



## CHILLERS- Technical manual - installation - maintenance

# NRL

**A HIGH EFFICIENCY**  
**E QUIET HIGH EFFICIENCY**  
**HA HIGH EFFICIENCY HEAT PUMP**  
**HE QUIET HIGH EFFICIENCY HEAT PUMP**





Dear Customer,

Thank you for choosing AERMEC. It is the fruit of many years of experience and special design studies and has been made of the highest grade materials and with cutting edge technology.

In addition, all our products bear the EC mark indicating that they meet the requirements of the European Machine Directive regarding safety. The standard of quality is permanently being monitored and AERMEC products are therefore a synonym for Safety, Quality and Reliability.

The data may undergo modifications considered necessary for the improvement of the product, at any time and without the obligation for any notice thereof.

Thank you again.  
AERMEC S.p.A

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# NRL

|                      |  |
|----------------------|--|
| <b>SERIAL NUMBER</b> |  |
|----------------------|--|

## CONFORMITY DECLARATION

We, the undersigned, declare on our own exclusive responsibility that the object in question, so defined:

**NAME**

**NRL**

**TYPE**

**AIR - WATER CHILLER/HEAT PUMP**

**MODEL**

and to which this declaration refers, complies with the following standardised regulations:

**CEI EN 60335-2-40**

Safety regulation regarding electric heat pumps, air conditioners and dehumidifiers

**CEI EN 61000-6-1**

Electromagnetic immunity and emission in residential environment

**CEI EN 61000-6-3**

**CEI EN 61000-6-2**

**CEI EN 61000-6-4**

Electromagnetic immunity and emission in industrial environment

**EN378**

Refrigerating system and heat pumps - Safety and environmental requirements

**UNI EN 12735**

Round welding-free copper pipes for air conditioning and cooling

**UNI EN 14276**

Pressure equipment for refrigerating systems and heat pumps

### thus meeting the essential requisites of the following directives:

- LV Directive: 2006/95/EC
- Electromagnetic Compatibility Directive 2004/108/EC
- Machine Directive 2006/42/EC
- PED Directive relating to pressure equipment 97/23/EC

In compliance with Directive 97/23/EC, the product meets the Total Quality Warranty procedure (module H) with certificate no. 06/270-QT3664 Rev.3 issued by the notified body no. 1131 CEC via Pisacane 46 Legnano (MI) - Italy

The person authorized to compile the technical file is: Massimiliano Sfragara - 37040 Bevilacqua (VR) Italy-Via Roma, 996

Bevilacqua

28/12/2009

Marketing Director

Signature



## 1. GENERAL WARNINGS

**Standards and directives to be followed in the design and manufacture of the unit:**

**Safety system:**

**Machine Directive**

2006/42/EC

**Low voltage directive**

LVD 2006/95/EC

**Electromagnetic compatibility directive**

EMC 2004/108/EC

**Pressure containers directive**

PED 97/23/CE EN 378,

UNI EN 14276

**Electrical part:**

EN 60204-1

**Protection rating**

IP24

**Acoustic part:**

SOUND POWER

(EN ISO 9614-2)

SOUND PRESSURE

(EN ISO 3744)

**Certifications:**

Eurovent

**Refrigerant GAS:**

This unit contains fluorinated greenhouse gases covered by the Kyoto Protocol.

Maintenance and disposal operations must be only carried out by qualified staff.

R410A GWP=1900

The AERMEC NRL units are built according to the recognised standards and safety regulations. They have been designed for air conditioning and production of hot water and must be used for this purpose in accordance with their performance characteristics. The company shall not be contractually or non-contractually liable for any damage to people, animals or objects, for failures caused by errors during installation, adjustment and maintenance or incorrect use. All the uses not expressly indicated in this manual are not allowed.

### 1.1. CONSERVING THE DOCUMENTATION

Deliver the following instructions plus all the complementary documentation to the system user, who shall be responsible for keeping the instructions so that they are always available when needed.

Read carefully this chapter; all the procedures must be carried out by qualified personnel according to the regulations in force in the different countries (M.D. 329/2004).

It must be installed in such a way as to make all maintenance and/or repair operations possible (SEE INSTALLER SECTION page 33).

The warranty of the device does not in any case cover costs owing to ladder trucks, lifts or other lifting systems that may be required in order to carry out the interventions under guarantee.

Do not modify or tamper the with chiller as this may cause dangerous situations and the manufacturer shall not be

liable for any damages. The warranty shall not be valid if the indications mentioned above are not observed.

### 1.2. SAFETY PRECAUTIONS AND INSTALLATION

- **THE CHILLER MUST BE INSTALLED BY AN AUTHORISED AND QUALIFIED TECHNICIAN, IN COMPLIANCE WITH THE NATIONAL LEGISLATION IN FORCE IN THE COUNTRY OF DESTINATION (MD 329/2004). Aermec shall not be held responsible for any damage whatsoever resulting from the non-compliance with these instructions.**
- Before starting any kind of work, it is necessary TO READ CAREFULLY THE INSTRUCTIONS, AND TO PERFORM THE SAFETY CHECKS TO AVOID ANY RISKS. All the personnel in charge must know the operations and the risks that may arise when all the unit installation operations begin.

## 2. DESCRIPTION AND CHOICE OF THE UNIT

The **NRL** is a range designed to produce cold water for technological systems. IT is constructed according to the size of several cooling and hydraulic circuits and, depending on the version, may have desuperheaters, total recovery, pumping unit only, or accumulator with pumping unit.

**The presence of more than one scroll type compressor allows the** NRL chillers various capacity controls of the cooling capacity. By means of a microprocessor, the electronic regulation controls and manages all the components and working parameters of the unit; an internal memory registers the working conditions in the moment when an alarm condition arises, in order to visualise it on the display.

### 2.1. MODELS AVAILABLE

- **"COOLING ONLY" (A - E)**  
maximum external temperature allowed - **46°C**;
- processed water temperature **18°C**;
- **"HEAT PUMP" (HA - HE)**  
in cooling mode, the operating limits arrive to a maximum external air temperature of **46°C**;
- processed water temperature **18°C**;
- in heating mode, the operating limits arrive at a maximum external air temperature of **42°C**;

- processed water temperature - **55°C**

#### – **NRLH do not offer the following configurations:**

- YH (with processed water temperature lower than 4°C)
- HC (condenser heat pump)

### 2.2. VERSIONS AVAILABLE

#### • **HEAT RECOVERY UNITS**

with desuperheater included in series (D).

#### – **WARNING:**

in the heat pump versions, the desuperheater must be intercepted during heat pump operation: otherwise, the guarantee will no longer be considered valid.

#### • **Total heat recovery (T)**

With plate-type exchanger inserted in parallel with the coils

#### **Both versions (D - T) use:**

- a hot gas bypass device upstream

from the evaporator

- Water filter before the recovery exchanger.

**The units with desuperheater (D) or total recovery (T) are not available in the versions:**

- YD
- YT
- XT (only for temperature lower than 4°C)
- XD (only for temperature lower than 4°C)

### 2.3. QUIET CONDENSER UNITS (CL)

**The NRL-C condenser units are not available in the versions:**

- HC (condenser heat pump)
- TC (condenser units with total recovery)
- DC (condenser units with desuperheater)
- **Mechanical thermostatic valve (Y):**  
version Y: this is the version that allows you to produce chilled water below the standard value of +4°C, to a minimum of -6°C. For lower values, contact the company headquarters.



#### **Danger!**

The refrigerant circuit is under steam. High temperatures are also possible. The unit may only be opened by a service technician (SAT) or by an authorised technician. The operations in the cooling circuit can only be performed by a qualified refrigeration technician.



#### **GAS R410A**

The chiller is delivered with the correct refrigerant load. The R410A is free of chlorine, it is not flammable and does not harm the ozone layer. However, any interventions are always competence of the technical service assistance (SAT) or an authorised technician.

## 2.4. CONFIGURATOR

| 1,2,3 | 4,5,6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15, 16 |
|-------|-------|---|---|---|----|----|----|----|----|--------|
| NRL   | 200   | 0 | ° | ° | °  | A  | °  | °  | °  | 00     |

field Code

1, 2, 3 NRL

4, 5, 6 Size 200,225,250,280,300,360

7 Compressor  
0 Standard compressor

8 Thermostatic valve  
° Standard mechanical thermostatic valve (to +4°C)  
Y Low water temperature mechanical thermostatic valve (to -6°C)  
x Electronic thermostatic valve also for low water temperature (to -6°C)

9 Model  
° Cooling only  
C Condenser unit  
H Heat pump

10 Heat recovery  
° Without recovery units  
D Desuperheater  
T Total recovery

11 Version  
A High efficiency  
E High efficiency, silenced version

12 Coils  
° Made of aluminium  
R Made of copper  
S Tinned copper  
V Varnished

13 Fans  
° Standard  
M Enlarged  
J Inverter

14 Fuel feed  
° 400V-3-50Hz with thermomagnetic switches  
1 230V-3-50Hz with thermomagnetic switches  
2 500V-3-50Hz with thermomagnetic switches

15, 16 Accumulation  
00 Without water accumulator  
01 Low-head water accumulator and single pump  
02 Low-head water accumulator and reserve pump  
03 High-head water accumulator and single pump  
04 High-head water accumulator and reserve pump  
05 Water accumulator with holes for supplementary electric heater, low head and single pump  
06 Water accumulator with holes for supplementary electric heater, low head and reserve pump  
07 Water accumulator with holes for supplementary electric heater, high head and single pump  
08 Water accumulator with holes for supplementary electric heater, high head and reserve pump  
09 Double hydraulic ring  
10 Double hydraulic ring with supplementary electric heater  
P1 Without water accumulator, with low-head pump  
P2 Without water accumulator, with low-head pump and reserve pump  
P3 Without water accumulator, with high-head pump  
P4 Without water accumulator, with high-head pump and reserve pump

### WARNING

NB: for heat pump versions, M fans are not available, only ° and J.

### 3. CHILLER CIRCUIT

#### Compressors

High efficiency scroll-type hermetic compressors, assembled on elastic anti-vibration supports, driven by a 2-pole electric motor with internal thermal protection of the electric heater casing included as standard. The heater is automatically powered when the unit stops, provided that the unit is kept under tension.

#### Air side heat exchanger

High efficiency device made of copper pipes and aluminium blades locked into place via mechanical pipe expansion.

#### Water side heat exchanger

Of the plate-type (AISI 316), externally insulated with closed cell material to reduce thermal dispersion. Fitted, as standard, with antifreeze heater.

#### LIQUID SEPARATOR (HEAT PUMP ONLY)

Located on the suction point of the compressor, to protect against any flowback of liquid refrigerant, flooded start-ups, operation in the presence of liquid.

#### Liquid accumulation

##### (only for heat pumps and total recovery)

To compensate the difference in volume between the finned coil and the plate-type exchanger, holding back excess liquid.

#### Filter drier

Of the mechanical type, made of ceramics and hygroscopic material able to trap impurities and any traces of humidity in the chiller circuit.

#### Sight glass

For checking the refrigerating gas load and any humidity in the refrigerating circuit.

#### Thermostatic valve

The mechanical type valve, with outside equaliser on the evaporator outlet, modulates the gas flow to the evaporator on the basis of the thermal load, in such a way as to ensure the proper degree of overheating of the intake gas.

#### Electronic valve (optional)

#### Liquid and discharge taps (cooling-only versions)

They allow the refrigerant to be cut off during extraordinary maintenance.

#### Solenoid valve

The valve closes when the compressor turns off, preventing the flow of refrigerant gas towards the evaporator.

#### Bypass solenoid valve (only for heat pumps)

To bypass the thermostat-controlled valve

during the defrosting cycle.

#### Cycle reversing valve (heat pump only)

Inverts the flow of refrigerant when operation is switched between summer/winter, and during defrosting cycles.

#### Non-return valve

Allows the flow of refrigerant in one direction only.

#### Desuperheater (only upon request)

Of the plate-type (AISI 316), externally insulated with closed cell material to reduce thermal dispersion.

#### Total recovery (only upon request)

Of the plate-type (AISI 316), externally insulated with closed cell material to reduce thermal dispersion.

### 3.1. FRAME AND FANS

#### Fan unit

Screw type, statically and dynamically balanced. The electric fans are protected electrically with thermomagnetic switches and mechanically with metal anti-intrusion grilles, in accordance with the standard CEI EN 60335-2-40.

#### Enlarged fans (M)

These offer a useful head to overcome the pressure drops in the system

#### Inverter fans (J)

#### Load-bearing structure

Made of hot-galvanised steel sheet of a suitable thickness, varnished with polyester powders able to resist atmospheric agents over time.

### 3.2. HYDRAULIC COMPO- NENTS

#### Circulation pump

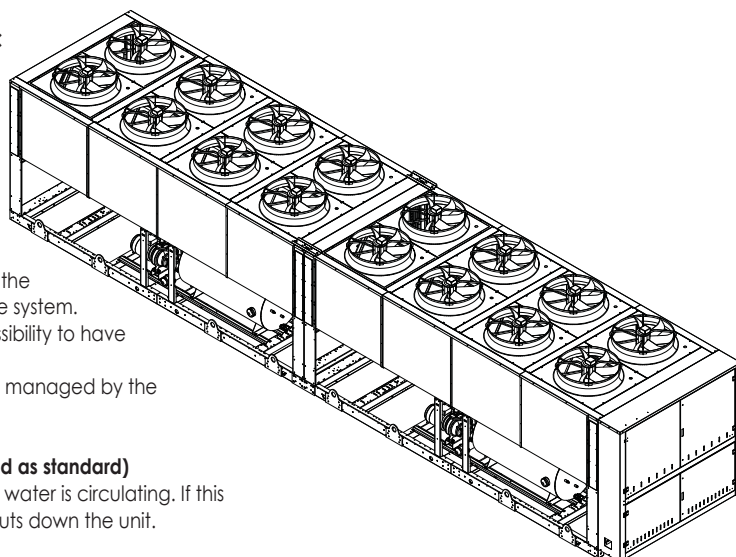
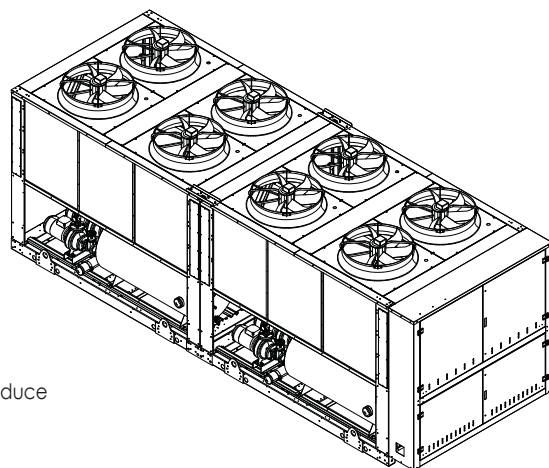
Depending on the characteristics of the pump chosen, it offers a useful head to overcome the pressure drops in the system. There is also the possibility to have a reserve pump. The reserve pump is managed by the electronic card.

#### Flow switch (installed as standard)

This checks that the water is circulating. If this is not the case, it shuts down the unit.

#### Water filter (installed as standard)

Allows you to block and eliminate any impurities in the hydraulic circuits. Inside, it has a filtering mesh with holes not greater than one millimetre. It is essential for avoiding serious damage to the plate-type exchanger.



### Accumulator tank

In stainless steel, with a 700-litre capacity. In order to reduce the thermal dispersion and eliminate the phenomenon of the formation of condensation, it is insulated with polyurethane material of a suitable thickness. One antifreeze electric heater of 300W (down to -20°C outside temperature and tank water temperature 5°C) assembled as standard and commanded from the card via an antifreeze sensor inserted in the tank.

### Drain valve (all versions)

Of the automatic type, assembled on the upper part of the hydraulic system; it releases any air bubbles that may be present in the system.

### Filling assembly (versions with accumulator)

This has a pressure gauge showing the pressure in the system.

### Expansion tank (versions with accumulator)

Of the membrane type, with nitrogen pre-charge.

### Hydraulic circuit safety valve (only for versions with pump or with accumulator)

Calibrated to 6 bar and with ductable discharge, it releases overpressure in the event of abnormal working pressure levels.

## 3.3. SAFETY AND CONTROL COMPONENTS

### Low pressure switch (BP)

#### - Cooling only (A - E)

Of fixed calibration, located on the low pressure side of the refrigerating circuit, it stops the operation of the compressor in the event of anomalous work pressures.

### High pressure switch (AP)

#### - Cooling only (A - E) - Heat pump (HA - HE)

With fixed calibration, placed on the high pressure side of the chiller circuit, it shuts down compressor operation in the case of abnormal operating pressure.

### Low pressure transducers (TP2)

#### - Standard for all the versions

Placed on the high pressure side of the chiller circuit, it communicates to the control card the operating pressure, sending a pre-alarm in case of abnormal pressure.

### High pressure transducer (TP3)

#### - Standard for all the versions

Placed on the high pressure side of the chiller circuit, it communicates to the control card the

operating pressure, sending a pre-alarm in case of abnormal pressure.

### Anti-freeze heater (installed as standard)

Its operation is commanded by the antifreeze probe located in the plate-type evaporator. It is activated when the water temperature is +3°C, and deactivated when the water temperature is +5°C. The dedicated software in the regulation card manages the heater.

### Refrigerating circuit safety valve

This intervenes by releasing overpressure in the event of abnormal working pressure levels.

- Calibrated at 45 bar on the HP branch
- Calibrated at 30 bar on the BP branch (only for heat pumps)

### Evaporator antifreeze heating element

Its operation is commanded by the antifreeze probe located in the plate-type evaporator. It is activated when the water temperature is +3°C, and deactivated when the water temperature is +5°C. The dedicated software in the regulation card manages the heater.

## 3.4. ELECTRICAL COMPONENTS

### ELECTRICAL PANEL

Contains the power section and the management of the controls and safety devices.  
In accordance with standards:  
CEI EN 61000-6-1  
CEI EN 61000-6-2  
CEI EN 61000-6-4 (immunity and electromagnetic emissions for the industrial sector).  
and Directives EMC 89/336/EEC and 92/31/EEC concerning electromagnetic compatibility, Low Voltage Directive LVD 2006/95/EC.

### DOOR-BLOCK DISCONNECTING SWITCH

It is possible to access the electrical panel by disconnecting the voltage, then using the opening lever of the panel itself. This lever can be blocked with one or more padlocks during maintenance, in order to prevent the machine being powered up accidentally.

### CONTROL KEYPAD

Provides full control functions. For a detailed description refer to the user manual.

### Remote control panel (PR3)

This allows the chiller command operations to be given from a distance.

**compressor protection thermomagnetic switch;**  
**fan protection thermomagnetic switch;**  
**auxiliary protection thermomagnetic switch;**  
**discharge gas temperature control thermostat.**

### ELECTRONIC REGULATION MICROPROCESSOR CARD

Consisting of a management/control card and a visualisation card.

#### • Functions carried out:

- adjustment of water temperature at evaporator inlet, with thermostat control for up to 4 levels and integral-proportional fan speed control (with DCPX accessory);
- compressor start-up delay;
- compressor sequence rotation;
- count of compressor work hours;
- start/stop;
- reset;
- permanent alarms memory;
- autostart after voltage drop;
- multi-lingual messages;
- operation with local or remote control.

#### • Machine status display:

- ON/OFF compressors;
- alarms summary.

#### • Alarm management:

- high pressure;
- flow switch;
- low pressure;
- anti-freeze;
- compressor overload;
- fan overload;
- pump overload.

#### • Display of the following parameters:

- water inlet temperature;
- accumulator temperature;
- water outlet temperature;
- delta T;
- high pressure;
- low pressure;
- waiting time for restart;
- alarms visualisation.

#### • Settings:

- without password:
  - cooling set;
  - total differential.
- with password:
  - antifreeze set;
  - low pressure exclusion time;
  - display language;
  - access code.

For further information, refer to the user manual.

#### 4. ACCESSORIES

|                          | 200   | 225                                                                                                                                                                                                                                                                                                                                                                                                               | 250   | 280   | 300   | 330   | 360   |
|--------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|-------|
| <b>AER485</b>            |       | Through this accessory it is possible to connect the unit with BMS supervision systems with electrical standard RS 485 and MODBUS type protocol.                                                                                                                                                                                                                                                                  |       |       |       |       |       |
| A                        | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| E                        | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| HA                       | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| HE                       | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| <b>AVX (00)</b>          |       | Sprung anti-vibration supports. Select the model using the compatibility table.                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| A                        | 767   | 773                                                                                                                                                                                                                                                                                                                                                                                                               | 779   | 785   | 791   | 798   | 798   |
| E                        |       |                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| HA                       | 767   | 773                                                                                                                                                                                                                                                                                                                                                                                                               | 779   | 785   | 791   | 798   | 798   |
| HE                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| <b>AVX (01-02-03-04)</b> |       | Sprung anti-vibration supports. Select the model using the compatibility table.                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| A                        | 768   | 774                                                                                                                                                                                                                                                                                                                                                                                                               | 780   | 786   | 792   | 799   | 799   |
| E                        |       |                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| HA                       | 768   | 774                                                                                                                                                                                                                                                                                                                                                                                                               | 780   | 786   | 792   | 799   | 799   |
| HE                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| <b>AVX (P1-P2-P3-P4)</b> |       | Sprung anti-vibration supports. Select the model using the compatibility table.                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| A                        | 769   | 775                                                                                                                                                                                                                                                                                                                                                                                                               | 781   | 787   | 793   | 800   | 800   |
| E                        |       |                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| HA                       | 769   | 775                                                                                                                                                                                                                                                                                                                                                                                                               | 781   | 787   | 793   | 800   | 800   |
| HE                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| <b>GP</b>                |       | Protect the external coils from accidental knocks.                                                                                                                                                                                                                                                                                                                                                                |       |       |       |       |       |
| A                        | 260x2 | 260 350                                                                                                                                                                                                                                                                                                                                                                                                           | 350x2 | 350x2 | 350x2 | 500x2 | 500x2 |
| E                        |       |                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| HA                       | 260x2 | 260 350                                                                                                                                                                                                                                                                                                                                                                                                           | 350x2 | 350x2 | 350x2 | 500x2 | 500x2 |
| HE                       |       |                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |       |       |       |
| <b>PGS</b>               |       | Card to be inserted in the electronic card of the unit. Allows you to programme two time bands per day (two switch on/off cycles) and to have differentiated programming for each day of the week.                                                                                                                                                                                                                |       |       |       |       |       |
| A                        | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| E                        | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| HA                       | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| HE                       | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| <b>AERWEB30</b>          |       | AERWEB30: the AERWEB device allows the remote control of a chiller from a common PC, using a serial connection. Using additional modules, the device allows the chiller to be controlled via the telephone line, using the AERMODEM accessory, or via the GSM network, using the AERMODEM GSM accessory. AERWEB can pilot up to 9 chillers, but each of these must be equipped with accessory AER485 or AER485P2. |       |       |       |       |       |
| A                        | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| E                        | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| HA                       | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |
| HE                       | •     | •                                                                                                                                                                                                                                                                                                                                                                                                                 | •     | •     | •     | •     | •     |

|              | 200        | 225                                                                                                                                                                                                                                                                                                                                                                                                                                      | 250        | 280        | 300        | 330        | 360        |
|--------------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|
| REF          |            | Current rephaser. Parallel connection with the motor makes the reduction of input current possible.<br>It can only be installed when the machine is being made and must therefore be specified when the order is placed.                                                                                                                                                                                                                 |            |            |            |            |            |
| A            | RIFNRL2000 | RIFNRL2250                                                                                                                                                                                                                                                                                                                                                                                                                               | RIFNRL2500 | RIFNRL2800 | RIFNRL3000 | RIFNRL3300 | RIFNRL3600 |
| E            |            |                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |            |            |
| HA           | RIFNRL2000 | RIFNRL2250                                                                                                                                                                                                                                                                                                                                                                                                                               | RIFNRL2500 | RIFNRL2800 | RIFNRL3000 | RIFNRL3300 | RIFNRL3600 |
| HE           |            |                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |            |            |
| DCPX         |            | This accessory allows correct operation with outside temperatures below 10°C and down to -10°C.<br>It is made up of an electronic regulation card that varies the fan rpm on the basis of the condensation pressure (read by the high pressure transducer), to keep it sufficiently high for the proper functioning of the unit.<br>It also allows correct heating operation with outside temperatures greater than 30°C and up to 42°C. |            |            |            |            |            |
| A            | 78         | 79                                                                                                                                                                                                                                                                                                                                                                                                                                       | 81         | 81         | 81         | 82         | 82         |
| E            | standard   |                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |            |            |
| HA           | 78         | 80                                                                                                                                                                                                                                                                                                                                                                                                                                       | 82         | 82         | 82         | 82         | 82         |
| HE           | standard   |                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |            |            |
| DCPX M       |            | DCPX only for configurations with enlarged fans (M).                                                                                                                                                                                                                                                                                                                                                                                     |            |            |            |            |            |
| A            | 78         | 80                                                                                                                                                                                                                                                                                                                                                                                                                                       | 82         | 82         | 82         | 82         | 82         |
| E            | standard   |                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |            |            |            |            |
| DUALCHILLER  |            | Simplified control system to switch on and off, and command, two chillers (using Aermec GR3 command) in a single system, as if they were a single unit.                                                                                                                                                                                                                                                                                  |            |            |            |            |            |
| A            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| E            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HA           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HE           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| MULTICHILLER |            | Control system to switch the individual chillers on and off, and command them, in a system in which several units are installed in parallel, always ensuring a constant delivery to the evaporators.                                                                                                                                                                                                                                     |            |            |            |            |            |
| A            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| E            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HA           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HE           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| TRX1         |            | The water accumulators with holes and supplementary electric heaters leave the factory with plastic protection caps. Before loading the system, if the installation of an electric heater is not envisaged it is compulsory to replace the plastic caps with the special TRX1.                                                                                                                                                           |            |            |            |            |            |
| A            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| E            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HA           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HE           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| PRM 1        |            | FACTORY-ASSEMBLED ACCESSORY. Pressure switch with manual reset (using a tool), electrically connected in series to the high pressure switch on the compressor delivery pipe.                                                                                                                                                                                                                                                             |            |            |            |            |            |
| A            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| E            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HA           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HE           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| PRM 2        |            | FACTORY-ASSEMBLED ACCESSORY. Pressure switch with manual reset (using a tool), electrically connected in series to the high pressure switch on the compressor delivery pipe.                                                                                                                                                                                                                                                             |            |            |            |            |            |
| A            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| E            | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HA           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |
| HE           | •          | •                                                                                                                                                                                                                                                                                                                                                                                                                                        | •          | •          | •          | •          | •          |

## 5. STARTING CURRENT REDUCTION IN PRESENCE OF DRE ACCESSORIES

| MODEL             | SINGLE CIRCUIT | DOUBLE CIRCUIT | THREE-CIRCUIT | FOUR-CIRCUIT | FIVE-CIRCUIT | SIX-CIRCUIT |
|-------------------|----------------|----------------|---------------|--------------|--------------|-------------|
| CURRENT REDUCTION | -30%           | -26%           | -22%          | -20%         | -18%         | -16%        |

## 6. TECHNICAL DATA

### 6.1. TECHNICAL DATA VERSIONS [A-E]

| COOLING              |     |   | 2000  | 2250   | 2500   | 2800   | 3000   | 3300   | 3600   |
|----------------------|-----|---|-------|--------|--------|--------|--------|--------|--------|
| Cooling output       | kW  | A | 542   | 593    | 644    | 714    | 798    | 874    | 938    |
|                      |     | E | 500   | 548    | 596    | 658    | 734    | 818    | 872    |
| Total input power    | kW  | A | 186   | 199    | 212    | 248    | 284    | 308    | 334    |
|                      |     | E | 202   | 216    | 230    | 268    | 308    | 330    | 358    |
| Water flow rate      | l/h | A | 93220 | 102000 | 110770 | 122810 | 137260 | 150330 | 161340 |
|                      |     | E | 86000 | 94260  | 102510 | 113180 | 126250 | 140700 | 149980 |
| Total pressure drops | kPa | A | 70,4  | 72,6   | 72,6   | 77,8   | 60,8   | 60,8   | 61,7   |
|                      |     | E | 60,7  | 63,0   | 63,0   | 66,9   | 52,1   | 53,7   | 53,9   |

| Energy indices |     |   |      |      |      |      |      |      |      |
|----------------|-----|---|------|------|------|------|------|------|------|
| EER            | W/W | A | 2,91 | 2,98 | 3,04 | 2,88 | 2,81 | 2,84 | 2,81 |
|                |     | E | 2,48 | 2,54 | 2,59 | 2,46 | 2,38 | 2,48 | 2,44 |
| ESEER          | W/W | A | 4,17 | 4,25 | 4,34 | 4,12 | 4,02 | 4,06 | 4,02 |
|                |     | E | 4,08 | 4,18 | 4,28 | 4,05 | 3,93 | 4,02 | 4,02 |

| ELECTRICAL DATA |   |   |            |     |     |     |     |     |      |
|-----------------|---|---|------------|-----|-----|-----|-----|-----|------|
| Fuel feed       | A | A | 400-3-50Hz |     |     |     |     |     |      |
|                 |   | E |            |     |     |     |     |     |      |
| Input current   | A | A | 361        | 377 | 393 | 470 | 547 | 563 | 589  |
|                 |   | E | 384        | 403 | 421 | 502 | 583 | 613 | 649  |
| Maximum current | A | A | 434        | 484 | 534 | 592 | 650 | 729 | 795  |
|                 |   | E |            |     |     |     |     |     |      |
| Peak current    | A | A | 643        | 752 | 802 | 801 | 859 | 997 | 1063 |
|                 |   | E |            |     |     |     |     |     |      |

| COMPRESSORS (SCROLL) |         |   |     |     |     |      |      |      |      |
|----------------------|---------|---|-----|-----|-----|------|------|------|------|
| Number/Circuit       | no./no. | A | 8/4 | 8/4 | 8/4 | 10/4 | 12/4 | 12/4 | 12/4 |
|                      |         | E |     |     |     |      |      |      |      |

| FANS (AXIAL)    |      |   |        |        |        |        |        |        |        |
|-----------------|------|---|--------|--------|--------|--------|--------|--------|--------|
| Quantity        | no.  | A | 8      | 10     | 12     | 12     | 12     | 16     | 16     |
|                 |      | E |        |        |        |        |        |        |        |
| Air flow rate   | m³/h | A | 140400 | 176400 | 212400 | 208200 | 204000 | 266000 | 244000 |
|                 |      | E | 105300 | 126990 | 148680 | 150840 | 153000 | 192300 | 183000 |
| Input power     | kW   | A | 10,0   | 12,5   | 15,0   | 15,0   | 15,0   | 20,1   | 20,1   |
|                 |      | E | 7,5    | 9,4    | 11,3   | 11,3   | 11,3   | 15,0   | 15,0   |
| Input current   | A    | A | 21,6   | 27     | 32,4   | 32,4   | 32,4   | 43,2   | 43,2   |
|                 |      | E | 16,2   | 20,25  | 24,3   | 24,3   | 24,3   | 32,4   | 32,4   |
| Useful heads[1] | Pa   | A | 39     | 39     | 40     | 38     | 37     | 36     | 32     |
|                 |      | E |        |        |        |        |        |        |        |

| EVAPORATORS (PLATES)        |      |   |    |         |    |    |    |    |    |
|-----------------------------|------|---|----|---------|----|----|----|----|----|
| Quantity                    | no.  | A | 2  | 2       | 2  | 2  | 2  | 2  | 2  |
|                             |      | E |    |         |    |    |    |    |    |
| Water connections (in/out)* | diam | A | 3" | 3"/4" * | 4" | 4" | 4" | 4" | 4" |
|                             |      | E |    |         |    |    |    |    |    |

| HYDRAULIC CIRCUIT             |       |   |         |  |  |  |  |  |  |
|-------------------------------|-------|---|---------|--|--|--|--|--|--|
| Accumulator capacity          | No./l | A | 2 x 700 |  |  |  |  |  |  |
|                               |       | E |         |  |  |  |  |  |  |
| Accumulator antifreeze heater | no./W | A | 2 x 300 |  |  |  |  |  |  |
|                               |       | E |         |  |  |  |  |  |  |
| Expansion tank capacity       | No./l | A | 4 x 25  |  |  |  |  |  |  |
|                               |       | E |         |  |  |  |  |  |  |

[1] The useful heads refer to the nominal air flow rate

\* The water connections are all of the Victaulic type

For size 2250, 3" connections are envisaged for module 1000 and 4" connections for module 1250, for the version [00]

|                                  |     |   | 2000 | 2250    | 2500 | 2800 | 3000 | 3300 | 3600 |
|----------------------------------|-----|---|------|---------|------|------|------|------|------|
| <b>LOW-HEAD CIRCULATION PUMP</b> |     |   |      |         |      |      |      |      |      |
| Input power                      | KW  | A | 7,4  | 3.7+4.8 | 9.6  | 9.6  | 9.6  | 13,0 | 13,0 |
|                                  |     | E | 15,4 | 7.7+4.8 |      |      |      |      |      |
| Input current                    | A   | A |      |         |      |      |      |      |      |
|                                  |     | E | 12,4 | 6.2+8.1 | 16.2 | 16,3 | 16,3 | 22,0 | 22,0 |
| Useful head                      | kPa | A | 85   | 103     | 103  | 82   | 106  | 94   | 82   |
|                                  |     | E | 104  | 118     | 125  | 108  | 125  | 111  | 102  |

|                                   |     |   |      |         |      |      |      |      |      |
|-----------------------------------|-----|---|------|---------|------|------|------|------|------|
| <b>HIGH-HEAD CIRCULATION PUMP</b> |     |   |      |         |      |      |      |      |      |
| Input power                       | KW  | A | 13,0 | 6.5+8.6 | 17.2 | 17.2 | 17.2 | 24.7 | 24.7 |
|                                   |     | E |      |         |      |      |      |      |      |
| Input current                     | A   | A | 22,0 | 11+14.6 | 29.2 | 29.2 | 29.2 | 42.4 | 42.4 |
|                                   |     | E |      |         |      |      |      |      |      |
| Useful head                       | kPa | A | 200  | 227     | 247  | 222  | 226  | 233  | 221  |
|                                   |     | E | 216  | 245     | 264  | 246  | 250  | 245  | 236  |

|                    |     |   |    |    |    |      |      |      |      |
|--------------------|-----|---|----|----|----|------|------|------|------|
| <b>SOUND DATA</b>  |     |   |    |    |    |      |      |      |      |
| Sound power (1)    | dBA | A | 91 | 93 | 94 | 93,5 | 93,5 | 94.5 | 96,5 |
|                    |     | E | 86 | 88 | 89 | 88.5 | 88   | 89.5 | 91.5 |
| Sound pressure (2) | dBA | A | 59 | 61 | 62 | 61,5 | 61,5 | 62,5 | 64.5 |
|                    |     | E | 54 | 56 | 57 | 56,5 | 56   | 57,5 | 59,5 |

|                   |    |   |      |      |      |      |      |       |       |
|-------------------|----|---|------|------|------|------|------|-------|-------|
| <b>DIMENSIONS</b> |    |   |      |      |      |      |      |       |       |
| Height            | mm | A | 2450 | 2450 | 2450 | 2450 | 2450 | 2450  | 2450  |
|                   |    | E |      |      |      |      |      |       |       |
| Width             | mm | A | 2200 | 2200 | 2200 | 2200 | 2200 | 2200  | 2200  |
|                   |    | E |      |      |      |      |      |       |       |
| Depth             | mm | A | 6400 | 7250 | 8100 | 8100 | 8100 | 11100 | 11100 |
|                   |    | E |      |      |      |      |      |       |       |
| Weight when empty | kg | A | 4820 | 5240 | 5660 | 6060 | 6510 | 7590  | 7850  |
|                   |    | E |      |      |      |      |      |       |       |

#### NOMINAL REFERENCE CONDITIONS

- Inlet water temperature 12°C
- Outlet water temperature 7°C
- Outside air temperature d.b. 35°C
- $\Delta t$  5°C

#### (1) Sound power

Aermec determines the sound power value on the basis of measurements taken in accordance with standard 9614-2, in compliance with the Eurovent certification.

#### (2) Sound pressure

Sound pressure in an unrestricted range on a reflective plane (directional fact. Q=2), 10m away from the unit external surface, complying with ISO 3744.

## 7. TECHNICAL DATA

### 7.1. TECHNICAL DATA VERSIONS [HA-HE]

| COOLING                           |         |          | 2000        | 2250    | 2500   | 2800   | 3000   | 3300   | 3600   |
|-----------------------------------|---------|----------|-------------|---------|--------|--------|--------|--------|--------|
| Cooling output                    | kW      | HA       | 522         | 576     | 630    | 702    | 776    | 874    | 944    |
|                                   |         | HE       | 462         | 515     | 568    | 638    | 710    | 796    | 852    |
| Total input power                 | kW      | HA       | 188         | 203     | 218    | 252    | 286    | 302    | 324    |
|                                   |         | HE       | 214         | 229     | 244    | 280    | 316    | 336    | 364    |
| Water flow rate                   | l/h     | HA       | 89780       | 99070   | 108360 | 120740 | 133470 | 150330 | 162370 |
|                                   |         | HE       | 79460       | 88580   | 97700  | 109740 | 122120 | 136910 | 146540 |
| Total pressure drops              | kPa     | HA       | 53,5        | 61,4    | 61,4   | 48,0   | 48,6   | 54,0   | 53,5   |
|                                   |         | HE       | 42,7        | 50,6    | 50,6   | 40,3   | 41,2   | 45,4   | 44,1   |
| HEATING                           |         |          | 2000        | 2250    | 2500   | 2800   | 3000   | 3300   | 3600   |
| Heating capacity                  | kW      | HA       | 586         | 637     | 688    | 776    | 866    | 968    | 1046   |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Total input power                 | kW      | HA       | 186         | 203     | 220    | 248    | 278    | 306    | 326    |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Water flow rate on heating        | l/h     | HA       | 100790      | 109560  | 118340 | 133470 | 148950 | 166500 | 179910 |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Total pressure drops in heat mode | kPa     | HA       | 68,8        | 75.5    | 75.5   | 58,2   | 60,1   | 66,3   | 65.9   |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Energy indices                    |         |          |             |         |        |        |        |        |        |
| EER                               | W/W     | HA       | 2,78        | 2,84    | 2,89   | 2,79   | 2,71   | 2,89   | 2,91   |
|                                   |         | HE       | 2,16        | 2,25    | 2,33   | 2,28   | 2,25   | 2,37   | 2,34   |
| ESEER                             | W/W     | HA       | 3,96        | 4,04    | 4,13   | 3,91   | 3,82   | 3,85   | 3,82   |
|                                   |         | HE       | 3,88        | 3,97    | 4,06   | 3,85   | 3,74   | 3,81   | 3,82   |
| COP                               | W/W     | HA       | 3,15        | 3,14    | 3,13   | 3,13   | 3,12   | 3,16   | 3,21   |
|                                   |         | HE       |             |         |        |        |        |        |        |
| ELECTRICAL DATA                   |         |          |             |         |        |        |        |        |        |
| Fuel feed                         | A       | HA       | 400V-3-50Hz |         |        |        |        |        |        |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Input current on cooling          | A       | HA       | 357         | 379     | 401    | 469    | 536    | 572    | 595    |
|                                   |         | HE       | 388         | 414     | 441    | 511    | 582    | 625    | 654    |
| Input current on heating          | A       | HA       | 353         | 374     | 395    | 462    | 530    | 565    | 585    |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Maximum current                   | A       | HA       | 442         | 495     | 548    | 606    | 664    | 747    | 813    |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Peak current                      | A       | HA       | 651         | 763     | 816    | 815    | 873    | 1015   | 1081   |
|                                   |         | HE       |             |         |        |        |        |        |        |
| COMPRESSORS (SCROLL)              |         |          |             |         |        |        |        |        |        |
| Number/Circuit                    | no./no. | HA<br>HE | 8/4         | 8/4     | 8/4    | 10/4   | 12/4   | 12/4   | 12/4   |
| FANS (AXIAL)                      |         |          |             |         |        |        |        |        |        |
| Quantity                          | no.     | HA<br>HE | 8           | 10      | 12     | 12     | 12     | 16     | 16     |
| Air flow rate                     | m³/h    | HA       | 167200      | 209600  | 252000 | 248400 | 244800 | 336000 | 331200 |
|                                   |         | HE       | 121200      | 148800  | 176400 | 180000 | 183600 | 235200 | 231800 |
| Input power                       | kW      | HA       | 13,6        | 17,0    | 20,4   | 20,4   | 20,4   | 27,1   | 27,1   |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Input current                     | A       | HA       | 28,8        | 36,0    | 43,2   | 43,2   | 43,2   | 57,6   | 57,6   |
|                                   |         | HE       |             |         |        |        |        |        |        |
| Useful heads[1]                   | Pa      | HA       | 48          | 48      | 49     | 47     | 45     | 49     | 47     |
|                                   |         | HE       |             |         |        |        |        |        |        |
| EVAPORATORS (PLATES)              |         |          |             |         |        |        |        |        |        |
| Quantity                          | no.     | HA<br>HE | 2           | 2       | 2      | 2      | 2      | 2      | 2      |
| Water connections (in/out)*       | diam    | HA       | 3"          | 3"/4" * | 4"     | 4"     | 4"     | 4"     | 4"     |
|                                   |         | HE       |             |         |        |        |        |        |        |
| HYDRAULIC CIRCUIT                 |         |          |             |         |        |        |        |        |        |
| Accumulator capacity              | L       | HA<br>HE | 2 x 700     |         |        |        |        |        |        |
| Accumulator antifreeze heater     | W       | HA<br>HE |             |         |        |        |        |        |        |
| Expansion tank capacity           | No./l   | A        | 4 x 25      |         |        |        |        |        |        |
|                                   |         | E        |             |         |        |        |        |        |        |

[1] The useful heads refer to the nominal air flow rate

\* The water connections are all of the Victaulic type

For size 2250, 3" connections are envisaged for module 1000 and 4" connections for module 1250, for the version [00]

|                                   |     |          | 2000         | 2250         | 2500         | 2800         | 3000         | 3300         | 3600         |
|-----------------------------------|-----|----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>LOW-HEAD CIRCULATION PUMP</b>  |     |          |              |              |              |              |              |              |              |
| Input power                       | KW  | HA<br>HE | 7,4          | 3.7+4.8      | 9.6          | 9.6          | 9.6          | 13,0         | 13,0         |
| Input current                     | A   | HA<br>HE | 12,4         | 6.2+8.1      | 16.2         | 16,3         | 16,3         | 22,0         | 22,0         |
| Useful head on cooling            | kPa | HA<br>HE | 111<br>131   | 128<br>150   | 128<br>150   | 128<br>149   | 125<br>141   | 106<br>126   | 95<br>119    |
| Useful head on heating            | kPa | HA<br>HE | 79<br>95     | 95<br>95     | 95<br>95     | 91<br>91     | 94<br>94     | 70<br>70     | 56<br>56     |
| <b>HIGH-HEAD CIRCULATION PUMP</b> |     |          |              |              |              |              |              |              |              |
| Input power                       | KW  | HA<br>HE | 13,0         | 6.5+8.6      | 17.2         | 17.2         | 17.2         | 24.7         | 24.7         |
| Input current                     | A   | HA<br>HE | 22,0         | 11+14.6      | 29.2         | 29.2         | 29.2         | 42.4         | 42.4         |
| Useful head on cooling            | kPa | HA<br>HE | 225<br>247   | 269<br>293   | 269<br>293   | 266<br>289   | 246<br>272   | 241<br>261   | 232<br>255   |
| Useful head on heating            | kPa | HA<br>HE | 189<br>232   | 232<br>232   | 232<br>232   | 225<br>225   | 193<br>193   | 207<br>207   | 193<br>193   |
| <b>SOUND DATA</b>                 |     |          |              |              |              |              |              |              |              |
| Sound power (1)                   | dBA | HA<br>HE | 91.5<br>86.0 | 93,3<br>87,8 | 94.5<br>89.0 | 94,0<br>88.5 | 93,5<br>88.0 | 95.0<br>89.5 | 97,0<br>91.5 |
| Sound pressure (2)                | dBA | HA<br>HE | 59,5<br>54,0 | 61,3<br>55,8 | 62,5<br>57,0 | 62,0<br>56,5 | 61,5<br>56,0 | 63,0<br>57,5 | 65,0<br>59,5 |
| <b>DIMENSIONS</b>                 |     |          |              |              |              |              |              |              |              |
| Height                            | mm  | HA<br>HE | 2450         | 2450         | 2450         | 2450         | 2450         | 2450         | 2450         |
| Width                             | mm  | HA<br>HE | 2200         | 2200         | 2200         | 2200         | 2200         | 2200         | 2200         |
| Depth                             | mm  | HA<br>HE | 6400         | 7250         | 8100         | 8100         | 8100         | 11100        | 11100        |
| Weight when empty                 | kg  | HA<br>HE | 4930         | 5360         | 5780         | 6190         | 6630         | 7710         | 7980         |

#### (1) Sound power

Aermec determines the sound power value on the basis of measurements taken in accordance with standard 9614-2, in compliance with the Eurovent certification.

#### (2) Sound pressure

Sound pressure in an unrestricted range on a reflective plane (directional fact. Q=2), 10m away from the unit external surface, complying with ISO 3744.

#### NOMINAL REFERENCE CONDITIONS

##### COOLING MODE

|                            |      |
|----------------------------|------|
| - Inlet water temperature  | 12°C |
| - Outlet water temperature | 7°C  |
| - Outside air temperature  | 35°C |
| - $\Delta t$               | 5°C  |

##### HEATING mode

|                            |       |
|----------------------------|-------|
| - Inlet water temperature  | 40°C  |
| - Outlet water temperature | 45°C  |
| - Outside air temperature  | 7/6°C |
| - $\Delta t$               | 5°C   |

## 8. TECHNICAL DATA

### 8.1. TECHNICAL DATA [C]

| COOLING            |         |   | 2000   | 2250   | 2500   | 2800   | 3000   | 3300   | 3600   |
|--------------------|---------|---|--------|--------|--------|--------|--------|--------|--------|
| Cooling output     | kW      | A | 564    | 617    | 670    | 744    | 830    | 926    | 994    |
|                    |         | E | 520    | 571    | 622    | 686    | 764    | 852    | 908    |
| Total input power  | kW      | A | 190    | 204    | 218    | 254    | 290    | 304    | 330    |
|                    |         | E | 206    | 221    | 236    | 276    | 316    | 338    | 368    |
| Energy indices     |         |   |        |        |        |        |        |        |        |
| EER                | W/W     | A | 2,97   | 3,02   | 3,07   | 2,93   | 2,86   | 3,05   | 3,01   |
|                    |         | E | 2,52   | 2,58   | 2,64   | 2,49   | 2,42   | 2,52   | 2,47   |
| ELECTRICAL DATA    |         |   |        |        |        |        |        |        |        |
| Input current      | A       | A | 370    | 387    | 404    | 482    | 562    | 578    | 604    |
|                    |         | E | 394    | 413    | 432    | 516    | 598    | 630    | 666    |
| Maximum current    | A       | A | 434    | 484    | 534    | 592    | 650    | 729    | 795    |
|                    |         | E | -      | -      | -      | -      | -      | -      | -      |
| Peak current       | A       | A | 643    | 752    | 802    | 801    | 859    | 997    | 1063   |
|                    |         | E | -      | -      | -      | -      | -      | -      | -      |
| COMPRESSORS        |         |   |        |        |        |        |        |        |        |
| Number/Circuit     | no./no. | A | 8/4    | 8/4    | 8/4    | 10/4   | 12/4   | 12/4   | 12/4   |
|                    |         | E |        |        |        |        |        |        |        |
| FANS (AXIAL)       |         |   |        |        |        |        |        |        |        |
| Quantity           | no.     | A | 8      | 10     | 12     | 12     | 12     | 16     | 16     |
|                    |         | E |        |        |        |        |        |        |        |
| Air flow rate      | m³/h    | A | 140400 | 176400 | 212400 | 208200 | 204000 | 266000 | 244000 |
|                    |         | E | 105300 | 126990 | 148680 | 150840 | 153000 | 192300 | 183000 |
| Input power        | kW      | A | 10,0   | 12,5   | 15,0   | 15,0   | 15,0   | 20,1   | 20,1   |
|                    |         | E | 7,5    | 9,4    | 11,3   | 11,3   | 11,3   | 15,0   | 15,0   |
| Input current      | A       | A | 21,6   | 27     | 32,4   | 32,4   | 32,4   | 43,2   | 43,2   |
|                    |         | E | 16,2   | 20,3   | 24,3   | 24,3   | 24,3   | 32,4   | 32,4   |
| SOUND DATA         |         |   |        |        |        |        |        |        |        |
| Sound power (1)    | dBA     | A | 91     | 93     | 94     | 93,5   | 93,5   | 94,5   | 96,5   |
|                    |         | E | 86     | 88     | 89     | 88,5   | 88     | 89,5   | 91,5   |
| Sound pressure (2) | dBA     | A | 59     | 61     | 62     | 61,5   | 61,5   | 62,5   | 64,5   |
|                    |         | E | 54     | 56     | 57     | 56,5   | 56     | 57,5   | 59,5   |
| DIMENSIONS         |         |   |        |        |        |        |        |        |        |
| Height             | mm      | A | 2450   | 2450   | 2450   | 2450   | 2450   | 2450   | 2450   |
|                    |         | E |        |        |        |        |        |        |        |
| Width              | mm      | A | 2200   | 2200   | 2200   | 2200   | 2200   | 2200   | 2200   |
|                    |         | E |        |        |        |        |        |        |        |
| Depth              | mm      | A | 6400   | 7250   | 8100   | 8100   | 8100   | 11100  | 11100  |
|                    |         | E |        |        |        |        |        |        |        |

#### (1) Sound power

Aermec determines the sound power value on the basis of measurements taken in accordance with standard 9614-2, in compliance with the Eurovent certification.

#### (2) Sound pressure

Sound pressure in an unrestricted range on a reflective plane (directional fact. Q=2), 10m away from the unit external surface, complying with ISO 3744.

## 9. OPERATING LIMITS

### 9.1. COOLING MODE

The devices in their standard configurations are not suitable for installation in salty environments. The maximum and minimum limits for the water flow rate to the exchanger are indicated by the curves of the pressure drop diagrams. For the operating limits, refer to the diagrams below, valid for  $\Delta t = 5^\circ\text{C}$ .

N.B.:

The unit can be activated with external air at  $46^\circ\text{C}$  and inlet water at  $35^\circ\text{C}$  in the summer function.

The unit can be activated with external air at  $-15^\circ\text{C}$  and inlet water at  $20^\circ\text{C}$  in the winter function.

Under these conditions the unit function is possible only for a short time in order to bring the system up to right temperature.

To reduce the time of this operation a three-way valve allowing to bypass the water from the supply to the system should be fitted, until the conditions enabling the unit to operate within the permitted operating limits are reached.

#### KEY:



Operation with glycol



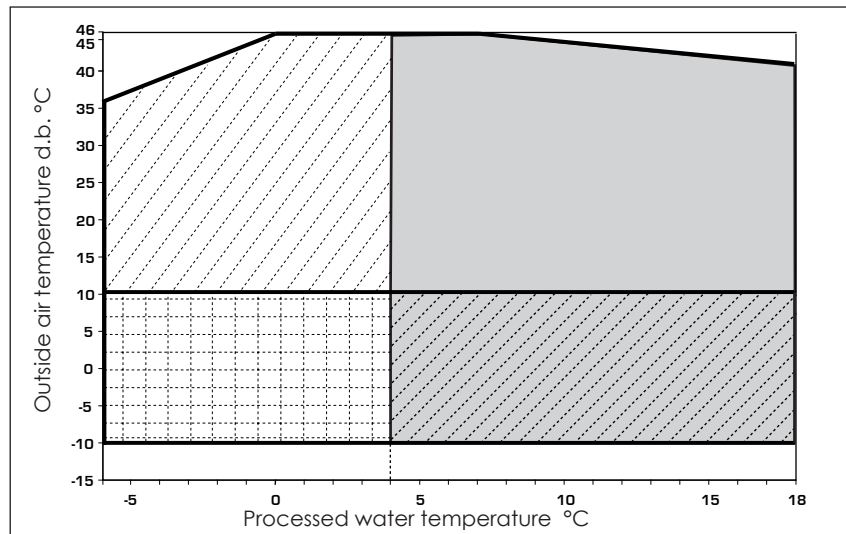
Operation with glycol, with DCPX accessory



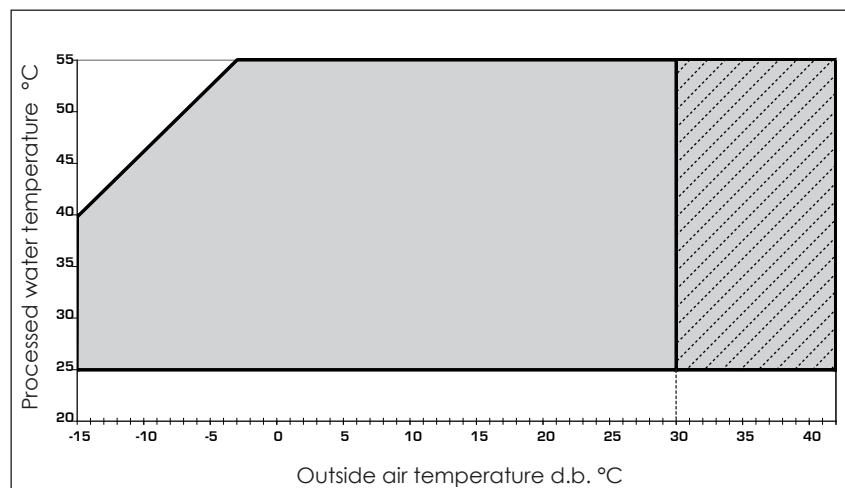
Standard operation



Standard operation with DCPX accessory

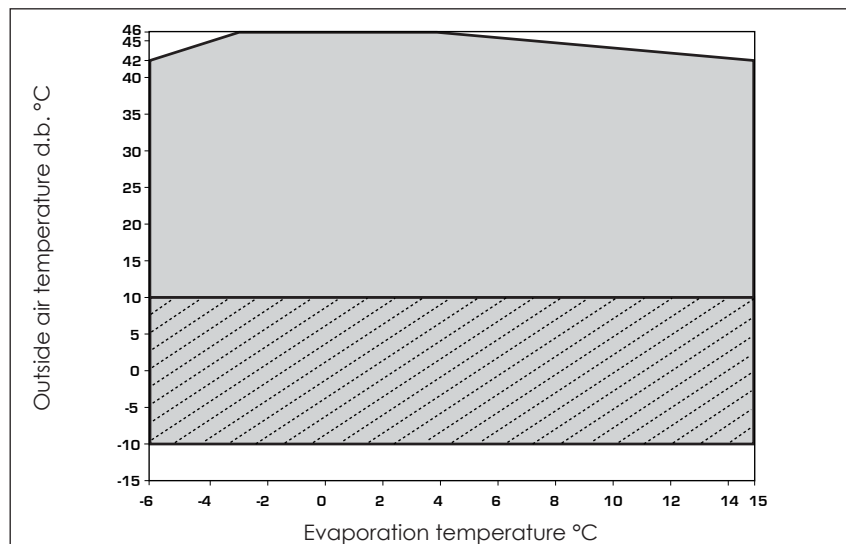


### 9.2. HEATING MODE



**NB** In the versions with accumulator (09-10) the operating limits in cold and warm modes are reduced to  $3^\circ\text{C}$ .

### 9.3. CONDENSER UNIT OPERATION



## 10. CORRECTION FACTORS

### 10.1. COOLING CAPACITY AND INPUT POWER

#### –"HIGH EFFICIENCY VERSIONS"

The refrigerating capacity yielded and the input electrical capacity in conditions other than rated conditions are obtained by multiplying the rated values ( $P_f$ ,  $P_a$ ) by the respective correction coefficients ( $C_f$ ,  $C_a$ ).  
The following diagrams allow you to obtain the correction coefficients to be used for the various versions of the devices, in cold mode; next to each curve you can see the outside air temperature to which it refers.

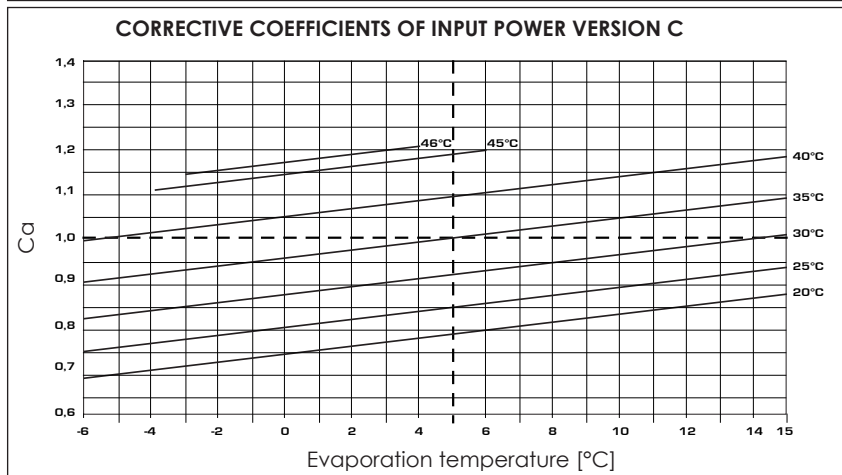
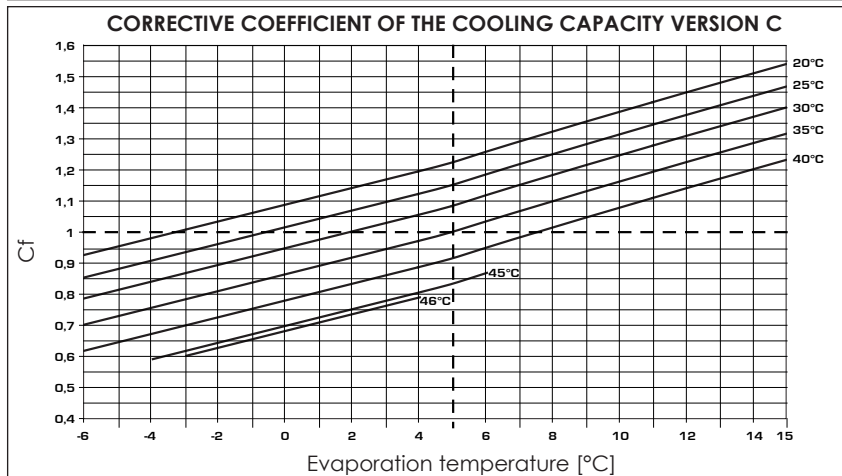
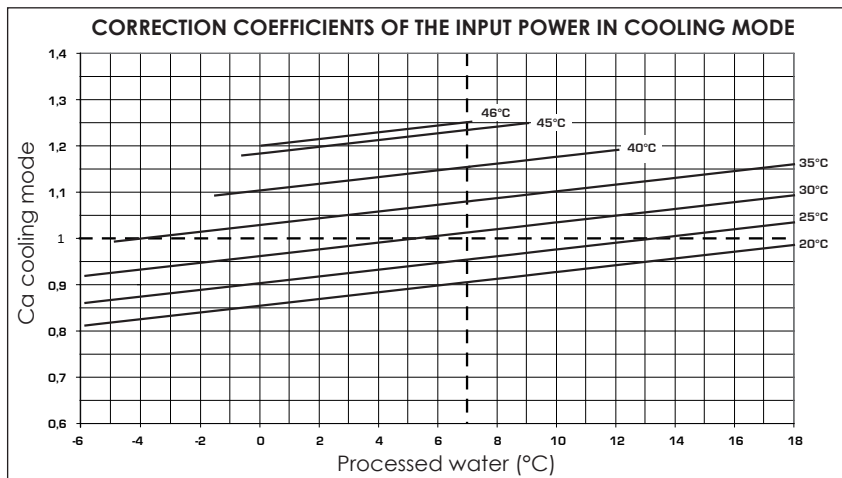
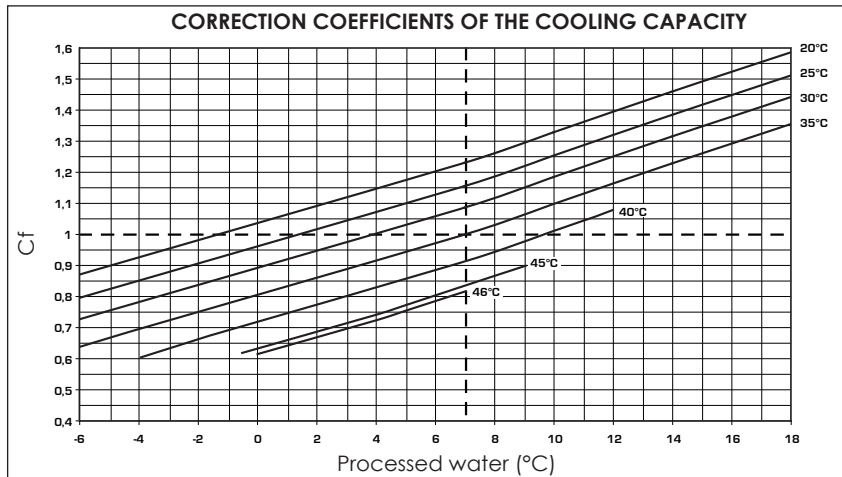
#### KEY

**$C_f$ :** correction coefficient of the cooling capacity.

**$C_a$ :** correction coefficient of the input power.

#### FOR $\Delta t$ DIFFERENT FROM 5°C

For the evaporator, use **Tab. 10.4.1.** to obtain the corrective factors of the cooling and absorbed power.  
To take into account the exchanger soiling, apply the relative fouling factors, **Tab. 10.4.2.**



## 10.2. HEATING CAPACITY AND INPUT POWER

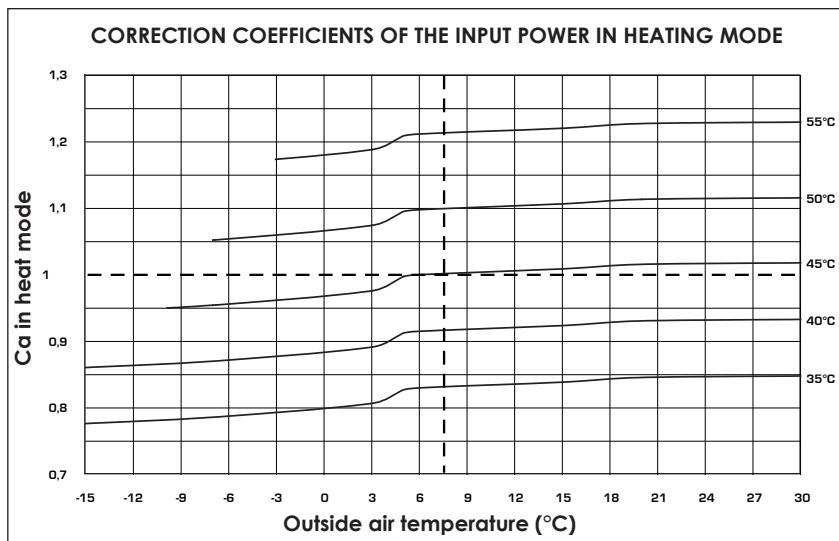
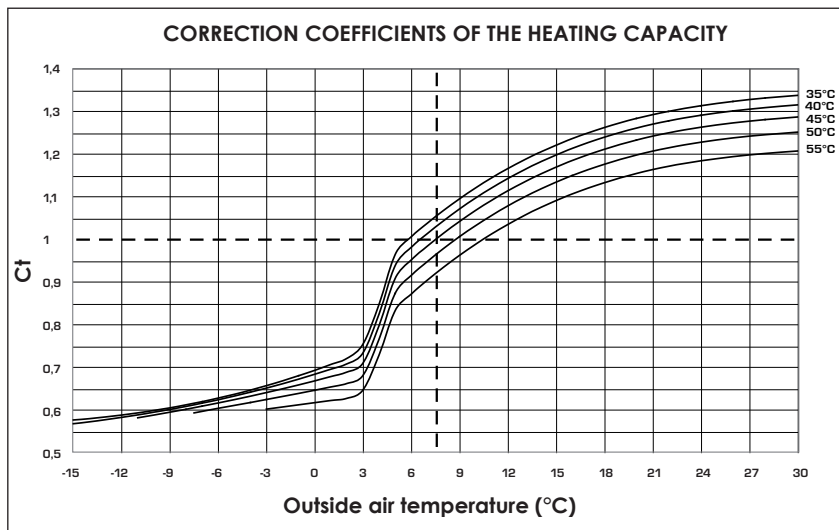
### – "HEAT PUMP VERSIONS"

The heating capacity yielded and the input electrical capacity in conditions other than rated conditions are obtained by multiplying the rated values ( $P_t$ ,  $P_a$ ) by the respective correction coefficients ( $C_t$ ,  $C_a$ ).  
The diagram allows you to obtain the correction coefficients; in line with each curve you will see the hot processed water temperature to which it refers, assuming a difference of temperature between the condenser inlet and outlet water equal to 5°C.

The outputs are intended as net of the defrosting cycles.

#### KEY

- Ca:** Correction coefficient of the input power.
- Ct:** correction coefficient of the heating capacity.



## 10.3. FOR $\Delta t$ DIFFERENT FROM THE RATED VALUE

For  $\Delta t$  different from 5°C water consumption, use Tab. 10.4.1 to obtain the correction factors for the cooling capacity and input power.

Tab. 10.4.1

|                                     | 3    | 5 | 8    | 10   |
|-------------------------------------|------|---|------|------|
| Cooling capacity correction factors | 0.99 | 1 | 1.02 | 1.03 |
| Cooling capacity correction factors | 0.99 | 1 | 1.01 | 1.02 |

## 10.4. FOULING FACTORS

The performance levels indicated in the table refer to conditions with clean tubes, with a fouling factor = 1. For other fouling factor values, multiply the data of the performance tables by the coefficients given. To take into account exchanger soiling, apply the relative fouling factors, Tab. 10.4.2.

Tab. 10.4.2

| Fouling factors [ $K \cdot m^2$ ]/[W] | 0.00005 | 0.0001 | 0.0002 |
|---------------------------------------|---------|--------|--------|
| Cooling capacity correction factors   | 1       | 0.98   | 0.94   |
| Cooling capacity correction factors   | 1       | 0.98   | 0.95   |

## 11. PRESSURE DROPS

### 11.1. TOTAL PRESSURE DROPS

Standard NRL unit, cooling only (A-E).  
NB

The pressure drops and effective pressures are calculated on the basis of cooling with water at 10°C. The pressure drops include:

- EVAPORATORS
- WATER FILTERS
- HYDRAULIC CIRCUITS

The diagram pressure drops are related to an average water temperature of 10 °C. The following table shows the correction to

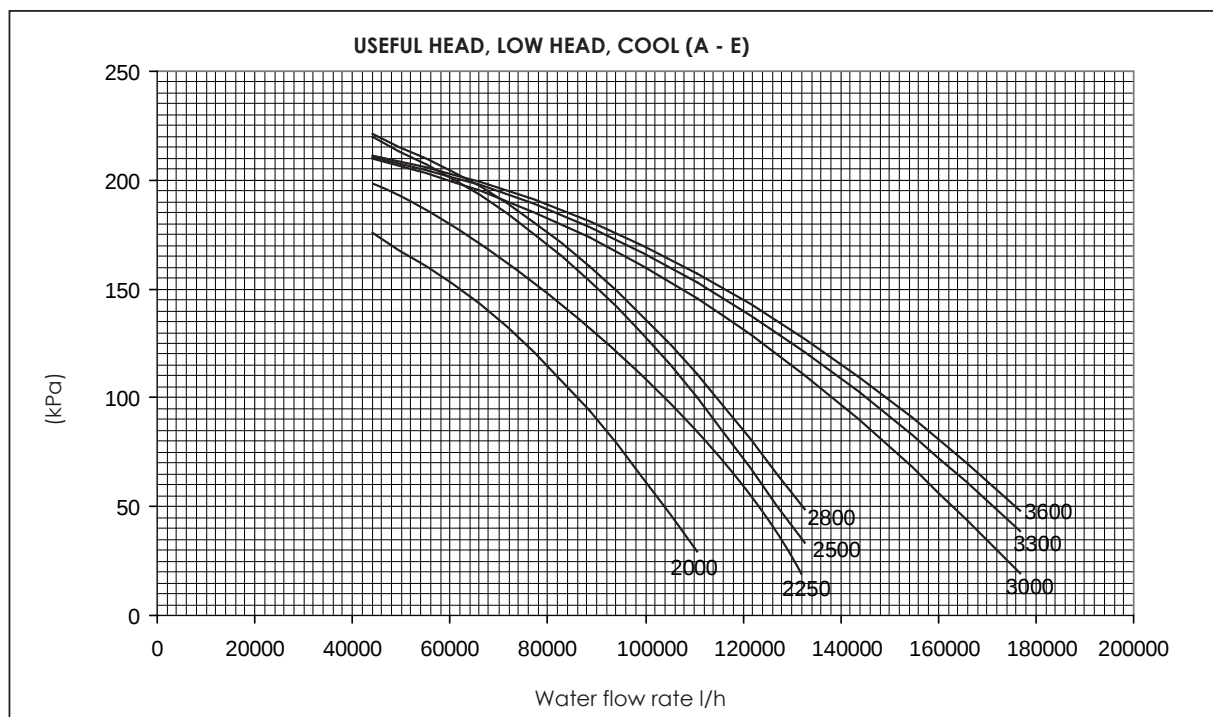
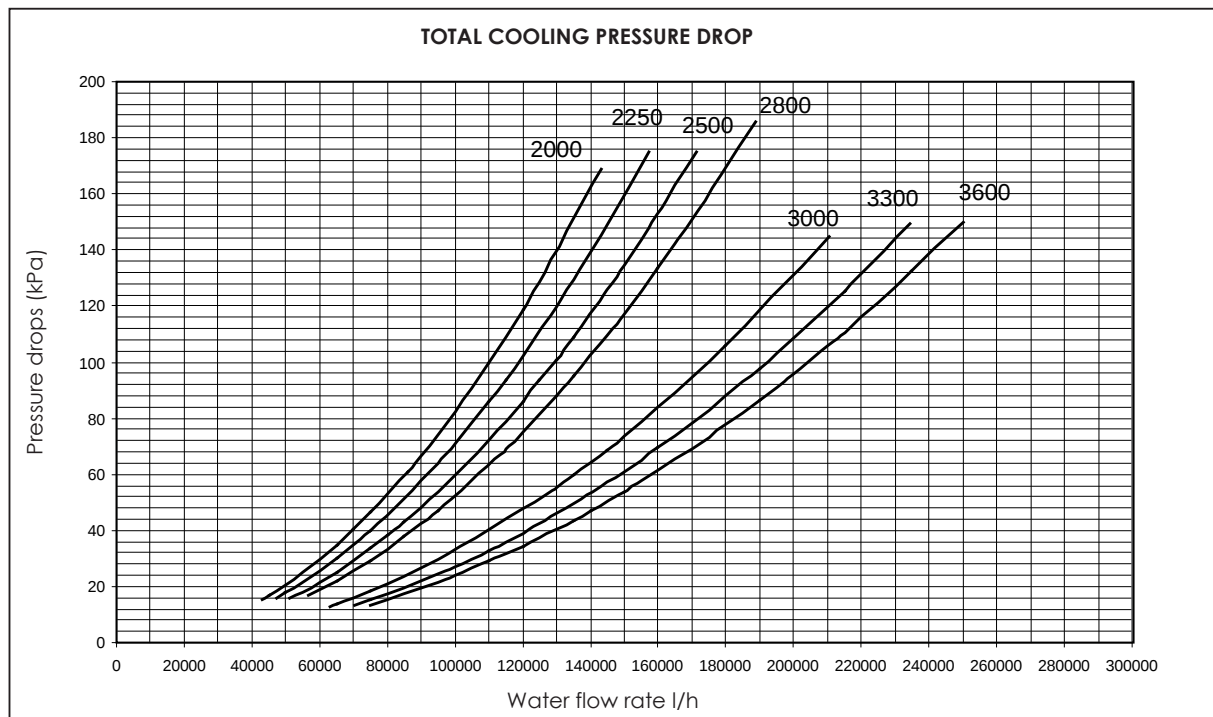
apply to the pressure drops when the average water temperature varies

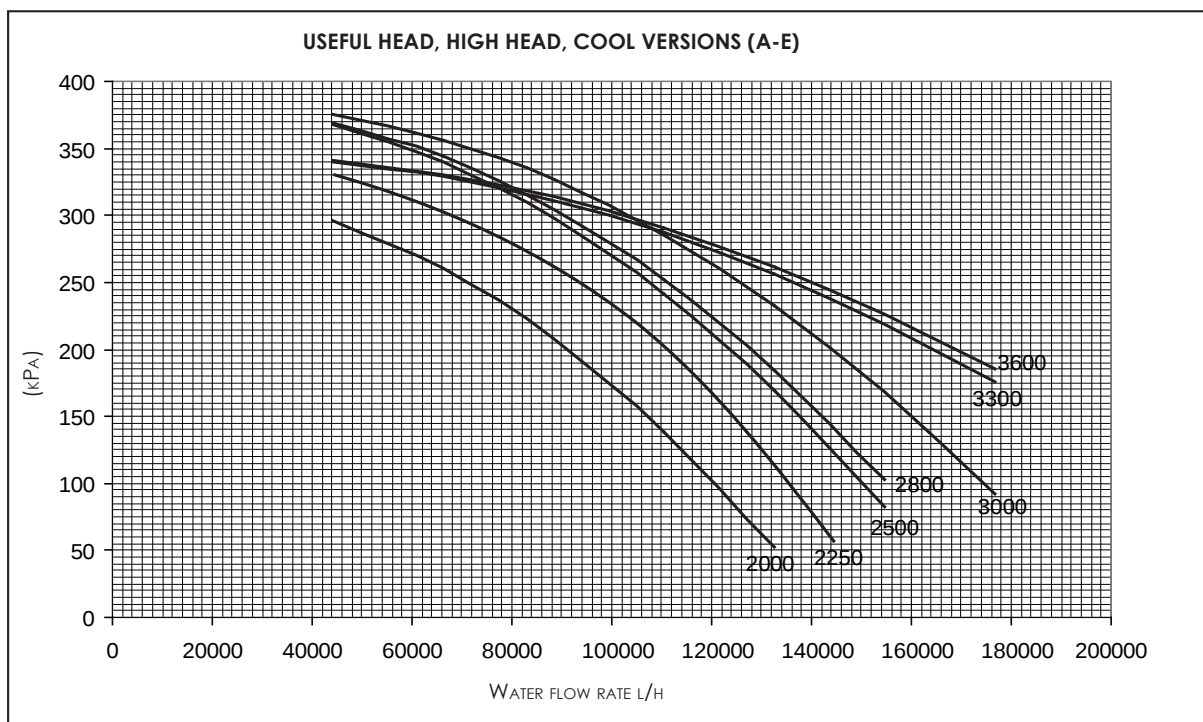
The chiller consists of two hydraulic circuits per module.

The pressure drops indicated in the graphics are relative to a single circuit  
SINCE THE HYDRAULIC PARALLEL IS IN CHARGE OF THE CUSTOMER OR THE OR THE PERSON IN CHARGE.

NB

*The water outlet probe (WOP) with its trap is free, near the electrical box, remember to insert it in the collector of the outlet hydraulic parallel, using a sleeve of ½ inch.*





## 11.2. TOTAL PRESSURE DROPS

NRL standard heat pump unit (HA-HE), in cooling mode.

NB

The pressure drops and effective pressures are calculated on the basis of cooling with water at 10°C. The pressure drops include:

- EVAPORATORS
- WATER FILTERS
- HYDRAULIC CIRCUITS

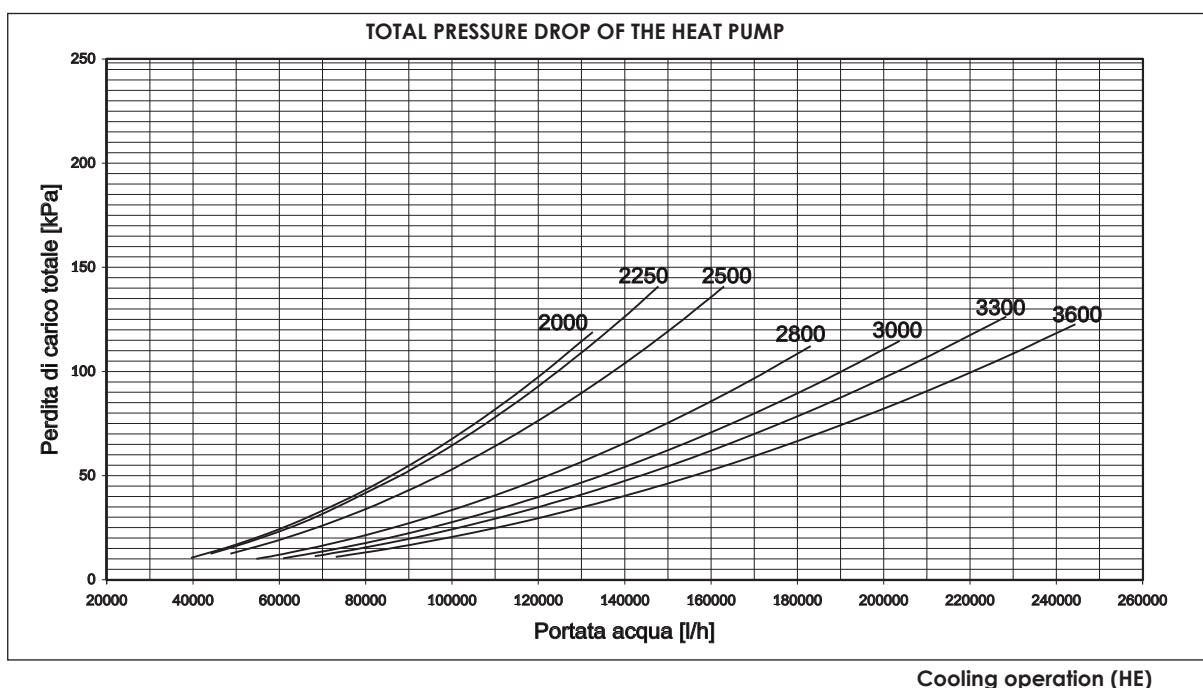
The diagram pressure drops are related to an average water temperature of 10 °C. The following table shows the correction to

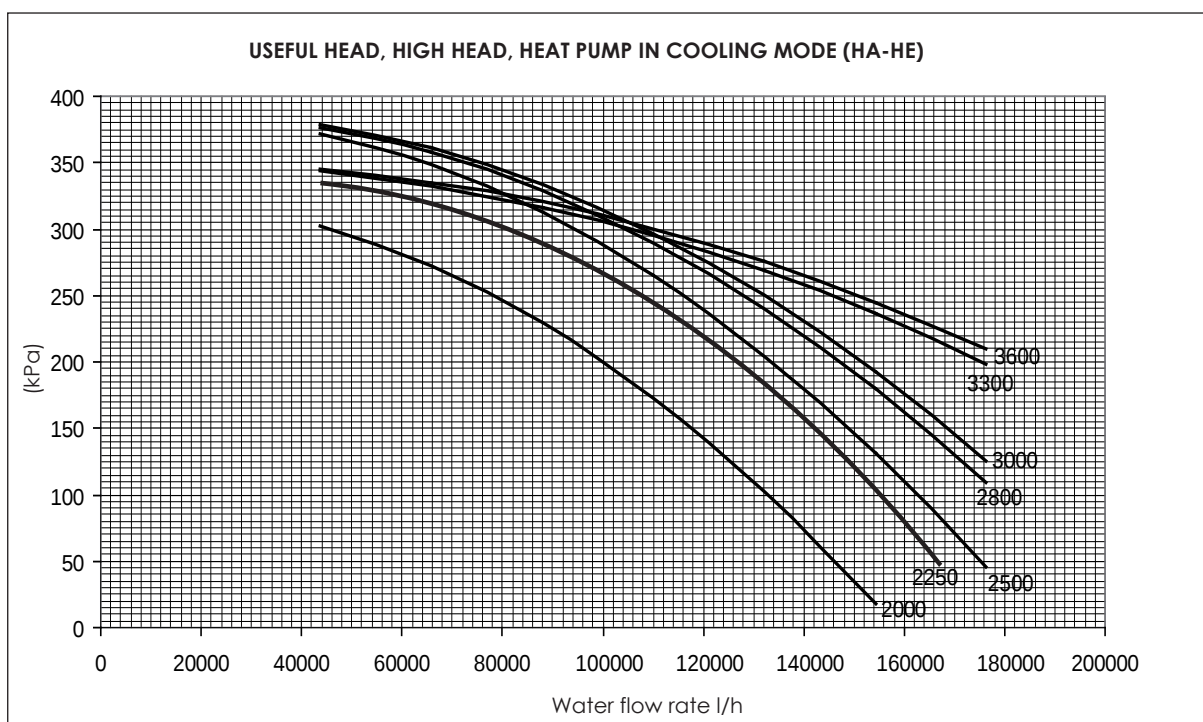
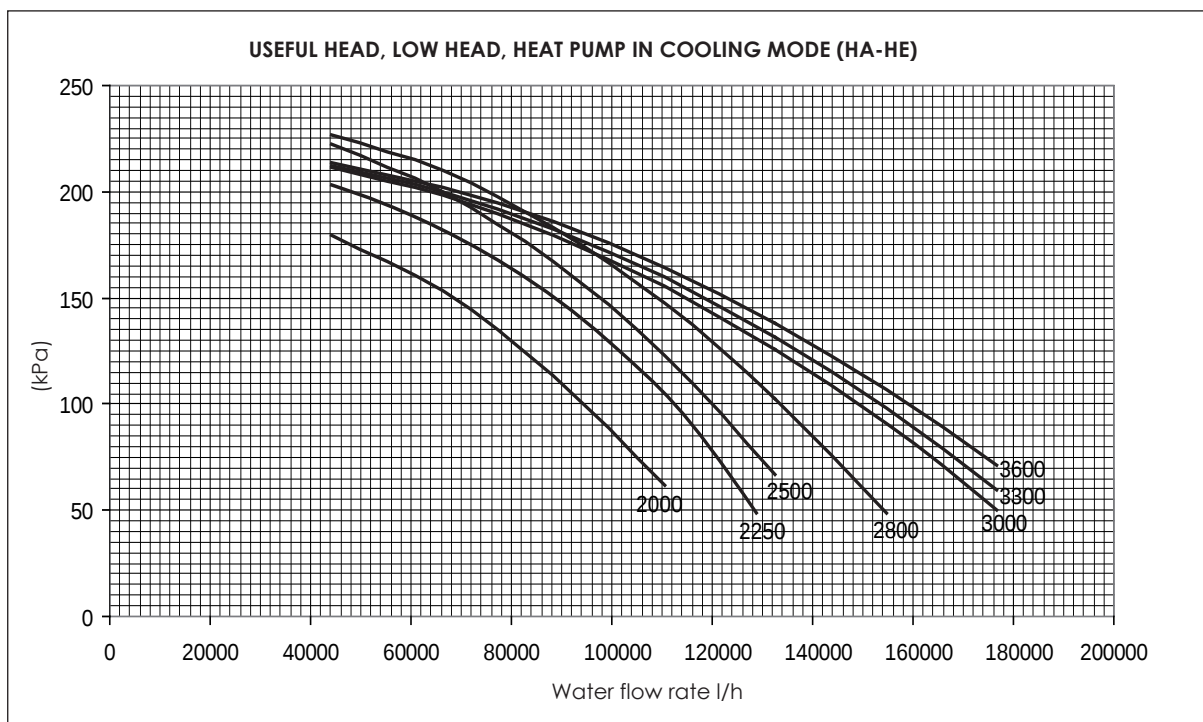
apply to the pressure drops when the average water temperature varies

The chiller consists of two hydraulic circuits per module. The pressure drops indicated in the graphics are relative to a single circuit SINCE THE HYDRAULIC PARALLEL IS IN CHARGE OF THE CUSTOMER OR THE OR THE PERSON IN CHARGE.

NB

The water outlet probe (WOP) with its trap is free, near the electrical box, remember to insert it in the collector of the outlet hydraulic parallel, using a sleeve of ½ inch.





**Corrective coefficients for heat pump on heating operation**

|                                     |      |    |       |      |      |      |      |
|-------------------------------------|------|----|-------|------|------|------|------|
| <b>Average water temperature</b>    | 5    | 10 | 15    | 20   | 30   | 40   | 50   |
| <b>Multiplicational coefficient</b> | 1.02 | 1  | 0.985 | 0.97 | 0.95 | 0.93 | 0.91 |

## 12. ACCUMULATOR

### 12.1. MAXIMUM/MINIMUM WATER CONTENT IN THE SYSTEM

#### 12.1.1. Maximum water content recommended

In the table 12.2 the maximum content is indicated in litres of water of the hydraulic system, compatible with expansion tank capacity supplied as part of the standard equipment (IN VERSIONS WITH ACCUMULATION OR VERSIONS WITH PUMP ONLY). The values shown in the table refer to three conditions of maximum and minimum water temperature. If the actual water content of the hydraulic system (including the accumulation tank) exceeds the level indicated in the table referred to the operating conditions, an additional scaled expansion tank must be installed, using the usual criteria, with respect to the additional water volume.

From tables 12.3, it is possible to obtain the values of maximum system content, also for other operational conditions with glycol water.

The values are obtained by multiplying the reference value by the correction coefficient.

#### 12.1.2. Expansion tank calibration

The standard pressure value for pre-charging the expansion tank is 1.5 bar, and the volume is 25 litres. Maximum value 6 bar.

The tank must be calibrated according to the maximum difference in height (H) of the device (see figure) according to the formula:

$p \text{ (calibration) [bar]} = H \text{ [m]} / 10.2 + 0.3$ .

For example, if the level difference H is 20m, the calibration value of the tank will be 2.3 bar.

If the calibration value obtained from the calculation is lower than 1.5 bar (i.e. for  $H < 12.25$ ), maintain the standard calibration.

### MINIMUM WATER CONTENT

| NRL FC | No Compressor | (1) l/KW | (2) l/KW |
|--------|---------------|----------|----------|
| 2000   | 8             | 4        | 8        |
| 2250   |               |          |          |
| 2500   |               |          |          |
| 2800   | 10            | 4        | 8        |
| 3000   | 12            | 4        | 8        |
| 3300   |               |          |          |
| 3600   |               |          |          |

### 12.2

| Hydraulic height              | H m              | 30    | 25    | 20    | 15   | ≥ 12.25 |
|-------------------------------|------------------|-------|-------|-------|------|---------|
| Expansion tank calibration    | bar              | 3.2   | 2.8   | 2.3   | 1.8  | 1.5     |
| Water content reference value | l <sup>(1)</sup> | 2,174 | 2,646 | 3,118 | 3590 | 3852    |
| Water content reference value | l <sup>(2)</sup> | 978   | 1190  | 1404  | 1616 | 1732    |
| Water content reference value | l <sup>(3)</sup> | 510   | 622   | 732   | 844  | 904     |

### 12.3

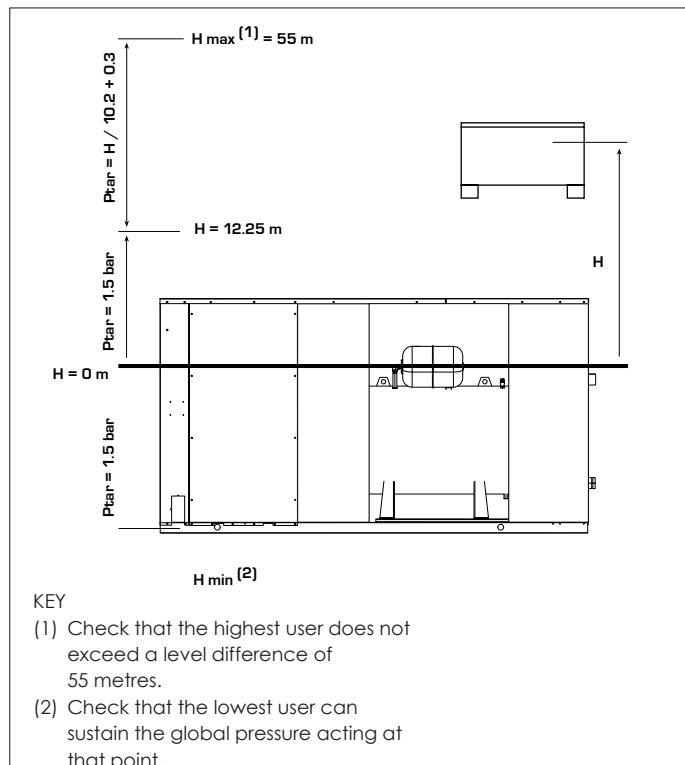
| Glycol water | Water temp. °C |      | Correction coefficient | Reference condition |
|--------------|----------------|------|------------------------|---------------------|
|              | max.           | min. |                        |                     |
| 10%          | 40             | -2   | 0.507                  | (1)                 |
| 10%          | 60             | -2   | 0.686                  | (2)                 |
| 10%          | 85             | -2   | 0.809                  | (3)                 |
| 20%          | 40             | -6   | 0.434                  | (1)                 |
| 20%          | 60             | -6   | 0.604                  | (2)                 |
| 20%          | 85             | -6   | 0.729                  | (3)                 |
| 35%          | 40             | -6   | 0.393                  | (1)                 |
| 35%          | 60             | -6   | 0.555                  | (2)                 |
| 35%          | 85             | -6   | 0.677                  | (3)                 |

Working reference conditions:

(1) Cooling: Max. water temp. = 40°C, Min. water temp. = 4°C.

(2) Heating (heat pump): Max. water temp. = 60°C, Min. water temp. = 4°C.

(3) Heating (boiler): Max. water temp. = 85°C, Min. water temp. = 4°C.



|     |                                                                                                                    |
|-----|--------------------------------------------------------------------------------------------------------------------|
| (1) | Minimum water content                                                                                              |
| (2) | Minimum water content in the case of process applications or operation with low outside temperatures and low load. |
|     | Adjusting the outlet water temperature.                                                                            |
|     | project $\Delta t$ less than 5°C.                                                                                  |

### 13. CAPACITY CONTROLS

| (*) Cooling capacity % | Levels of power |    |    |    |    |    |    |     |    |     |     |     |
|------------------------|-----------------|----|----|----|----|----|----|-----|----|-----|-----|-----|
| Versions               | 1°              | 2° | 3° | 4° | 5° | 6° | 7° | 8°  | 9° | 10° | 11° | 12° |
| NRL 2000               | 14              | 28 | 41 | 54 | 66 | 78 | 89 | 100 |    |     |     |     |
| NRL 2250               | 14              | 28 | 41 | 54 | 66 | 78 | 89 | 100 |    |     |     |     |
| NRL 2500               | 14              | 28 | 41 | 54 | 66 | 78 | 89 | 100 |    |     |     |     |
| NRL 2800               | 13              | 25 | 37 | 49 | 58 | 67 | 76 | 84  | 92 | 100 |     |     |
| NRL 3000               | 10              | 19 | 28 | 37 | 46 | 55 | 63 | 71  | 78 | 86  | 93  | 100 |
| NRL 3300               | 10              | 19 | 28 | 37 | 46 | 55 | 63 | 71  | 78 | 86  | 93  | 100 |
| NRL 3600               | 10              | 19 | 28 | 37 | 46 | 55 | 63 | 71  | 78 | 86  | 93  | 100 |

| (*) Input power % | Levels of power |    |    |    |    |    |    |     |    |     |     |     |
|-------------------|-----------------|----|----|----|----|----|----|-----|----|-----|-----|-----|
| Versions          | 1°              | 2° | 3° | 4° | 5° | 6° | 7° | 8°  | 9° | 10° | 11° | 12° |
| NRL 2000          | 11              | 22 | 34 | 46 | 59 | 72 | 86 | 100 |    |     |     |     |
| NRL 2250          | 11              | 22 | 34 | 46 | 59 | 72 | 86 | 100 |    |     |     |     |
| NRL 2500          | 11              | 22 | 34 | 46 | 59 | 72 | 86 | 100 |    |     |     |     |
| NRL 2800          | 10              | 20 | 30 | 40 | 50 | 59 | 69 | 79  | 89 | 100 |     |     |
| NRL 3000          | 7               | 15 | 22 | 30 | 38 | 46 | 55 | 63  | 72 | 81  | 91  | 100 |
| NRL 3300          | 7               | 15 | 22 | 30 | 38 | 46 | 55 | 63  | 72 | 81  | 91  | 100 |
| NRL 3600          | 7               | 15 | 22 | 30 | 38 | 46 | 55 | 63  | 72 | 81  | 91  | 100 |

| (**) Heating capacity % | Levels of power |    |    |    |    |    |    |     |    |     |     |     |
|-------------------------|-----------------|----|----|----|----|----|----|-----|----|-----|-----|-----|
| Versions                | 1°              | 2° | 3° | 4° | 5° | 6° | 7° | 8°  | 9° | 10° | 11° | 12° |
| NRL 2000                | 14              | 27 | 40 | 53 | 65 | 77 | 89 | 100 |    |     |     |     |
| NRL 2250                | 14              | 27 | 40 | 53 | 65 | 77 | 89 | 100 |    |     |     |     |
| NRL 2500                | 14              | 27 | 40 | 53 | 65 | 77 | 89 | 100 |    |     |     |     |
| NRL 2800                | 12              | 24 | 36 | 48 | 57 | 66 | 75 | 83  | 92 | 100 |     |     |
| NRL 3000                | 9               | 18 | 27 | 36 | 45 | 53 | 61 | 69  | 77 | 85  | 93  | 100 |
| NRL 3300                | 9               | 18 | 27 | 36 | 45 | 53 | 61 | 69  | 77 | 85  | 93  | 100 |
| NRL 3600                | 9               | 18 | 27 | 36 | 45 | 53 | 61 | 69  | 77 | 85  | 93  | 100 |

| (*) Input power % | Levels of power |    |    |    |    |    |    |     |    |     |     |     |
|-------------------|-----------------|----|----|----|----|----|----|-----|----|-----|-----|-----|
| Versions          | 1°              | 2° | 3° | 4° | 5° | 6° | 7° | 8°  | 9° | 10° | 11° | 12° |
| NRL 2000          | 11              | 22 | 34 | 46 | 59 | 72 | 86 | 100 |    |     |     |     |
| NRL 2250          | 11              | 22 | 34 | 46 | 59 | 72 | 86 | 100 |    |     |     |     |
| NRL 2500          | 11              | 22 | 34 | 46 | 59 | 72 | 86 | 100 |    |     |     |     |
| NRL 2800          | 10              | 20 | 30 | 40 | 50 | 59 | 69 | 79  | 89 | 100 |     |     |
| NRL 3000          | 7               | 15 | 22 | 30 | 38 | 46 | 55 | 63  | 72 | 81  | 91  | 100 |
| NRL 3300          | 7               | 15 | 22 | 30 | 38 | 46 | 55 | 63  | 72 | 81  | 91  | 100 |
| NRL 3600          | 7               | 15 | 22 | 30 | 38 | 46 | 55 | 63  | 72 | 81  | 91  | 100 |

The performance values refer to the following conditions:

(\*) processed water temperature = 7°C;

(\*) outside air temperature = 35°C.

The performance values refer to the following conditions:

(\*) processed water temperature = 50°C;

\*\* external air temperature = 7°C D.B./6°C W.B

## 14. GLYCOL

- The cooling capacity and input power correction factors make allowance for the presence of glycol and the different evaporation temperature.
- The pressure drop correction factor already takes account of the different flow rate deriving from the application of the water flow rate correction factor.
- The correction factor of the water flow rate is calculated so as to maintain the same  $\Delta t$  that would be used in the absence of glycol.

### NOTE

To make it easier to read the following graph, an example is given.

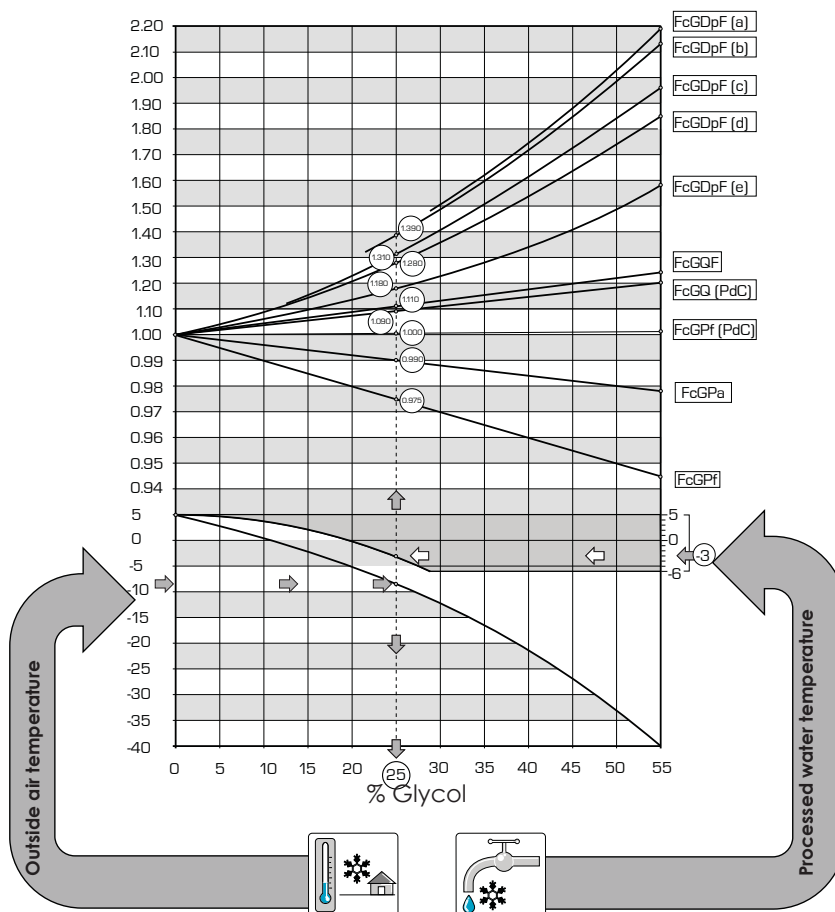
By using the diagram below it is possible to establish the percentage of glycol necessary; this percentage can be calculated taking into account one of the following factors:

On the basis of the fluid considered (water or air), it will be necessary to enter the graph from the right or left side, from the intersection of the outside air temperature or processed water temperature straight lines and the relative curves, a point is obtained through which the vertical line that will identify both the percentage of glycol and the relative correction coefficients will have to pass.

### 14.1. HOW TO READ THE GLYCOL CURVES

The curves shown in the figure summarise a notable quantity of data, each of which is represented by a specific curve. In order to use these curves correctly, it is necessary to make some initial considerations:

- If you want to calculate the percentage of glycol on the basis of the outside air temperature, you must enter from the left-hand axis and, once you have intersected the curve, trace a vertical line which, in turn, will intercept all the other curves; the points obtained from the upper curves represent the coefficients for the correction of the cooling capacity and input power, for the flow rates and the pressure drops (remember that these coefficients must anyway be multiplied by the nominal value of the sizes examined); the lower axis advises the percentage of glycol necessary on the basis of the outside air temperature considered.
- If you want to calculate the percentage of glycol on the



### KEY:

|            |                                                                               |
|------------|-------------------------------------------------------------------------------|
| FcGPF      | Correction factor of the cooling capacity                                     |
| FcGPa      | Correction factor of the input power                                          |
| FcGDpF (a) | Correction factor of the pressure drops (evaporator) (average temp. = -3.5°C) |
| FcGDpF (b) | Correction factor of the pressure drops (average temp. = 0.5°C)               |
| FcGDpF (c) | Correction factor of the pressure drops (average temp. = 5.5°C)               |
| FcGDpF (d) | Correction factor of the pressure drops (average temp. = 9.5°C)               |
| FcGDpF (e) | Correction factor of the pressure drops (average temp. = 47.5°C)              |
| FcGGF      | Correction factor of the outputs (evaporator) (average temp. = 9.5°C)         |
| FcGQC      | Correction factor of the outputs (condenser) (average temp. = 47.5°C)         |

### NB:

Although the graph reaches outside air temperatures of -40°C, it is necessary to maintain the machine's operating limits as reference.

basis of the temperature of the processed water, you must enter from the right-hand axis and, once you have intersected the curve, trace a vertical line which, in turn, will intercept all the other curves; the points obtained from the upper curves represent the coefficients for the cooling capacity and input power, for the flow rates and the pressure drops (remember that these coefficients must anyway be multiplied by the nominal value of the sizes examined); the lower axis advises the percentage of glycol necessary to produce water at the

required temperature.

- REMEMBER THAT THE INITIAL SIZES "Outside air temperature" AND "Processed water temperature", are not directly linked to each other, so it is not possible to enter the curve of one of these sizes, and obtain the corresponding point on the other curve.

## 15. DESUPERHEATER

The heating capacity that can be obtained from the desuperheater is obtained by multiplying the nominal value (Pd) shown in table 15.1.1 by a suitable coefficient (Cd).

The diagrams will give you the correction coefficients to be used for the chillers in the various versions; next to each curve you can see the outside air temperature to which it refers.

In the heat pump versions, the desuperheater must be intercepted during heat pump operation: otherwise, the guarantee will no longer be considered valid.

### 14.2. PRESSURE DROPS

The NRL models with desuperheater, from size 2800 to 3600, have 4 desuperheaters (placed in parallel 2 to 2).

#### NB:

the characteristics of the desuperheaters and the pressure drop curves are shown below.

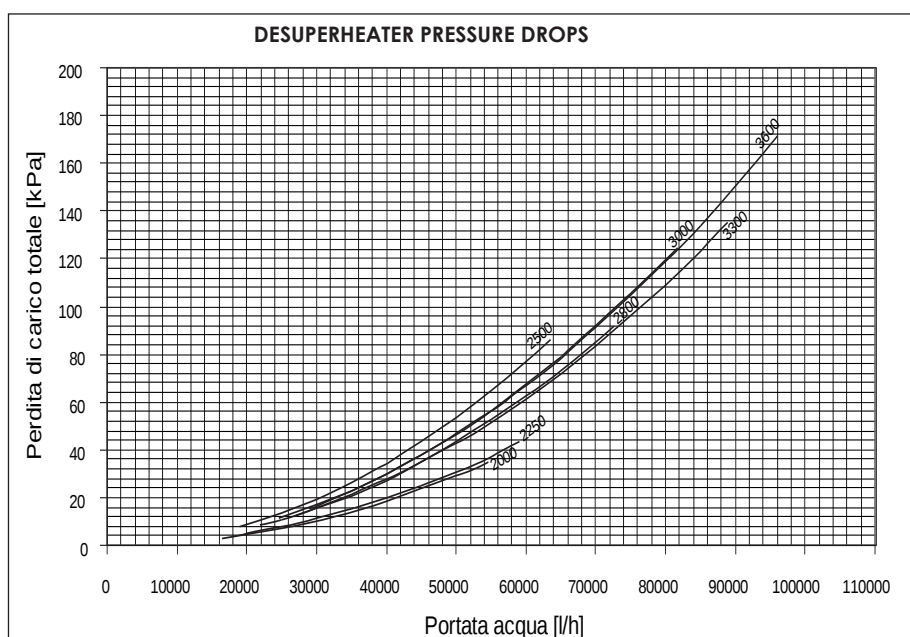
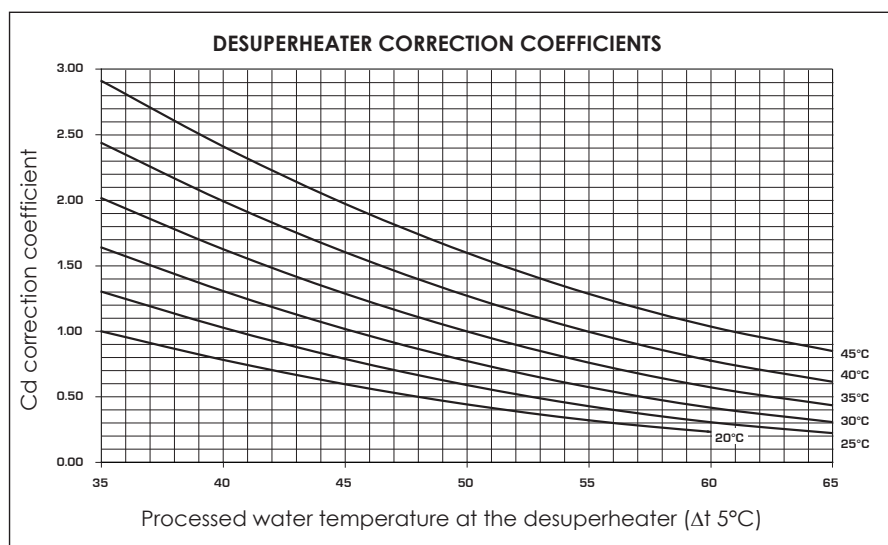
For processed water temperatures different from 50°C, the result obtained is multiplied by the correction factor that can be obtained from Table 15.1.2.

The nominal value refers to:

- air temperature 35°C
- water at the desuperheater 45/50°C
- $\Delta t$  5°C

**The units with desuperheater (D)  
not for versions:**

- YD
- XD (only for temperature lower than 4°C)



### 15.2.1. NRL (D)

|                               |     | 2000  | 2250  | 2500  | 2800  | 3000  | 3300  | 3600  |
|-------------------------------|-----|-------|-------|-------|-------|-------|-------|-------|
| Heat capacity recovered       | kW  | 191   | 206   | 222   | 253   | 285   | 310   | 335   |
| Desuperheater water flow rate | l/h | 32800 | 35470 | 38140 | 43590 | 49040 | 53360 | 57690 |
| Desuperheater pressure drops  | kPa | 12,5  | 15,5  | 31,1  | 33,1  | 44,9  | 48,6  | 61,7  |

### 15.2.2. Correction of pressure drop when average water temperature varies.

| Average water temperature °C | 30   | 40   | 50 | 60   | 70   |
|------------------------------|------|------|----|------|------|
| Multiplication coefficient   | 1.04 | 1.02 | 1  | 0.98 | 0.96 |

## 16. TOTAL RECOVERY

In case of operation with total heat recovery, the machine performances do not depend on the external air temperature but on that of the hot water produced: the electrical input power and the recovery heating capacity are obtained by multiplying the values ( $P_a$ ,  $P_r$ ) shown in table 16.1.1 by the respective correction coefficients ( $C_a$ ,  $C_r$ ), that can be seen in the following diagrams.

According to the temperature of the hot water produced referred to is shown assuming a difference of 5°C between the inlet to and outlet from the total heat recovery unit.

The cooling capacity ( $C_c$ ) is obtained from the difference between recovery heating capacity ( $C_r$ ) and input power ( $I_p$ ).

The nominal value refers to:

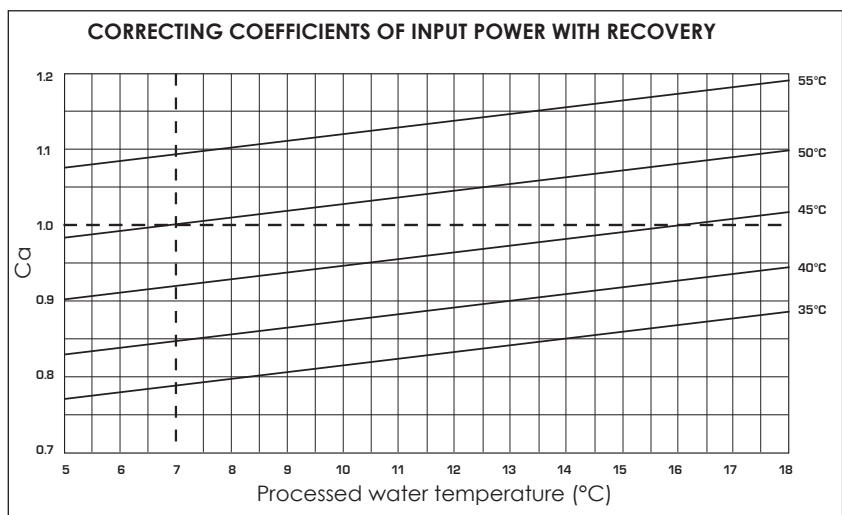
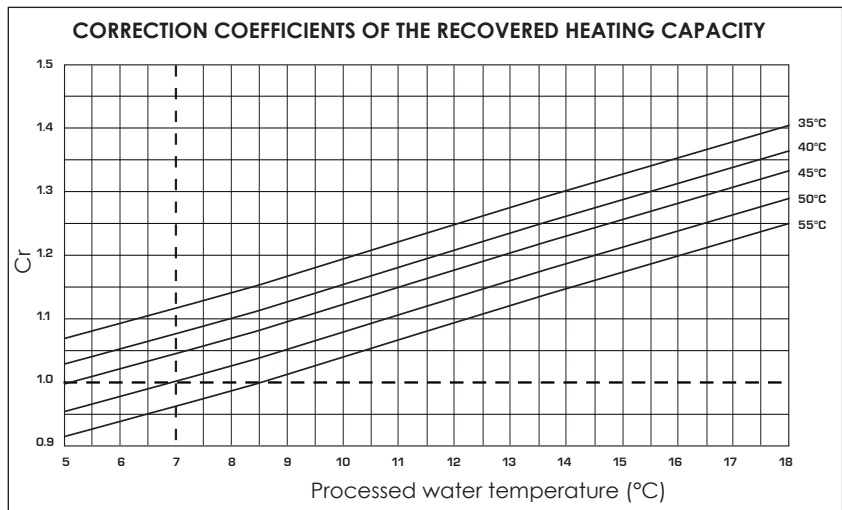
- air temperature 35°C
- water at the desuperheater 50°C
- $\Delta t$  5°C

### NOTES:

**Using total recovery is only allowed in the cooling operation.**

**The units with total recovery (T) are not available in the versions:**

- YT
- XT (only for temperature lower than 4°C)



### 16.1.1. NRL (T)

|                                  |     | 2000   | 2250   | 2500   | 2800   | 3000   | 3300   | 3600   |
|----------------------------------|-----|--------|--------|--------|--------|--------|--------|--------|
| Heat capacity recovered          | kW  | 712    | 774    | 836    | 952    | 1068   | 1161   | 1254   |
| Total input power                | kW  | 197    | 213    | 230    | 263    | 295    | 320    | 345    |
| Water flow rate recovery         | l/h | 122520 | 133160 | 143800 | 163790 | 183770 | 199740 | 215700 |
| Pressure drop recovery exchanger | kPa | 73.0   | 73.0   | 57,8   | 58,2   | 66.9   | 65,5   | 67,5   |

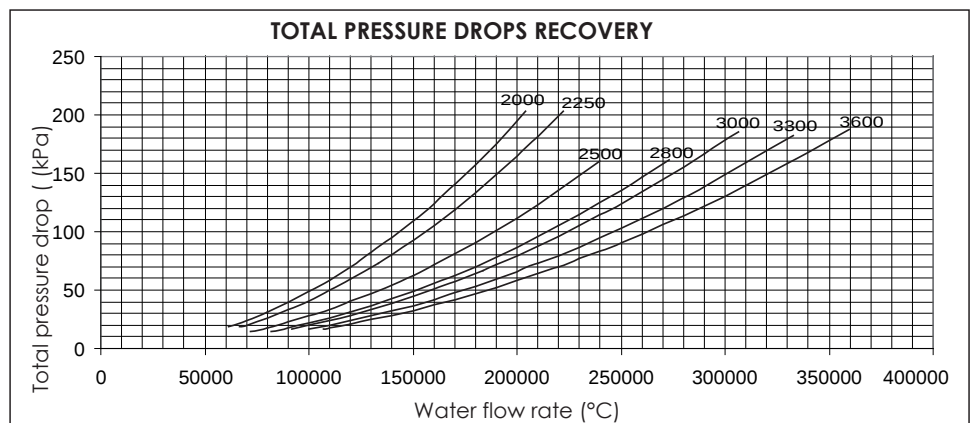
### 16.1. PRESSURE DROP

The NRL models with total heat recovery always have 1 heat recovery unit.

The characteristics of the heat recovery units and the pressure drop curves are shown below; the filter leakage is not covered.

The pressure drops in the diagram refer to the average water temperature of 50 °C.

The table 16.2.1. shows the correction to be applied to the pressure drops when the average water temperature varies.



### 16.1.2. Correction of pressure drop when average water temperature varies.

|                              |      |      |    |
|------------------------------|------|------|----|
| Average water temperature °C | 30   | 40   | 50 |
| Multiplicational coefficient | 1.04 | 1.02 | 1  |

## 17. MEASUREMENTS OF THE CHILLERS LINES VERSIONS (C)

| COOLING LINES |                 |                     |       |                    |       |                                           |                                           |
|---------------|-----------------|---------------------|-------|--------------------|-------|-------------------------------------------|-------------------------------------------|
| Model         | Line length [m] | Suction line f [mm] |       | Liquid line f [mm] |       | Refrigerant R410A per metre of line [g/m] | Refrigerant R410A per metre of line [g/m] |
|               |                 | C1/C3               | C2/C4 | C1/C3              | C2/C4 | C1/C3                                     | C2/C4                                     |
| NRL 2000C     | 0-10            | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
|               | 10-20           | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
|               | 20-30           | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
| NRL 2250C     | 0-10            | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
|               | 10-20           | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
|               | 20-30           | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
| NRL 2500C     | 0-10            | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
|               | 10-20           | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
|               | 20-30           | 54                  | 54    | 35                 | 35    | 831                                       | 831                                       |
| NRL 2800C     | 0-10            | 54                  | 67(*) | 35                 | 35    | 831                                       | 868                                       |
|               | 10-20           | 54                  | 67(*) | 35                 | 35    | 831                                       | 868                                       |
|               | 20-30           | 54                  | 67(*) | 35                 | 35    | 831                                       | 868                                       |
| NRL 3000C     | 0-10            | 67(*)               | 67(*) | 35                 | 35    | 868                                       | 868                                       |
|               | 10-20           | 67(*)               | 67(*) | 35                 | 35    | 868                                       | 868                                       |
|               | 20-30           | 67(*)               | 67(*) | 35                 | 35    | 868                                       | 868                                       |
| NRL 3300C     | 0-10            | 67(*)               | 67(*) | 35                 | 42    | 868                                       | 1237                                      |
|               | 10-20           | 67(*)               | 67(*) | 35                 | 42    | 868                                       | 1237                                      |
|               | 20-30           | 67(*)               | 67(*) | 35                 | 42    | 868                                       | 1237                                      |
| NRL 3600C     | 0-10            | 67(*)               | 67(*) | 42                 | 42    | 1237                                      | 1237                                      |
|               | 10-20           | 67(*)               | 67(*) | 42                 | 42    | 1237                                      | 1237                                      |
|               | 20-30           | 67(*)               | 67(*) | 42                 | 42    | 1237                                      | 1237                                      |

(\*) Parzializzazione minima 2 compressori ON

### Key

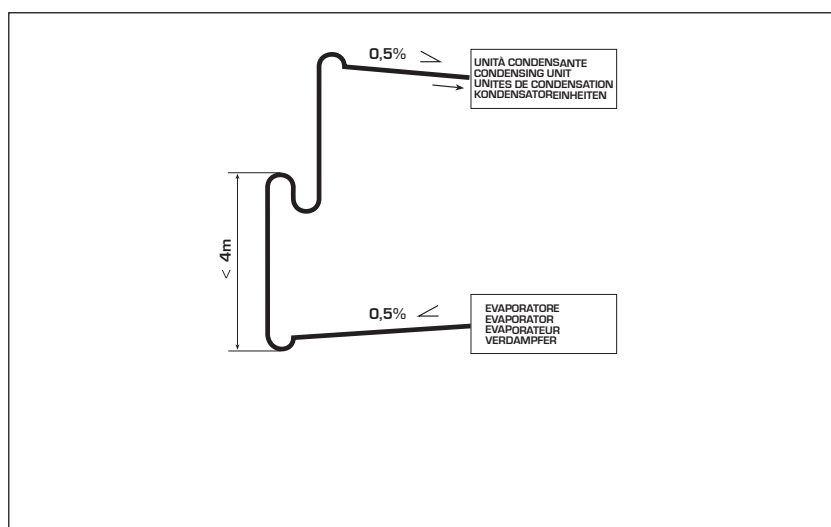
**C1 = Chiller circuit 1**

**C2 = Chiller circuit 2**

**C3 = Chiller circuit 3**

**C4 = Chiller circuit 4**

If the evaporator is positioned lower than the condenser, drain-taps must be available on the suction line to draw the oil towards the compressor. By "line length" we mean the distance between the units, measured on the liquid line. For further information, contact the head office.



## 18. SOUND DATA

### Sound power

Aermec determines the sound power value on the basis of measurements taken in accordance with standard 9614-2, in compliance with the Eurovent certification.

### Sound pressure

Sound pressure in free field, on a reflecting plane (directional factor Q=2), in accordance with standard ISO 3744.

#### NB:

The data refer to the version with standard fans.

#### The values refer to:

- water inlet temperature      12°C
- processed water temperature   7°C
- outside air temperature       35°C

| NRL - E | Total sound levels |              |             | Octave band[Hz]                            |      |      |      |      |      |      |
|---------|--------------------|--------------|-------------|--------------------------------------------|------|------|------|------|------|------|
|         | Pow.<br>dB(A)      | Pressure     |             | 125                                        | 250  | 500  | 1000 | 2000 | 4000 | 8000 |
|         |                    | dB(A)<br>10m | dB(A)<br>1m | Sound power by central band frequency [dB] |      |      |      |      |      |      |
| 2000E   | 86,0               | 54,0         | 68,0        | 98,0                                       | 85,5 | 81,0 | 77,5 | 76,0 | 72,0 | 68,0 |
| 2250E   | 87,8               | 55,8         | 69,8        | 99,1                                       | 87,6 | 83,7 | 80,1 | 77,1 | 73,1 | 70,5 |
| 2500E   | 89,0               | 57,0         | 71,0        | 100,0                                      | 89,0 | 85,3 | 81,7 | 78,0 | 74,0 | 72,0 |
| 2800E   | 88,5               | 56,5         | 70,5        | 100,6                                      | 85,2 | 83,1 | 83,0 | 77,0 | 71,0 | 62,7 |
| 3000E   | 88,0               | 56,0         | 70,0        | 98,5                                       | 88,0 | 84,0 | 81,5 | 78,0 | 72,1 | 65,1 |
| 3300E   | 89,5               | 57,5         | 71,5        | 101,0                                      | 87,0 | 84,0 | 82,5 | 81,0 | 75,5 | 69,5 |
| 3600E   | 91,5               | 59,5         | 73,5        | 99,0                                       | 89,0 | 86,0 | 86,0 | 85,0 | 78,0 | 72,0 |

| NRL - HE | Total sound levels |              |             | Octave band[Hz]                            |      |      |      |      |      |      |
|----------|--------------------|--------------|-------------|--------------------------------------------|------|------|------|------|------|------|
|          | Pow.<br>dB(A)      | Pressure     |             | 125                                        | 250  | 500  | 1000 | 2000 | 4000 | 8000 |
|          |                    | dB(A)<br>10m | dB(A)<br>1m | Sound power by central band frequency [dB] |      |      |      |      |      |      |
| 2000HE   | 86,6               | 54,6         | 68,6        | 99,0                                       | 85,7 | 81,6 | 77,2 | 76,3 | 72,3 | 68,4 |
| 2250HE   | 87,9               | 55,9         | 69,9        | 98,8                                       | 89,1 | 82,7 | 80,6 | 78,5 | 72,7 | 67,0 |
| 2500HE   | 89,0               | 57,0         | 71,0        | 98,5                                       | 91,0 | 83,5 | 82,5 | 80,0 | 73,0 | 65,0 |
| 2800HE   | 88,5               | 56,5         | 70,5        | 101,0                                      | 86,0 | 83,5 | 82,5 | 76,0 | 67,0 | 61,0 |
| 3000HE   | 88,0               | 56,0         | 70,0        | 102,0                                      | 85,0 | 82,0 | 79,0 | 75,0 | 66,0 | 60,0 |
| 3300HE   | 89,5               | 57,5         | 71,5        | 102,0                                      | 87,0 | 82,5 | 83,0 | 80,0 | 70,0 | 65,0 |
| 3600HE   | 91,5               | 59,5         | 73,5        | 103,0                                      | 90,5 | 84,8 | 86,0 | 81,5 | 72,0 | 66,4 |

| NRL - A | Total sound levels |              |             | Octave band[Hz]                            |      |      |      |      |      |      |
|---------|--------------------|--------------|-------------|--------------------------------------------|------|------|------|------|------|------|
|         | Pow.<br>dB(A)      | Pressure     |             | 125                                        | 250  | 500  | 1000 | 2000 | 4000 | 8000 |
|         |                    | dB(A)<br>10m | dB(A)<br>1m | Sound power by central band frequency [dB] |      |      |      |      |      |      |
| 2000A   | 91,0               | 59,0         | 73,0        | 100,5                                      | 89,5 | 87,5 | 85,0 | 81,5 | 77,5 | 69,0 |
| 2250A   | 92,7               | 60,7         | 74,7        | 101,9                                      | 92,3 | 89,6 | 86,4 | 82,9 | 78,9 | 73,8 |
| 2500A   | 94,0               | 62,0         | 76,0        | 103,0                                      | 94,0 | 91,0 | 87,5 | 84,0 | 80,0 | 76,0 |
| 2800A   | 93,5               | 61,5         | 75,5        | 105,0                                      | 93,0 | 90,0 | 86,0 | 82,5 | 78,0 | 72,0 |
| 3000A   | 93,5               | 61,5         | 75,5        | 105,0                                      | 93,5 | 90,0 | 85,5 | 82,5 | 77,5 | 72,0 |
| 3300A   | 94,5               | 62,5         | 76,5        | 104,5                                      | 93,5 | 91,0 | 89,0 | 84,0 | 78,0 | 72,0 |
| 3600A   | 96,5               | 64,5         | 78,5        | 106,0                                      | 95,0 | 93,0 | 91,0 | 87,0 | 81,0 | 76,0 |

| NRL - HA | Total sound levels |              |             | Octave band[Hz]                            |      |      |      |      |      |      |
|----------|--------------------|--------------|-------------|--------------------------------------------|------|------|------|------|------|------|
|          | Pow.<br>dB(A)      | Pressure     |             | 125                                        | 250  | 500  | 1000 | 2000 | 4000 | 8000 |
|          |                    | dB(A)<br>10m | dB(A)<br>1m | Sound power by central band frequency [dB] |      |      |      |      |      |      |
| 2000HA   | 91,6               | 59,6         | 73,6        | 101,0                                      | 90,0 | 87,8 | 85,9 | 82,1 | 78,1 | 70,0 |
| 2250HA   | 93,3               | 61,3         | 75,3        | 101,7                                      | 94,4 | 89,4 | 87,4 | 83,9 | 78,6 | 69,2 |
| 2500HA   | 94,5               | 62,5         | 76,5        | 102,2                                      | 96,5 | 90,5 | 88,5 | 85,2 | 79,0 | 68,2 |
| 2800HA   | 94,0               | 62,0         | 76,0        | 104,0                                      | 93,0 | 89,0 | 90,0 | 82,0 | 74,0 | 67,0 |
| 3000HA   | 93,5               | 61,5         | 75,5        | 105,0                                      | 92,0 | 89,0 | 88,0 | 82,0 | 74,5 | 68,0 |
| 3300HA   | 95,0               | 63,0         | 77,0        | 104,0                                      | 95,5 | 91,5 | 90,0 | 84,0 | 76,0 | 69,0 |
| 3600HA   | 97,0               | 65,0         | 79,0        | 105,0                                      | 98,0 | 93,5 | 92,5 | 85,0 | 76,0 | 70,0 |

# CHECK PARAMETERS

|                          |                                                                                          |         |       |
|--------------------------|------------------------------------------------------------------------------------------|---------|-------|
| Cold Setting             | Water inlet temperature in cooling mode                                                  | MIN.    | -10°C |
|                          |                                                                                          | MAX.    | 20°C  |
|                          |                                                                                          | DEFAULT | 7.0°C |
| heating Setting          | Water inlet temperature in heat mode                                                     | MIN.    | 30°C  |
|                          |                                                                                          | MAX.    | 50°C  |
|                          |                                                                                          | DEFAULT | 50°C  |
| Anti-freeze intervention | Anti-freeze alarm intervention temperature on EV side (water output temperature).        | MIN.    | -15°C |
|                          |                                                                                          | MAX.    | 4°C   |
|                          |                                                                                          | DEFAULT | 3°C   |
| Total differential       | Proportional temperature band within which the compressors are activated and deactivated | MIN.    | 3°C   |
|                          |                                                                                          | MAX.    | 10°C  |
|                          |                                                                                          | DEFAULT | 5°C   |
| Autostart                | auto                                                                                     |         |       |

| NRL                                                                                 | 2000       |            | 2250       |            | 2500       |            |
|-------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|
| COMPRESSOR THERMOMAGNETIC SWITCHES 400V                                             | CIRCUIT 1° | CIRCUIT 2° | CIRCUIT 1° | CIRCUIT 2° | CIRCUIT 1° | CIRCUIT 2° |
| MTC1                                                                                | 51A        | 51A        | 51A        | 62A        | 62A        | 62A        |
| mtc1a                                                                               | 51A        | 51A        | 51A        | 62A        | 62A        | 62A        |
| mtc1b                                                                               | \          | \          | \          | \          | \          | \          |
| mtc2                                                                                | 51A        | 51A        | 51A        | 62A        | 62A        | 62A        |
| mtc2a                                                                               | 51A        | 51A        | 51A        | 62A        | 62A        | 62A        |
| mtc2b                                                                               | \          | \          | \          | \          | \          | \          |
| HIGH PRESSURE SWITCH WITH MANUAL RESET                                              |            |            |            |            |            |            |
| PA (bar)                                                                            | 40         |            | 40         |            | 40         |            |
| High pressure transducer                                                            |            |            |            |            |            |            |
| TAP (bar)                                                                           | 39         |            | 39         |            | 39         |            |
| LOW PRESSURE TRANSDUCER                                                             |            |            |            |            |            |            |
| TBP (bar)                                                                           | 2          |            | 2          |            | 2          |            |
| CHILLER CIRCUIT SAFETY VALVE                                                        |            |            |            |            |            |            |
| AP (bar)                                                                            | 45         |            | 45         |            | 45         |            |
| BP (bar) only in heat pump                                                          | 30         |            | 30         |            | 30         |            |
| FAN THERMOMAGNETIC SWITCHES [°]                                                     |            |            |            |            |            |            |
| The calibration is carried out on a thermomagnetic switch (single ventilation line) |            |            |            |            |            |            |
| Fans A-E                                                                            | 7A         | 7A         | 7A         | 11A        | 11A        | 11A        |
| Fans HA-HE                                                                          | 9A         | 9A         | 9A         | 13A        | 13A        | 13A        |
| FANS THERMOMAGNETIC SWITCHES [M]                                                    |            |            |            |            |            |            |
| The calibration is carried out on a thermomagnetic switch (single ventilation line) |            |            |            |            |            |            |
| Fans A-E                                                                            | 9A         | 9A         | 9A         | 13A        | 13A        | 13A        |
| Fans HA-HE                                                                          | -          | -          | -          | -          | -          | -          |
| NUMBER OF FANS                                                                      |            |            |            |            |            |            |
| No. fans A-E                                                                        | 4          | 4          | 4          | 6          | 6          | 6          |
| No. fans HA-HE                                                                      | 4          | 4          | 4          | 6          | 6          | 6          |

| NRL                                                                                 | 2800       |            | 3000       |            |
|-------------------------------------------------------------------------------------|------------|------------|------------|------------|
| COMPRESSOR THERMOMAGNETIC SWITCHES 400V                                             | CIRCUIT 1° | CIRCUIT 2° | CIRCUIT 1° | CIRCUIT 2° |
| MTC1                                                                                | 62A        | 62A        | 51A        | 51A        |
| mtc1a                                                                               | 62A        | 62A        | 51A        | 51A        |
| mtc1b                                                                               | -          | -          | 51A        | 51A        |
| mtc2                                                                                | 51A        | 51A        | 51A        | 51A        |
| mtc2a                                                                               | 51A        | 51A        | 51A        | 51A        |
| mtc2b                                                                               | 51A        | 51A        | 51A        | 51A        |
| HIGH PRESSURE SWITCH WITH MANUAL RESET                                              |            |            |            |            |
| PA (bar)                                                                            | 40         |            | 40         |            |
| High pressure transducer                                                            |            |            |            |            |
| TAP (bar)                                                                           | 39         |            | 39         |            |
| LOW PRESSURE TRANSDUCER                                                             |            |            |            |            |
| TBP (bar)                                                                           | 2          |            | 2          |            |
| CHILLER CIRCUIT SAFETY VALVE                                                        |            |            |            |            |
| AP (bar)                                                                            | 45         |            | 45         |            |
| BP (bar) only in heat pump                                                          | 30         |            | 30         |            |
| FAN THERMOMAGNETIC SWITCHES [°]                                                     |            |            |            |            |
| The calibration is carried out on a thermomagnetic switch (single ventilation line) |            |            |            |            |
| Fans A-E                                                                            | 11A        | 11A        | 11A        | 11A        |
| Fans HA-HE                                                                          | 13A        | 13A        | 13A        | 13A        |
| FANS THERMOMAGNETIC SWITCHES [M]                                                    |            |            |            |            |
| The calibration is carried out on a thermomagnetic switch (single ventilation line) |            |            |            |            |
| Fans A-E                                                                            | 13A        | 13A        | 13A        | 13A        |
| Fans HA-HE                                                                          | -          | -          | -          | -          |
| NUMBER OF FANS                                                                      |            |            |            |            |
| No. fans A-E                                                                        | 6          | 6          | 6          | 6          |
| No. fans HA-HE                                                                      | 6          | 6          | 6          | 6          |

| NRL                                                                                 | 3300       |            | 3600       |            |
|-------------------------------------------------------------------------------------|------------|------------|------------|------------|
| COMPRESSOR THERMOMAGNETIC SWITCHES 400V                                             | CIRCUIT 1° | CIRCUIT 2° | CIRCUIT 1° | CIRCUIT 2° |
| MTC1                                                                                | 51A        | 51A        | 62A        | 62A        |
| mtc1a                                                                               | 51A        | 51A        | 62A        | 62A        |
| mtc1b                                                                               | 51A        | 51A        | 62A        | 62A        |
| mtc2                                                                                | 62A        | 62A        | 62A        | 62A        |
| mtc2a                                                                               | 62A        | 62A        | 62A        | 62A        |
| mtc2b                                                                               | 62A        | 62A        | 62A        | 62A        |
| HIGH PRESSURE SWITCH WITH MANUAL RESET                                              |            |            |            |            |
| PA (bar)                                                                            | 40         |            | 40         |            |
| High pressure transducer                                                            |            |            |            |            |
| TAP (bar)                                                                           | 39         |            | 39         |            |
| LOW PRESSURE TRANSDUCER                                                             |            |            |            |            |
| TBP (bar)                                                                           | 2          |            | 2          |            |
| CHILLER CIRCUIT SAFETY VALVE                                                        |            |            |            |            |
| AP (bar)                                                                            | 45         |            | 45         |            |
| BP (bar) only in heat pump                                                          | 30         |            | 30         |            |
| FAN THERMOMAGNETIC SWITCHES [°]                                                     |            |            |            |            |
| The calibration is carried out on a thermomagnetic switch (single ventilation line) |            |            |            |            |
| Fans A-E                                                                            | 13A        | 13A        | 13A        | 13A        |
| Fans HA-HE                                                                          | 18A        | 18A        | 18A        | 18A        |
| FANS THERMOMAGNETIC SWITCHES [M]                                                    |            |            |            |            |
| The calibration is carried out on a thermomagnetic switch (single ventilation line) |            |            |            |            |
| Fans A-E                                                                            | 18A        | 18A        | 18A        | 18A        |
| Fans HA-HE                                                                          | -          | -          | -          | -          |
| NUMBER OF FANS                                                                      |            |            |            |            |
| No. fans A-E                                                                        | 8          | 8          | 8          | 8          |
| No. fans HA-HE                                                                      | 8          | 8          | 8          | 8          |

# FOR THE INSTALLER



## 19. SELECTION AND PLACE OF INSTALLATION

Before installing the unit, decide with the customer the position in which it will be placed, pay attention to the following points:

- the support surface must be able to withstand the weight of the unit;
- the safety distance between the units and other equipment or structures must be strictly respected so that the air in fans inlet and outlet circulates freely.
- The unit must be installed by an authorised technician in compliance with the national laws in the country of destination respecting the minimum technical spaces to allow maintenance.

## 20. POSITIONING

The machine is delivered from the factory wrapped in estincoil. Before moving the unit, check the lifting capacity of the machines used. Once the packaging has been removed, the unit must be handled by qualified personnel with the suitable equipment. To handle the machine; see figure

- hook up the lifting belts to the



The unit must be installed by an authorised and qualified technician, in compliance with the national legislation in force in the country of destination (MD 329/2004).

We shall not be held responsible for any damage whatsoever resulting from the non-compliance with these instructions.



Before starting any kind of work, it is necessary TO READ CAREFULLY THE INSTRUCTIONS, AND TO PERFORM THE SAFETY CHECKS TO REDUCE ANY RISK TO A MINIMUM. All the personnel in charge must know the operations and possible risks that may arise when all the unit installation operations begin.

*provided eyebolts (as indicated in figure).*

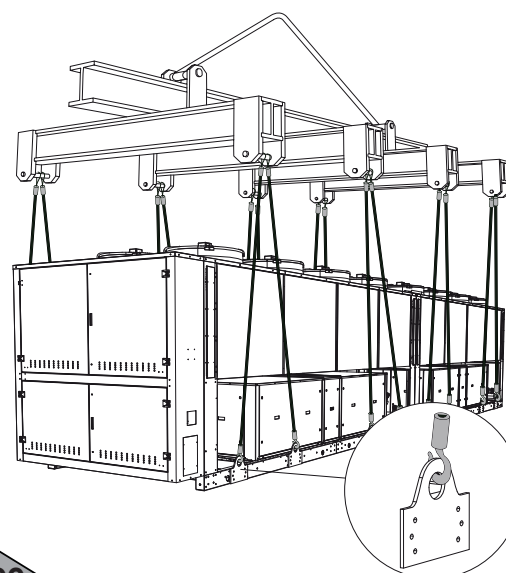
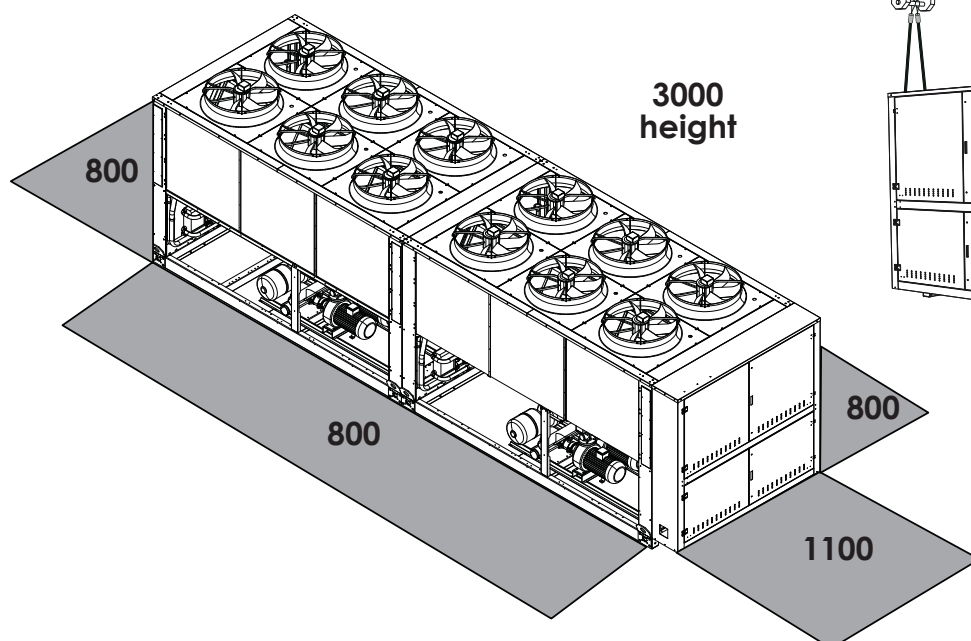
**WARNING: ALWAYS USE ALL THE PROVIDED EYEBOLTS**

- In order to avoid damaging the unit with the cables, insert protection elements between them and the machine. It is absolutely forbidden to stand beneath the unit.
- Take into account that when the chiller is working, vibrations may be generated; it is therefore advisable to install anti-vibration supports (AVX accessories), fitting them to the holes in the base according to the assembly diagram.
- It is compulsory to provide the necessary technical spaces,

to allow REGULAR AND EXTRAORDINARY MAINTENANCE INTERVENTIONS

- Fasten the unit by checking carefully that its on the same level; check that easy access to the hydraulic and electric part is allowed.

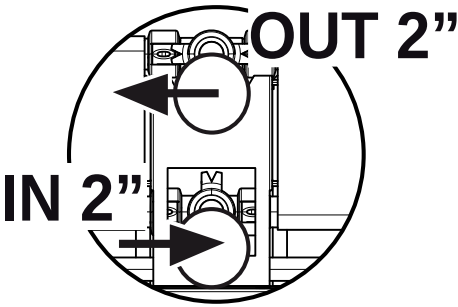
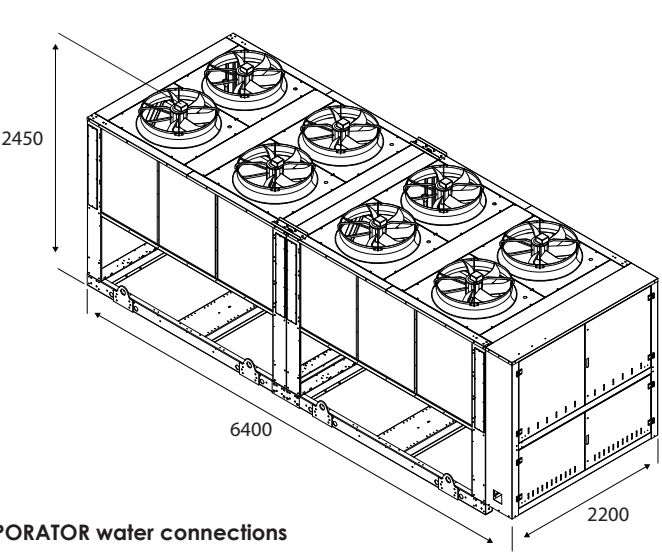
### 20.1. MINIMUM TECHNICAL SPACES (mm)



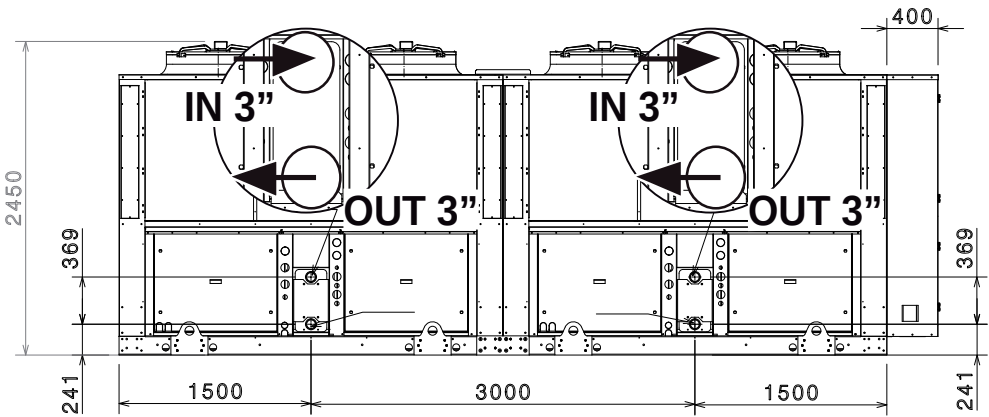
**WARNING:**  
ALWAYS USE ALL  
THE PROVIDED  
EYEBOLTS

NRL 2000 STANDARD

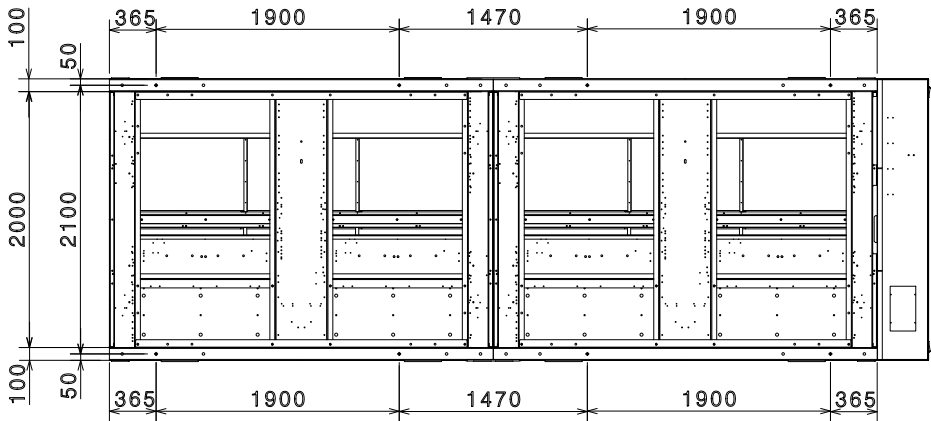
DESUPERHEATER water connections

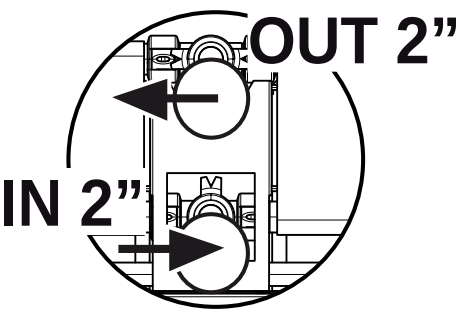
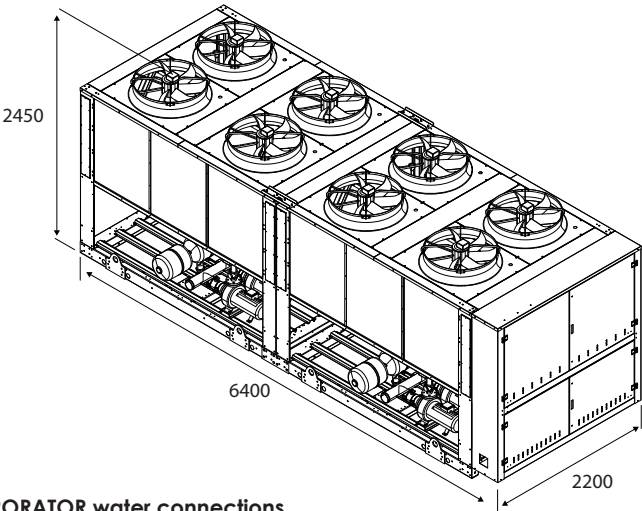


EVAPORATOR water connections

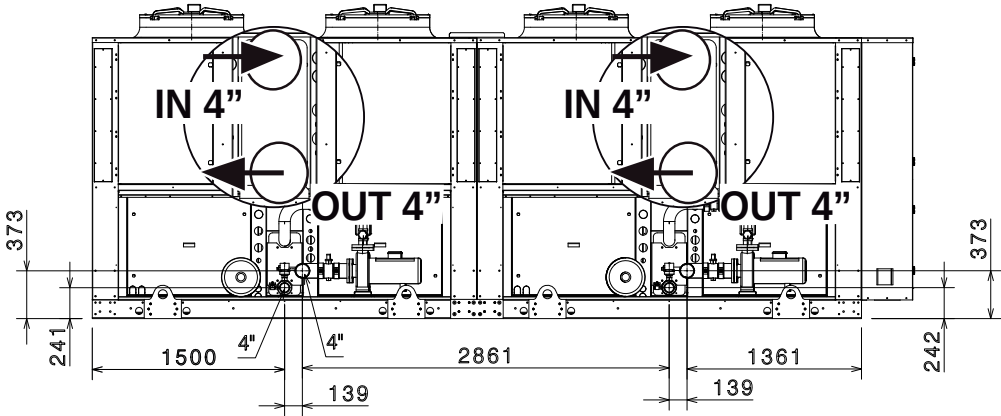


Position AVX

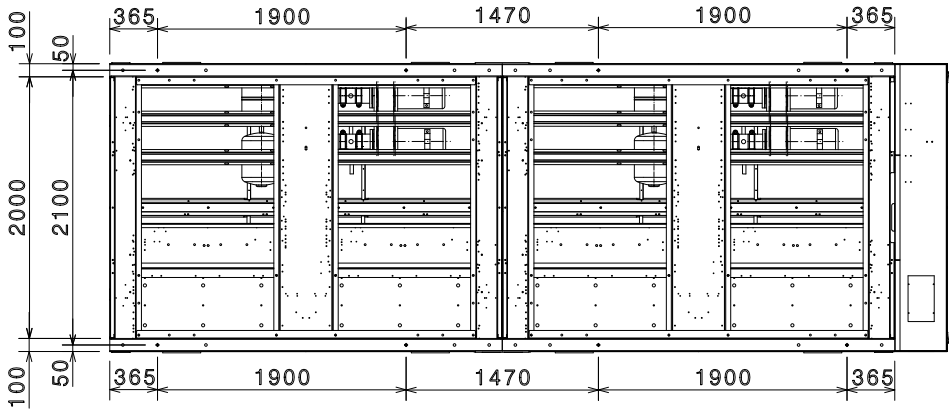


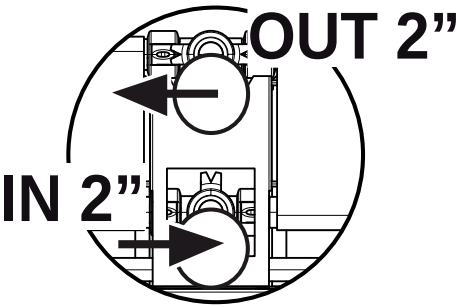
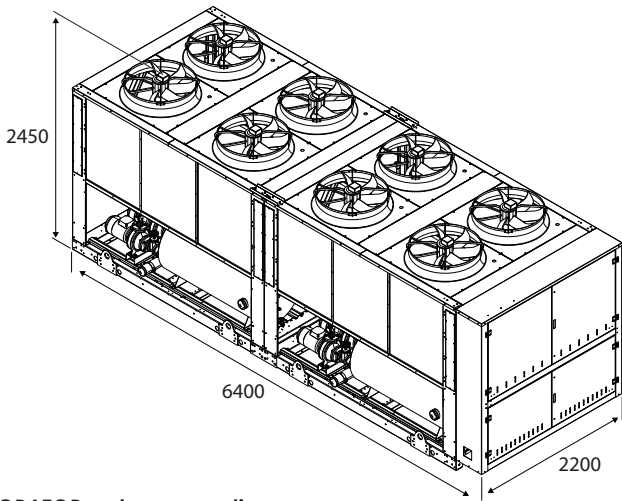


EVAPORATOR water connections

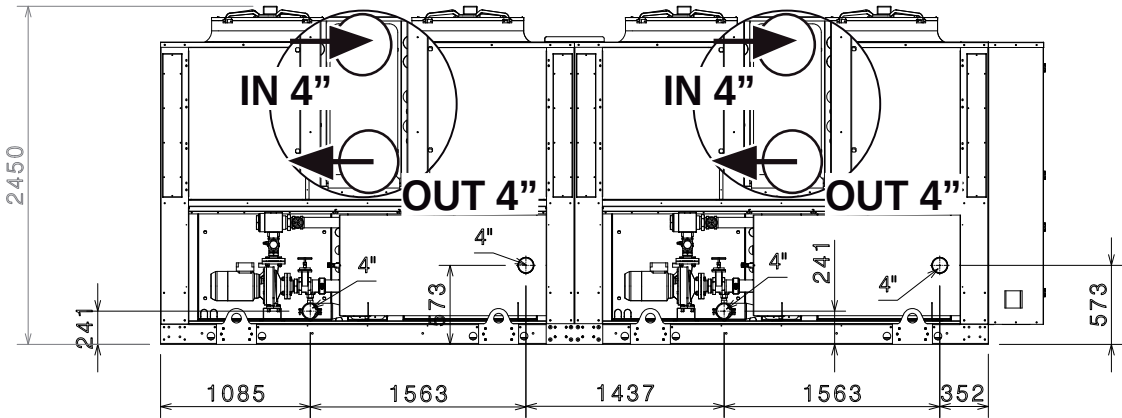


Position AVX

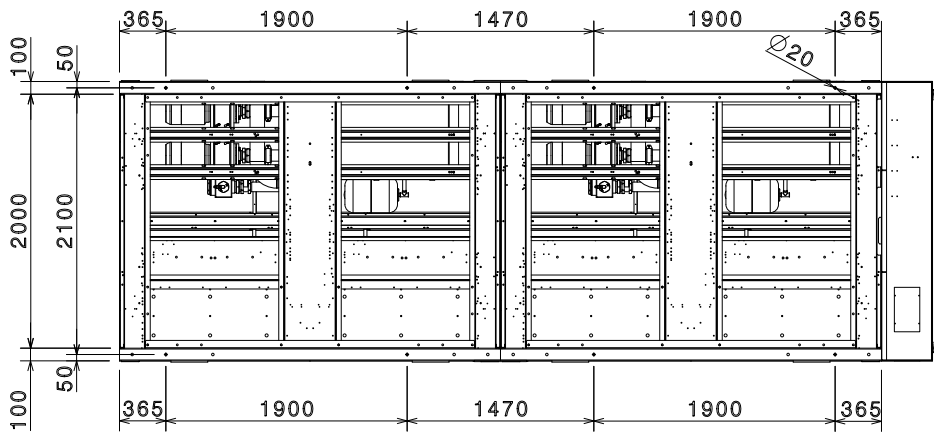


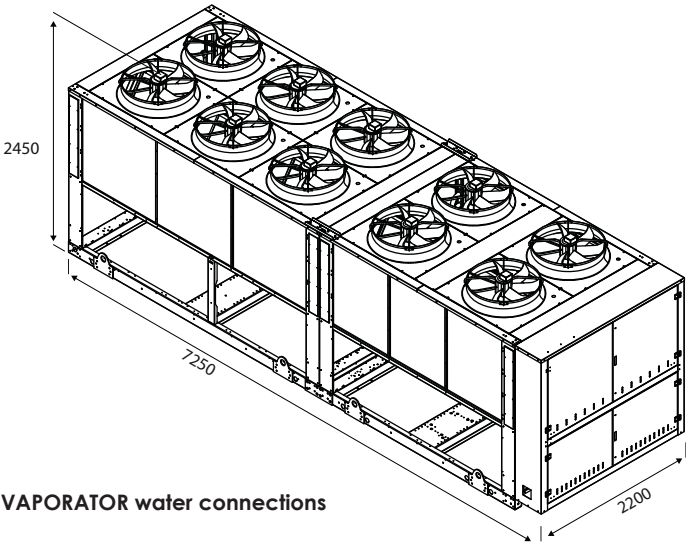


EVAPORATOR water connections

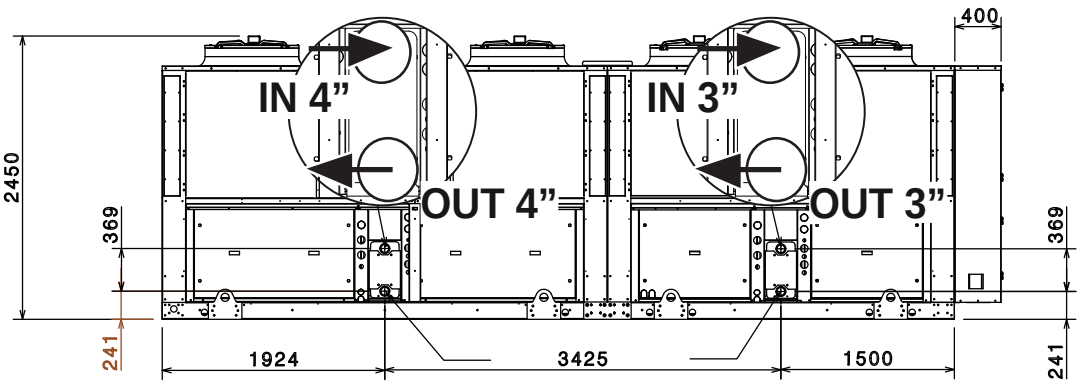
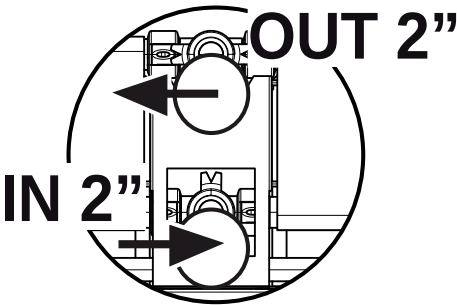


Position AVX

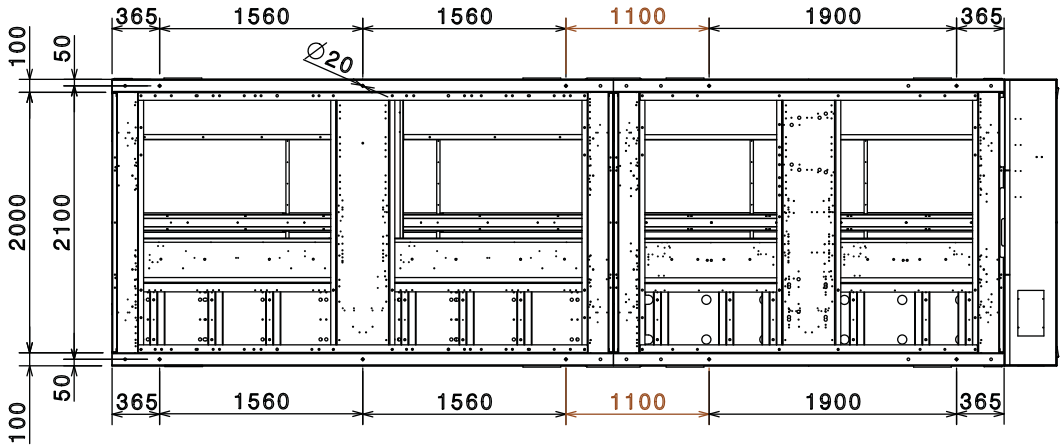


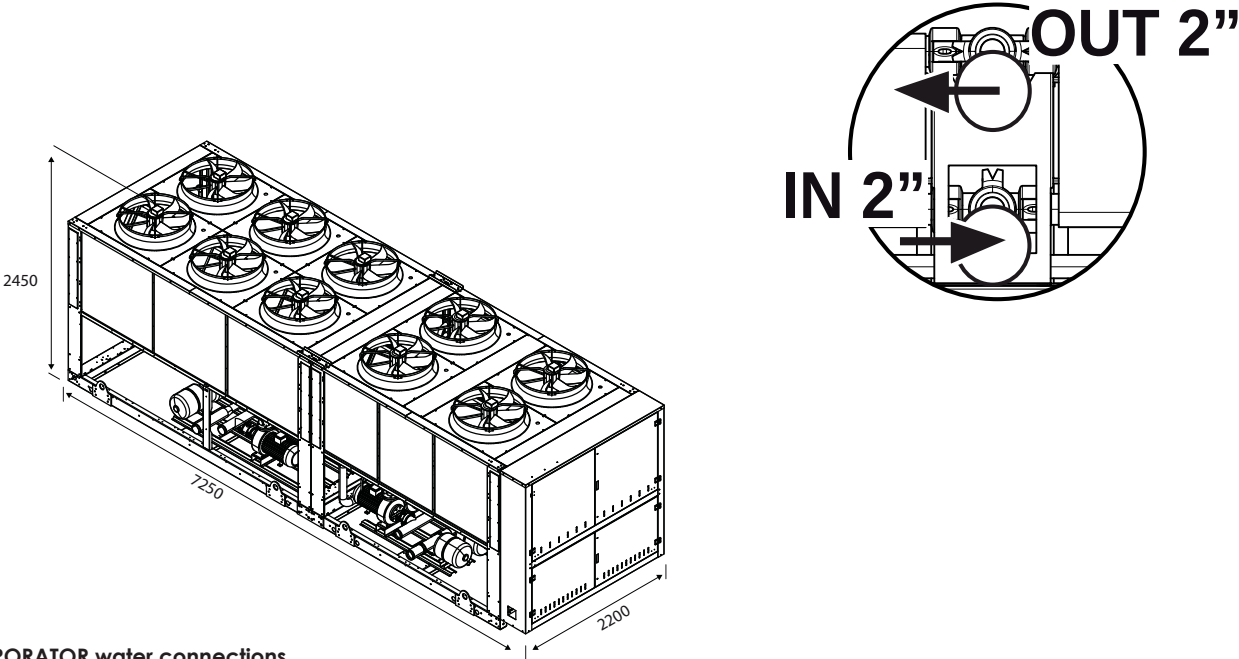


EVAPORATOR water connections

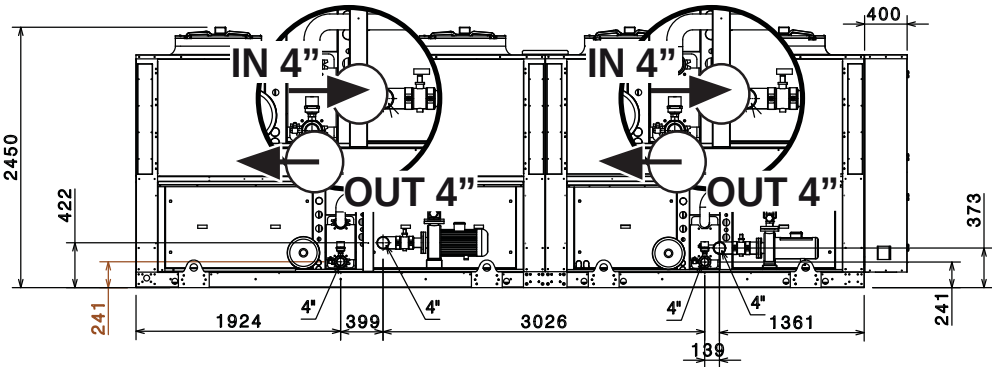


Position AVX

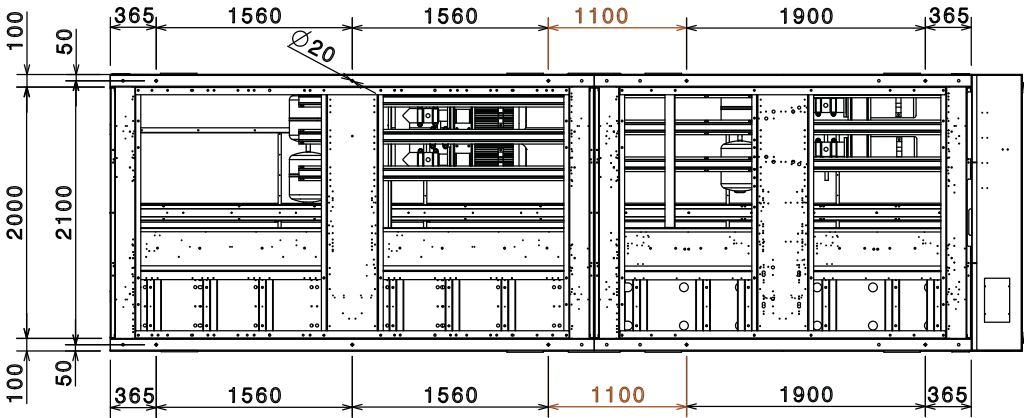


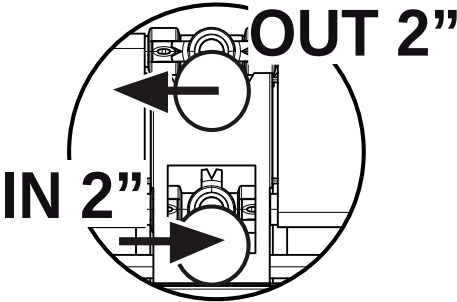
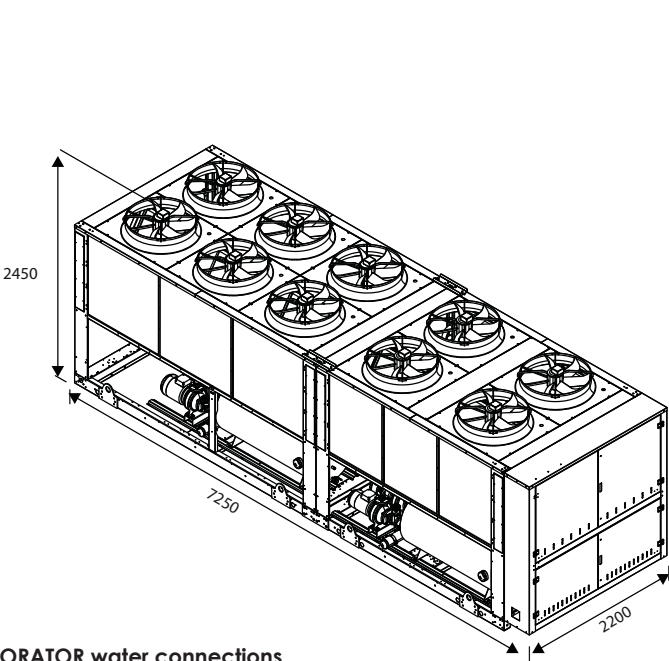


EVAPORATOR water connections

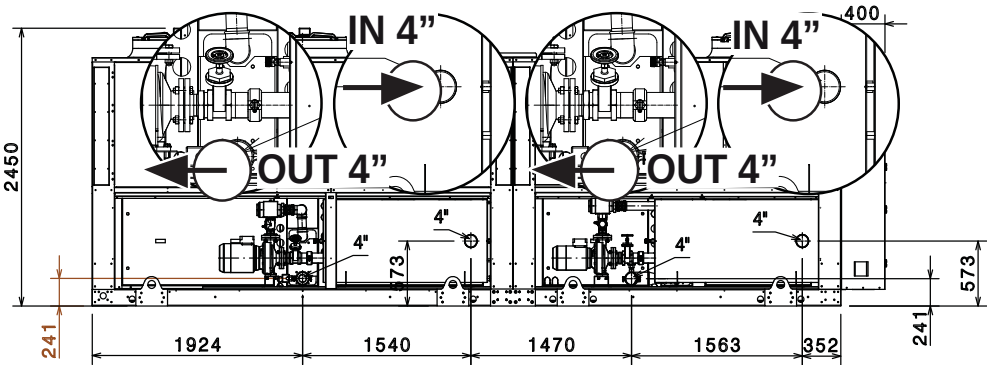


Position AVX

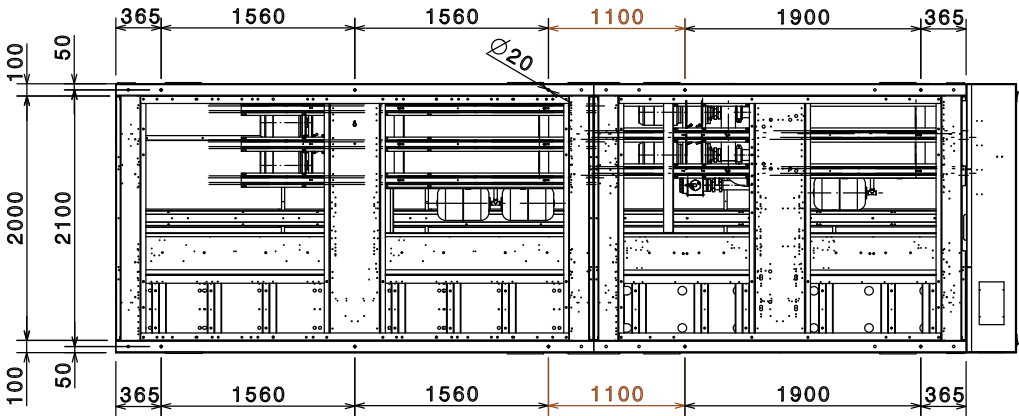


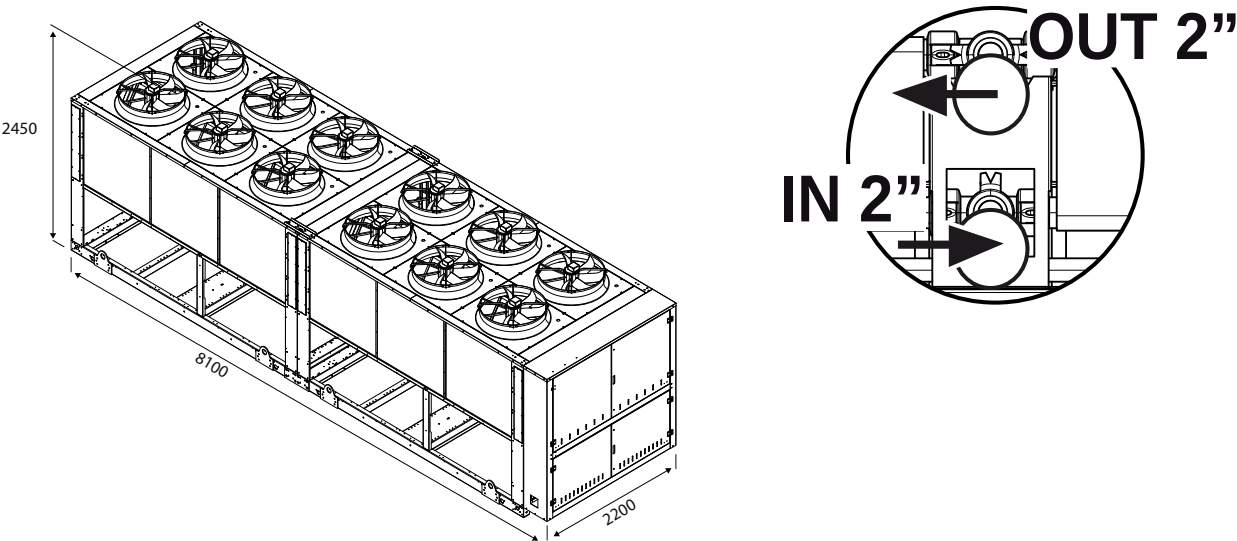


EVAPORATOR water connections

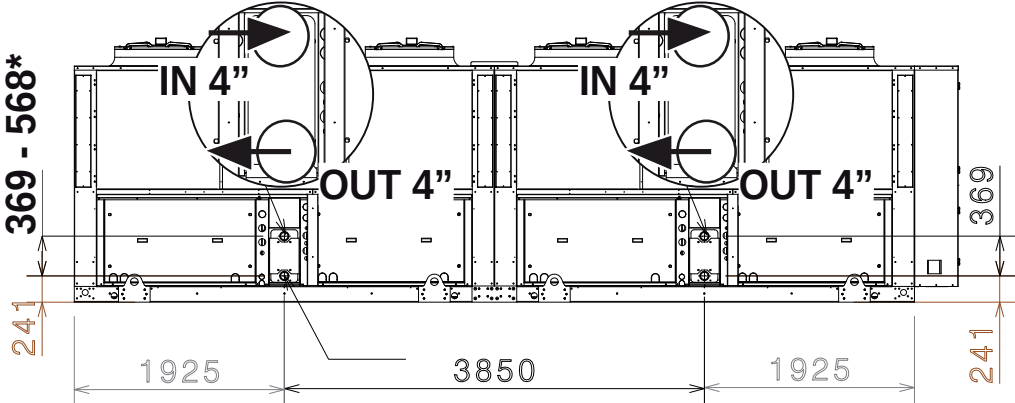


Position AVX

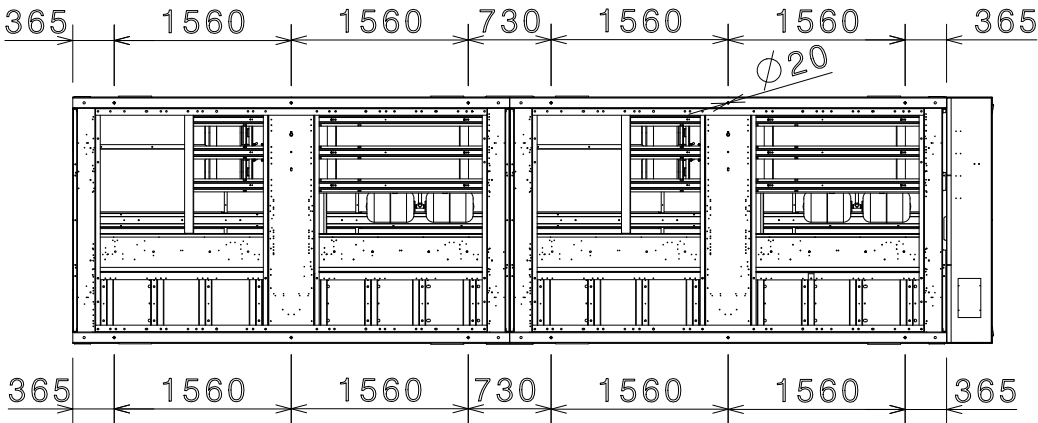




EVAPORATOR water connections

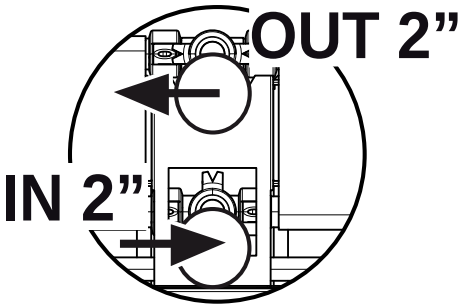
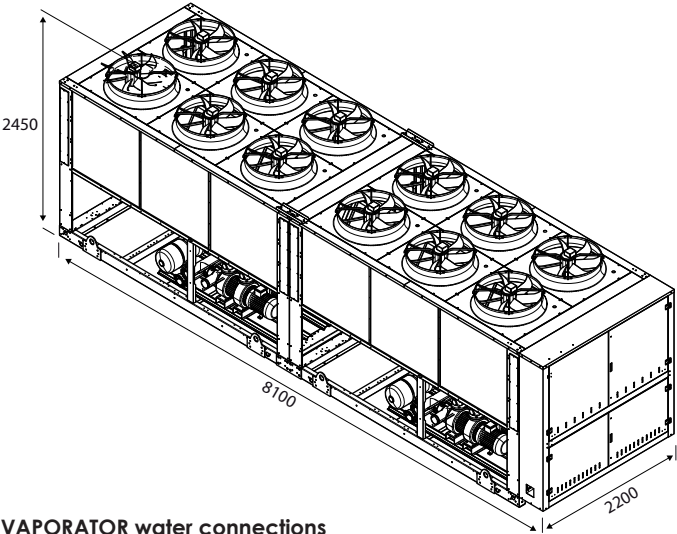


Position AVX

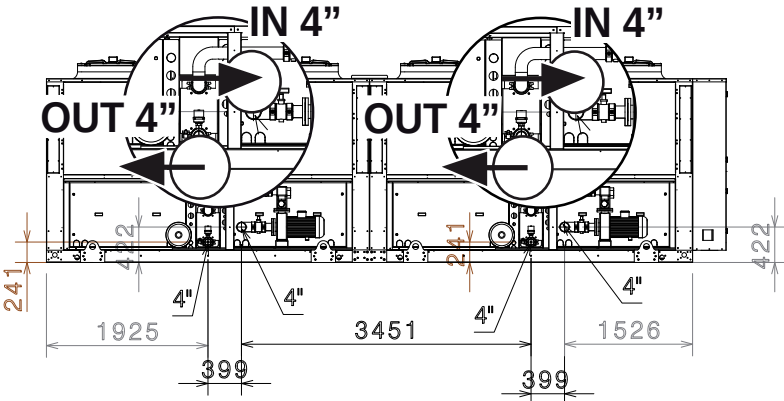


\*NOTE:  
The opposite table shows the variation of the position according to the exchanger type

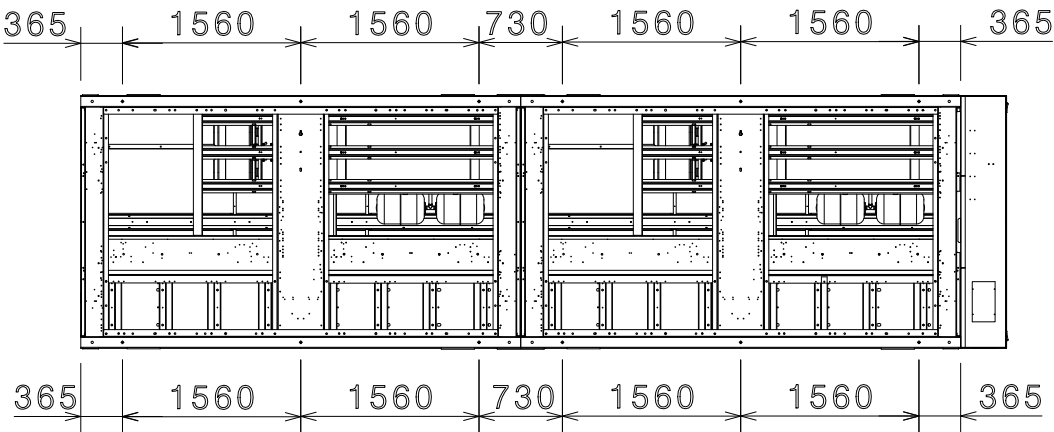
| MODEL      | POSITION |
|------------|----------|
| 2800 A-E   | 369      |
| 3000 A-E   | 568      |
| 3300 A-E   | 568      |
| 3600 A-E   | 568      |
| 2800 HA-HE | 568      |
| 3000 HA-HE | 568      |
| 3300 HA-HE | 568      |
| 3600 HA-HE | 568      |

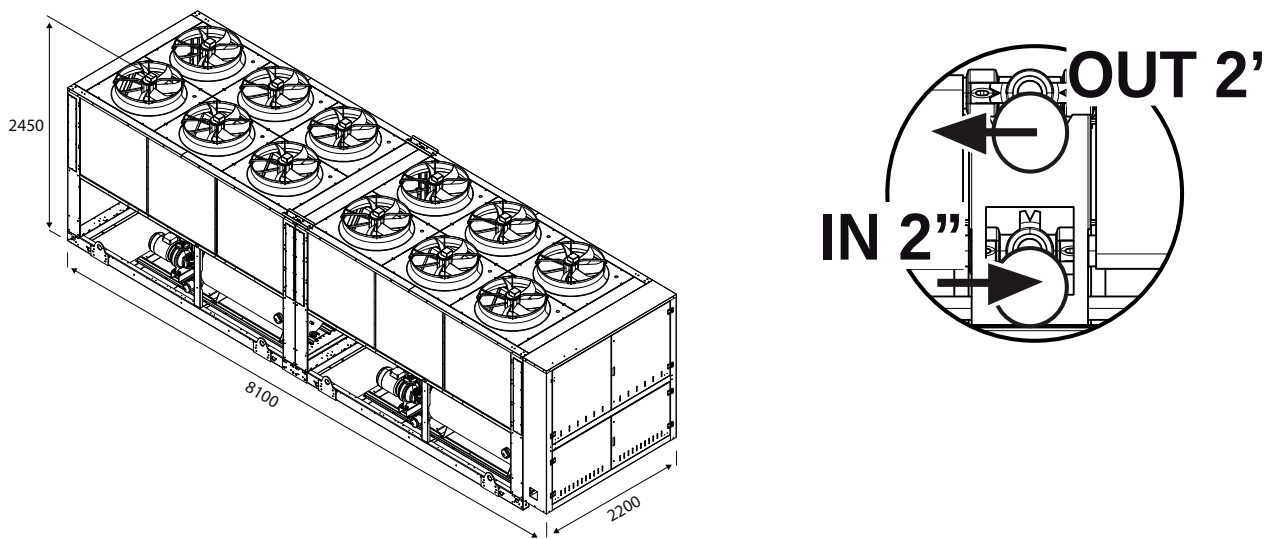


EVAPORATOR water connections

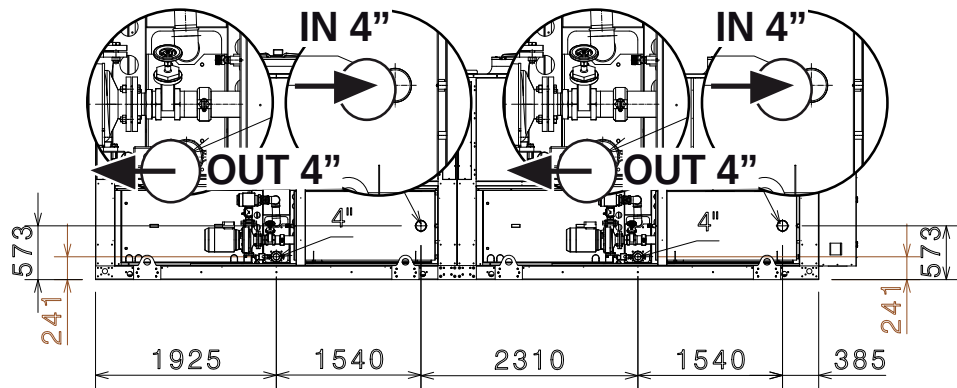


Position AVX

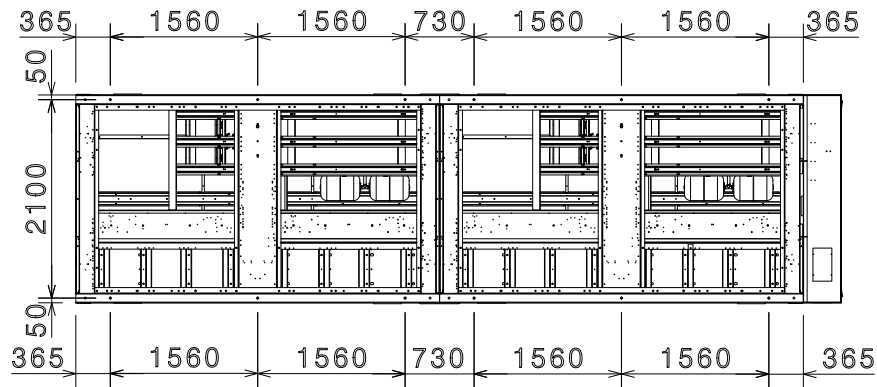


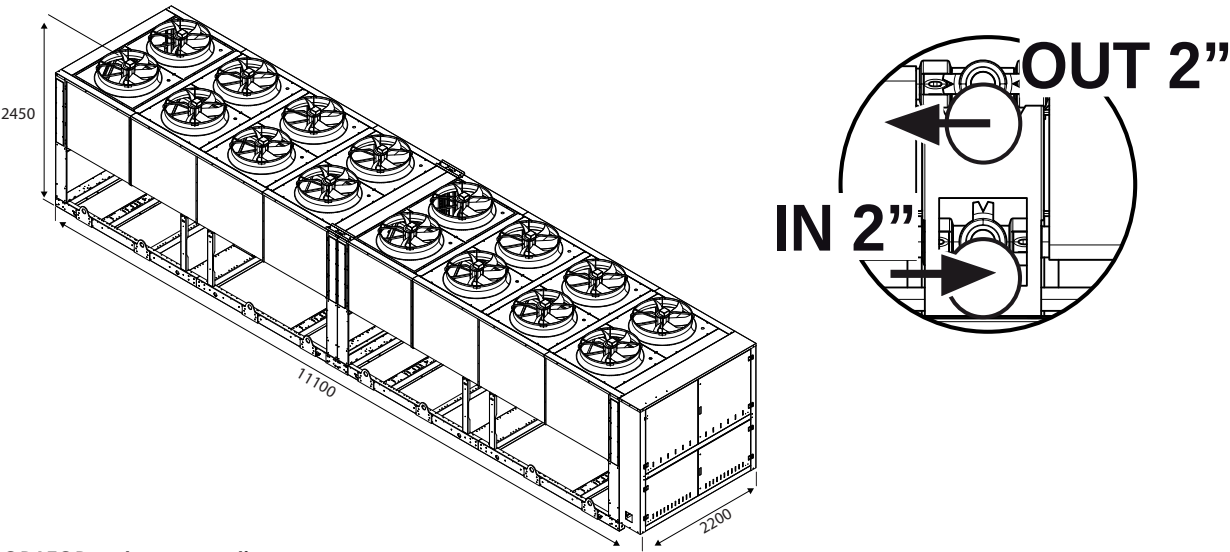


EVAPORATOR water connections

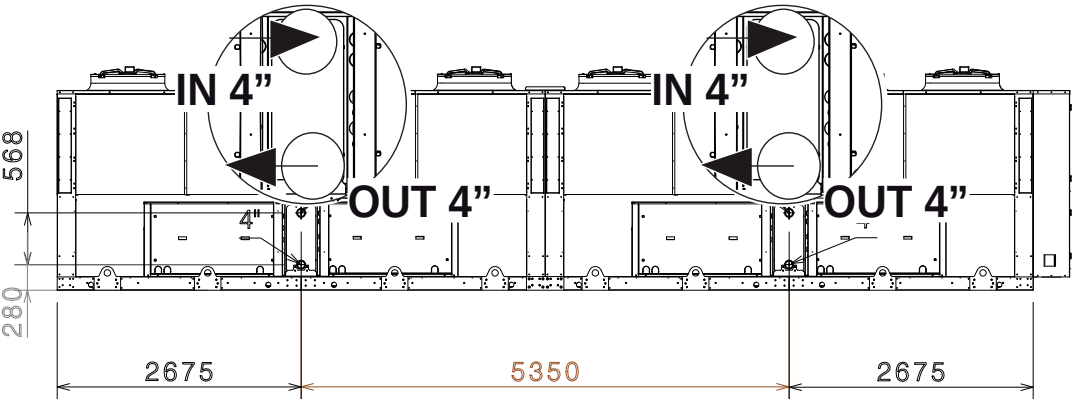


Position AVX

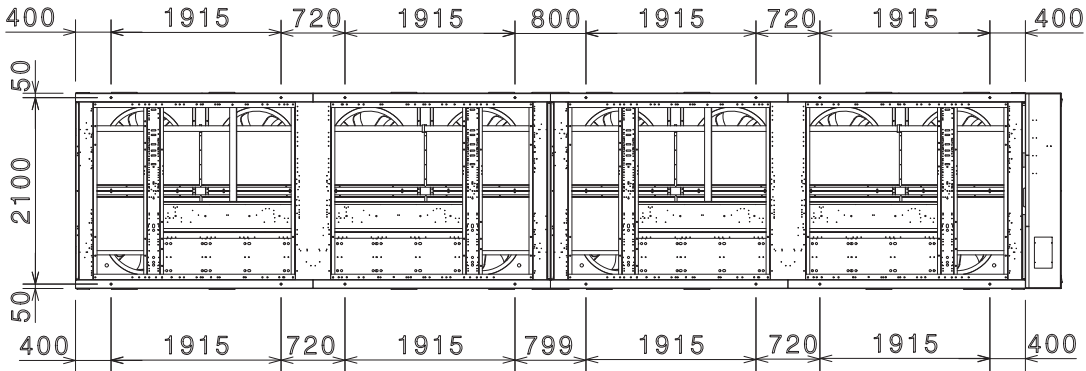


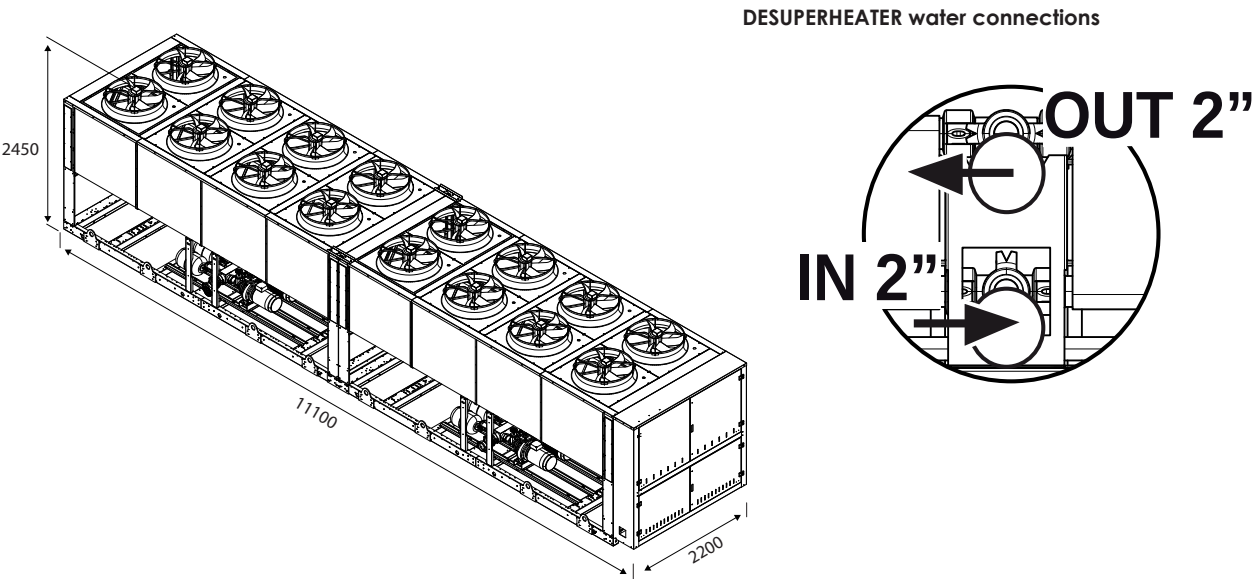


EVAPORATOR water connections

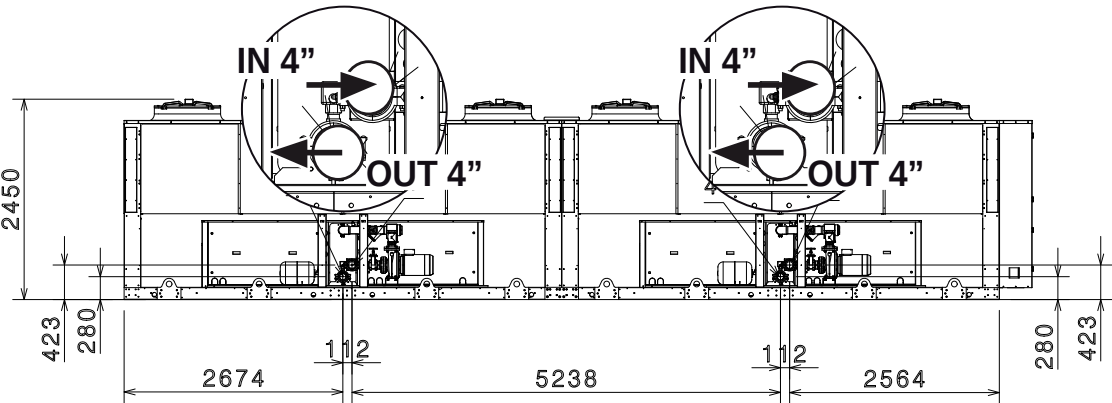


Position AVX

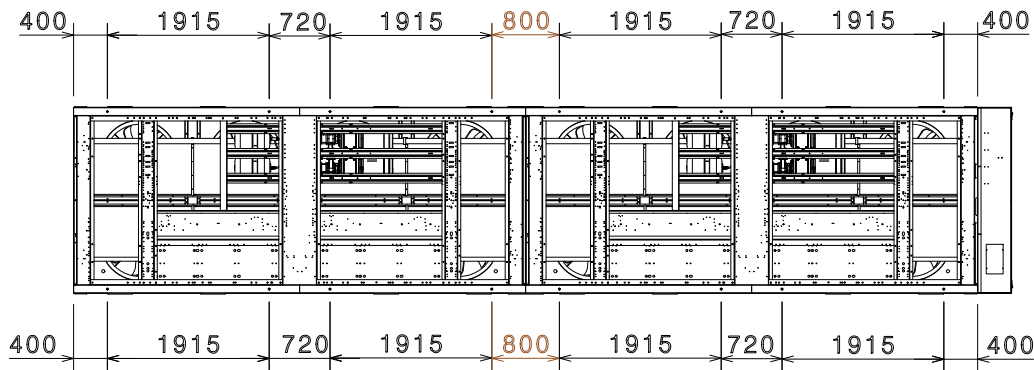


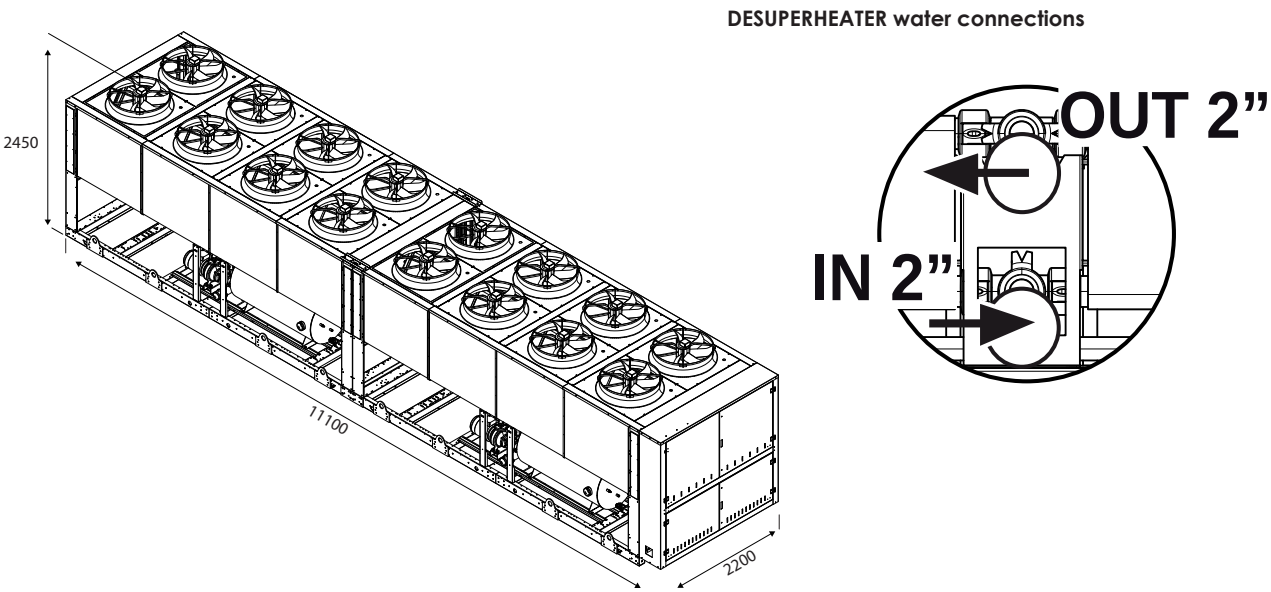


EVAPORATOR water connections

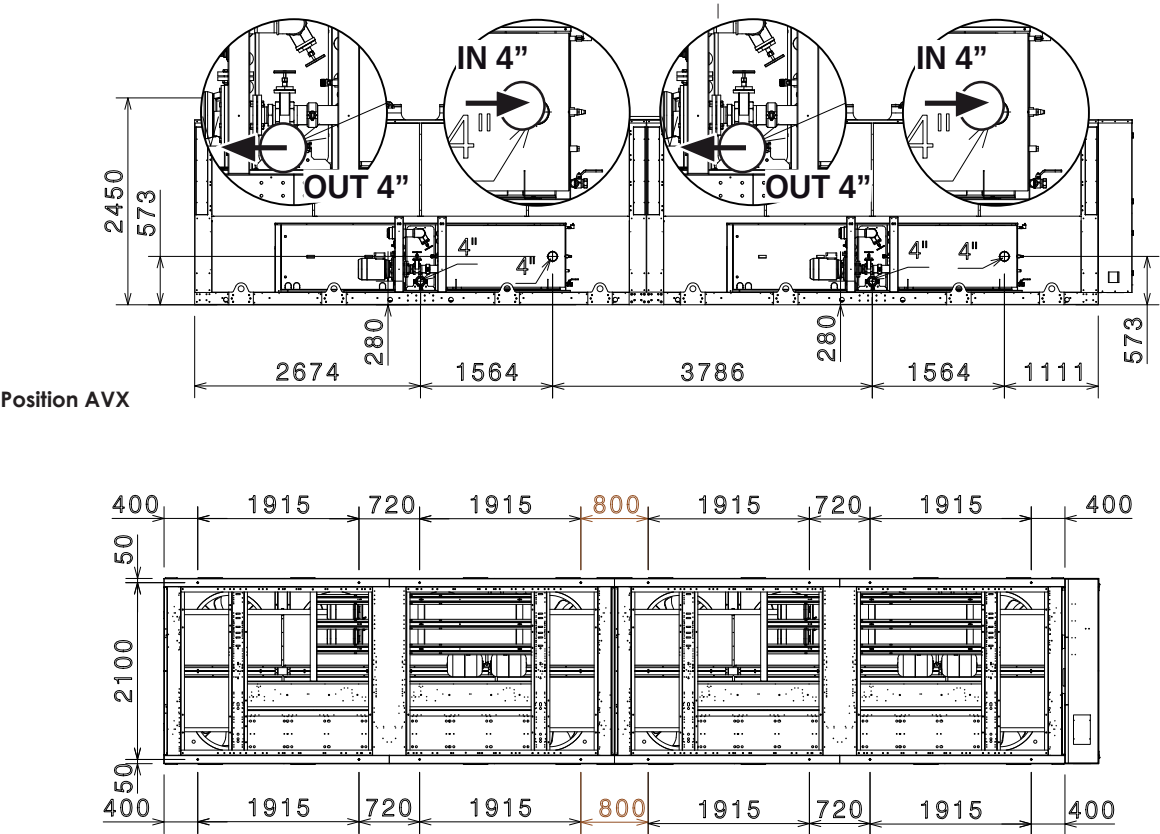


Position AVX





EVAPORATOR water connections



## 21. DISTRIBUTION OF PERCENTAGE WEIGHTS ON SUPPORTINGPOINTS

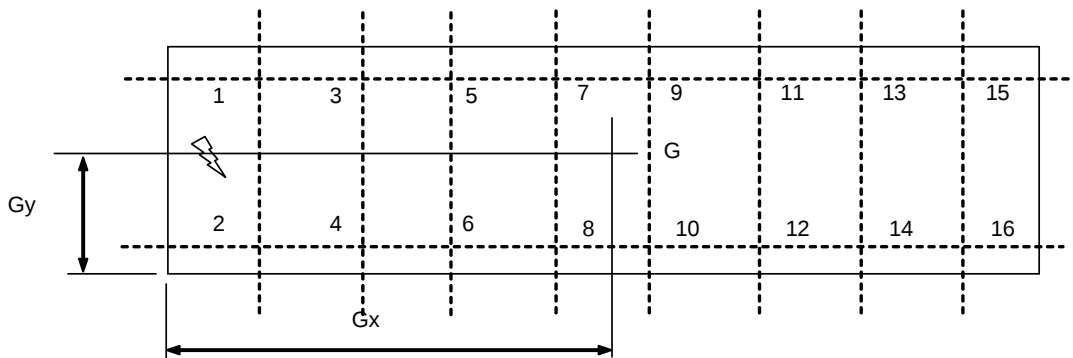
### 21.1. NRL A - E (2000 - 2250 - 2500 - 2800)

| MODEL        |    | EMPTY             |     |        | RUNNING           |      |              |       |
|--------------|----|-------------------|-----|--------|-------------------|------|--------------|-------|
|              |    | CENTRE OF GRAVITY |     | WEIGHT | CENTRE OF GRAVITY |      | TOTAL WEIGHT |       |
|              |    | XG                | YG  | kg     | XG                | YG   | kg           | WATER |
| NRL 2000 A/E | 00 | 3132              | 814 | 4820   | 3134              | 816  | 4860         | 40    |
| NRL 2000 A/E | 01 | 3112              | 917 | 5460   | 3081              | 1083 | 6960         | 1500  |
| NRL 2000 A/E | 02 | 3109              | 929 | 5540   | 3080              | 1090 | 7040         | 1500  |
| NRL 2000 A/E | 03 | 3110              | 926 | 5520   | 3080              | 1088 | 7020         | 1500  |
| NRL 2000 A/E | 04 | 3106              | 945 | 5660   | 3078              | 1100 | 7160         | 1500  |
| NRL 2000 A/E | P1 | 3135              | 864 | 5110   | 3139              | 892  | 5320         | 210   |
| NRL 2000 A/E | P2 | 3136              | 877 | 5190   | 3139              | 904  | 5400         | 210   |
| NRL 2000 A/E | P3 | 3136              | 874 | 5170   | 3139              | 901  | 5380         | 210   |
| NRL 2000 A/E | P4 | 3137              | 889 | 5270   | 3140              | 916  | 5480         | 210   |

|              |    |      |     |      |      |      |      |      |
|--------------|----|------|-----|------|------|------|------|------|
| NRL 2250 A/E | 00 | 3418 | 817 | 5240 | 3421 | 819  | 5280 | 40   |
| NRL 2250 A/E | 01 | 3391 | 913 | 5880 | 3350 | 1070 | 7380 | 1500 |
| NRL 2250 A/E | 02 | 3388 | 923 | 5960 | 3348 | 1076 | 7460 | 1500 |
| NRL 2250 A/E | 03 | 3389 | 921 | 5940 | 3348 | 1075 | 7440 | 1500 |
| NRL 2250 A/E | 04 | 3384 | 939 | 6080 | 3345 | 1086 | 7580 | 1500 |
| NRL 2250 A/E | P1 | 3417 | 863 | 5530 | 3419 | 889  | 5740 | 210  |
| NRL 2250 A/E | P2 | 3417 | 875 | 5610 | 3419 | 901  | 5820 | 210  |
| NRL 2250 A/E | P3 | 3417 | 872 | 5590 | 3419 | 898  | 5800 | 210  |
| NRL 2250 A/E | P4 | 3417 | 887 | 5690 | 3419 | 911  | 5900 | 210  |

|              |    |      |     |      |      |      |      |      |
|--------------|----|------|-----|------|------|------|------|------|
| NRL 2500 A/E | 00 | 3882 | 819 | 5660 | 3884 | 821  | 5700 | 40   |
| NRL 2500 A/E | 01 | 3830 | 910 | 6310 | 3749 | 1059 | 7810 | 1500 |
| NRL 2500 A/E | 02 | 3824 | 921 | 6400 | 3745 | 1066 | 7900 | 1500 |
| NRL 2500 A/E | 03 | 3826 | 918 | 6370 | 3746 | 1064 | 7870 | 1500 |
| NRL 2500 A/E | 04 | 3816 | 936 | 6520 | 3739 | 1076 | 8020 | 1500 |
| NRL 2500 A/E | P1 | 3890 | 864 | 5960 | 3896 | 888  | 6170 | 210  |
| NRL 2500 A/E | P2 | 3892 | 876 | 6050 | 3898 | 900  | 6260 | 210  |
| NRL 2500 A/E | P3 | 3891 | 872 | 6020 | 3897 | 896  | 6230 | 210  |
| NRL 2500 A/E | P4 | 3894 | 887 | 6130 | 3900 | 910  | 6340 | 210  |

|              |    |      |     |      |      |      |      |      |
|--------------|----|------|-----|------|------|------|------|------|
| NRL 2800 A/E | 00 | 3974 | 795 | 6060 | 3976 | 797  | 6110 | 50   |
| NRL 2800 A/E | 01 | 3917 | 882 | 6710 | 3824 | 1029 | 8220 | 1510 |
| NRL 2800 A/E | 02 | 3909 | 893 | 6800 | 3819 | 1036 | 8310 | 1510 |
| NRL 2800 A/E | 03 | 3912 | 890 | 6770 | 3821 | 1034 | 8280 | 1510 |
| NRL 2800 A/E | 04 | 3900 | 907 | 6920 | 3813 | 1046 | 8430 | 1510 |
| NRL 2800 A/E | P1 | 3977 | 837 | 6360 | 3980 | 862  | 6580 | 220  |
| NRL 2800 A/E | P2 | 3978 | 850 | 6450 | 3981 | 873  | 6670 | 220  |
| NRL 2800 A/E | P3 | 3977 | 846 | 6420 | 3981 | 869  | 6640 | 220  |
| NRL 2800 A/E | P4 | 3978 | 860 | 6530 | 3982 | 883  | 6750 | 220  |



| Model        |    | PERCENTAGE OF WEIGHT DISTRIBUTION SUPPORTS (%) |       |       |       |       |       |      |       |   |    |    |    | AVX |
|--------------|----|------------------------------------------------|-------|-------|-------|-------|-------|------|-------|---|----|----|----|-----|
|              |    | 1                                              | 2     | 3     | 4     | 5     | 6     | 7    | 8     | 9 | 10 | 11 | 12 |     |
|              |    | %                                              | %     | %     | %     | %     | %     | %    | %     | % | %  | %  | %  |     |
| NRL 2000 A/E | 00 | 10,5%                                          | 17,7% | 10,7% | 18,2% | 8,6%  | 14,6% | 7,3% | 12,4% | - | -  | -  | -  | 767 |
| NRL 2000 A/E | 01 | 14,0%                                          | 14,4% | 13,8% | 14,3% | 13,2% | 13,6% | 8,2% | 8,5%  | - | -  | -  | -  | 768 |
| NRL 2000 A/E | 02 | 14,1%                                          | 14,3% | 13,9% | 14,2% | 13,3% | 13,6% | 8,2% | 8,4%  | - | -  | -  | -  | 768 |
| NRL 2000 A/E | 03 | 14,1%                                          | 14,4% | 13,9% | 14,2% | 13,3% | 13,6% | 8,2% | 8,4%  | - | -  | -  | -  | 768 |
| NRL 2000 A/E | 04 | 14,2%                                          | 14,2% | 14,0% | 14,0% | 13,5% | 13,5% | 8,2% | 8,2%  | - | -  | -  | -  | 768 |
| NRL 2000 A/E | P1 | 11,2%                                          | 16,4% | 11,7% | 17,2% | 9,9%  | 14,5% | 7,7% | 11,3% | - | -  | -  | -  | 769 |
| NRL 2000 A/E | P2 | 11,3%                                          | 16,2% | 11,9% | 17,0% | 10,1% | 14,5% | 7,8% | 11,1% | - | -  | -  | -  | 769 |
| NRL 2000 A/E | P3 | 11,3%                                          | 16,3% | 11,8% | 17,1% | 10,1% | 14,5% | 7,7% | 11,2% | - | -  | -  | -  | 769 |
| NRL 2000 A/E | P4 | 11,4%                                          | 16,0% | 12,0% | 16,9% | 10,3% | 14,5% | 7,8% | 11,0% | - | -  | -  | -  | 769 |

|              |    |       |       |       |       |      |      |       |       |      |      |   |   |     |
|--------------|----|-------|-------|-------|-------|------|------|-------|-------|------|------|---|---|-----|
| NRL 2250 A/E | 00 | 9,5%  | 16,0% | 9,6%  | 16,2% | 5,5% | 9,2% | 8,5%  | 14,3% | 4,2% | 7,0% | - | - | 773 |
| NRL 2250 A/E | 01 | 12,9% | 13,6% | 12,4% | 13,1% | 6,9% | 7,3% | 12,5% | 13,2% | 4,0% | 4,2% | - | - | 774 |
| NRL 2250 A/E | 02 | 13,0% | 13,6% | 12,4% | 13,0% | 6,9% | 7,2% | 12,6% | 13,2% | 4,0% | 4,2% | - | - | 774 |
| NRL 2250 A/E | 03 | 13,0% | 13,6% | 12,4% | 13,0% | 6,9% | 7,2% | 12,6% | 13,2% | 4,0% | 4,2% | - | - | 774 |
| NRL 2250 A/E | 04 | 13,1% | 13,5% | 12,5% | 12,8% | 6,9% | 7,1% | 12,8% | 13,1% | 4,0% | 4,1% | - | - | 774 |
| NRL 2250 A/E | P1 | 10,2% | 15,0% | 10,8% | 15,9% | 5,4% | 8,0% | 9,9%  | 14,6% | 4,2% | 6,1% | - | - | 775 |
| NRL 2250 A/E | P2 | 10,3% | 14,8% | 11,0% | 15,9% | 5,4% | 7,8% | 10,1% | 14,6% | 4,1% | 6,0% | - | - | 775 |
| NRL 2250 A/E | P3 | 10,2% | 14,9% | 10,9% | 15,9% | 5,4% | 7,8% | 10,1% | 14,6% | 4,1% | 6,0% | - | - | 775 |
| NRL 2250 A/E | P4 | 10,4% | 14,7% | 11,2% | 15,8% | 5,4% | 7,6% | 10,4% | 14,7% | 4,1% | 5,8% | - | - | 775 |

|              |    |       |       |       |       |      |      |      |      |      |       |      |      |     |
|--------------|----|-------|-------|-------|-------|------|------|------|------|------|-------|------|------|-----|
| NRL 2500 A/E | 00 | 8,0%  | 13,4% | 8,4%  | 14,1% | 4,1% | 6,8% | 5,2% | 8,7% | 7,0% | 11,7% | 4,7% | 7,9% | 779 |
| NRL 2500 A/E | 01 | 10,9% | 11,7% | 11,3% | 12,2% | 3,0% | 3,2% | 9,0% | 9,7% | 9,5% | 10,3% | 4,3% | 4,7% | 780 |
| NRL 2500 A/E | 02 | 11,0% | 11,7% | 11,4% | 12,2% | 2,9% | 3,1% | 9,2% | 9,8% | 9,6% | 10,2% | 4,3% | 4,6% | 780 |
| NRL 2500 A/E | 03 | 11,0% | 11,7% | 11,4% | 12,2% | 2,9% | 3,1% | 9,1% | 9,8% | 9,6% | 10,2% | 4,3% | 4,6% | 780 |
| NRL 2500 A/E | 04 | 11,1% | 11,6% | 11,6% | 12,1% | 2,9% | 3,0% | 9,4% | 9,8% | 9,7% | 10,2% | 4,3% | 4,5% | 780 |
| NRL 2500 A/E | P1 | 8,2%  | 12,0% | 9,8%  | 14,5% | 3,8% | 5,7% | 5,6% | 8,2% | 8,3% | 12,2% | 4,7% | 7,0% | 781 |
| NRL 2500 A/E | P2 | 8,2%  | 11,8% | 10,1% | 14,5% | 3,8% | 5,5% | 5,7% | 8,2% | 8,5% | 12,3% | 4,7% | 6,8% | 781 |
| NRL 2500 A/E | P3 | 8,2%  | 11,9% | 10,0% | 14,5% | 3,8% | 5,5% | 5,6% | 8,2% | 8,4% | 12,3% | 4,7% | 6,9% | 781 |
| NRL 2500 A/E | P4 | 8,2%  | 11,6% | 10,3% | 14,6% | 3,7% | 5,3% | 5,7% | 8,1% | 8,7% | 12,3% | 4,7% | 6,7% | 781 |

|              |    |       |       |       |       |      |      |      |      |      |       |      |      |     |
|--------------|----|-------|-------|-------|-------|------|------|------|------|------|-------|------|------|-----|
| NRL 2800 A/E | 00 | 7,3%  | 12,9% | 7,8%  | 13,8% | 4,7% | 8,2% | 4,7% | 8,2% | 6,6% | 11,6% | 5,2% | 9,1% | 785 |
| NRL 2800 A/E | 01 | 10,2% | 11,6% | 10,7% | 12,1% | 3,7% | 4,2% | 8,4% | 9,5% | 9,0% | 10,3% | 4,9% | 5,5% | 786 |
| NRL 2800 A/E | 02 | 10,3% | 11,5% | 10,8% | 12,1% | 3,6% | 4,1% | 8,5% | 9,5% | 9,1% | 10,2% | 4,8% | 5,4% | 786 |
| NRL 2800 A/E | 03 | 10,2% | 11,5% | 10,7% | 12,1% | 3,7% | 4,1% | 8,4% | 9,5% | 9,1% | 10,3% | 4,8% | 5,5% | 786 |
| NRL 2800 A/E | 04 | 10,4% | 11,5% | 10,9% | 12,0% | 3,6% | 3,9% | 8,7% | 9,6% | 9,2% | 10,2% | 4,8% | 5,3% | 786 |
| NRL 2800 A/E | P1 | 7,5%  | 11,7% | 9,1%  | 14,2% | 4,5% | 7,0% | 5,1% | 7,9% | 7,8% | 12,1% | 5,2% | 8,0% | 787 |
| NRL 2800 A/E | P2 | 7,5%  | 11,5% | 9,4%  | 14,2% | 4,4% | 6,7% | 5,2% | 7,8% | 8,0% | 12,1% | 5,2% | 7,9% | 787 |
| NRL 2800 A/E | P3 | 7,5%  | 11,5% | 9,3%  | 14,2% | 4,5% | 6,8% | 5,1% | 7,9% | 7,9% | 12,1% | 5,2% | 7,9% | 787 |
| NRL 2800 A/E | P4 | 7,6%  | 11,3% | 9,6%  | 14,3% | 4,4% | 6,6% | 5,2% | 7,8% | 8,2% | 12,2% | 5,2% | 7,7% | 787 |

## 21.2. NRL A - E (3000 - 3300 - 3600)

| MODEL        |    | EMPTY             |     |        | RUNNING           |      |              |       |
|--------------|----|-------------------|-----|--------|-------------------|------|--------------|-------|
|              |    | CENTRE OF GRAVITY |     | WEIGHT | CENTRE OF GRAVITY |      | TOTAL WEIGHT |       |
|              |    | XG                | YG  | kg     | XG                | YG   | kg           | WATER |
| NRL 3000 A/E | 00 | 3980              | 791 | 6510   | 3982              | 794  | 6560         | 50    |
| NRL 3000 A/E | 01 | 3921              | 881 | 7220   | 3833              | 1019 | 8730         | 1510  |
| NRL 3000 A/E | 02 | 3910              | 897 | 7370   | 3826              | 1031 | 8880         | 1510  |
| NRL 3000 A/E | 03 | 3921              | 881 | 7220   | 3833              | 1019 | 8730         | 1510  |
| NRL 3000 A/E | 04 | 3910              | 897 | 7370   | 3826              | 1031 | 8880         | 1510  |
| NRL 3000 A/E | P1 | 3983              | 839 | 6870   | 3986              | 862  | 7090         | 220   |
| NRL 3000 A/E | P2 | 3984              | 857 | 7020   | 3987              | 879  | 7240         | 220   |
| NRL 3000 A/E | P3 | 3983              | 839 | 6870   | 3986              | 862  | 7090         | 220   |
| NRL 3000 A/E | P4 | 3984              | 853 | 6980   | 3987              | 874  | 7200         | 220   |

|              |    |      |     |      |      |      |       |      |
|--------------|----|------|-----|------|------|------|-------|------|
| NRL 3300 A/E | 00 | 5431 | 815 | 7590 | 5433 | 818  | 7650  | 60   |
| NRL 3300 A/E | 01 | 5384 | 891 | 8300 | 5312 | 1013 | 9820  | 1520 |
| NRL 3300 A/E | 02 | 5375 | 905 | 8450 | 5305 | 1023 | 9970  | 1520 |
| NRL 3300 A/E | 03 | 5380 | 897 | 8360 | 5309 | 1017 | 9880  | 1520 |
| NRL 3300 A/E | 04 | 5368 | 916 | 8570 | 5300 | 1031 | 10090 | 1520 |
| NRL 3300 A/E | P1 | 5436 | 855 | 7950 | 5440 | 875  | 8180  | 230  |
| NRL 3300 A/E | P2 | 5438 | 871 | 8100 | 5442 | 890  | 8330  | 230  |
| NRL 3300 A/E | P3 | 5436 | 862 | 8010 | 5441 | 881  | 8240  | 230  |
| NRL 3300 A/E | P4 | 5439 | 879 | 8180 | 5443 | 897  | 8410  | 230  |

|              |    |      |     |      |      |      |       |      |
|--------------|----|------|-----|------|------|------|-------|------|
| NRL 3600 A/E | 00 | 5433 | 826 | 7850 | 5436 | 828  | 7910  | 60   |
| NRL 3600 A/E | 01 | 5388 | 898 | 8560 | 5317 | 1016 | 10080 | 1520 |
| NRL 3600 A/E | 02 | 5379 | 912 | 8710 | 5311 | 1026 | 10230 | 1520 |
| NRL 3600 A/E | 03 | 5384 | 904 | 8620 | 5315 | 1020 | 10140 | 1520 |
| NRL 3600 A/E | 04 | 5372 | 923 | 8830 | 5306 | 1034 | 10350 | 1520 |
| NRL 3600 A/E | P1 | 5438 | 864 | 8210 | 5442 | 883  | 8440  | 230  |
| NRL 3600 A/E | P2 | 5440 | 879 | 8360 | 5444 | 897  | 8590  | 230  |
| NRL 3600 A/E | P3 | 5439 | 870 | 8270 | 5443 | 889  | 8500  | 230  |
| NRL 3600 A/E | P4 | 5441 | 887 | 8440 | 5445 | 905  | 8670  | 230  |

| Model        |    | PERCENTAGE OF WEIGHT DISTRIBUTION SUPPORTS (%) |       |       |       |      |      |      |      |      |       |      |      |    |    |    |    | AVX |
|--------------|----|------------------------------------------------|-------|-------|-------|------|------|------|------|------|-------|------|------|----|----|----|----|-----|
|              |    | 1                                              | 2     | 3     | 4     | 5    | 6    | 7    | 8    | 9    | 10    | 11   | 12   | 13 | 14 | 15 | 16 |     |
|              |    | %                                              | %     | %     | %     | %    | %    | %    | %    | %    | %     | %    | %    |    |    |    |    |     |
| NRL 3000 A/E | 00 | 7,0%                                           | 12,3% | 8,3%  | 14,8% | 4,1% | 7,3% | 4,8% | 8,4% | 7,1% | 12,5% | 4,8% | 8,6% | -  | -  | -  | -  | 791 |
| NRL 3000 A/E | 01 | 9,7%                                           | 11,3% | 11,1% | 12,8% | 3,2% | 3,7% | 8,3% | 9,6% | 9,4% | 10,9% | 4,6% | 5,3% | -  | -  | -  | -  | 792 |
| NRL 3000 A/E | 02 | 9,9%                                           | 11,2% | 11,2% | 12,7% | 3,2% | 3,6% | 8,5% | 9,6% | 9,6% | 10,8% | 4,5% | 5,1% | -  | -  | -  | -  | 792 |
| NRL 3000 A/E | 03 | 9,7%                                           | 11,3% | 11,1% | 12,8% | 3,2% | 3,7% | 8,3% | 9,6% | 9,4% | 10,9% | 4,6% | 5,3% | -  | -  | -  | -  | 792 |
| NRL 3000 A/E | 04 | 9,9%                                           | 11,2% | 11,2% | 12,7% | 3,2% | 3,6% | 8,5% | 9,6% | 9,6% | 10,8% | 4,5% | 5,1% | -  | -  | -  | -  | 792 |
| NRL 3000 A/E | P1 | 7,2%                                           | 11,1% | 9,7%  | 15,1% | 3,9% | 6,1% | 5,2% | 8,0% | 8,3% | 12,9% | 4,8% | 7,5% | -  | -  | -  | -  | 793 |
| NRL 3000 A/E | P2 | 7,2%                                           | 10,8% | 10,1% | 15,2% | 3,9% | 5,8% | 5,3% | 8,0% | 8,7% | 13,0% | 4,8% | 7,3% | -  | -  | -  | -  | 793 |
| NRL 3000 A/E | P3 | 7,2%                                           | 11,1% | 9,7%  | 15,1% | 3,9% | 6,1% | 5,2% | 8,0% | 8,3% | 12,9% | 4,8% | 7,5% | -  | -  | -  | -  | 793 |
| NRL 3000 A/E | P4 | 7,2%                                           | 10,9% | 10,0% | 15,1% | 3,9% | 5,9% | 5,3% | 8,0% | 8,6% | 13,0% | 4,8% | 7,3% | -  | -  | -  | -  | 793 |

|              |    |      |      |       |       |      |      |      |      |      |      |      |       |      |      |      |      |     |
|--------------|----|------|------|-------|-------|------|------|------|------|------|------|------|-------|------|------|------|------|-----|
| NRL 3300 A/E | 00 | 5,7% | 9,6% | 5,6%  | 9,5%  | 5,2% | 8,8% | 3,6% | 6,1% | 3,2% | 5,5% | 5,8% | 9,9%  | 4,1% | 6,9% | 3,9% | 6,7% | 798 |
| NRL 3300 A/E | 01 | 6,7% | 7,8% | 9,8%  | 11,4% | 4,5% | 5,3% | 2,8% | 3,3% | 5,3% | 6,3% | 9,4% | 11,0% | 3,7% | 4,4% | 3,8% | 4,5% | 799 |
| NRL 3300 A/E | 02 | 6,7% | 7,7% | 10,0% | 11,5% | 4,5% | 5,2% | 2,8% | 3,2% | 5,5% | 6,3% | 9,6% | 11,0% | 3,7% | 4,2% | 3,8% | 4,4% | 799 |
| NRL 3300 A/E | 03 | 6,7% | 7,8% | 9,9%  | 11,5% | 4,5% | 5,3% | 2,8% | 3,2% | 5,4% | 6,3% | 9,5% | 11,0% | 3,7% | 4,3% | 3,8% | 4,4% | 799 |
| NRL 3300 A/E | 04 | 6,7% | 7,6% | 10,2% | 11,6% | 4,4% | 5,0% | 2,7% | 3,1% | 5,6% | 6,3% | 9,8% | 11,1% | 3,6% | 4,1% | 3,8% | 4,3% | 799 |
| NRL 3300 A/E | P1 | 5,7% | 8,6% | 6,6%  | 9,9%  | 5,5% | 8,3% | 3,6% | 5,5% | 3,3% | 5,0% | 6,8% | 10,3% | 4,4% | 6,7% | 3,9% | 6,0% | 800 |
| NRL 3300 A/E | P2 | 5,7% | 8,4% | 6,8%  | 10,0% | 5,6% | 8,2% | 3,6% | 5,3% | 3,3% | 4,9% | 7,0% | 10,4% | 4,5% | 6,6% | 3,9% | 5,8% | 800 |
| NRL 3300 A/E | P3 | 5,7% | 8,5% | 6,7%  | 10,0% | 5,5% | 8,3% | 3,6% | 5,4% | 3,3% | 4,9% | 6,9% | 10,3% | 4,4% | 6,7% | 3,9% | 5,9% | 800 |
| NRL 3300 A/E | P4 | 5,7% | 8,2% | 7,0%  | 10,1% | 5,6% | 8,2% | 3,6% | 5,2% | 3,3% | 4,8% | 7,2% | 10,4% | 4,5% | 6,6% | 3,9% | 5,7% | 800 |

|              |    |      |      |       |       |      |      |      |      |      |      |      |       |      |      |      |      |     |
|--------------|----|------|------|-------|-------|------|------|------|------|------|------|------|-------|------|------|------|------|-----|
| NRL 3600 A/E | 00 | 5,7% | 9,4% | 5,8%  | 9,6%  | 5,2% | 8,6% | 3,6% | 6,0% | 3,3% | 5,5% | 6,0% | 10,0% | 4,1% | 6,8% | 4,0% | 6,6% | 798 |
| NRL 3600 A/E | 01 | 6,6% | 7,7% | 9,8%  | 11,4% | 4,5% | 5,3% | 2,8% | 3,3% | 5,4% | 6,3% | 9,5% | 11,0% | 3,7% | 4,3% | 3,8% | 4,5% | 799 |
| NRL 3600 A/E | 02 | 6,7% | 7,6% | 10,1% | 11,5% | 4,5% | 5,1% | 2,8% | 3,2% | 5,5% | 6,3% | 9,7% | 11,1% | 3,7% | 4,2% | 3,8% | 4,4% | 799 |
| NRL 3600 A/E | 03 | 6,7% | 7,7% | 9,9%  | 11,5% | 4,5% | 5,2% | 2,8% | 3,2% | 5,4% | 6,3% | 9,5% | 11,0% | 3,7% | 4,3% | 3,8% | 4,4% | 799 |
| NRL 3600 A/E | 04 | 6,7% | 7,6% | 10,3% | 11,6% | 4,4% | 5,0% | 2,7% | 3,1% | 5,6% | 6,3% | 9,8% | 11,1% | 3,6% | 4,1% | 3,8% | 4,3% | 799 |
| NRL 3600 A/E | P1 | 5,7% | 8,5% | 6,7%  | 10,0% | 5,5% | 8,2% | 3,6% | 5,4% | 3,4% | 5,0% | 6,9% | 10,3% | 4,4% | 6,6% | 4,0% | 5,9% | 800 |
| NRL 3600 A/E | P2 | 5,7% | 8,3% | 7,0%  | 10,1% | 5,6% | 8,1% | 3,6% | 5,2% | 3,4% | 4,9% | 7,2% | 10,4% | 4,5% | 6,5% | 4,0% | 5,7% | 800 |
| NRL 3600 A/E | P3 | 5,7% | 8,4% | 6,8%  | 10,1% | 5,5% | 8,1% | 3,6% | 5,3% | 3,4% | 5,0% | 7,0% | 10,4% | 4,4% | 6,5% | 4,0% | 5,8% | 800 |
| NRL 3600 A/E | P4 | 5,7% | 8,1% | 7,1%  | 10,2% | 5,6% | 8,0% | 3,6% | 5,1% | 3,4% | 4,8% | 7,3% | 10,5% | 4,5% | 6,5% | 4,0% | 5,7% | 800 |

### 21.3. NRL HA - HE (2000 - 2250 - 2500 - 2800 )

| Model           |    | EMPTY             |     |        | RUNNING           |      |              |       |
|-----------------|----|-------------------|-----|--------|-------------------|------|--------------|-------|
|                 |    | CENTRE OF GRAVITY |     | WEIGHT | CENTRE OF GRAVITY |      | TOTAL WEIGHT |       |
|                 |    | XG                | YG  | kg     | XG                | YG   | kg           | WATER |
| NRL 2000 A/E(H) | 00 | 3159              | 807 | 4930   | 3161              | 809  | 4970         | 40    |
| NRL 2000 A/E(H) | 01 | 3136              | 909 | 5570   | 3101              | 1073 | 7070         | 1500  |
| NRL 2000 A/E(H) | 02 | 3134              | 920 | 5650   | 3099              | 1080 | 7150         | 1500  |
| NRL 2000 A/E(H) | 03 | 3134              | 918 | 5630   | 3100              | 1079 | 7130         | 1500  |
| NRL 2000 A/E(H) | 04 | 3130              | 936 | 5770   | 3097              | 1091 | 7270         | 1500  |
| NRL 2000 A/E(H) | P1 | 3161              | 856 | 5220   | 3164              | 884  | 5430         | 210   |
| NRL 2000 A/E(H) | P2 | 3161              | 869 | 5300   | 3164              | 896  | 5510         | 210   |
| NRL 2000 A/E(H) | P3 | 3161              | 866 | 5280   | 3164              | 893  | 5490         | 210   |
| NRL 2000 A/E(H) | P4 | 3162              | 881 | 5380   | 3164              | 908  | 5590         | 210   |

|                 |    |      |     |      |      |      |      |      |
|-----------------|----|------|-----|------|------|------|------|------|
| NRL 2250 A/E(H) | 00 | 3424 | 810 | 5360 | 3426 | 812  | 5400 | 40   |
| NRL 2250 A/E(H) | 01 | 3374 | 905 | 6000 | 3295 | 1061 | 7500 | 1500 |
| NRL 2250 A/E(H) | 02 | 3369 | 915 | 6080 | 3292 | 1067 | 7580 | 1500 |
| NRL 2250 A/E(H) | 03 | 3370 | 912 | 6060 | 3293 | 1066 | 7560 | 1500 |
| NRL 2250 A/E(H) | 04 | 3361 | 930 | 6200 | 3287 | 1077 | 7700 | 1500 |
| NRL 2250 A/E(H) | P1 | 3412 | 855 | 5650 | 3408 | 882  | 5860 | 210  |
| NRL 2250 A/E(H) | P2 | 3409 | 867 | 5730 | 3405 | 893  | 5940 | 210  |
| NRL 2250 A/E(H) | P3 | 3410 | 864 | 5710 | 3406 | 890  | 5920 | 210  |
| NRL 2250 A/E(H) | P4 | 3406 | 879 | 5810 | 3402 | 903  | 6020 | 210  |

|                 |    |      |     |      |      |      |      |      |
|-----------------|----|------|-----|------|------|------|------|------|
| NRL 2500 A/E(H) | 00 | 3889 | 812 | 5780 | 3892 | 814  | 5820 | 40   |
| NRL 2500 A/E(H) | 01 | 3838 | 902 | 6430 | 3757 | 1050 | 7930 | 1500 |
| NRL 2500 A/E(H) | 02 | 3832 | 913 | 6520 | 3753 | 1057 | 8020 | 1500 |
| NRL 2500 A/E(H) | 03 | 3834 | 909 | 6490 | 3754 | 1055 | 7990 | 1500 |
| NRL 2500 A/E(H) | 04 | 3824 | 927 | 6640 | 3747 | 1067 | 8140 | 1500 |
| NRL 2500 A/E(H) | P1 | 3897 | 856 | 6080 | 3903 | 881  | 6290 | 210  |
| NRL 2500 A/E(H) | P2 | 3899 | 868 | 6170 | 3905 | 892  | 6380 | 210  |
| NRL 2500 A/E(H) | P3 | 3898 | 864 | 6140 | 3904 | 888  | 6350 | 210  |
| NRL 2500 A/E(H) | P4 | 3901 | 879 | 6250 | 3907 | 902  | 6460 | 210  |

|                 |    |      |     |      |      |      |      |      |
|-----------------|----|------|-----|------|------|------|------|------|
| NRL 2800 A/E(H) | 00 | 3980 | 790 | 6190 | 3982 | 793  | 6250 | 60   |
| NRL 2800 A/E(H) | 01 | 3923 | 877 | 6840 | 3831 | 1022 | 8360 | 1520 |
| NRL 2800 A/E(H) | 02 | 3916 | 887 | 6930 | 3826 | 1029 | 8450 | 1520 |
| NRL 2800 A/E(H) | 03 | 3918 | 884 | 6900 | 3828 | 1027 | 8420 | 1520 |
| NRL 2800 A/E(H) | 04 | 3907 | 901 | 7050 | 3820 | 1038 | 8570 | 1520 |
| NRL 2800 A/E(H) | P1 | 3983 | 832 | 6490 | 3986 | 856  | 6720 | 230  |
| NRL 2800 A/E(H) | P2 | 3983 | 844 | 6580 | 3987 | 867  | 6810 | 230  |
| NRL 2800 A/E(H) | P3 | 3983 | 840 | 6550 | 3987 | 864  | 6780 | 230  |
| NRL 2800 A/E(H) | P4 | 3984 | 854 | 6660 | 3988 | 877  | 6890 | 230  |

| Model           |    | PERCENTAGE OF WEIGHT DISTRIBUTION SUPPORTS (%) |       |       |       |       |       |      |       |   |    |    |    | AVX |
|-----------------|----|------------------------------------------------|-------|-------|-------|-------|-------|------|-------|---|----|----|----|-----|
|                 |    | 1                                              | 2     | 3     | 4     | 5     | 6     | 7    | 8     | 9 | 10 | 11 | 12 |     |
|                 |    | %                                              | %     | %     | %     | %     | %     | %    | %     | % | %  | %  | %  |     |
| NRL 2000 A/E(H) | 00 | 10,2%                                          | 17,6% | 10,5% | 18,0% | 8,7%  | 15,0% | 7,4% | 12,7% | - | -  | -  | -  | 767 |
| NRL 2000 A/E(H) | 01 | 13,7%                                          | 14,4% | 13,6% | 14,2% | 13,2% | 13,9% | 8,3% | 8,7%  | - | -  | -  | -  | 768 |
| NRL 2000 A/E(H) | 02 | 13,8%                                          | 14,3% | 13,7% | 14,1% | 13,3% | 13,8% | 8,3% | 8,6%  | - | -  | -  | -  | 768 |
| NRL 2000 A/E(H) | 03 | 13,8%                                          | 14,3% | 13,6% | 14,2% | 13,3% | 13,8% | 8,3% | 8,6%  | - | -  | -  | -  | 768 |
| NRL 2000 A/E(H) | 04 | 14,0%                                          | 14,2% | 13,8% | 14,0% | 13,5% | 13,8% | 8,3% | 8,5%  | - | -  | -  | -  | 768 |
| NRL 2000 A/E(H) | P1 | 11,0%                                          | 16,3% | 11,5% | 17,1% | 10,0% | 14,9% | 7,8% | 11,6% | - | -  | -  | -  | 769 |
| NRL 2000 A/E(H) | P2 | 11,1%                                          | 16,1% | 11,6% | 16,9% | 10,2% | 14,8% | 7,8% | 11,4% | - | -  | -  | -  | 769 |
| NRL 2000 A/E(H) | P3 | 11,1%                                          | 16,2% | 11,6% | 16,9% | 10,1% | 14,8% | 7,8% | 11,4% | - | -  | -  | -  | 769 |
| NRL 2000 A/E(H) | P4 | 11,2%                                          | 15,9% | 11,8% | 16,8% | 10,4% | 14,8% | 7,9% | 11,2% | - | -  | -  | -  | 769 |

|                 |    |       |       |       |       |      |      |       |       |      |      |   |   |     |
|-----------------|----|-------|-------|-------|-------|------|------|-------|-------|------|------|---|---|-----|
| NRL 2250 A/E(H) | 00 | 9,3%  | 15,9% | 9,6%  | 16,4% | 5,4% | 9,2% | 8,5%  | 14,6% | 4,1% | 7,0% | - | - | 773 |
| NRL 2250 A/E(H) | 01 | 12,7% | 13,6% | 12,5% | 13,5% | 8,0% | 8,6% | 11,3% | 12,1% | 3,7% | 4,0% | - | - | 774 |
| NRL 2250 A/E(H) | 02 | 12,8% | 13,5% | 12,6% | 13,4% | 8,1% | 8,6% | 11,4% | 12,1% | 3,7% | 3,9% | - | - | 774 |
| NRL 2250 A/E(H) | 03 | 12,7% | 13,6% | 12,6% | 13,4% | 8,1% | 8,6% | 11,4% | 12,1% | 3,7% | 3,9% | - | - | 774 |
| NRL 2250 A/E(H) | 04 | 12,9% | 13,4% | 12,7% | 13,3% | 8,2% | 8,6% | 11,5% | 12,0% | 3,6% | 3,8% | - | - | 774 |
| NRL 2250 A/E(H) | P1 | 10,0% | 14,9% | 10,7% | 16,0% | 5,8% | 8,7% | 9,6%  | 14,3% | 4,0% | 6,0% | - | - | 775 |
| NRL 2250 A/E(H) | P2 | 10,1% | 14,8% | 10,8% | 15,9% | 5,9% | 8,7% | 9,7%  | 14,3% | 4,0% | 5,8% | - | - | 775 |
| NRL 2250 A/E(H) | P3 | 10,1% | 14,8% | 10,8% | 15,9% | 5,9% | 8,7% | 9,7%  | 14,3% | 4,0% | 5,9% | - | - | 775 |
| NRL 2250 A/E(H) | P4 | 10,2% | 14,6% | 11,0% | 15,8% | 6,0% | 8,6% | 9,9%  | 14,2% | 4,0% | 5,7% | - | - | 775 |

|                 |    |       |       |       |       |      |      |      |      |      |       |      |      |     |
|-----------------|----|-------|-------|-------|-------|------|------|------|------|------|-------|------|------|-----|
| NRL 2500 A/E(H) | 00 | 7,8%  | 13,3% | 8,4%  | 14,3% | 4,0% | 6,9% | 5,1% | 8,7% | 7,0% | 11,9% | 4,7% | 8,0% | 779 |
| NRL 2500 A/E(H) | 01 | 10,7% | 11,7% | 11,3% | 12,4% | 3,0% | 3,3% | 8,9% | 9,8% | 9,5% | 10,4% | 4,3% | 4,7% | 780 |
| NRL 2500 A/E(H) | 02 | 10,8% | 11,7% | 11,4% | 12,3% | 2,9% | 3,2% | 9,0% | 9,8% | 9,6% | 10,4% | 4,3% | 4,6% | 780 |
| NRL 2500 A/E(H) | 03 | 10,8% | 11,7% | 11,4% | 12,3% | 3,0% | 3,2% | 9,0% | 9,8% | 9,6% | 10,4% | 4,3% | 4,7% | 780 |
| NRL 2500 A/E(H) | 04 | 10,9% | 11,6% | 11,5% | 12,2% | 2,9% | 3,0% | 9,2% | 9,8% | 9,7% | 10,3% | 4,3% | 4,5% | 780 |
| NRL 2500 A/E(H) | P1 | 8,0%  | 12,0% | 9,8%  | 14,6% | 3,8% | 5,7% | 5,5% | 8,3% | 8,3% | 12,4% | 4,7% | 7,0% | 781 |
| NRL 2500 A/E(H) | P2 | 8,0%  | 11,8% | 10,0% | 14,7% | 3,8% | 5,5% | 5,6% | 8,2% | 8,5% | 12,4% | 4,7% | 6,8% | 781 |
| NRL 2500 A/E(H) | P3 | 8,0%  | 11,8% | 9,9%  | 14,7% | 3,8% | 5,6% | 5,6% | 8,2% | 8,4% | 12,4% | 4,7% | 6,9% | 781 |
| NRL 2500 A/E(H) | P4 | 8,0%  | 11,6% | 10,2% | 14,7% | 3,7% | 5,4% | 5,6% | 8,1% | 8,7% | 12,5% | 4,7% | 6,7% | 781 |

|                 |    |       |       |       |       |      |      |      |      |      |       |      |      |     |
|-----------------|----|-------|-------|-------|-------|------|------|------|------|------|-------|------|------|-----|
| NRL 2800 A/E(H) | 00 | 7,2%  | 12,7% | 7,9%  | 14,0% | 4,6% | 8,1% | 4,6% | 8,2% | 6,7% | 11,9% | 5,1% | 9,0% | 785 |
| NRL 2800 A/E(H) | 01 | 10,0% | 11,5% | 10,7% | 12,3% | 3,7% | 4,2% | 8,2% | 9,5% | 9,1% | 10,5% | 4,8% | 5,5% | 786 |
| NRL 2800 A/E(H) | 02 | 10,1% | 11,5% | 10,8% | 12,3% | 3,6% | 4,1% | 8,3% | 9,5% | 9,2% | 10,5% | 4,8% | 5,4% | 786 |
| NRL 2800 A/E(H) | 03 | 10,0% | 11,5% | 10,8% | 12,3% | 3,6% | 4,1% | 8,3% | 9,5% | 9,2% | 10,5% | 4,8% | 5,5% | 786 |
| NRL 2800 A/E(H) | 04 | 10,2% | 11,4% | 10,9% | 12,2% | 3,5% | 4,0% | 8,5% | 9,5% | 9,3% | 10,4% | 4,7% | 5,3% | 786 |
| NRL 2800 A/E(H) | P1 | 7,4%  | 11,6% | 9,2%  | 14,4% | 4,4% | 6,9% | 5,0% | 7,9% | 7,9% | 12,3% | 5,1% | 8,0% | 787 |
| NRL 2800 A/E(H) | P2 | 7,4%  | 11,4% | 9,4%  | 14,5% | 4,4% | 6,7% | 5,1% | 7,8% | 8,1% | 12,4% | 5,1% | 7,8% | 787 |
| NRL 2800 A/E(H) | P3 | 7,4%  | 11,4% | 9,3%  | 14,4% | 4,4% | 6,8% | 5,1% | 7,8% | 8,0% | 12,4% | 5,1% | 7,9% | 787 |
| NRL 2800 A/E(H) | P4 | 7,4%  | 11,2% | 9,6%  | 14,5% | 4,3% | 6,5% | 5,1% | 7,7% | 8,3% | 12,5% | 5,1% | 7,7% | 787 |

## 21.4. NRL HA - HE (3000 - 3300 - 3600)

| Model           |    | EMPTY             |     |        | RUNNING           |      |              |       |
|-----------------|----|-------------------|-----|--------|-------------------|------|--------------|-------|
|                 |    | CENTRE OF GRAVITY |     | WEIGHT | CENTRE OF GRAVITY |      | TOTAL WEIGHT |       |
|                 |    | XG                | YG  | kg     | XG                | YG   | kg           | WATER |
| NRL 3000 A/E(H) | 00 | 3985              | 786 | 6630   | 3988              | 789  | 6690         | 60    |
| NRL 3000 A/E(H) | 01 | 3927              | 874 | 7340   | 3840              | 1012 | 8860         | 1520  |
| NRL 3000 A/E(H) | 02 | 3916              | 891 | 7490   | 3832              | 1023 | 9010         | 1520  |
| NRL 3000 A/E(H) | 03 | 3927              | 874 | 7340   | 3840              | 1012 | 8860         | 1520  |
| NRL 3000 A/E(H) | 04 | 3916              | 891 | 7490   | 3832              | 1023 | 9010         | 1520  |
| NRL 3000 A/E(H) | P1 | 3988              | 833 | 6990   | 3991              | 856  | 7220         | 230   |
| NRL 3000 A/E(H) | P2 | 3989              | 851 | 7140   | 3992              | 873  | 7370         | 230   |
| NRL 3000 A/E(H) | P3 | 3988              | 833 | 6990   | 3991              | 856  | 7220         | 230   |
| NRL 3000 A/E(H) | P4 | 3989              | 846 | 7100   | 3992              | 868  | 7330         | 230   |

|                 |    |      |     |      |      |      |       |      |
|-----------------|----|------|-----|------|------|------|-------|------|
| NRL 3300 A/E(H) | 00 | 5436 | 810 | 7710 | 5439 | 813  | 7780  | 70   |
| NRL 3300 A/E(H) | 01 | 5389 | 885 | 8420 | 5318 | 1006 | 9950  | 1530 |
| NRL 3300 A/E(H) | 02 | 5381 | 899 | 8570 | 5311 | 1016 | 10100 | 1530 |
| NRL 3300 A/E(H) | 03 | 5386 | 891 | 8480 | 5315 | 1010 | 10010 | 1530 |
| NRL 3300 A/E(H) | 04 | 5374 | 910 | 8690 | 5306 | 1024 | 10220 | 1530 |
| NRL 3300 A/E(H) | P1 | 5441 | 850 | 8070 | 5445 | 869  | 8310  | 240  |
| NRL 3300 A/E(H) | P2 | 5442 | 865 | 8220 | 5447 | 884  | 8460  | 240  |
| NRL 3300 A/E(H) | P3 | 5441 | 856 | 8130 | 5446 | 875  | 8370  | 240  |
| NRL 3300 A/E(H) | P4 | 5443 | 873 | 8300 | 5448 | 892  | 8540  | 240  |

|                 |    |      |     |      |      |      |       |      |
|-----------------|----|------|-----|------|------|------|-------|------|
| NRL 3600 A/E(H) | 00 | 5439 | 821 | 7980 | 5442 | 824  | 8050  | 70   |
| NRL 3600 A/E(H) | 01 | 5393 | 893 | 8690 | 5323 | 1010 | 10220 | 1530 |
| NRL 3600 A/E(H) | 02 | 5385 | 907 | 8840 | 5317 | 1020 | 10370 | 1530 |
| NRL 3600 A/E(H) | 03 | 5390 | 898 | 8750 | 5321 | 1014 | 10280 | 1530 |
| NRL 3600 A/E(H) | 04 | 5378 | 917 | 8960 | 5312 | 1027 | 10490 | 1530 |
| NRL 3600 A/E(H) | P1 | 5443 | 859 | 8340 | 5448 | 878  | 8580  | 240  |
| NRL 3600 A/E(H) | P2 | 5445 | 874 | 8490 | 5449 | 892  | 8730  | 240  |
| NRL 3600 A/E(H) | P3 | 5444 | 865 | 8400 | 5448 | 883  | 8640  | 240  |
| NRL 3600 A/E(H) | P4 | 5446 | 882 | 8570 | 5450 | 899  | 8810  | 240  |

| Model           |    | PERCENTAGE OF WEIGHT DISTRIBUTION SUPPORTS (%) |       |       |       |      |      |      |      |      |       |      |      |    |    |    |    | AVX |
|-----------------|----|------------------------------------------------|-------|-------|-------|------|------|------|------|------|-------|------|------|----|----|----|----|-----|
|                 |    | 1                                              | 2     | 3     | 4     | 5    | 6    | 7    | 8    | 9    | 10    | 11   | 12   | 13 | 14 | 15 | 16 |     |
|                 |    | %                                              | %     | %     | %     | %    | %    | %    | %    | %    | %     | %    | %    |    |    |    |    |     |
| NRL 3000 A/E(H) | 00 | 6,8%                                           | 12,3% | 8,3%  | 14,9% | 4,1% | 7,3% | 4,7% | 8,4% | 7,1% | 12,7% | 4,8% | 8,5% | -  | -  | -  | -  | 791 |
| NRL 3000 A/E(H) | 01 | 9,6%                                           | 11,2% | 11,1% | 13,0% | 3,2% | 3,8% | 8,2% | 9,6% | 9,4% | 11,1% | 4,5% | 5,3% | -  | -  | -  | -  | 792 |
| NRL 3000 A/E(H) | 02 | 9,7%                                           | 11,2% | 11,2% | 12,9% | 3,2% | 3,6% | 8,4% | 9,6% | 9,6% | 11,0% | 4,5% | 5,2% | -  | -  | -  | -  | 792 |
| NRL 3000 A/E(H) | 03 | 9,6%                                           | 11,2% | 11,1% | 13,0% | 3,2% | 3,8% | 8,2% | 9,6% | 9,4% | 11,1% | 4,5% | 5,3% | -  | -  | -  | -  | 792 |
| NRL 3000 A/E(H) | 04 | 9,7%                                           | 11,2% | 11,2% | 12,9% | 3,2% | 3,6% | 8,4% | 9,6% | 9,6% | 11,0% | 4,5% | 5,2% | -  | -  | -  | -  | 792 |
| NRL 3000 A/E(H) | P1 | 7,1%                                           | 11,1% | 9,7%  | 15,2% | 3,9% | 6,1% | 5,1% | 8,0% | 8,3% | 13,1% | 4,8% | 7,5% | -  | -  | -  | -  | 793 |
| NRL 3000 A/E(H) | P2 | 7,1%                                           | 10,8% | 10,1% | 15,3% | 3,8% | 5,9% | 5,2% | 8,0% | 8,7% | 13,2% | 4,8% | 7,3% | -  | -  | -  | -  | 793 |
| NRL 3000 A/E(H) | P3 | 7,1%                                           | 11,1% | 9,7%  | 15,2% | 3,9% | 6,1% | 5,1% | 8,0% | 8,3% | 13,1% | 4,8% | 7,5% | -  | -  | -  | -  | 793 |
| NRL 3000 A/E(H) | P4 | 7,1%                                           | 10,9% | 10,0% | 15,3% | 3,9% | 5,9% | 5,2% | 8,0% | 8,6% | 13,1% | 4,8% | 7,3% | -  | -  | -  | -  | 793 |

|                 |    |      |      |       |       |      |      |      |      |      |      |      |       |      |      |      |      |     |
|-----------------|----|------|------|-------|-------|------|------|------|------|------|------|------|-------|------|------|------|------|-----|
| NRL 3300 A/E(H) | 00 | 5,6% | 9,5% | 5,6%  | 9,6%  | 5,2% | 8,8% | 3,6% | 6,1% | 3,2% | 5,4% | 5,8% | 9,9%  | 4,1% | 7,1% | 3,9% | 6,6% | 798 |
| NRL 3300 A/E(H) | 01 | 6,6% | 7,8% | 9,7%  | 11,5% | 4,6% | 5,4% | 2,8% | 3,3% | 5,3% | 6,2% | 9,3% | 11,0% | 3,8% | 4,5% | 3,8% | 4,5% | 799 |
| NRL 3300 A/E(H) | 02 | 6,6% | 7,7% | 9,9%  | 11,6% | 4,5% | 5,3% | 2,7% | 3,2% | 5,4% | 6,3% | 9,5% | 11,1% | 3,7% | 4,3% | 3,8% | 4,4% | 799 |
| NRL 3300 A/E(H) | 03 | 6,6% | 7,7% | 9,8%  | 11,5% | 4,5% | 5,4% | 2,8% | 3,3% | 5,3% | 6,3% | 9,4% | 11,1% | 3,8% | 4,4% | 3,8% | 4,4% | 799 |
| NRL 3300 A/E(H) | 04 | 6,6% | 7,6% | 10,1% | 11,6% | 4,5% | 5,1% | 2,7% | 3,1% | 5,5% | 6,3% | 9,7% | 11,1% | 3,7% | 4,3% | 3,7% | 4,3% | 799 |
| NRL 3300 A/E(H) | P1 | 5,6% | 8,6% | 6,6%  | 10,0% | 5,5% | 8,4% | 3,6% | 5,5% | 3,2% | 5,0% | 6,7% | 10,3% | 4,4% | 6,8% | 3,9% | 5,9% | 800 |
| NRL 3300 A/E(H) | P2 | 5,6% | 8,3% | 6,8%  | 10,1% | 5,6% | 8,3% | 3,6% | 5,3% | 3,3% | 4,8% | 7,0% | 10,4% | 4,5% | 6,7% | 3,9% | 5,8% | 800 |
| NRL 3300 A/E(H) | P3 | 5,6% | 8,5% | 6,7%  | 10,1% | 5,5% | 8,4% | 3,6% | 5,4% | 3,2% | 4,9% | 6,8% | 10,4% | 4,5% | 6,8% | 3,9% | 5,9% | 800 |
| NRL 3300 A/E(H) | P4 | 5,6% | 8,2% | 6,9%  | 10,2% | 5,6% | 8,2% | 3,5% | 5,2% | 3,3% | 4,8% | 7,1% | 10,4% | 4,6% | 6,7% | 3,9% | 5,7% | 800 |

|                 |    |      |      |       |       |      |      |      |      |      |      |      |       |      |      |      |      |     |
|-----------------|----|------|------|-------|-------|------|------|------|------|------|------|------|-------|------|------|------|------|-----|
| NRL 3600 A/E(H) | 00 | 5,6% | 9,3% | 5,8%  | 9,7%  | 5,2% | 8,7% | 3,6% | 6,0% | 3,3% | 5,5% | 6,0% | 10,0% | 4,1% | 6,9% | 3,9% | 6,5% | 798 |
| NRL 3600 A/E(H) | 01 | 6,5% | 7,7% | 9,8%  | 11,5% | 4,6% | 5,4% | 2,8% | 3,3% | 5,3% | 6,2% | 9,4% | 11,1% | 3,8% | 4,5% | 3,8% | 4,5% | 799 |
| NRL 3600 A/E(H) | 02 | 6,6% | 7,6% | 10,0% | 11,6% | 4,5% | 5,2% | 2,7% | 3,2% | 5,4% | 6,3% | 9,6% | 11,1% | 3,7% | 4,3% | 3,8% | 4,4% | 799 |
| NRL 3600 A/E(H) | 03 | 6,5% | 7,7% | 9,9%  | 11,5% | 4,5% | 5,3% | 2,8% | 3,2% | 5,3% | 6,2% | 9,5% | 11,1% | 3,8% | 4,4% | 3,8% | 4,4% | 799 |
| NRL 3600 A/E(H) | 04 | 6,6% | 7,5% | 10,2% | 11,6% | 4,5% | 5,1% | 2,7% | 3,1% | 5,5% | 6,3% | 9,8% | 11,1% | 3,7% | 4,2% | 3,8% | 4,3% | 799 |
| NRL 3600 A/E(H) | P1 | 5,6% | 8,4% | 6,7%  | 10,1% | 5,5% | 8,3% | 3,6% | 5,3% | 3,3% | 5,0% | 6,9% | 10,4% | 4,4% | 6,7% | 3,9% | 5,9% | 800 |
| NRL 3600 A/E(H) | P2 | 5,6% | 8,2% | 7,0%  | 10,2% | 5,6% | 8,2% | 3,5% | 5,2% | 3,3% | 4,9% | 7,1% | 10,5% | 4,5% | 6,6% | 3,9% | 5,7% | 800 |
| NRL 3600 A/E(H) | P3 | 5,6% | 8,3% | 6,8%  | 10,1% | 5,5% | 8,2% | 3,5% | 5,3% | 3,3% | 5,0% | 7,0% | 10,4% | 4,5% | 6,7% | 3,9% | 5,8% | 800 |
| NRL 3600 A/E(H) | P4 | 5,6% | 8,1% | 7,1%  | 10,3% | 5,6% | 8,1% | 3,5% | 5,1% | 3,3% | 4,8% | 7,3% | 10,5% | 4,6% | 6,6% | 3,9% | 5,6% | 800 |

## 22. HYDRAULIC CIRCUIT

The NRL consists of TWO CIRCUITS both fitted with:

- **Evaporators 1 x circuit**
- **Water filter 1 per circuit (supplied)**  
*supplied with log and victaulic gaskets*
- **Desuperheaters**  
(2 per circuit in parallel mode)  
without filter
- **Water inlet probe SIW**
- **Water outlet probe SUW**

NB

*The water outlet probe (WOP) with its trap is free, near the electrical box, remember to insert it in the collector of the outlet hydraulic parallel, using a sleeve of ½ inch.*

### 22.1. EXTERNAL HYDRAULIC CIRCUIT RECOMMENDED

The selection and installation of components outside the NRL should be carried out by the installer, who should work according to the technical code of practice and in compliance with the legislation in force in the country of destination (MD 329/2004).

Before connecting the pipes make sure that they do not contain stones, sand, rust, slag or any foreign bodies that may damage the system. It is necessary to make a by-pass to the unit to be able to carry out the cleaning of the pipes without having to disconnect the machine. The connection pipes must be properly supported so as not to burden the unit with their weight.

On the water circuit, it is advisable to install the following instruments, if not foreseen in the version you have:

1. Two pressure gauges of suitable size (input and output section).
2. Two anti-vibration couplings (input and output section).

3. Two shut-off valves (normal input section, output section calibrating valve).
4. Two thermometers (input and output section).
5. Expansion tanks
6. Pump
7. Accumulation
8. Flow switch
9. Safety valve
10. Charging unit
11. Chiller drain tap in the tube output evaporator (for standard version)

NB

*In case of version with pumping unit, without standby pump, it is recommended to install unidirectional valves to the delivery of each module.*

*So water reflow is avoided in the circuit of the pump/s from the other circuit.*

*For NRL 2250 model with pumping unit, it is recommended the installation, to the delivery of the module 1250, of a capacity balance valve, to balance the capacities between the two evaporators (module 1000 and 1250).*

It is necessary, that the water flow rate to the chiller unit complies with the values reported in the performance tables.

The systems loaded with anti-freeze or specific regulations, need the water backflow system.

Special supply/recovery water, is carried out with appropriate treatment systems.

### 22.2. SYSTEM LOAD

- Before starting the load, check that the system drain tap is closed.
- Open all the drain valves of the system and of the related terminals.

- Open the shut-off devices of the system.
- Start the filling by slowly opening the water system load cock placed outside the machine.
- When water begins to flow from the terminal vent valves, close them and continue loading up to read on the gauge the value of 1.5 bar.

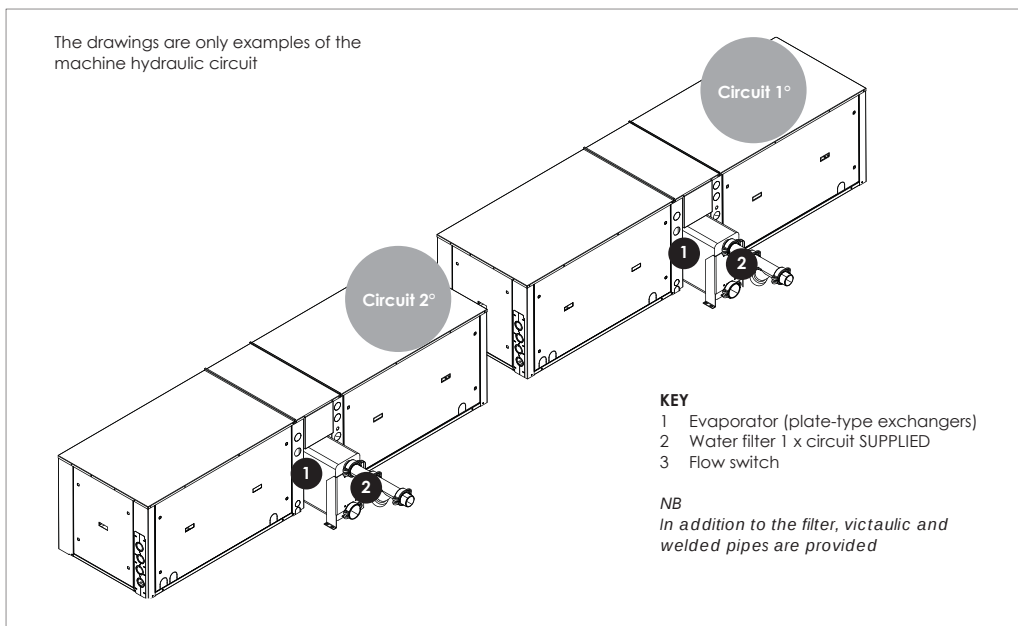
**The system is loaded at a pressure between 1 and 2 bar.**

It is advisable to repeat this operation once the machine has worked for some hours and to periodically check the system pressure, restoring if it drops below 1 bar. Check the hydraulic seal of the joints.

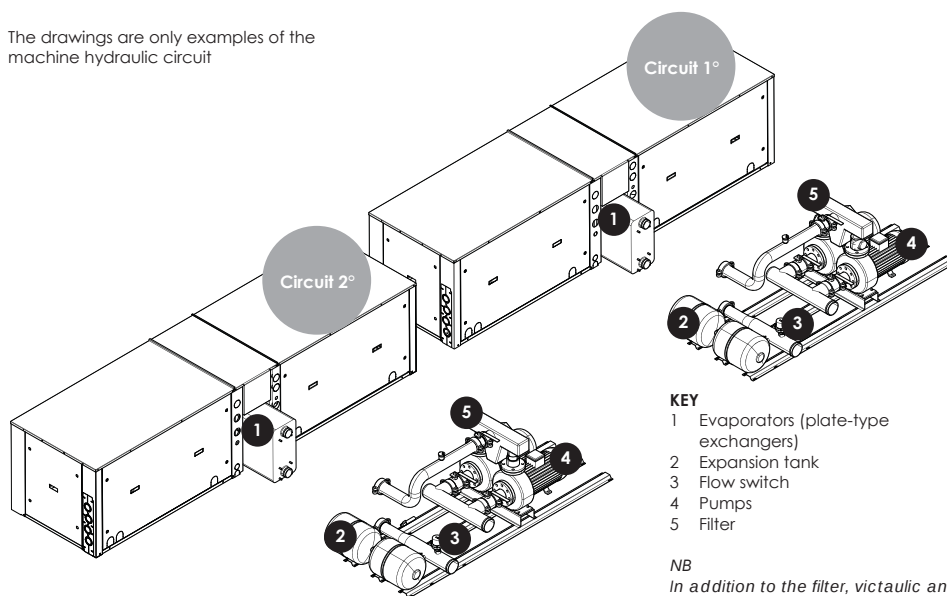
### 22.3. EMPTYING THE SYSTEM

- Before starting to drain the system, turn "off" the unit
- Check that the water system load/restore tap is closed
- Open the drain tap outside the machine and all the vent valves of the system and the corresponding terminals.
- **In case of prolonged shut-down of the unit during winter (if not added with glycol) or for other inconveniences, drain the chiller hydraulic circuit by the corresponding knobs (see fig.1 and fig.2)**

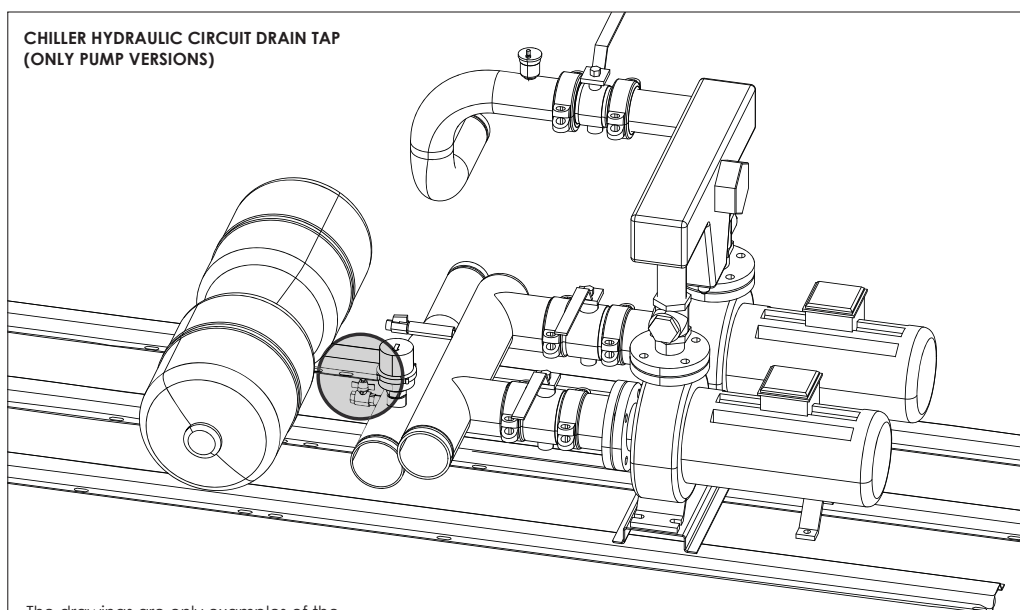
If the system uses glycol, this liquid should not be drained to the environment because it is a pollutant. It must be collected and, if possible, reused.



The drawings are only examples of the machine hydraulic circuit

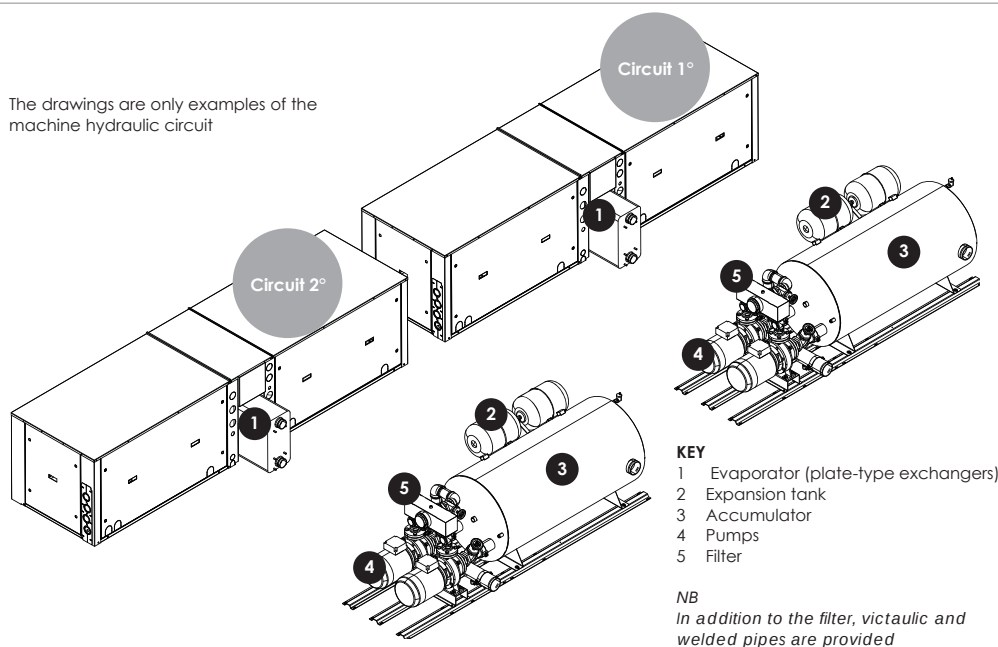


#### CHILLER HYDRAULIC CIRCUIT DRAIN TAP (ONLY PUMP VERSIONS)

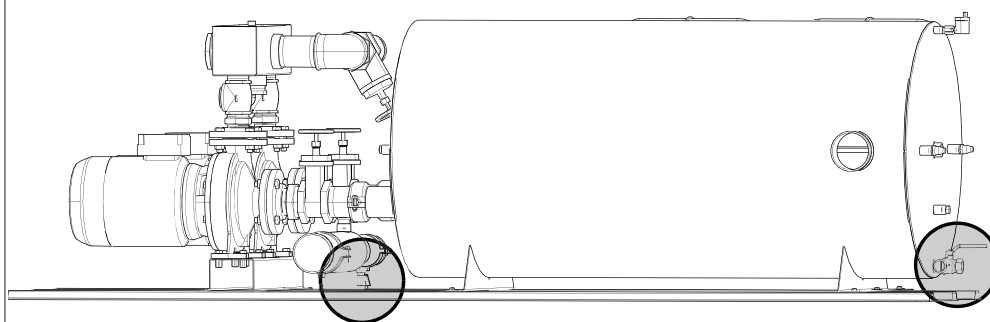


The drawings are only examples of the machine hydraulic circuit

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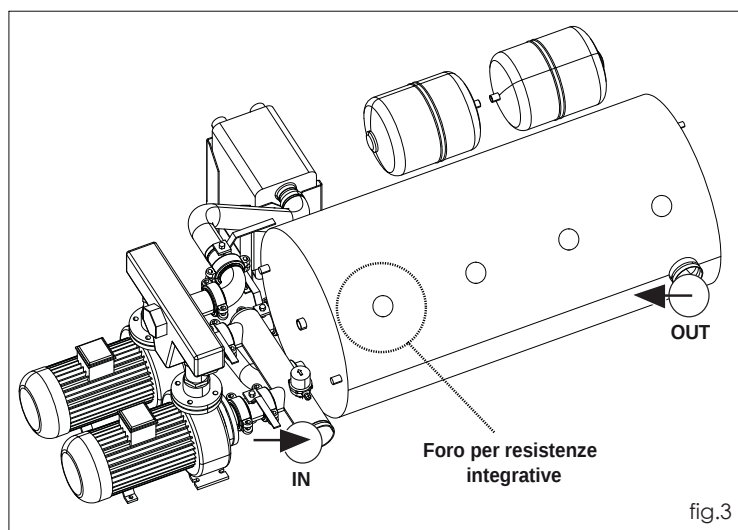


#### CHILLER HYDRAULIC CIRCUIT DRAIN TAP (VERSIONS WITH ACCUMULATOR)



The drawings are only examples of the machine hydraulic circuit

fig 2



**NB**  
for all sizes, with the pre-installation of the additional resistance, the water flow will be reversed according to the standard version.  
The tank is then set downstream of the heat exchanger (see fig.3)

## 23. ELECTRICAL WIRINGS

The default NRL chillers are completely wired and only need the connection to the power supply net, downstream to a group switch, according to the to the regulations in force in the country where the machine is installed. It is also suggested to check:

- the mains supply characteristics, to ensure it is suitable for the levels indicated in the electrical data table, also taking into consideration any other equipment that may be operating at the same time.
- The unit is only powered after the last (hydraulic and electric) installations.
- Follow the connections instructions of the phase conductors, and earth.
- The power line will have a special protection upstream against short circuits and earth losses that sections the system according to other users.
- The voltage should be within a tolerance of  $\pm 10\%$  of the rated supply voltage of the machine (for three-phase units displacement max 3% between the phases). If these parameters are not respected, contact the energy supplier. For electrical wirings use isolated double cables according to the standards in force in the different countries.
- It is necessary to use a omnipolar thermomagnetic switch, in compliance with the CEI-EN standards (contact opening of at least 3 mm), with adequate switch capability and differential protection based on the followed electrical data table, installed as close as possible to the machine.
- It is necessary to carry out an efficient earth connection. The manufacturer can not be held responsible for any damage caused by the failure and ineffective earthing of the machine.
- For units with three-phase power check the correct connection of the phases.

### WARNING:

**It is forbidden to use water pipes for the earthing of the machine.**



All electrical operations must be carried out BY QUALIFIED PERSONNEL, IN ACCORDANCE WITH THE CORRESPONDING REGULATIONS, trained and informed about the risks related to such operations.



The characteristics of electric lines and related components must be established by PERSONNEL AUTHORISED TO DESIGN ELECTRIC INSTALLATIONS, following international regulations and the national regulations of the country in which the unit is installed, in compliance with the legislative regulations in force at the moment of installation.



For installation requirements, the wiring layout supplied with the unit must be compulsory referred to. The wiring layout together with the manuals must be kept in good conditions and readily ACCESSIBLE FOR FUTURE OPERATIONS ON THE UNIT.



It is compulsory to check the machine sealing before connecting the electrical wiring. The machine should only be powered once the hydraulic and electric operations are completed.

### 23.1. RECOMMENDED SECTION OF ELECTRIC CABLES

The cable sections indicated in the table are advised for a maximum length of 50 m.

| Cable sections recommended<br>max. length: 50m |         |                 | NRL BASE |       |       |       |       |       |       |
|------------------------------------------------|---------|-----------------|----------|-------|-------|-------|-------|-------|-------|
|                                                |         |                 | 2000     | 2250  | 2500  | 2800  | 3000  | 3300  | 3600  |
| No. power supplies                             |         |                 | 1        | 1     | 1     | 1     | 1     | 1     | 1     |
| Versions                                       |         |                 | 00       | 00    | 00    | 00    | 00    | 00    | 00    |
| (no. conductors -<br>sect.) for each phase     | SECT. A | mm <sup>2</sup> | 2x185    | 2x240 | 3x240 | 3x240 | 3x240 | 4x185 | 4x185 |
|                                                | Earth   | mm <sup>2</sup> | 1x185    | 1x240 | 2x185 | 2x185 | 2x185 | 2x185 | 2x185 |
|                                                | IL      | A               | 630      | 630   | 630   | 800   | 800   | 800   | 800   |

| Cable sections recommended<br>max. length: 50m |         |                 | NRL WITH PUMP           |                         |                         |
|------------------------------------------------|---------|-----------------|-------------------------|-------------------------|-------------------------|
|                                                |         |                 | 2000                    | 2250                    | 2500                    |
| No. power supplies                             |         |                 | 1                       | 1                       | 1                       |
| Versions                                       |         |                 | with<br>hydronic<br>kit | with<br>hydronic<br>kit | with<br>hydronic<br>kit |
| (no. conductors -<br>sect.) for each phase     | SECT. A | mm <sup>2</sup> | 2x240                   | 3x185                   | 3x240                   |
|                                                | Earth   | mm <sup>2</sup> | 1x185                   | 1x240                   | 2x185                   |
|                                                | IL      | A               | 630                     | 630                     | 630                     |

| Cable sections recommended<br>max. length: 50m |         |                 | NRL WITH PUMP           |                         |                         |                         |
|------------------------------------------------|---------|-----------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                                                |         |                 | 2800                    | 3000                    | 3300                    | 3600                    |
| No. power supplies                             |         |                 | 1                       | 1                       | 1                       | 1                       |
| Versions                                       |         |                 | with<br>hydronic<br>kit | with<br>hydronic<br>kit | with<br>hydronic<br>kit | with<br>hydronic<br>kit |
| (no. conductors -<br>sect.) for each phase     | SECT. A | mm <sup>2</sup> | 3x240                   | 4x185                   | 4x185                   | 4x185                   |
|                                                | Earth   | mm <sup>2</sup> | 2x185                   | 2x185                   | 2x185                   | 2x185                   |
|                                                | IL      | A               | 800                     | 800                     | 800                     | 800                     |

### KEY

**Sec. A:** Fuel feed

**Terra**

**IL:** Main switch

For higher lengths or different types of cable installation, it will be the DESIGNERS responsibility to carefully measure the line main switch, the supply power line and the earthing protection connection, and the working connection cables:

- the length
- the type of cable
- Absorption of the unit and its physical position, and room temperature.

**WARNING:**

**Check that all power cables are correctly secured to the terminals when switched on for the first time and after 30 days of use. Afterwards, check the connection of the power cables every six months. Slack terminals could cause the cables and components to overheat.**

**23.4. CONNECTION TO THE POWER SUPPLY**

- Check there is no voltage on the electric line you want to use.

**23.4.1. To access the electric box:**

- Turn ¼ the screws of the electrical panel in counter-clockwise direction
- Turn the handle of the door-block disconnecting switch to OFF (see figure). In this way, the electrical panel can be accessed

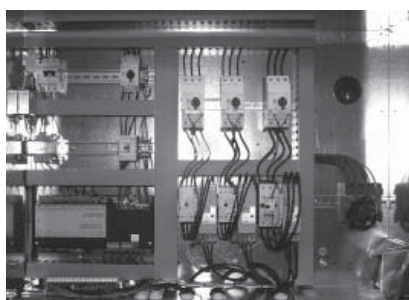


Fig.1

**23.2. ELECTRICAL POWER CONNECTION**

- For functional connection of the unit take the supply power cable to the electrical panel inside the unit fig.1 in the previous page and connect it to the disconnecting switch terminals observing the phase, and the earth. fig.2

**23.3. AUXILIARY CONNECTIONS AT THE USER/INSTALLER EXPENSE**

The terminals indicated in future explanations are part of the GR3 control boards. For installation requirements, refer to the wiring diagram supplied with the unit. The wiring diagram together with the manuals must be kept in good conditions and readily ACCESSIBLE FOR FUTURE OPERATIONS ON THE UNIT.

**23.3.1. Auxiliary switch (IAD)**

To prepare the auxiliary switch, connect the device to the clamp 4 of the control board M7 SC and to the clamp 4 of the remote panel.

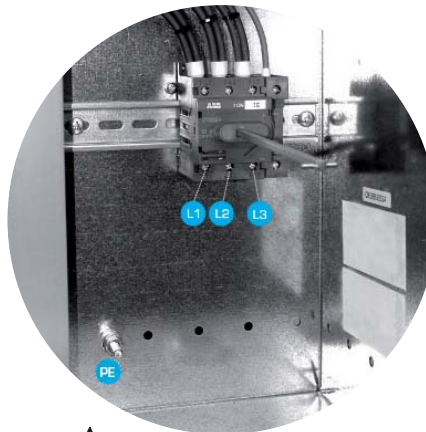
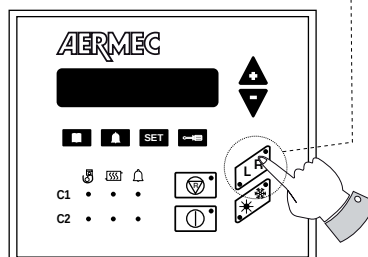
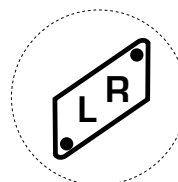


Fig.2

| Key fig. 2 |        |
|------------|--------|
| L1         | Line 1 |
| L2         | Line 2 |
| L3         | Line 3 |
| PE         | Earth  |



**23.3.2. Pump contactor (CP01 - CP02)**

To prepare the pump contactor, connect the device CP01 to the clamp 2 of the control board M16 SC and the device CP02 to the clamp 4 and 6 of the control board M1 SE2.

**23.3.3. External alarm (EA)**

To prepare an external alarm device, connect the device contact to the clamp 1 and 2 of the control board M17.

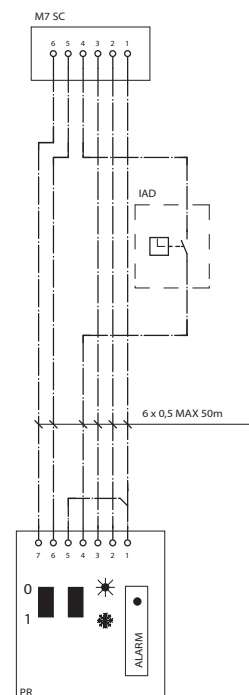
**23.3.4. Connection PR3 (standard)**

Connect the remote panel PR3 to the control board M7 SC (as shown below), remember that the maximum allowed distance is 50 m.

**THE PR3 CONNECTED MUST BE ENABLED, AS WELL. See next procedure**

**CONNECTION REMOTE PANEL - PR3**

**COMANDO A DISTANZA REMOTE CONTROL**



**ENABLING REMOTE PANEL - PR3**

- To enable the remote panel PR3:
- act on the L/R key on the small panel of the GR3 on the machine (as shown in the figure above)
  - when the LED next to the letter R (Remote) lights up, the machine function will be enabled by the remote panel.

## 24. CONTROL AND FIRST START-UP

### 24.1. PREPARATION FOR COMMISSIONING

Bear in mind that a free start-up service is offered by the Aermec Technical Service for the unit of this series, at the request of Aermec customers or legitimate owners and in ITALY only.  
The start-up must be previously agreed on the basis of the system implementation times. Before the intervention of the AERMEC After Sales Service, all the operations (electrical and hydraulic hook ups, loading and breather from the system) must be completed.

Before starting the unit make sure that:

- All the safety conditions have been respected
- The unit has been properly fixed to the support base
- The minimum technical spaces have been observed;
- Water connections have been performed respecting the input and output
- The hydraulic system has been loaded and vented.
- The hydraulic circuit taps are open
- The electrical connections have been properly carried out;
- The voltage is within a tolerance of 10% of the unit nominal voltage
- The earthing has been carried out correctly
- Tightening of all electrical and hydraulic connections have been well carried out.

### 24.2. FIRST COMMISSIONING OF THE MACHINE

Before activating the unit:

- Close the electric panel lid.
- Position the door-block disconnecting switch of the machine on ON, **turning the handle down. (fig.3)**
- Press the key ON to start the machine (fig.4);  
when the access LED appears the unit is ready for the operation.

### 24.3. SEASON CHANGEOVER

- For each seasonal change check that the operation conditions return to the limit.
- Check that the absorption current of the compressor is less than the maximum indicated in the technical data table.
- Check in the models with three-phase supply power that the noise level of the compressor is not abnormal, in this case invert a phase.
- Make sure that the voltage value are

within the prefixed limits and that the displacements between the three phases (three-phase supply power) do not get above 3%.

#### 24.3.1. Season change of the panel on the machine

To activate the season change, just press the indicated key in (fig. 5). To ensure that the operation is successful, machine must be active as remote or local.  
For further information refer to the USE manual.

#### 24.3.2. Season change of PR3

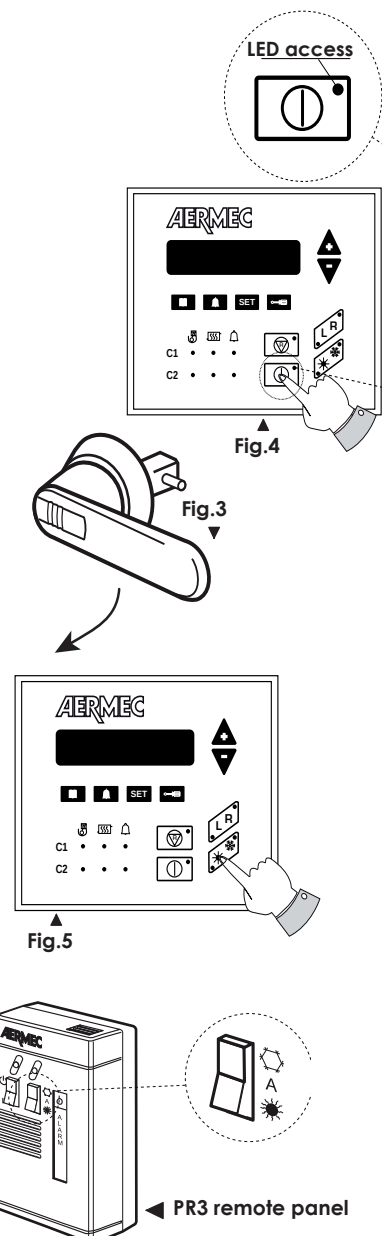
- Just act directly on the switch. The machine turns off automatically and it restarts with the selected operation mode.

#### WARNING



The first start-up has to be carried out with the standard settings, only at last test vary the values of the operation Set Point. Before starting, power the unit for at least 12-24 hours by positioning the protection thermomagnetic switch and the door-block disconnecting switch on ON fig.1

Make sure that the control panel is turned off until it allows the oil heater system the compressor casing.



## 25. FUNCTIONING CHARACTERISTICS

### 25.1. COOLING SET POINT

(Default defined) = 7°C,  $\Delta t = 5^\circ\text{C}$ .

### 25.2. HEATING SET POINT

(Default defined) = 45°C,  $\Delta t = 5^\circ\text{C}$ .

In case of restoring of the unit supplied power after a momentary interruption, the pre-set mode is maintained in memory.

### 25.3. COMPRESSOR START DELAY

To prevent the compressor start too close to each other, two functions have been arranged.

- Minimum time from last turn-off 60 seconds.
- Minimum time from last start 300 seconds.

### 25.4. CIRCULATION PUMP

The electronic board provides an output to manage the circulation pump.  
After the first 10 seconds of the pump operation, when the water flow rate is running, activate the function of water flow rate alarm (flow switch).

### 25.5. ANTI-FREEZE ALARM

The anti-freeze alarm is active as if the machine is turned-off or if the machine is in standby mode. In order to prevent breakage of the plate-type exchanger due to freezing water contained, the compressor is locked (if the machine is turned on under 4° C) and the resistance starts up (if standby below 5° C). If the temperature detected by the probe in the exchanger output and in the chiller input is below +4 ° C.

#### WARNING

**THE ANTI-FREEZE SET TEMPERATURE CAN BE VARIED ONLY BY AN AUTHORISED SERVICE CENTRE AND ONLY AFTER VERIFYING THAT IN THE WATER CIRCUIT IS AN ANTIFREEZE SOLUTION.**

The intervention of this alarm sets the compressor block and not of the pump, which remains active, and the resistance starts-up if installed.

For the restoration of the normal functions of the temperature of the water output have to come back over +4 ° C, the reset is manual.

#### WARNING:

**AT ANY INTERVENTIONS OF THIS ALARM IT IS RECOMMENDED TO IMMEDIATELY CONTACT THE NEAREST TECHNICAL SERVICE ASSISTANCE**

### 25.6. WATER FLOW RATE ALARM

The GR3 provides the management of a water flow rate alarm commanded from a flow switch standardly installed on the machine. This safety type can occur after the first 10 seconds of operation of the pump if the water flow rate is not sufficient. This alarm sets the block of the compressor and the pump.

## 26. REGULAR MAINTENANCE

Any cleaning operation is forbidden before disconnecting the unit from the power supply.

Check for voltage before operating.  
Periodic maintenance is essential to maintain the unit in perfect working order under the functional as well as the energetic aspect.

Therefore it is essential to provide yearly controls for the:

### 26.6.1. Hydraulic circuit

#### CONTROL:

- Water circuit filling
- Water filter cleaning
- Flow switch control
- Air in the circuit (leaks)
- That the water flow rate to the evaporator is always constant
- The hydraulic piping thermal insulation state
- Where provided the percentage of glycol

### 26.6.2. Electric circuit

#### CONTROL:

- Efficiency of safety devices
- Electrical power supply
- Electrical power consumption
- Connections tightened
- Function of the compressor housing resistance

### 26.6.3. Chiller circuit

#### CONTROL:

- Compressor conditions
- Efficiency of the plate-type exchanger resistance
- Working pressure
- Loss test for the control of the sealing of the refrigerant circuit
- Function of high and low pressure switches
- Perform the necessary checks on the filter-drier to verify their efficiency.

### 26.6.4. Mechanical controls

#### CONTROL:

- The screws, compressors and the electric box of the unit external panelling are properly tightened. If they are poorly tightened, they produce abnormal noise and vibrations
- The structure conditions.  
If necessary, treat oxidised parts with paints suitable for eliminating or reducing oxidation.

## 27. EXTRAORDINARY MAINTENANCE

The NRL are loaded with R410A gas and tested in the factory. In normal conditions, no Technical Assistance Service operation is needed for the refrigerant gas check. Along time, however, small leaks from the joints may be generated. Due to these

#### WARNING

Inspection, maintenance and possible repair operations must be carried out only by an authorised technician according to the law.

A deficient check/ maintenance operation may result in damage to things and people.

For machines installed near the sea the maintenance intervals must be halved.

leaks, the refrigerant comes out and the circuit is drained, causing the unit malfunction. In these cases, the refrigerant leakage points are found and repaired, and the cooling circuit is recharged, operating in compliance with Law 28 December 1993 no. 549.

#### **27.6.1. Loading procedure**

The loading procedure is as follows:

- Empty and dehydrated the entire refrigeration circuit using a vacuum pump connected to the low grip as to the high grip of high pressure till the vacuum gauge reading up to about 10 Pa. Wait some minutes and check that this value does not goes back again over 50 Pa.
- Connect the refrigerant gas bomb or a load cylinder to the grip on the low-pressure line.
- Charge the amount of refrigerant gas indicated on the characteristics plate of the machine.
- After any operation control that the liquid indicator indicates a dry circuit (dry-green) In case of partial

loss the circuit has to be emptied completely before reloading it.

- The refrigerant R410A has to be loaded only in liquid phase.
- Different operating conditions from the normal can result in different values.
- Leak testing or leaking research must be carried out only by using refrigerant gas R410A by checking with a suitable leak detection.
- It is prohibited to use in the refrigeration circuit, oxygen or acetylene or other flammable or poisonous gas because they can cause explosions or intoxication.



It is advisable to keep a machine booklet (not supplied, but provided by the user), in order to keep trace of the operations carried out on the unit. In this way, it will be easier to organise the operations properly and facilitate failure prevention and troubleshooting in the machine.

In the booklet, write down date, type of operation carried out (routine maintenance, inspection or repair), description of the operation, measures taken...



It is forbidden to CHARGE the cooling circuits with a refrigerant different from the one indicated. If a different refrigerant gas is used, the compressor may result seriously damaged.



#### **DISPOSAL**

Provided that the disposal of the unit is carried out according to the rules in force in different countries.







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