
	D4	-	-	-	-	-	-	-	-	344	355
	G1	244	167	185	227	246	271	297	317	361	367
	G2	256	235	279	277	321	361	495	570	502	508
	G3	0	181	199	252	284	317	348	377	526	537
	G4	-	-	-	-	-	-	-	-	406	421

1 single pump (A to F) + 200 litres buffer tank

1 single pump (A to F) + 500 litres buffer tank

ECOLOGIC	HE	40E	45E	65E	75E	100E	110E	*40E*	*45E*	*65E*	*75E*	*100E*	*110E*
Weight without water	(Kg)	897	921	1004	1094	1321	1427	933	957	1040	1130	1357	1463
Operating weight	(Kg)	**1115**	**1139**	**1225**	**1315**	**1549**	**1657**	**1451**	**1475**	**1561**	**1651**	**1885**	**1993**
Point Load (Kg)	D1	301	307	318	323	263	261	385	391	4002	407	347	345
	D2	313	324	339	370	338	356	397	408	423	454	422	440
	D3	-	-	-	-	233	247	-	-	-	-	233	247
	G1	261	263	294	316	239	257	345	347	378	400	323	341
	G2	240	244	273	306	307	351	324	328	357	390	391	435
	G3	-	-	-	-	167	185	-	-	-	-	167	185

1 doublepump (l, m, n) + 200 litres buffer tank

1 twin pump (l, m, n) + 500 litres buffer tank

ECOLOGIC	HE	75E	100E	110E
Weight without water	(Kg)	1138	1365	1471
Operating weight	(Kg)	**1359**	**1593**	**1701**
Point Load (Kg)	D1	323	263	261
	D2	392	338	356
	D3	-	255	269
	G1	316	239	257
	G2	328	307	351
	G3	-	189	207

ECOLOGIC	HE	*75E*	*100E*	*110E*
Weight without water	(Kg)	1174	1401	1507
Operating weight	(Kg)	**1695**	**1929**	**2037**
Point Load (Kg)	D1	407	347	345
	D2	476	422	440
	D3	-	255	269
	G1	400	323	341
	G2	412	391	435
	G3	-	189	207

1 single pump (A to F)

ECOLOGIC	SLN	40E	45E	65E	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	906	925	1011	1105	1338	1449	1529	1694	1851	2327	2546	3513	3649
Operating weight	(Kg)	**910**	**930**	**1018**	**1113**	**1348**	**1461**	**1538**	**1707**	**1865**	**2346**	**2569**	**3540**	**3686**
Point Load (Kg)	D1	253	244	266	275	209	211	240	253	271	315	334	491	387
	D2	258	258	293	318	286	306	277	317	356	513	579	491	528
	D3	-	-	-	-	241	250	232	249	269	313	333	480	519
	D4	-	-	-	-	-	-	-	-	-	-	-	316	340
	G1	211	227	240	268	187	205	251	264	286	321	341	370	387
	G2	188	201	219	252	255	301	301	345	385	537	607	502	539
	G3	-	-	-	-	170	188	236	278	298	348	375	521	576
	G4	-	-	-	-	-	-	-	-	-	-	-	371	408

1 double pump (l, m, n)

ECOLOGIC	SLN	75E	100E	110E	90D	130D	150D	200D	230D	300D	370D
Weight without water	(Kg)	1149	1382	1493	1573	1746	1903	2375	2594	3583	3719
Operating weight	(Kg)	**1157**	**1392**	**1505**	**1582**	**1759**	**1917**	**2394**	**2617**	**3610**	**3756**
Point Load (Kg)	D1	275	209	211	240	253	271	315	334	491	387
	D2	340	286	306	277	317	356	513	579	491	528
	D3	-	263	272	254	275	295	337	357	480	519
	D4	-	-	-	-	-	-	-	-	351	375
	G1	268	187	205	251	264	286	321	341	370	387
	G2	274	255	301	301	345	385	537	607	502	539
	G3	-	192	210	258	304	324	372	399	521	576
	G4	-	-	-	-	-	-	-	-	406	443

1 single pump (A to F) + 200 litres buffer tank

ECOLOGIC	SLN	40E	45E	65E	75E	100E	110E
Weight without water	(Kg)	981	1000	1086	1180	1424	1535
Operating weight	(Kg)	**1198**	**1218**	**1306**	**1401**	**1652**	**1765**
Point Load (Kg)	D1	325	316	338	347	281	283
	D2	330	330	365	390	358	378
	D3	-	-	-	-	249	258
	G1	283	299	312	340	259	277
	G2	260	273	291	324	327	373
	G3	-	-	-	-	178	196

1 single pump (A to F) + 500 litres buffer tank

40E	*45E*	*65E*	*75E*	*100E*	*110E*
1017	1036	1122	1216	1460	1571
1534	**1554**	**1642**	**1737**	**1988**	**2101**
409	400	422	431	365	367
397	408	423	454	422	440
-	-	-	-	249	258
367	383	396	424	343	361
344	357	375	408	411	457
-	-	-	-	178	196

1 doublepump (l, m, n) + 200 litres buffer tank

ECOLOGIC	SLN	75E	100E	110E
Weight without water	(Kg)	1224	1468	1579
Operating weight	(Kg)	**1445**	**1696**	**1809**
Point Load (Kg)	D1	347	281	283
	D2	412	358	378
	D3	-	271	280
	G1	340	259	277
	G2	346	327	373
	G3	-	200	218

1 twin pump (l, m, n) + 500 litres buffer tank

ECOLOGIC	SLN	*75E*	*100E*	*110E*
Weight without water	(Kg)	1260	1504	1615
Operating weight	(Kg)	**1781**	**2032**	**2145**
Point Load (Kg)	D1	431	365	367
	D2	496	442	462
	D3	-	271	280
	G1	424	343	361
	G2	430	411	457
	G3	-	200	218

To supply and install, where specified in the project n° …. unit(s) air-cooled water chiller with cooling capacity of …. kW, to cool …. m^3/hr. of water from …. °C to …. working with …. °C ambient temperature. The unit should work with electricity at …. V. 3ph. 50Hz. The electrical power absorbed should not overcome …. kW. The units COP will be at least …. at the working conditions of the project. Part load COP will be at least …. at the working conditions of the project. For the units with 2, 3, 4 and 6 compressors the chillers will have (1) or (2) independent refrigerant circuits, with the respective electronic microprocessor will allow the starting of the compressors and the control of the chiller. Each chiller will be factory assembled on a robust base frame made of zinc coated steel. The panels will be zinc coated steel panels protected by an epoxy coated paint. The unit will be tested in the factory at the nominal working conditions and water temperatures. Before shipment a full refrigerant leak test will be held to avoid any losses, and the units will be filled with oil and …… refrigerant.

General

Units are leak and pressure-tested at 27 bars (400 psi) high side and 16.5 bars (200 psi) low side, and then evacuated and charged. Packaged units ship with a full operating charge of oil and refrigerant. Unit panels, structural elements, and control boxes are constructed of 1.5 to 3 mm (11 to 16 gauge) galvanized sheet metal. The chiller is constructed on a solid rugged base frame constructed of "C" section steel beams welded together to form a ridged base. The base is structurally able to carry the unit weight and is torsion ally ridged with no vibrating sections. The base is hot dipped galvanised for corrosion protection. The chiller is lifted, moved and mounted via the base frame that contains AVM mounting and lifting points as standard. Unit panels and control boxes are finished with baked-on powder paint, and the structural-steel base is finished with an air-dry paint. The unit is painted to RAL 9002 as standard. All the internal surfaces are coated in a clear urethane lacquer to protect the insulation and pipework (option). The units must be constructed to meet European regulations and standards specifically EN 60204-1, NR 2037/2000, ISO9001, & Eurovent certification performance standards

Compressors

All units will have direct driven hermetic Scroll compressors . The scroll compressor axial seal will be achieved by floating tip seals the radial seal is achieved via a micro cushion of oil. The compressor motors will be suction gas cooled and have thermal overload device. The operating limits of the compressor motors will allow for +/- 10% of the nameplate voltage. The compressors must be mounted on vibration isolation pads to reduce noise transmission.

Evaporator

The evaporator is twin brazed plate type designed, tested, and stamped in accordance with the appropriate pressure-vessel code approval. The evaporator is designed for a waterside working pressure of 30 bars (146psi) and refrigerant side 30 bars (450psi). Water connections are grooved stubs for simple site connection; the water connections must be sealed for shipping. The evaporator includes and is insulated with 13 mm (1/2 inch) (K-0.26). Optional evaporator heaters with thermostats are provided to protect the evaporator from freezing at ambient temperatures down to -20°C (-6°F). The evaporator is designed to operate with a flow detection device. Options are for a paddle type (supplied loose fitting by others) or differential pressure type switch .The evaporator will have independent refrigerant circuits. The evaporator should be protected from debris and a water filter is available as an option

Condenser coil

the condenser coils are constructed with internally enhanced seamless copper tubes arranged in a staggered row pattern and mechanically expanded into rippled aluminum fins with full fin collars for higher efficiencies. A collar that will increase the surface area in connection with the tubes, protecting them from ambient corrosion, gives the spacing between the fins. The coils fin space should allow the coil to be washable to maintain operating efficiency. The coils will have an integral subcooler circuit which provides sufficient subcooling to effectively eliminate the possibility of liquid flashing and increase the unit's efficiency of 5¸7% without an increase in power absorbed, and the surface area will be dimensioned in a way to permit an air velocity not greater than 2.8 m/sec.

Condenser fans

the condenser fans are direct drive vertical discharge Hushtone helical type with multiple aerofoil blades for higher efficiencies and lower noise. The fan blade will be of the sickle end type mounted in a bell mouth orifice. The air discharge is vertical and each fan will be coupled to the electrical motor, supplied as standard to IP55 class "F" insulation with and capable to work to ambient temperatures of -20°C to +55°C max humidity 80%. The fans are direct driven via or three-phase motor with permanently lubricated ball bearings. The motors are designed for external operation and are available in 4 different speeds with the option of two-speed motor.

Low Noise and Super Low Noise Versions

The low noise version uses low noise fans designed to minimise external noise emissions while maintaining a high airflow. The fan blade will be of the sickle end type mounted in a bell mouth orifice. The air discharge is vertical and each fan will be coupled to the electrical motor, supplied as standard to IP55 class "F" insulation and capable to work to ambient temperatures of -20°C to +55°C max humidity 80%. The fans are direct driven via a three-phase motor with permanently lubricated ball bearings.

Control panel - field power connection, controls interlock terminals, and unit control system shall be centrally located in a weatherproof cabinet accessible through a lockable door. Power and starting controls shall be separate from safety and operating controls in different compartments of the same panel. All 3-phase connections shall be fully shrouded to prevent accidental contact. Power and starting controls shall include lockable individual thermal overloads and contactors for each compressor winding and fan motors. Operating and safety controls shall be via a microprocessor controller.

Solid-state protection for compressor motor; high and low pressure cut-out switch (for each refrigerant circuit).

anti-freeze thermostat. Standard single point power connections include main three-phase power to the compressors, condenser fans, and (optional) control power transformer, and (optional) connections are available for the 230-volt single-phase power for freeze protection on the evaporator heaters. All internal cables must be tied. The chillers will have full earth bonding between isolated metal parts.

Climatic II option plus solid-state protection for compressor motor; high and low pressure cut-out switch (for each refrigerant circuit); anti-freeze thermostat. Standard single point power connections include main three-phase power to the compressors, condenser fans, and (optional) control power transformer, and (optional) connections are available for the 230-volt single-phase power for freeze protection on the evaporator heaters. All internal cables must be mounted on cable tray and tied. The chillers will have full earth bonding between isolated metal parts.

Control & capacity regulation (Climatic)

The standard control module is a weatherproof digital display. The display shows upto 4 numeric or letter sequences. In addition to the digital display there are functional LEDs to denote unit operation. Control interface will be via push button and menu screens for simple use.

All alarms and faults are shown via the display

Functions

Remote stop start (remote connection by others)

Flow switch (remote connection by others)

Compressor overload Alarm

High pressure Alarm

Low pressure Alarm

Operating hours compressors

Operating hours Pump

Condenser fan control

Chilled water pump

Freeze protection

Chilled water set point control

Remote chilled water reset (4-20mA)

Alarm counter to go from auto reset to manual reset

Self-diagnostic on sensors

Password protection of settings

Remote display option

Remote communication to PC option

Advanced Controller (Climatic II)

All the above functions plus
This is supplied with a removable Digital user interface KP02
Display is a digital single line

1. Status of Pumps (chilled water, condenser water and secondary system)
2. Fault history for each refrigeration circuit (last 24 occurences)
3. Fault history for pumps
4. Hours run
5. Automatic balance of compressor run hours
6. Time clock, day, date for auto scheduling of the chiller
7. Chilled water set point, with programmable predictive PID control
8. Programmable auto reset of chilled water set point based on ambient temperature
9. Programmable condenser fan staging
10. Start and stop of pumps (run and standby)
11. Auto switching if lead pump fails
12. Display of all refrigerant temperature and pressure values, Ambient and Chilled water temperatures
13. Display of timer status (Start and anti recycle)
14. Display of chilled water temperature curve over 24Hrs
15. Adaptive logic to avoid nuisance fault trips
16. General machine faults; chilled water flow, loss of power, freeze protection
17. Refrigeration circuit faults; Hp & Lp and high discharge temperature
18. Compressor faults; Motor temperature, phase protection,
19. Capacity staging, plus loading delay on start, and predictive control logic
20. Common alarm
21. Fan circuit breaker trip
22. Pump circuit breaker trip
23. Insufficient chilled water flow
24. Programmable temperature difference set point between flow and return water
25. Freeze protection
26. Programmable Minimum and maximum water set point
27. Self diagnostic on sensors and communications
28. Self diagnostic on electronic expansion valves
29. Adaptive Control of Electronic TEV
30. Phase protection (option)
31. Password protection
32. Options for remote control and BMS interface
    On the High efficiency and Super low noise Climatic II is standard, LCD display is an option. Weatherproof LCD crystal backlight display 240x128 pixels. Monitoring upto 2050 points. Control interface will be via push button and menu screens with graphic icons for simple use.
    All alarms and fault are in full written display, fault codes are not acceptable.
33. A full screen display of all operating conditions in a graphic layout
34. Status of Pumps graphic display (chilled water, condenser water and secondary system)

Refrigerant piping

Each refrigerant circuit shall include a factory insulated suction line,manual liquid line isolation valve with charging connection; a refrigerant filter drier, sensor indicator; liquid line solenoid valve, thermostatic or (option) electronic expansion valve (std on HE), and 27 bar relief valve. All refrigerant pipework must be clamped to prevent vibration and all small-bore lines should be high pressure plastic with aircraft type fittings. The refrigerant lines should contain independent Schrader valve test points for maintenance

Electronic expansion valve

(standard on high efficiency unit Optional on others)

Each refrigerant circuit will be equipped with an motorized electronic expansion valve controlled by 0-10V working with a PID system, this type of system allows a simple control system that quickly interacts at load variations. This valve combines two functions as a liquid solenoid and electronic expansion valve. It shall be managed directly by the *ClimaticII* microprocessor

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