AERMEC
air conditioning

MULTISCROLL tecnology

R410A

RS485

CHILLERS- Technical manual - installation - maintenance

NRL

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

AERMEC
COMPANY QUALITY SYSTEM
ICIM
ISO 9001:2000 - Cert. n° 0128/5
CISQ IQNet
AERMEC S.P.A.

EUROVENT

CE

EN

INRLPY. 12.09 4086921_01

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

SUMMARY

AERMEC S.p.A.
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NRL

SERIAL NUMBER	

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 **CEI EN 61000-6-3**	Electromagnetic immunity and emission in residential environment
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.

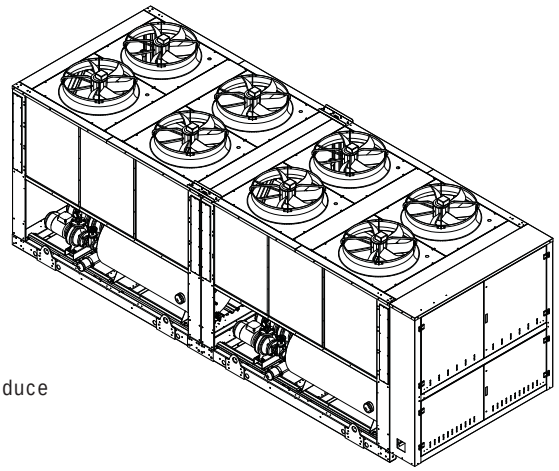
Bypass solenoid valve (only for heat pumps)
To bypass the thermostat-controlled valve during the defrosting cycle.

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

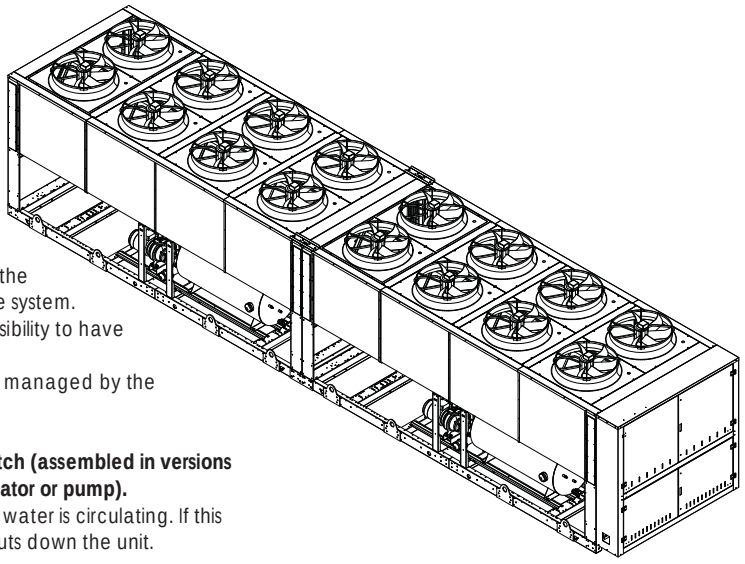
Fan unit
Screw type, statically and dynamically balanced. The electric fans are protected electrically with thermomagnetic switches and mechanically with metal anti-intrusion grilles, in accordance with the standard CEI EN 60335-2-40.

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 COMPONENTS



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 switchFlow switch (assembled in versions with water accumulator or pump).
This checks that the water is circulating. If this is not the case, it shuts down the unit.

Water filter (assembled in the version with water accumulator or pump; supplied with the other versions).
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:**
  a) without password:
  cooling set;
  total differential.
  b) 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
AER485P1		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	•	•	•	•	•	•	•
AVX (00)		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							
AVX (01-02-03-04)		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							
AVX (P1-P2-P3-P4)		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							
GP		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							

PGS		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	•	•	•	•	•	•	•
AERWEB30		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. 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. 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. 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						

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
FAN (ENLARGED M)									
Quantity	n°	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	13,9	17,4	20,9	20,9	20,9	27,9	27,9
		E	-	-	-	-	-	-	-
Input current	A	A	29,6	37	44,4	44,4	44,4	59,2	59,2
		E	-	-	-	-	-	-	-
Useful head **[1]**	Pa	A	39	39	40	38	37	36	32
		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
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							
LOW-HEAD CIRCULATION PUMP									
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
HIGH-HEAD CIRCULATION PUMP									
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
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							
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
- Δt 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 HE	586	637	688	776	866	968	1046
Total input power	kW	HA HE	186	203	220	248	278	306	326
Water flow rate on heating	l/h	HA HE	100790	109560	118340	133470	148950	166500	179910
Total pressure drops in heat mode	kPa	HA HE	68,8	75.5	75.5	58,2	60,1	66,3	65.9
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 HE	3,15	3,14	3,13	3,13	3,12	3,16	3,21
ELECTRICAL DATA									
Fuel feed	A	HA HE	400V - 3 - 50 Hz						
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 HE	353	374	395	462	530	565	585
Maximum current	A	HA HE	442	495	548	606	664	747	813
Peak current	A	HA HE	651	763	816	815	873	1015	1081
COMPRESSORS (SCROLL)									
Number/Circuit	no./ no.	HA HE	8/4	8/4	8/4	10/4	12/4	12/4	12/4
FANS (AXIAL)									
Quantity	no.	HA 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 HE	13,6	17,0	20,4	20,4	20,4	27,1	27,1
Input current	A	HA HE	28,8	36,0	43,2	43,2	43,2	57,6	57,6
FANS (INVERTER J)									
Quantity	n°	HA 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	-	-	-	-	-	-	-

[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
EVAPORATORS (PLATES)									
Quantity	no.	HA	2	2	2	2	2	2	2
		HE							
Water connections (in/out)*	diam	HA	3"	3"/4" *	4"	4"	4"	4"	4"
		HE							
HYDRAULIC CIRCUIT									
Accumulator capacity	L	HA	2 x 700						
		HE							
Accumulator antifreeze heater	W	HA	2 x 300						
		HE							
LOW-HEAD CIRCULATION PUMP									
Input power	KW	HA	7,4	3.7+4.8	9.6	9.6	9.6	13,0	13,0
		HE							
Input current	A	HA	12,4	6.2+8.1	16.2	16,3	16,3	22,0	22,0
		HE							
Useful head on cooling	kPa	HA	111	128	128	128	125	106	95
		HE	131	150	150	149	141	126	119
Useful head on heating	kPa	HA	79	95	95	91	94	70	56
		HE							
Expansion tank capacity	No./l	A	4 x 25						
		E							
HIGH-HEAD CIRCULATION PUMP									
Input power	KW	HA	13,0	6.5+8.6	17.2	17.2	17.2	24.7	24.7
		HE							
Input current	A	HA	22,0	11+14.6	29.2	29.2	29.2	42.4	42.4
		HE							
Useful head on cooling	kPa	HA	225	269	269	266	246	241	232
		HE	247	293	293	289	272	261	255
Useful head on heating	kPa	HA	189	232	232	225	193	207	193
		HE							
SOUND DATA									
Sound power (1)	dBA	HA	91.5	93,3	94.5	94,0	93,5	95.0	97,0
		HE	86.0	87,8	89.0	88.5	88.0	89.5	91.5
Sound pressure (2)	dBA	HA	59,5	61,3	62,5	62.0	61,5	63.0	65.0
		HE	54,0	55,8	57,0	56,5	56,0	57,5	59,5
DIMENSIONS									
Height	mm	HA	2450	2450	2450	2450	2450	2450	2450
		HE							
Width	mm	HA	2200	2200	2200	2200	2200	2200	2200
		HE							
Depth	mm	HA	6400	7250	8100	8100	8100	11100	11100
		HE							
Weight when empty	kg	HA	4930	5360	5780	6190	6630	7710	7980
		HE							

(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
- Δt 5°C

HEATING mode

- Inlet water temperature 40°C
- Outlet water temperature 45°C
- Outside air temperature 7/6°C
- Δt 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.

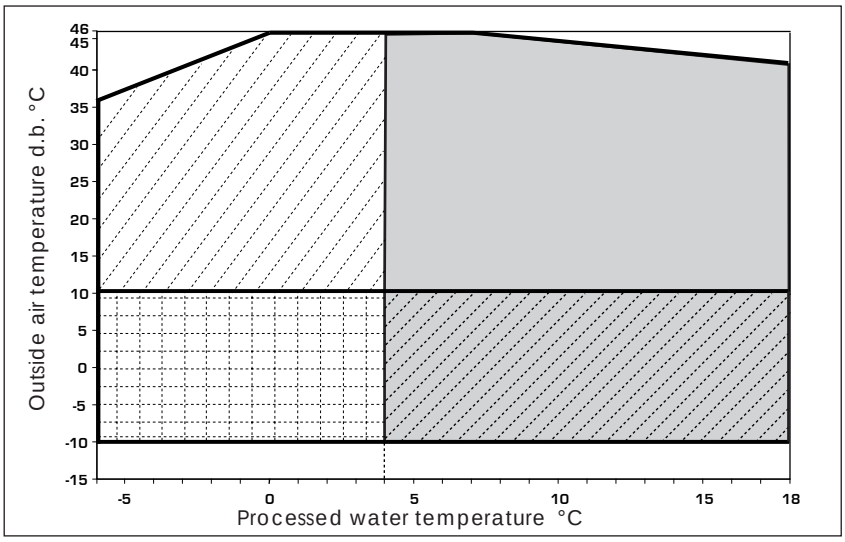
(2) Sound pressure
Sound pressure in an unrestricted range on a reflective plane (directional fact. Q=2), 10m away from the unit external surface, complying with ISO 3744.

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 $\Delta t = 5°C$.

N.B.:
The unit can be activated with external air at 46°C and inlet water at 35°C in the summer function.
The unit can be activated with external air at -15°C and inlet water at 20°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 by-pass 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:

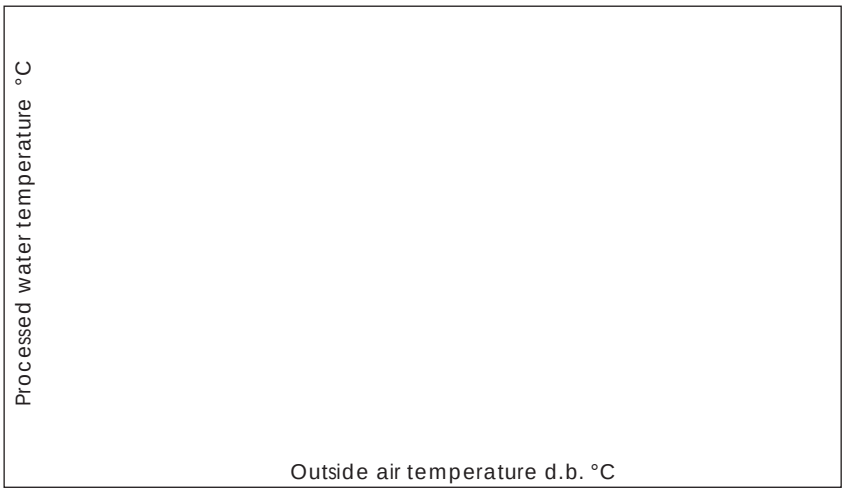
Operation with glycol

Operation with glycol, with DCPX accessory

Standard operation

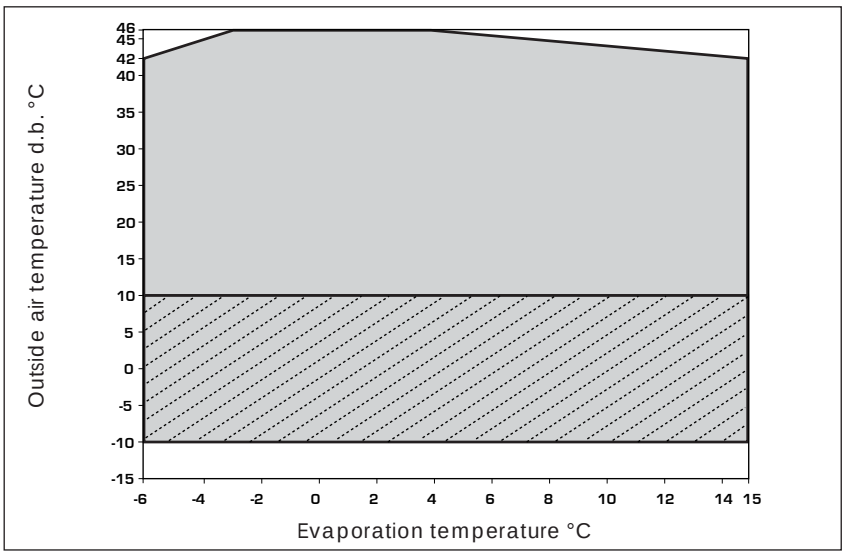
Standard operation with DCPX accessory

9.2. HEATING MODE



NB In the versions with accumulator (09-10) the operating limits in cold and warm modes are reduced to 3°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 (Pf, Pa) by the respective correction coefficients (Cf, Ca).
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.

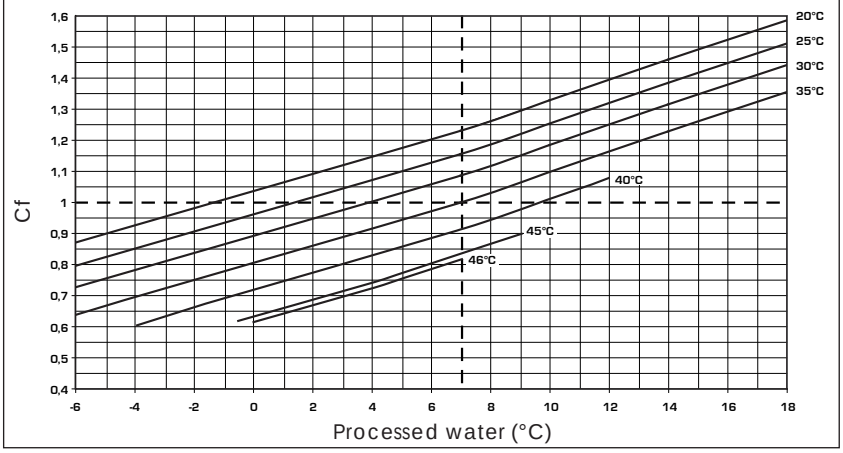
KEY

Cf: correction coefficient of the cooling capacity.

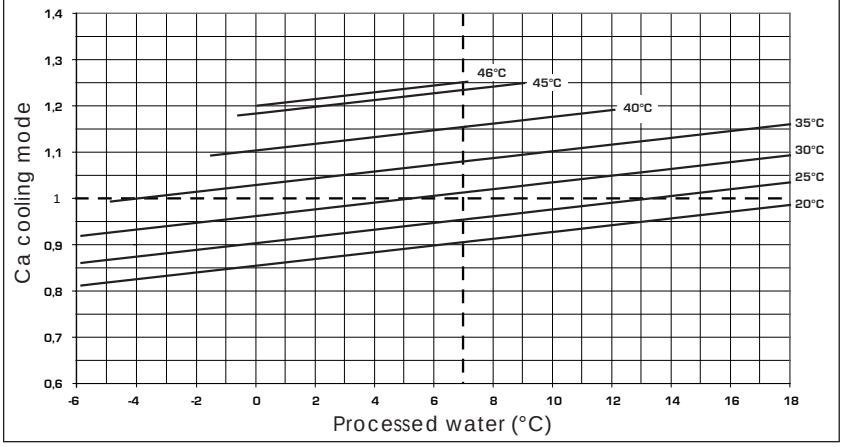
Ca: correction coefficient of the input power.

FOR Δt 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.**

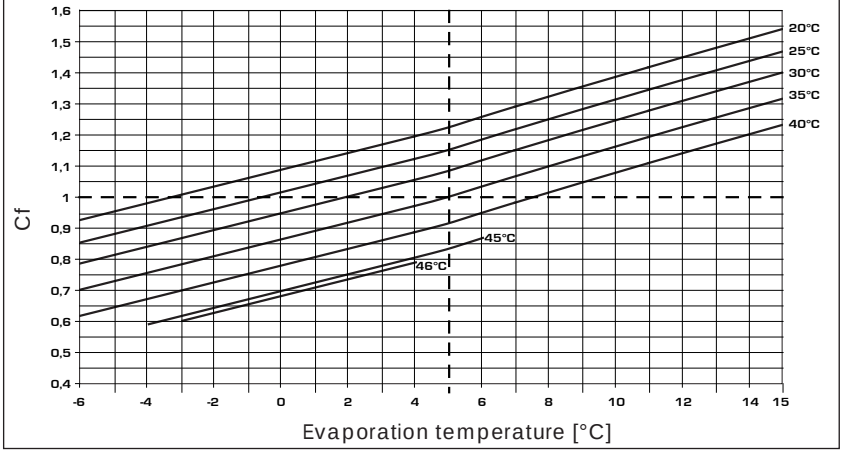
CORRECTION COEFFICIENTS OF THE COOLING CAPACITY



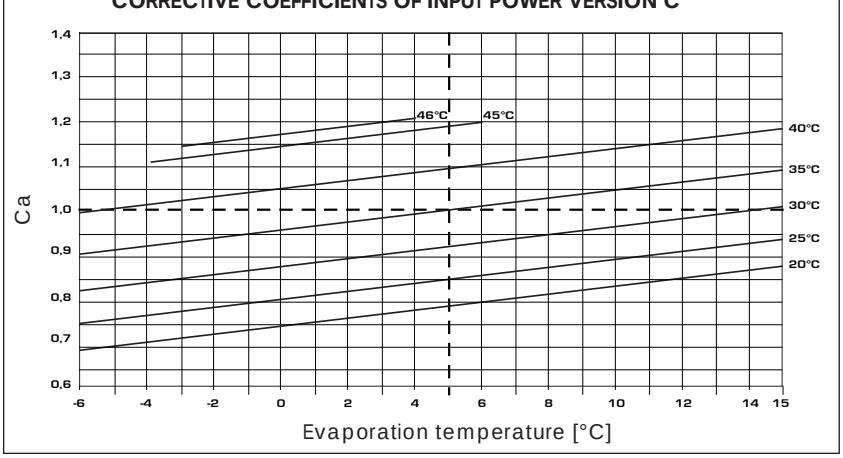
CORRECTION COEFFICIENTS OF THE INPUT POWER IN COOLING MODE



CORRECTIVE COEFFICIENT OF THE COOLING CAPACITY VERSION C



CORRECTIVE COEFFICIENTS OF INPUT POWER VERSION C



10.2. HEATING CAPACITY AND INPUT POWER

– **"HEAT PUMP VERSIONS"**

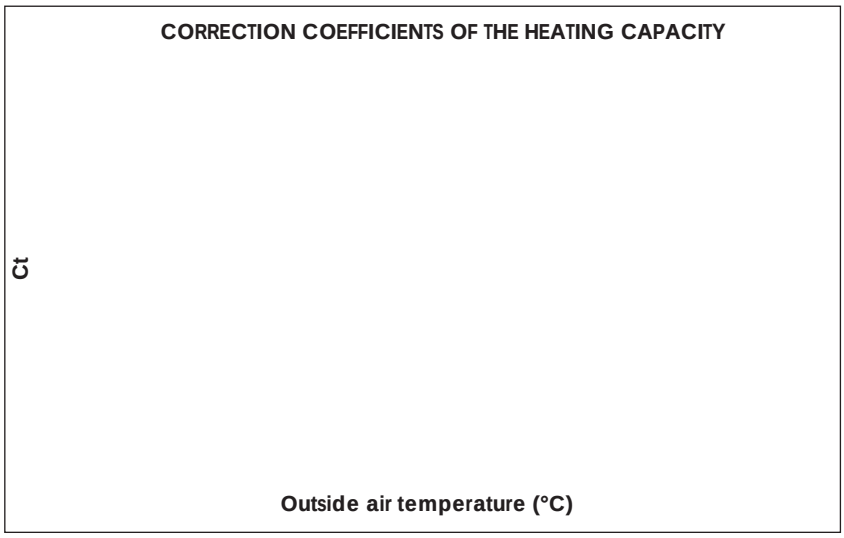
The heating capacity yielded and the input electrical capacity in conditions other than rated conditions are obtained by multiplying the rated values (Pt, Pa) by the respective correction coefficients (Ct, Ca).
The diagram allows you to obtain the correction coefficients; in line with each curve you 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.

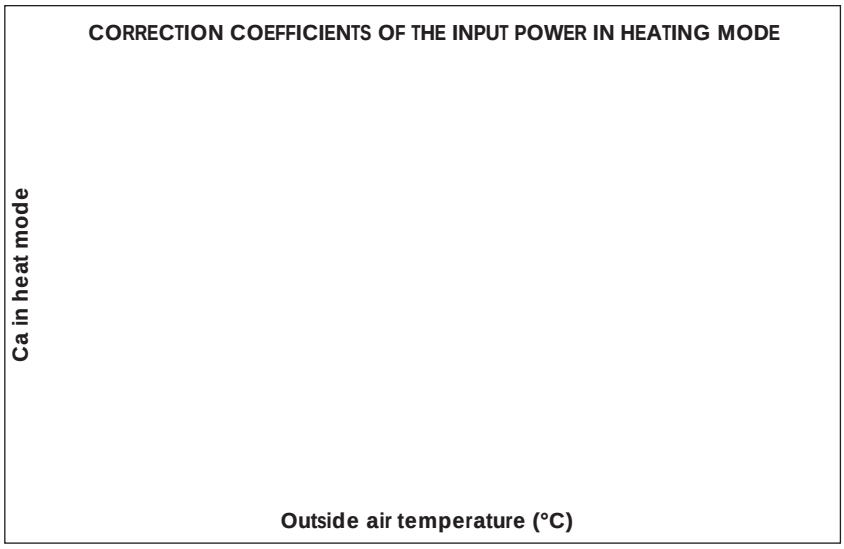
The outputs are intended as net of the defrosting cycles.

KEY

Ca: Correction coefficient of the input power.

Ct: correction coefficient of the heating capacity.





10.3. FOR Δt DIFFERENT FROM THE RATED VALUE

For Δt 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*m²]/[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

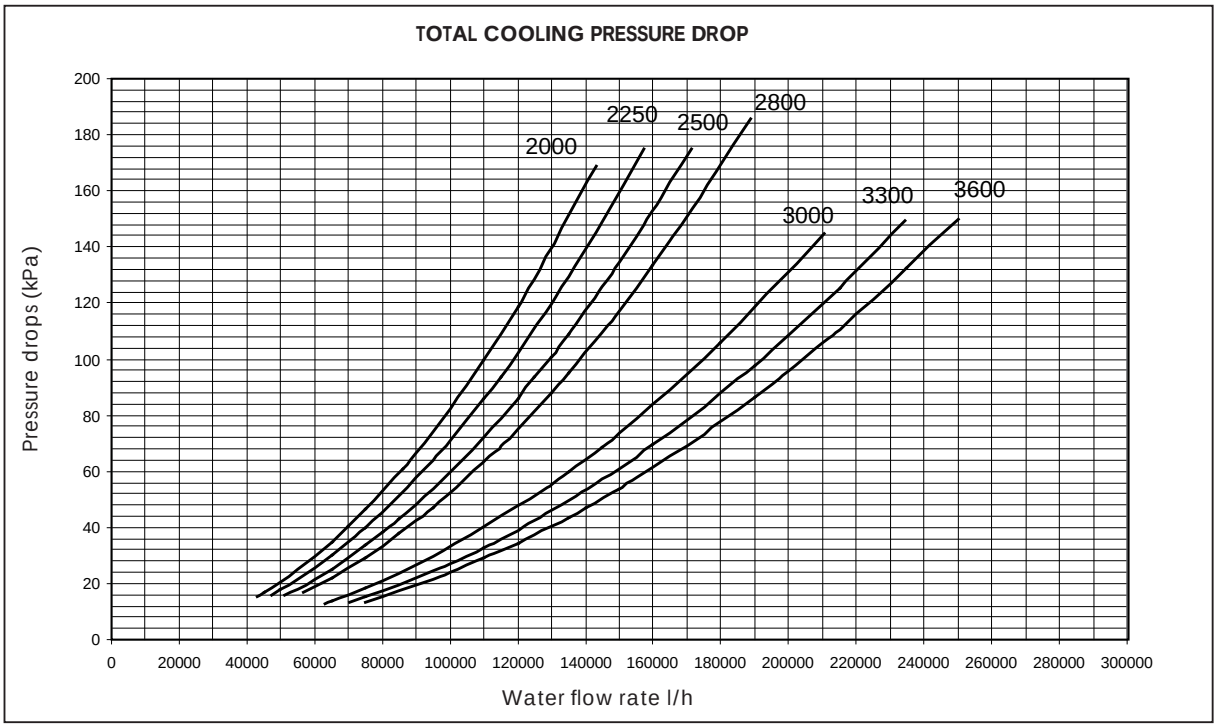
11.1. TOTAL PRESSURE DROPS

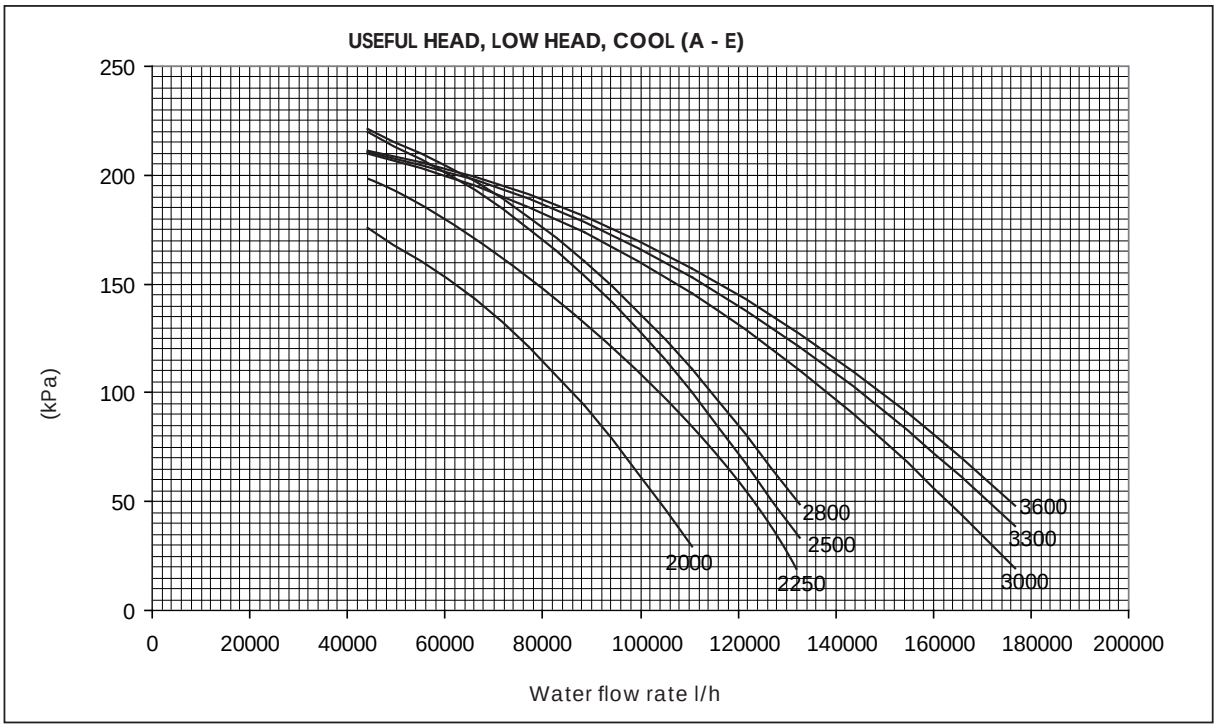
Standard NRL unit, cooling only (A-E).
NB
The pressure drops and effective pressures are calculated on the basis of cooling with water at 10°C. The pressure drops include:
- EVAPORATORS
- WATER FILTERS
- HYDRAULIC CIRCUITS

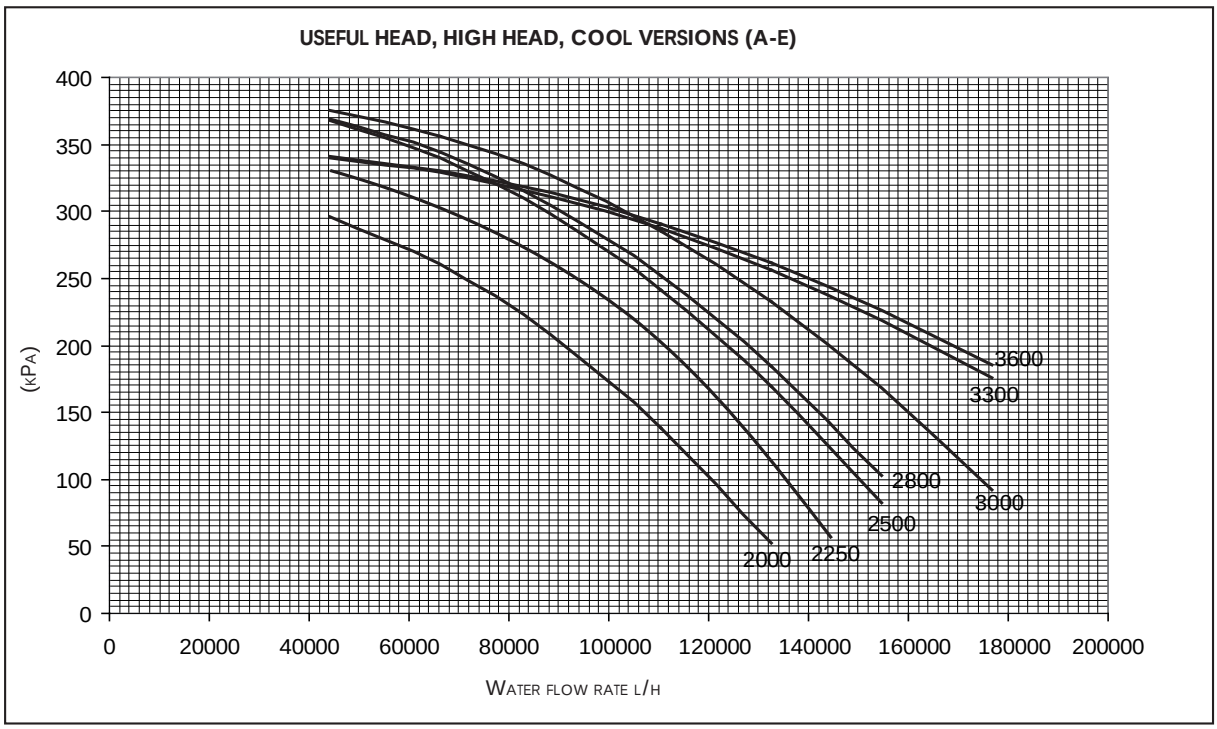
The diagram pressure drops are related to an average water temperature of 10 °C. The following table shows the correction to apply to the pressure drops when the average water temperature varies

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

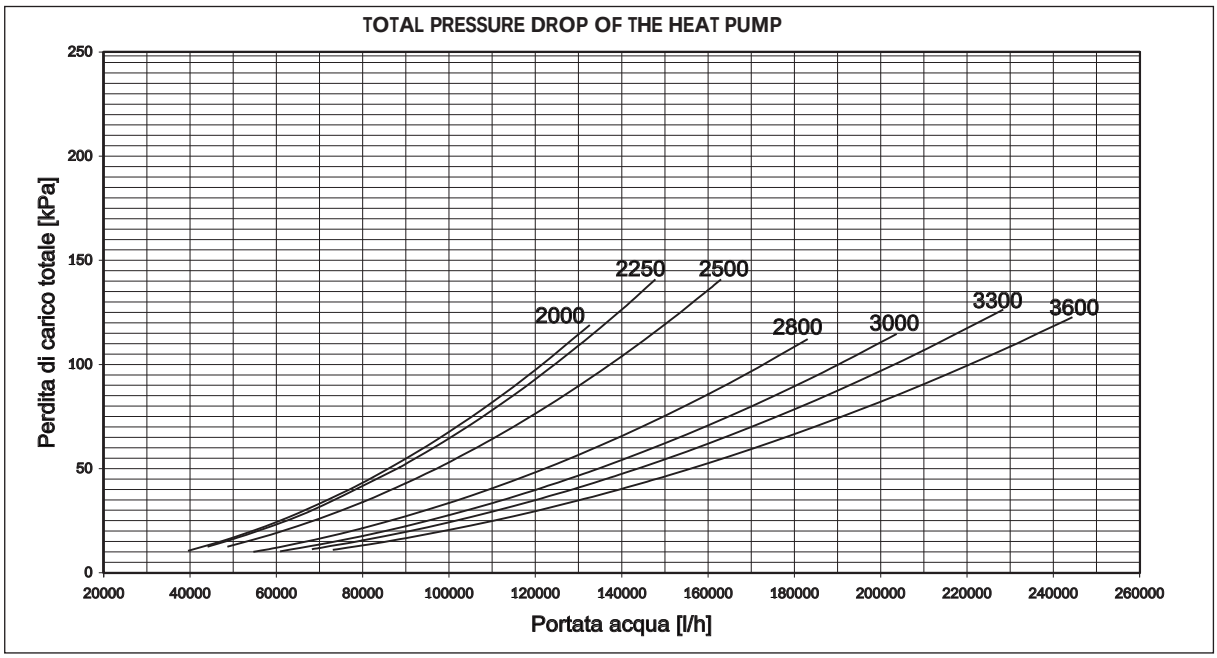
NRL standard heat pump unit (HA-HE), in cooling mode.
NB
The pressure drops and effective pressures are calculated on the basis of cooling with water at 10°C. The pressure drops include:

- EVAPORATORS
- WATER FILTERS
- HYDRAULIC CIRCUITS

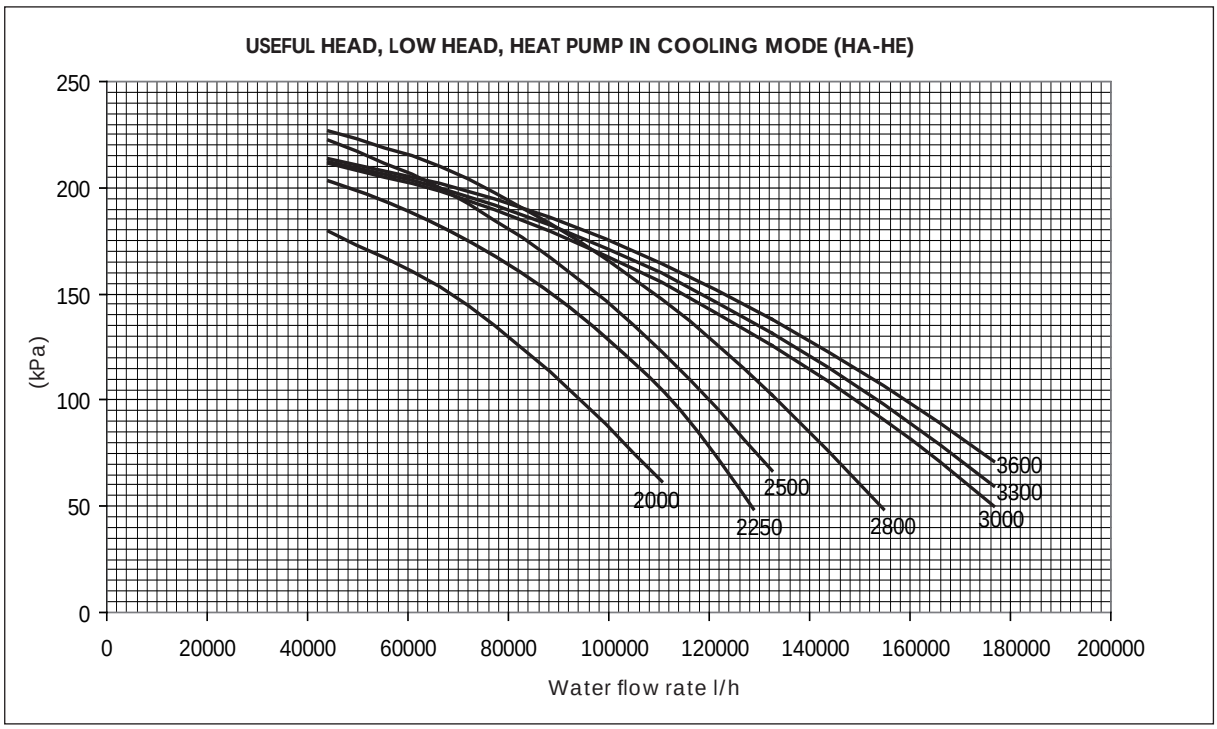
The diagram pressure drops are related to an average water temperature of 10 °C. The following table shows the correction to apply to the pressure drops when the average water temperature varies

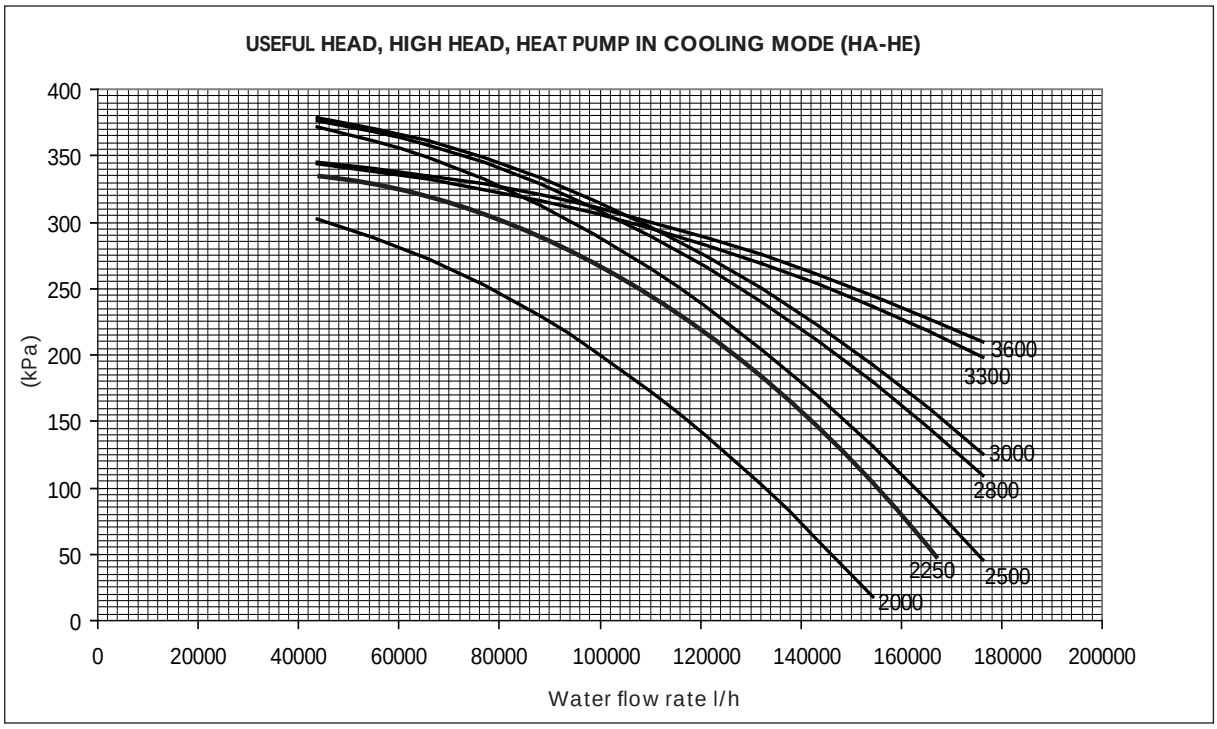
The chiller consists of two hydraulic circuits per module.
The pressure drops indicated in the graphics are relative to a single circuit SINCE THE HYDRAULIC PARALLEL IS IN CHARGE OF THE CUSTOMER OR THE OR THE PERSON IN CHARGE.

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.



Cooling operation (HE)





Corrective coefficients for heat pump on heating operation

Average water temperature	5	10	15	20	30	40	50
Multiplicational coefficient	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 (calibration) [bar] = H [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			

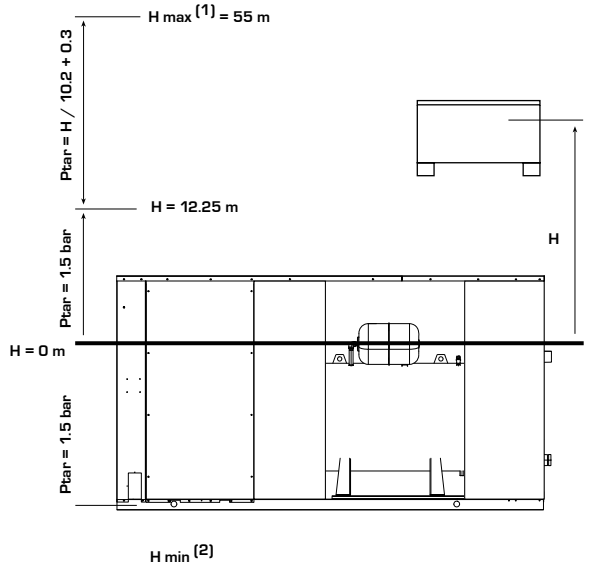
12.2

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 (1)	2,174	2,646	3,118	3590	3852
Water content reference value	l (2)	978	1190	1404	1616	1732
Water content reference value	l (3)	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.



KEY
(1) Check that the highest user does not exceed a level difference of 55 metres.
(2) Check that the lowest user can sustain the global pressure acting at that point.

(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 Δt 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

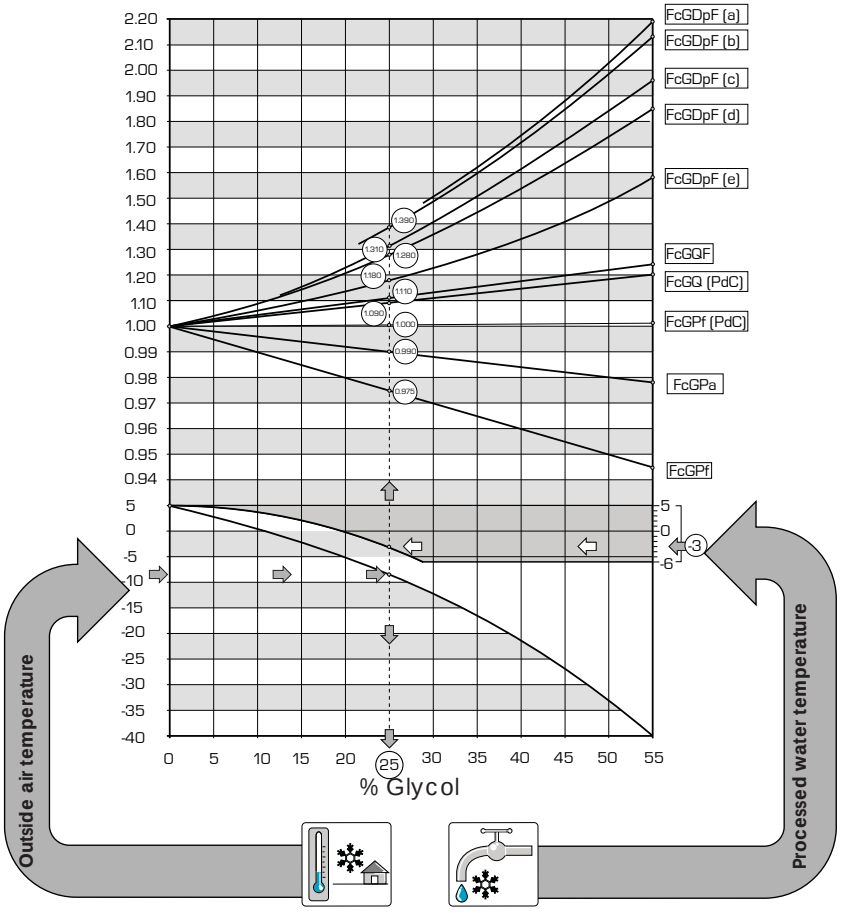
The performance values refer to the following conditions:
(*) processed water temperature = 7°C;
(*) outside air temperature = 35°C.

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 Δt 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 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.



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)
FcGQF	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.

14.1. HOW TO READ THE GLYCOL CURVES

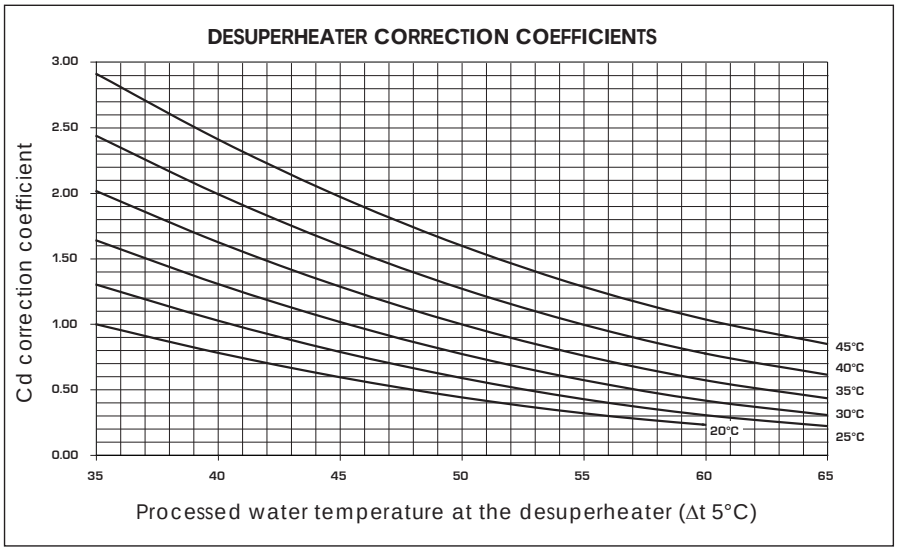
The curves shown in the figure summarise a notable quantity of data, each of which is represented by a specific curve. In order to use these curves correctly, it is necessary to make some initial considerations:

- 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 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.



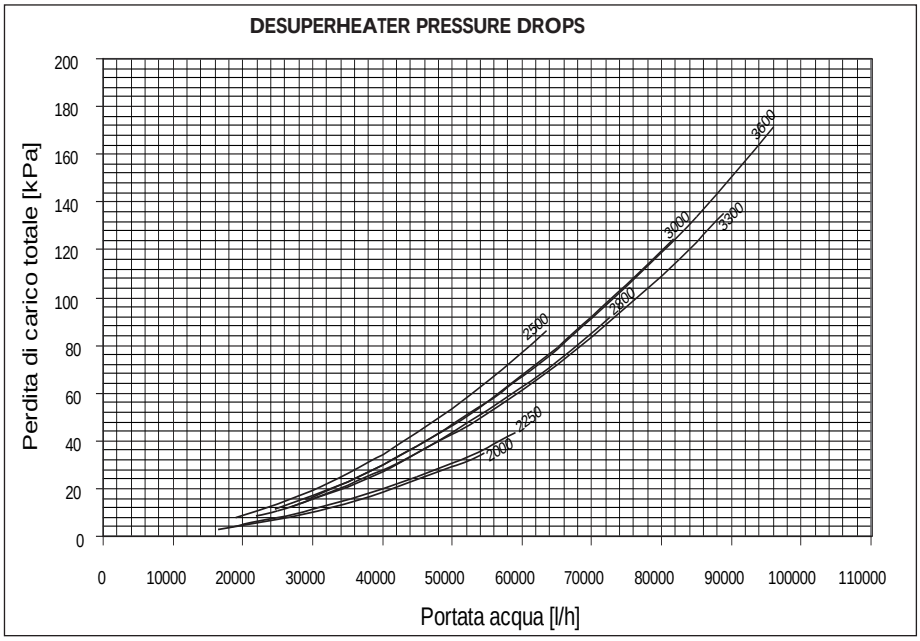
14.2. PRESSURE DROPS

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
−Δt	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 (Pa, Pr) shown in table 16.1.1 by the respective correction coefficients (Ca, Cr), 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 (Cc) is obtained from the difference between recovery heating capacity (Cr) and input power (Ip).

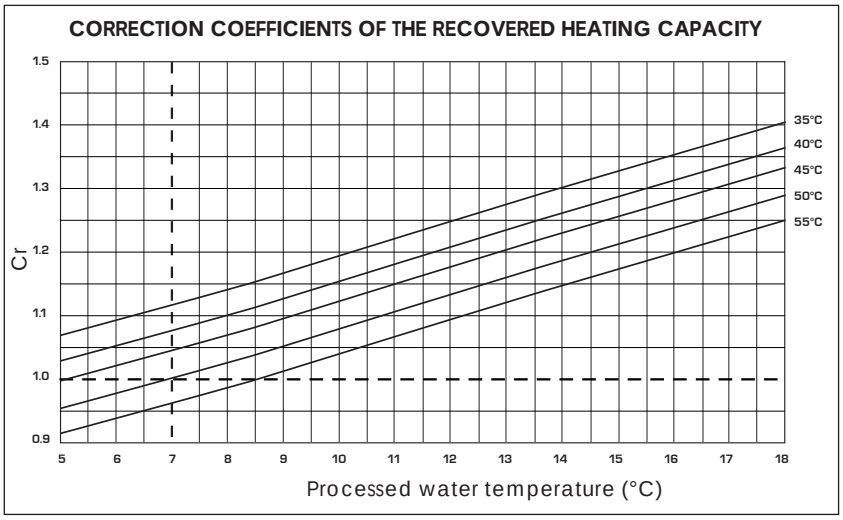
The nominal value refers to:

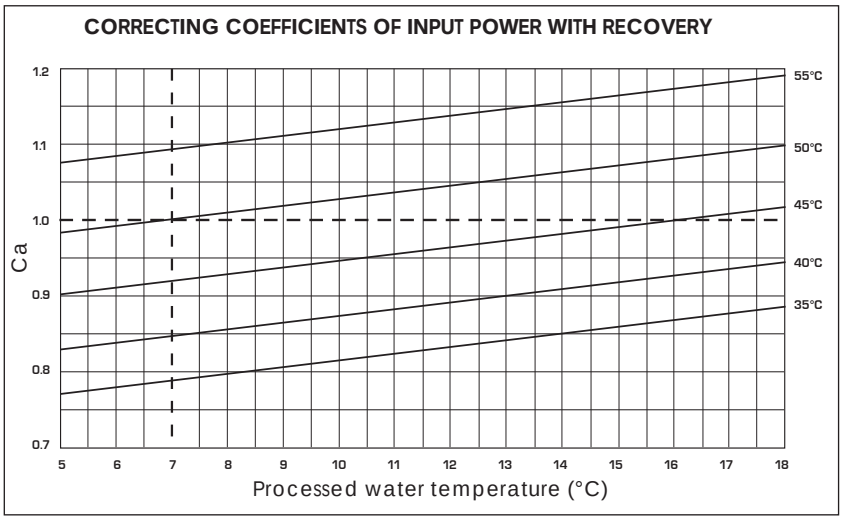
–air temperature	35°C
–water at the desuperheater	50°C
–Δt	5°C

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)





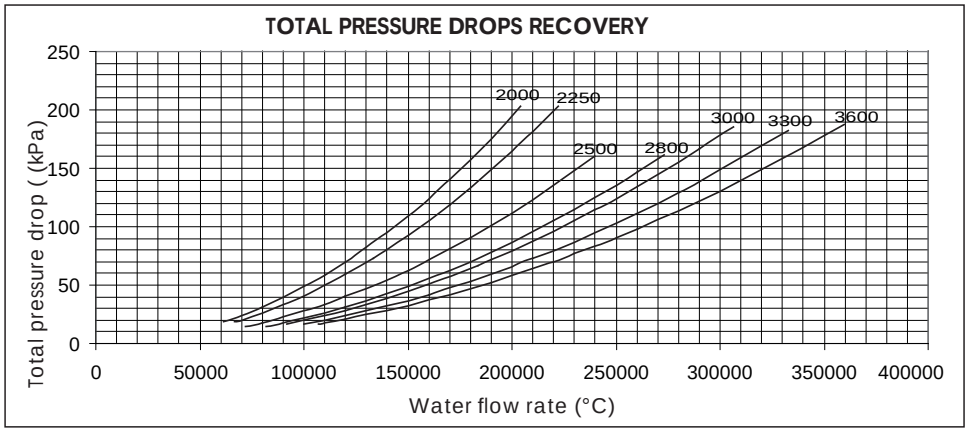
16.1.1. NRL (T)

		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

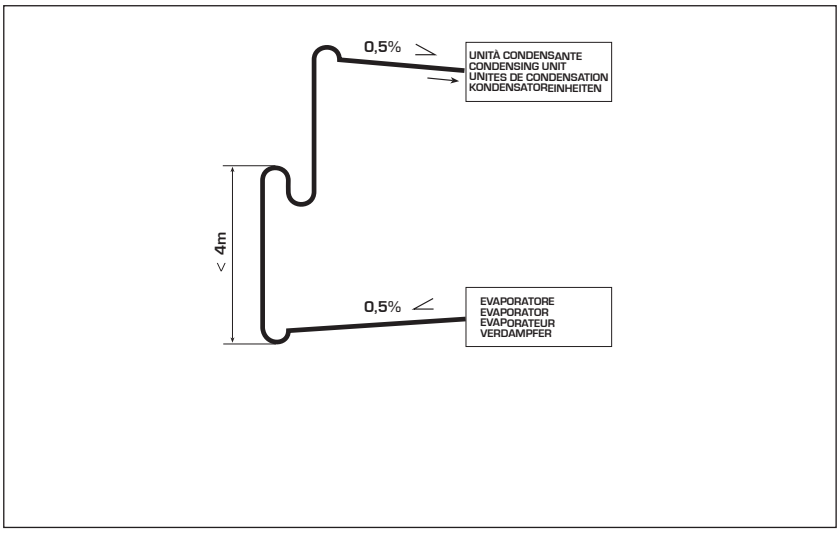
17. MEASUREMENTS OF THE CHILLERS LINES VERSIONS (C)

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. dB(A)	Pressure		125	250	500	1000	2000	4000	8000
		dB(A) 10m	dB(A) 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. dB(A)	Pressure		125	250	500	1000	2000	4000	8000
		dB(A) 10m	dB(A) 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. dB(A)	Pressure		125	250	500	1000	2000	4000	8000
		dB(A) 10m	dB(A) 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. dB(A)	Pressure		125	250	500	1000	2000	4000	8000
		dB(A) 10m	dB(A) 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

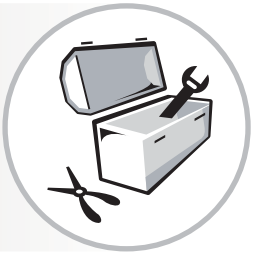
CHECK PARAMETERS			
Cold Setting	Water inlet temperature in cooling mode	**MIN.**	-10°C
		MAX.	20°C
		DEFAULT	7.0°C
heating Setting	Water inlet temperature in heat mode	**MIN.**	30°C
		MAX.	50°C
		DEFAULT	50°C
Anti-freeze intervention	Anti-freeze alarm intervention temperature on EV side (water output 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

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.

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

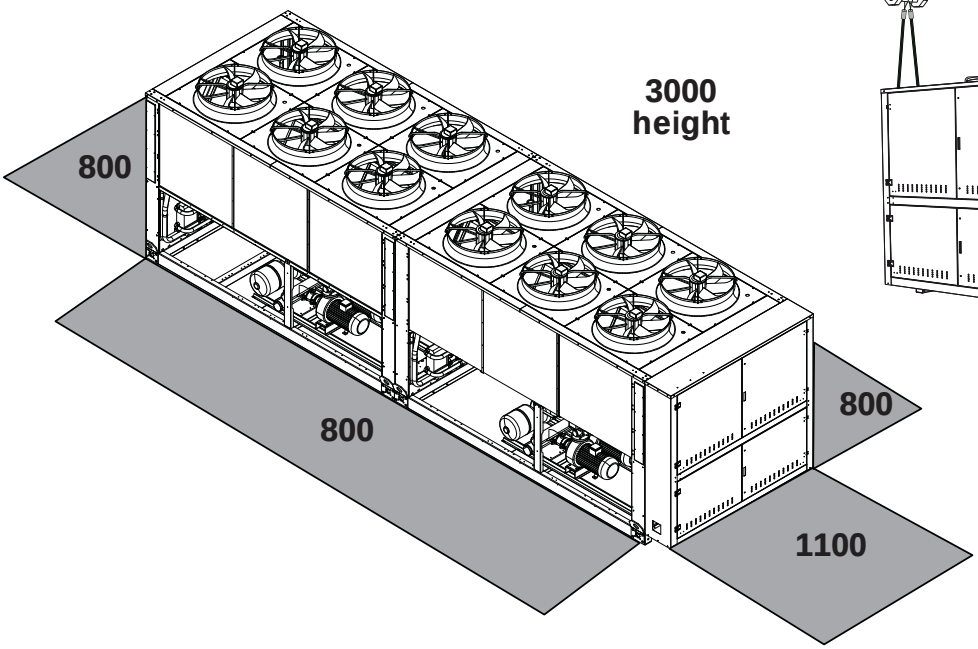
- the support surface must be able to withstand the weight of the unit;
- the safety distance between the units and other equipment or structures must be strictly respected so that the air in fans inlet and outlet circulates freely.
- The unit must be installed by an authorised technician in compliance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

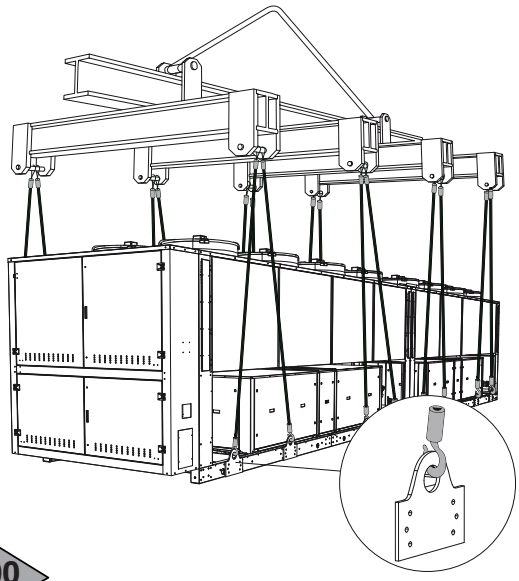
20. POSITIONING

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 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)

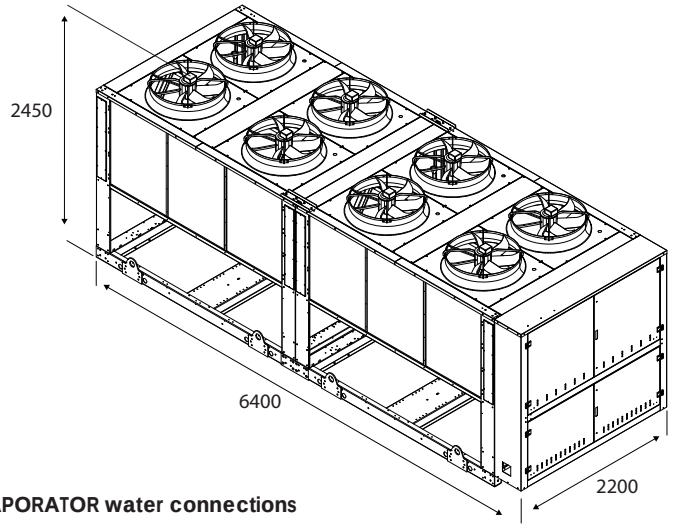




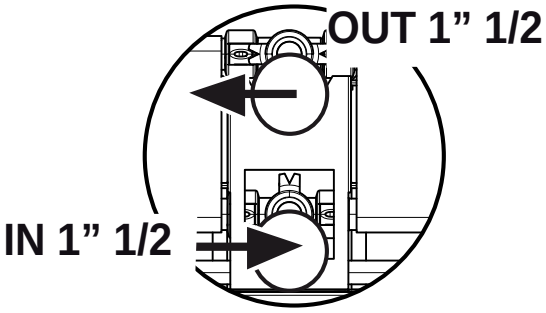
WARNING:
ALWAYS USE ALL THE PROVIDED EYEBOLTS

20.2. DIMENSIONAL TABLES

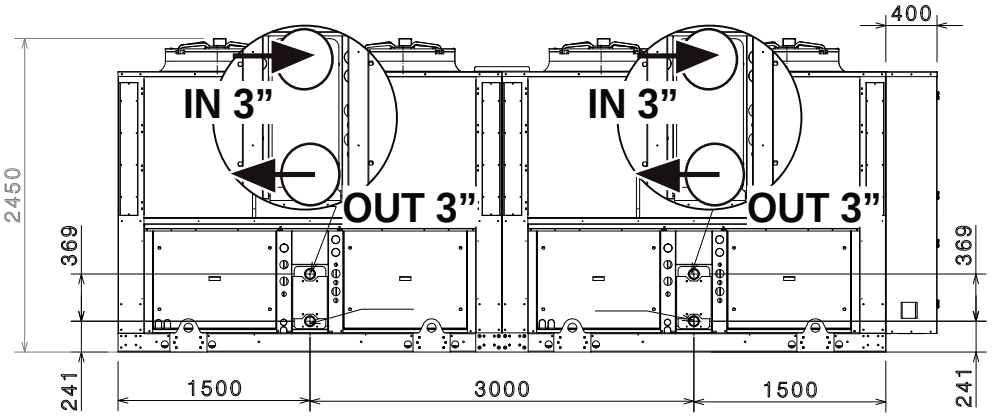
NRL 2000 STANDARD



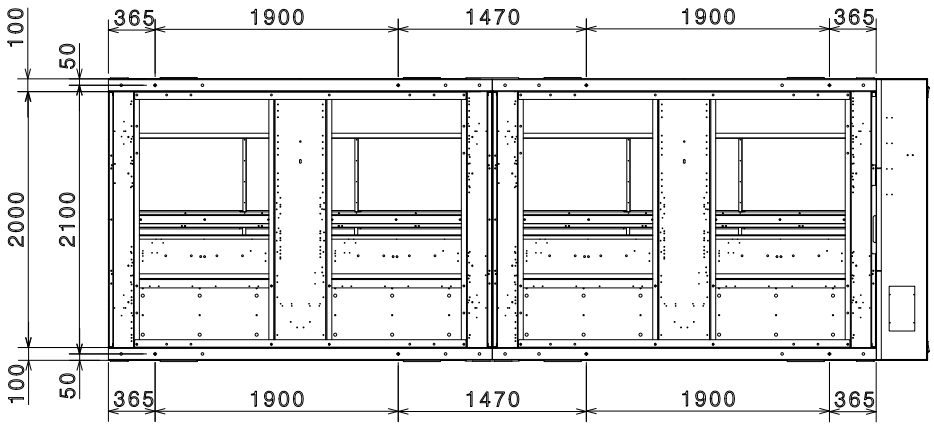
DESUPERHEATER water connections

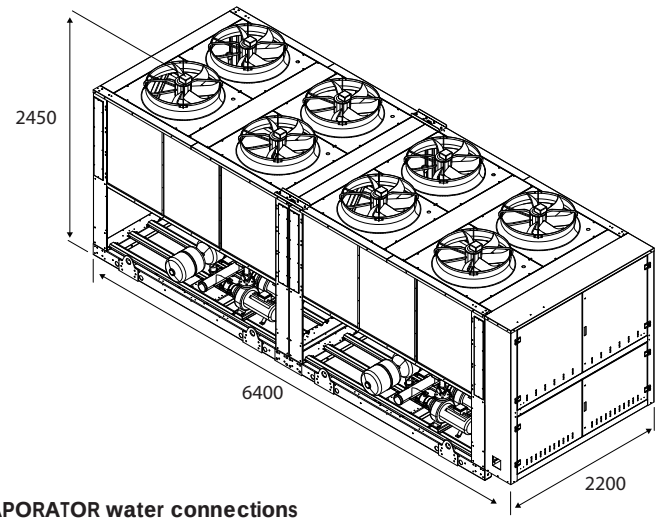


EVAPORATOR water connections

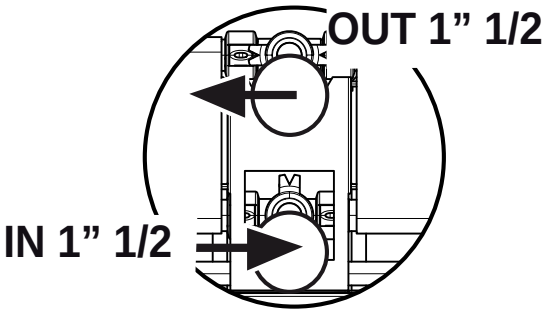


Position AVX

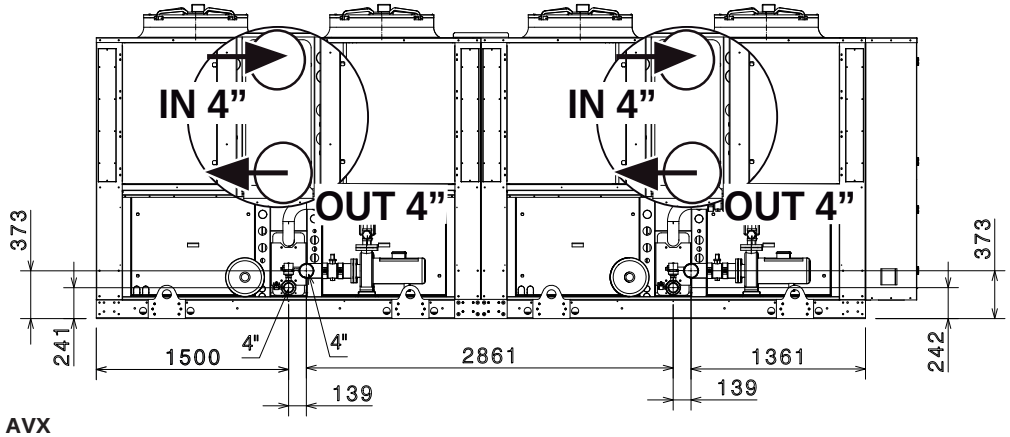




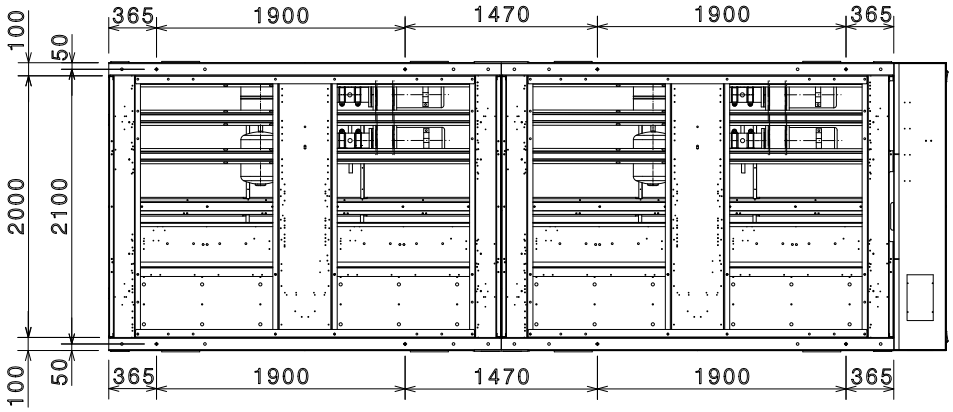
DESUPERHEATER water connections

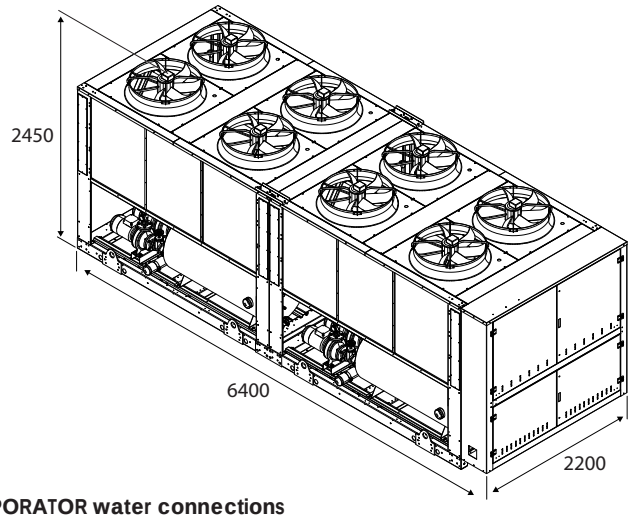


EVAPORATOR water connections



Position AVX





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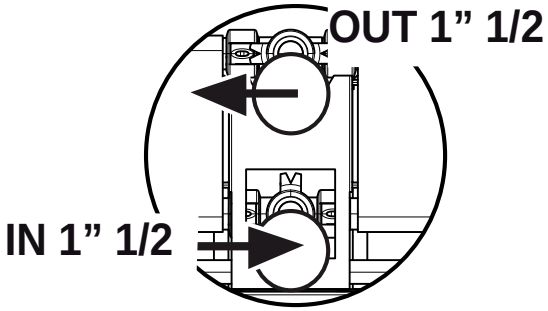
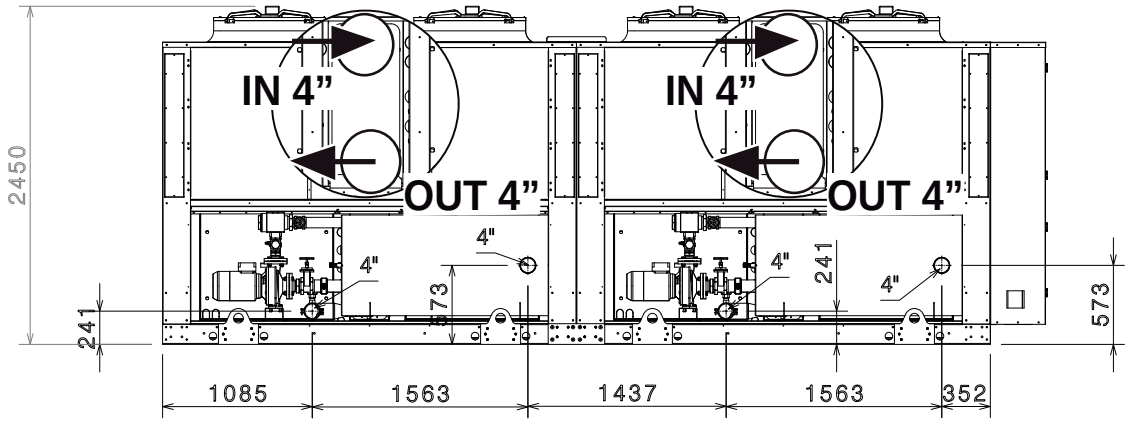
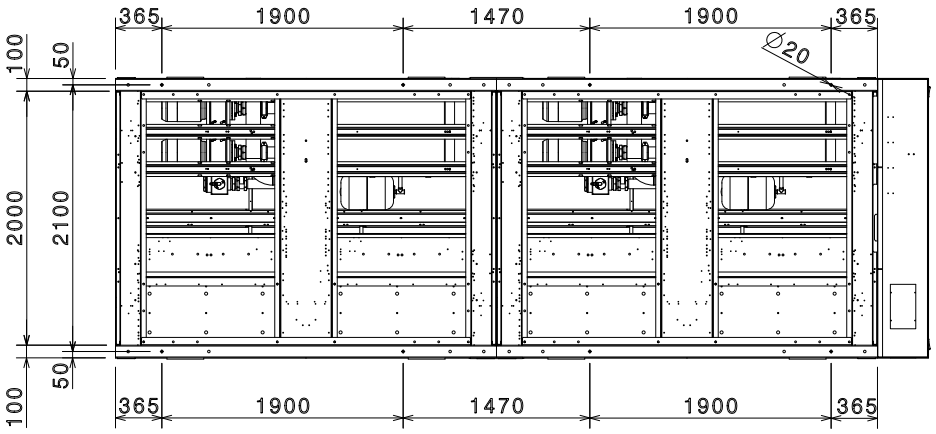


EVAPORATOR water connections



Position AVX



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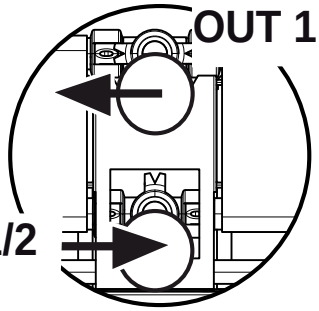
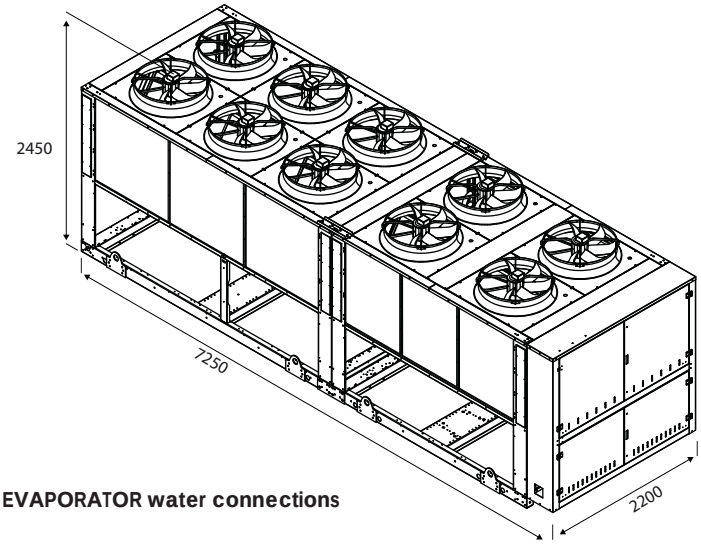
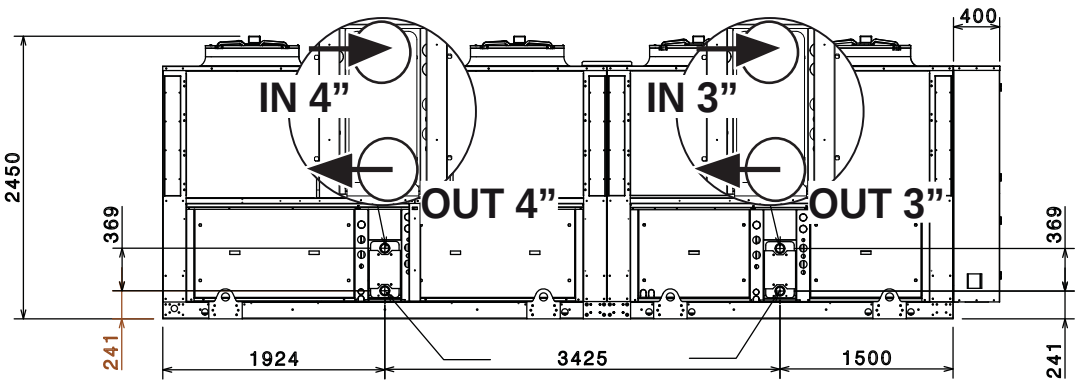
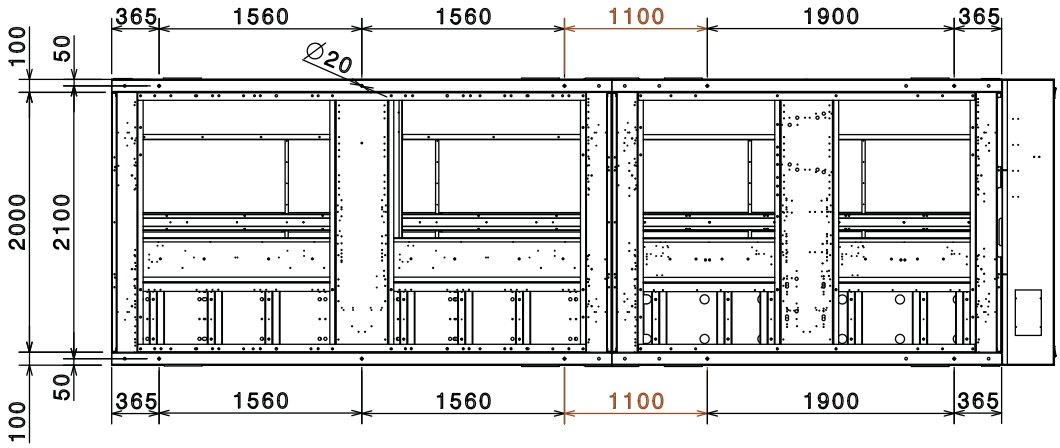




EVAPORATOR water connections



Position AVX



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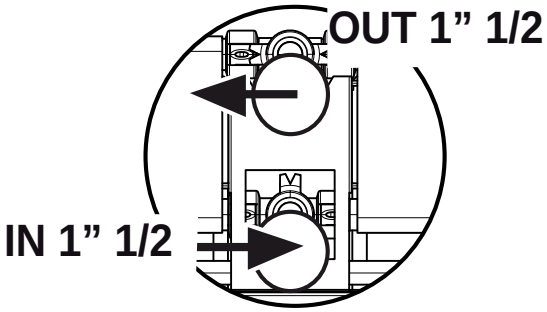
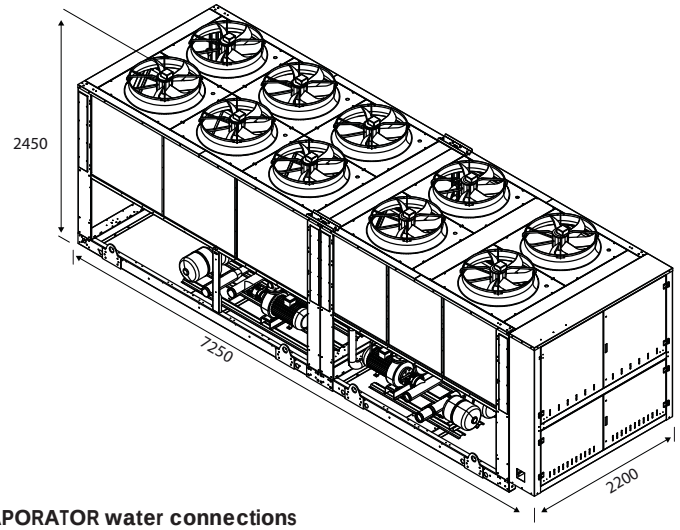
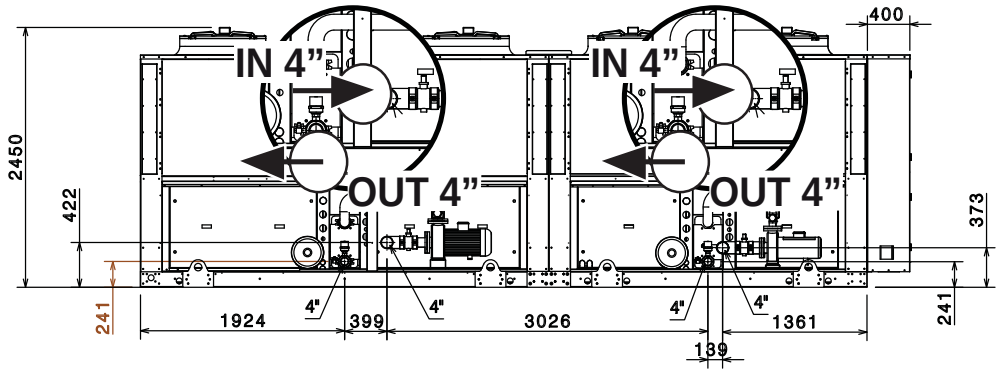
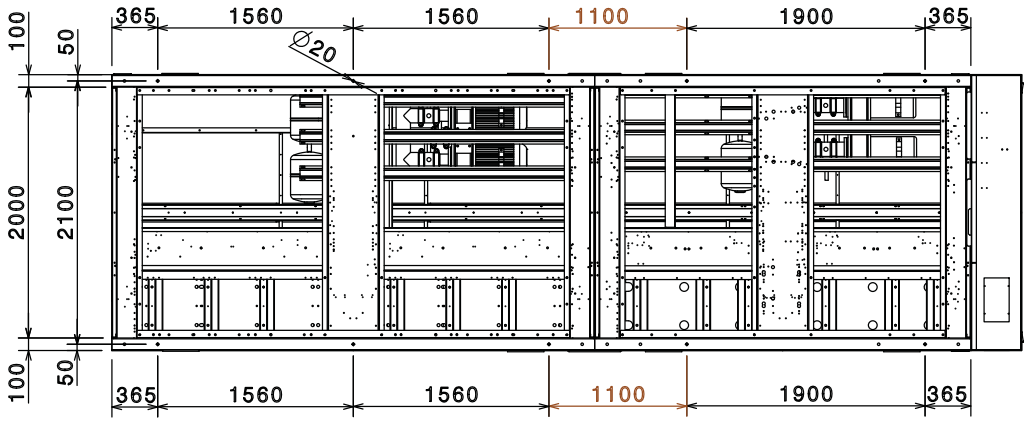


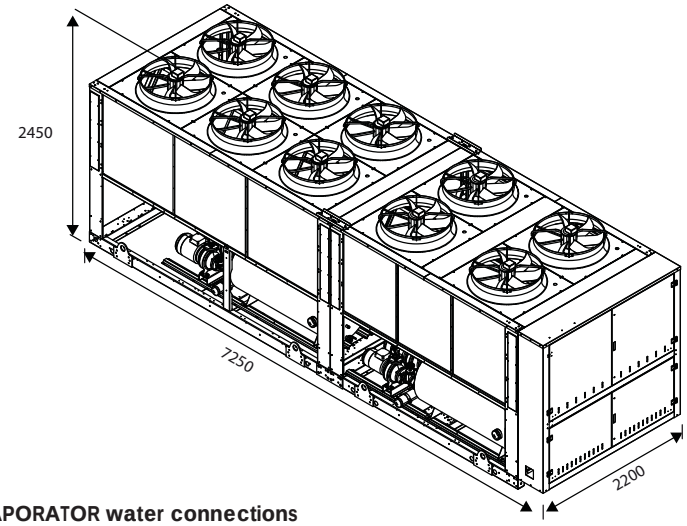


EVAPORATOR water connections



Position AVX





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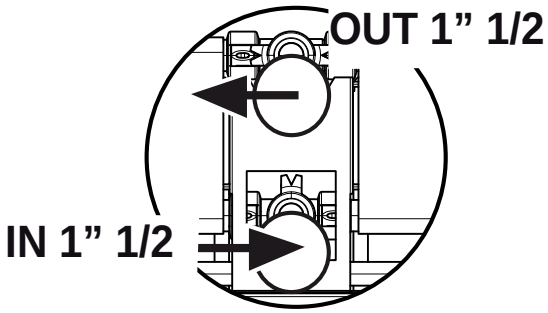
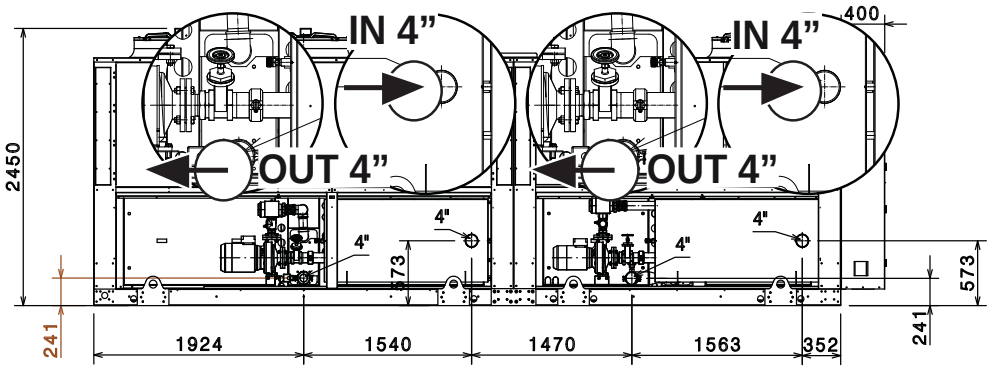
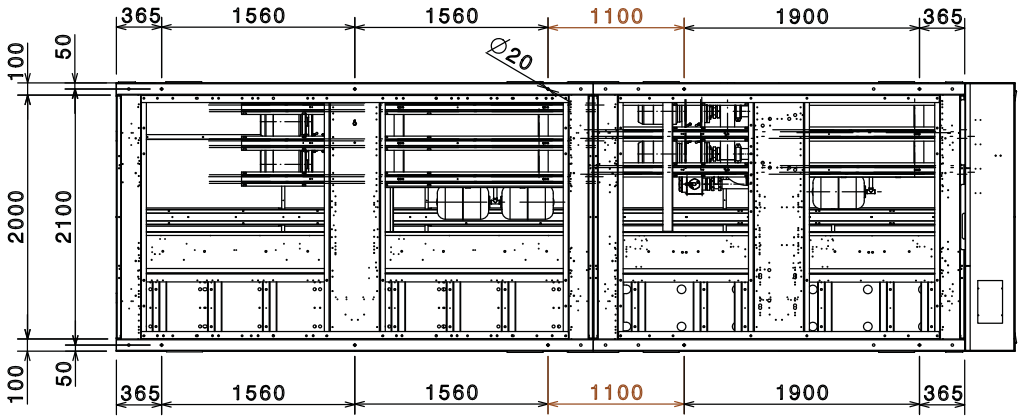
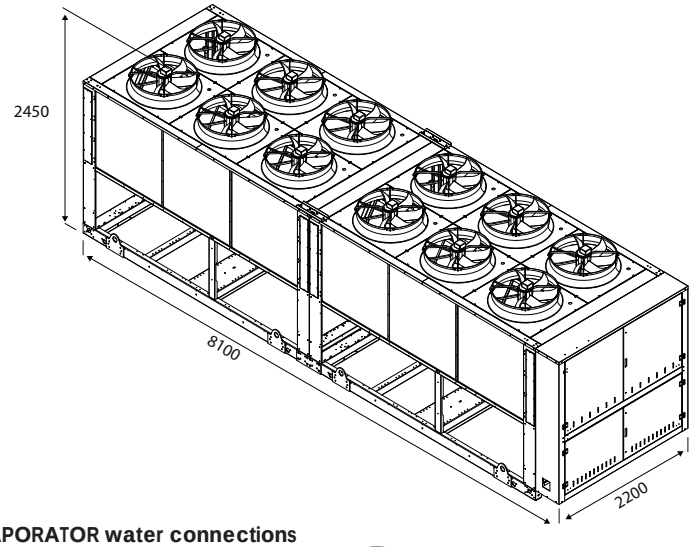


EVAPORATOR water connections

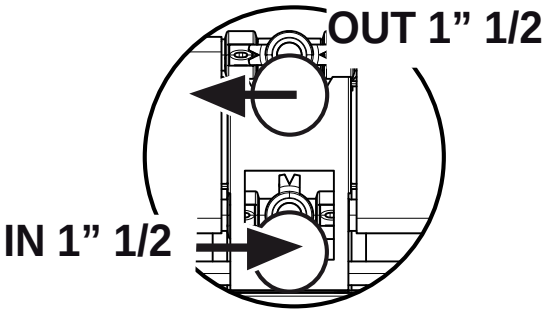


Position AVX

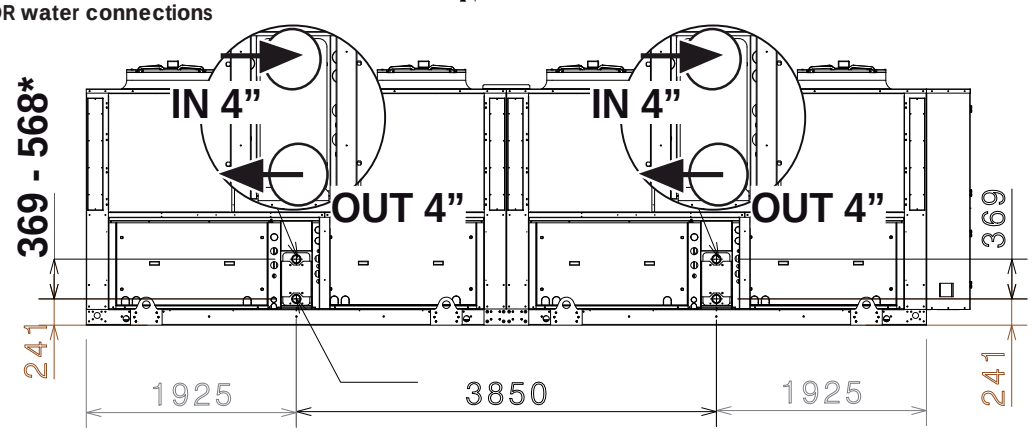




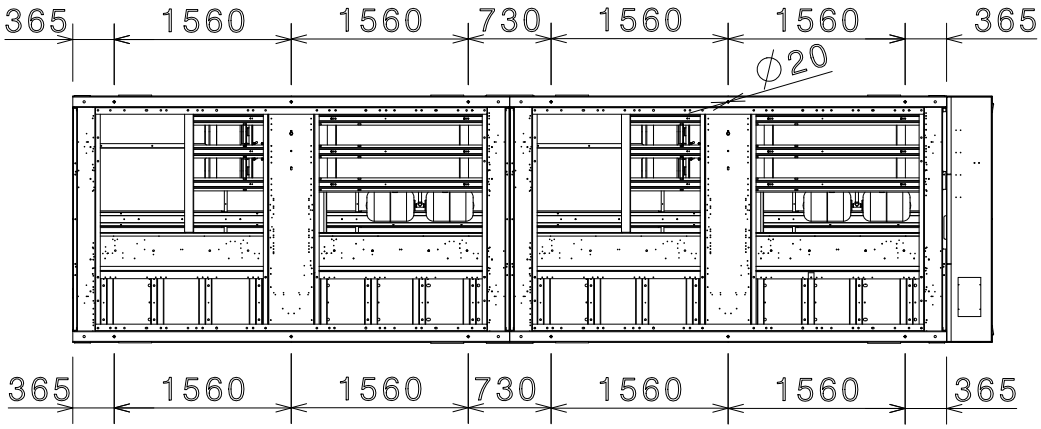
DESUPERHEATER water connections



EVAPORATOR water connections

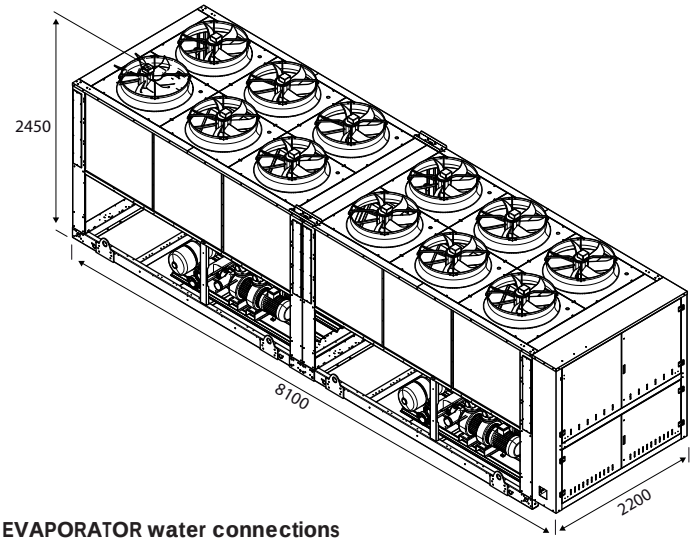


Position AVX

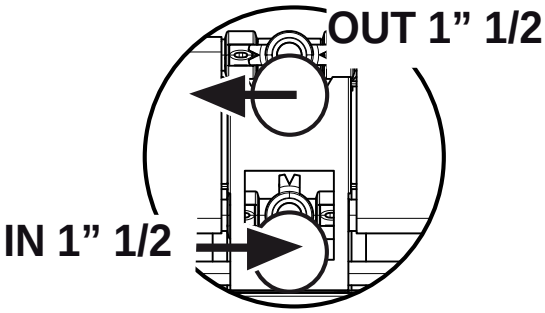


*NOTE:
The opposite table shows the variation of the position according to the exchanger type

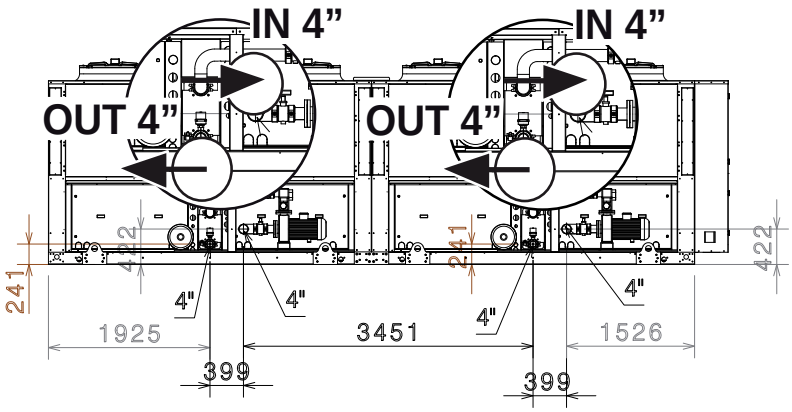
MODEL	POSITION
2800 A-E	**369**
3000 A-E	**568**
3300 A-E	568
3600 A-E	568
2800 HA-HE	**568**
3000 HA-HE	**568**
3300 HA-HE	568
3600 HA-HE	568



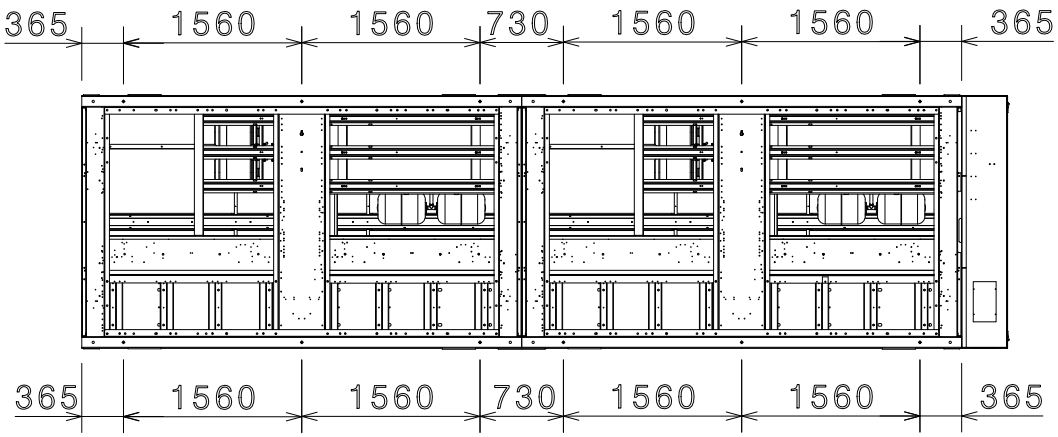
DESUPERHEATER water connections

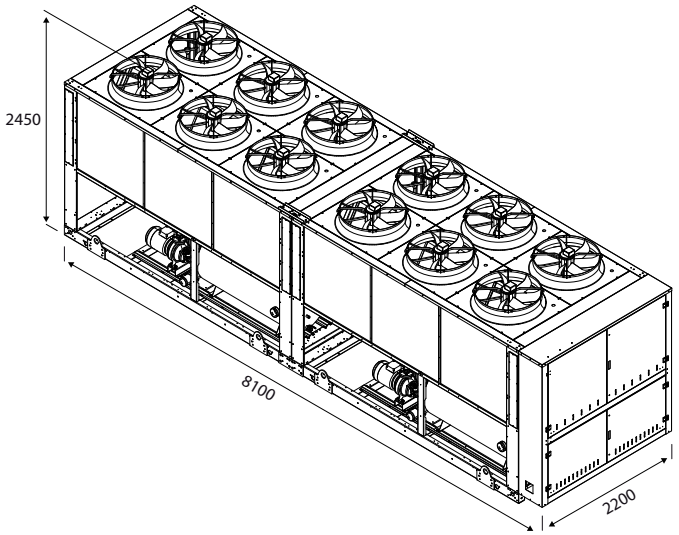


EVAPORATOR water connections

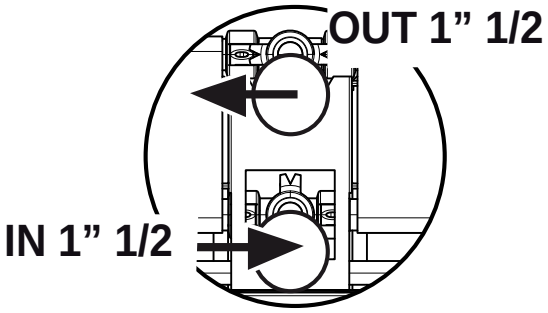


Position AVX

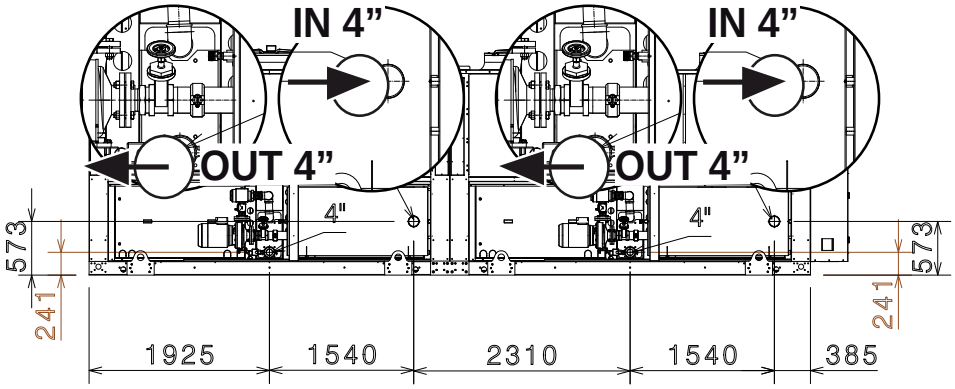




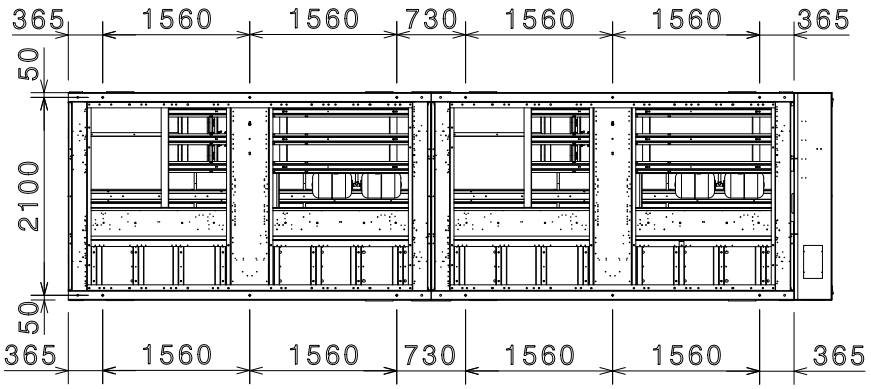
DESUPERHEATER water connections



EVAPORATOR water connections



Position AVX



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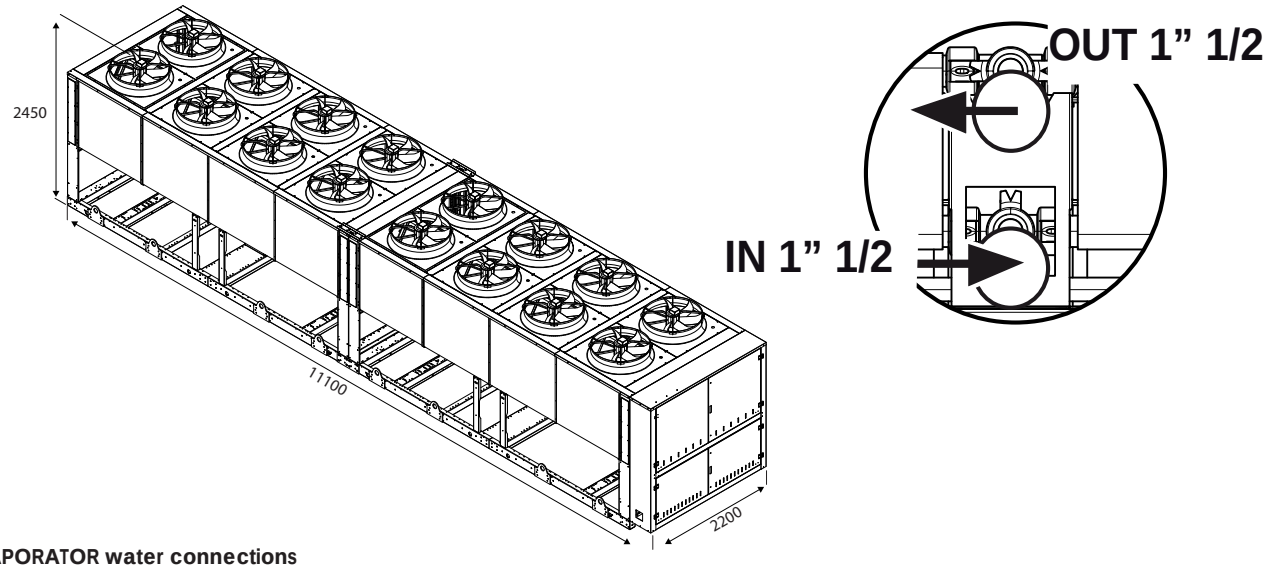
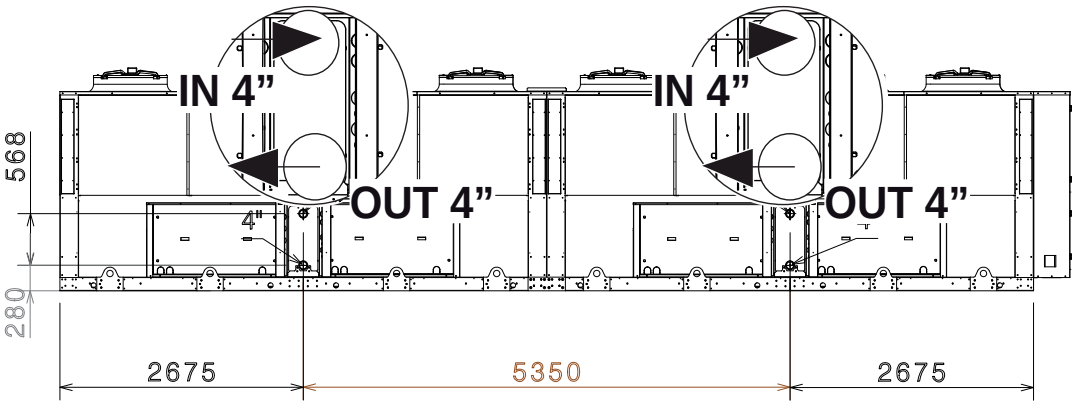
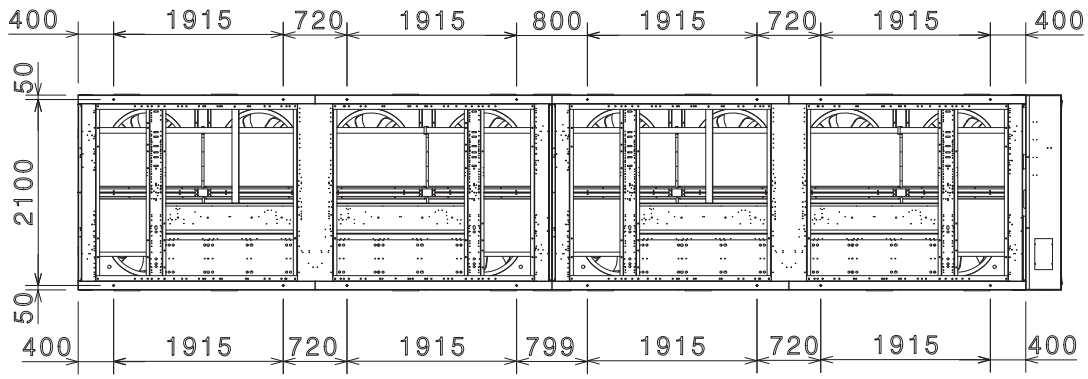


EVAPORATOR water connections



Position AVX



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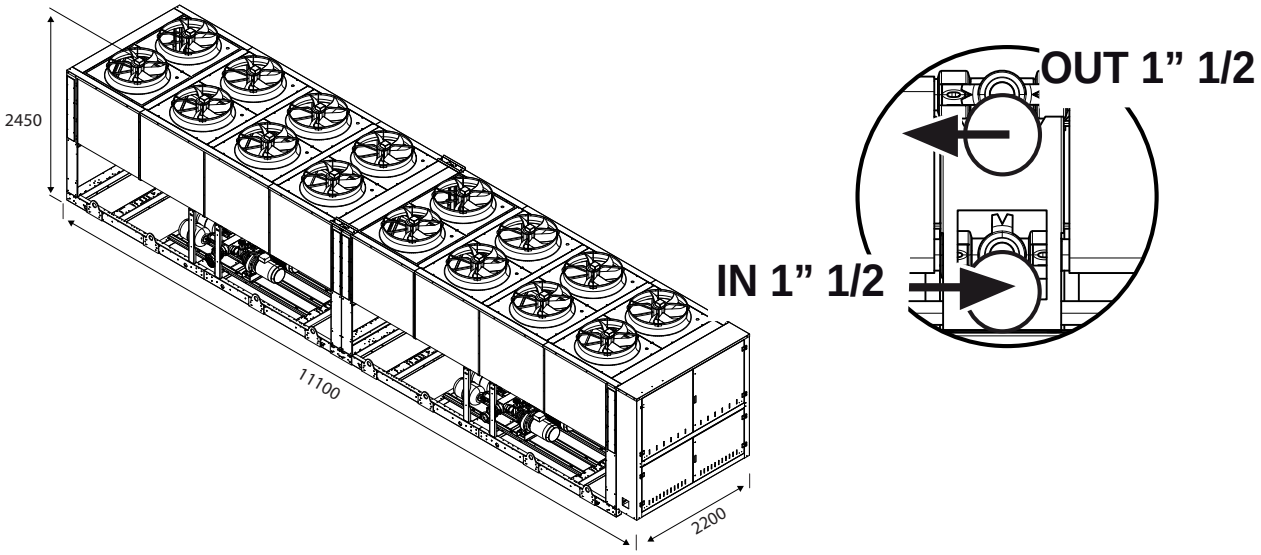
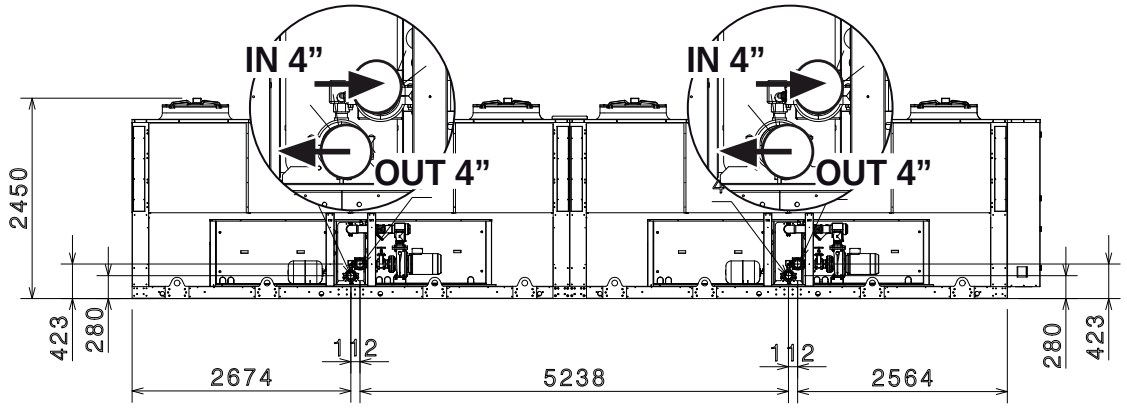
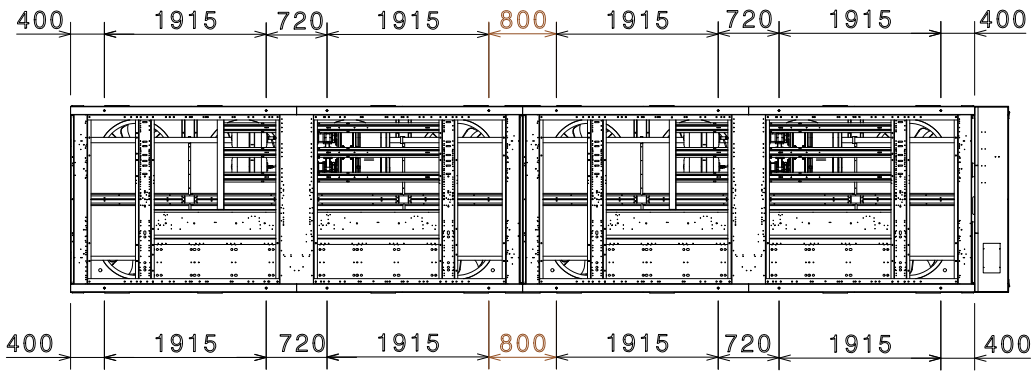


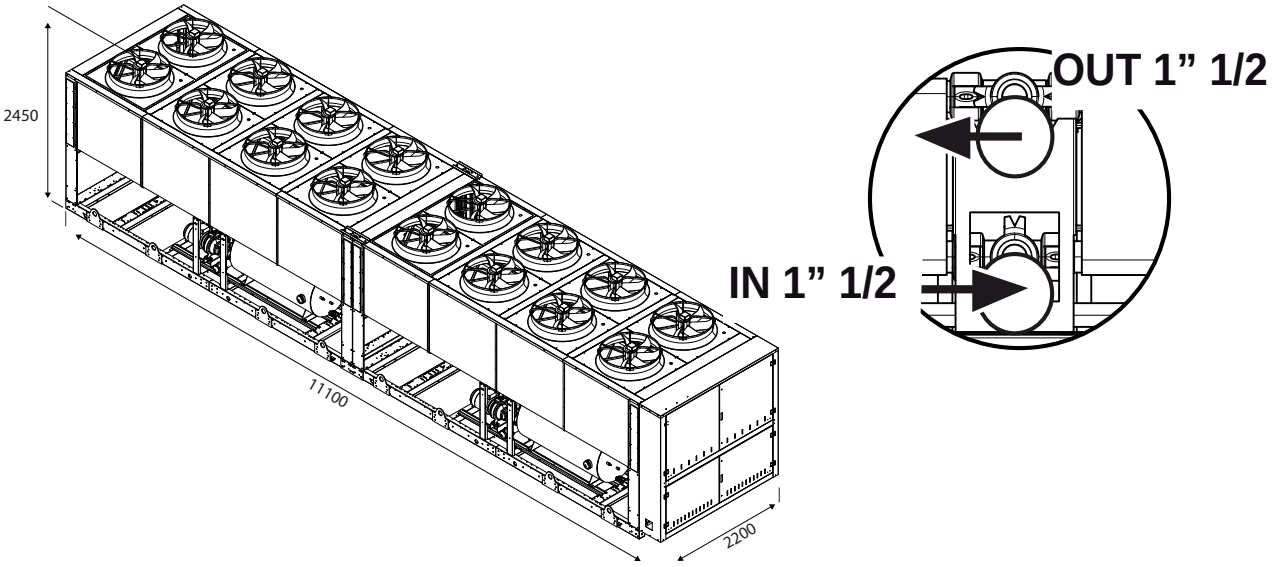
EVAPORATOR water connections



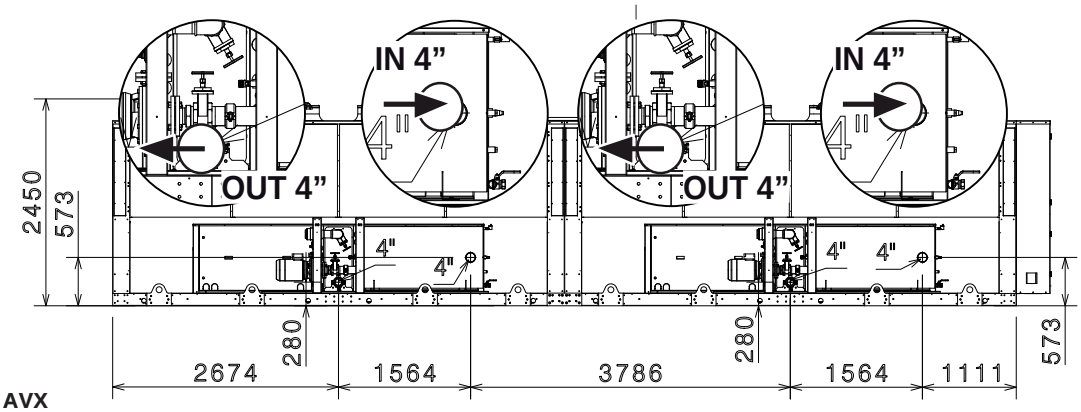
Position AVX



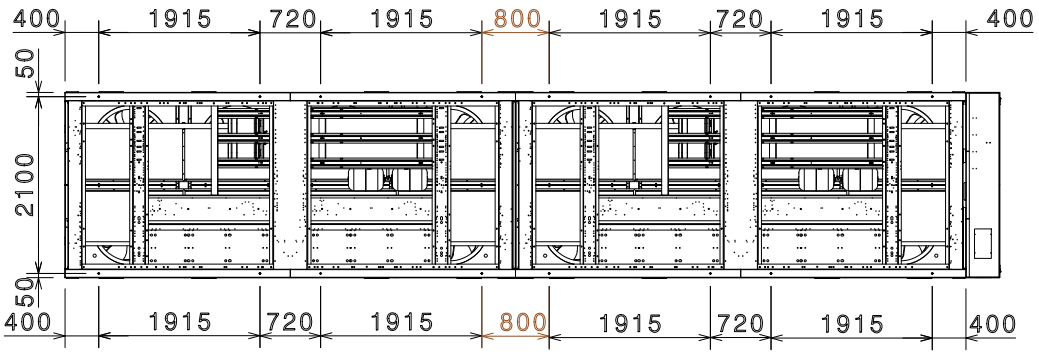
DESUPERHEATER water connections



EVAPORATOR water connections



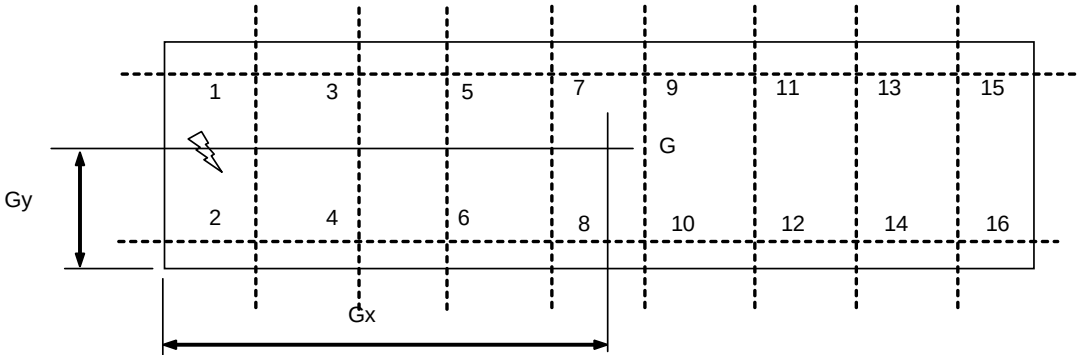
Position AVX



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 (%)																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	AVX
		%	%	%	%	%	%	%	%	%	%	%	%					
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.

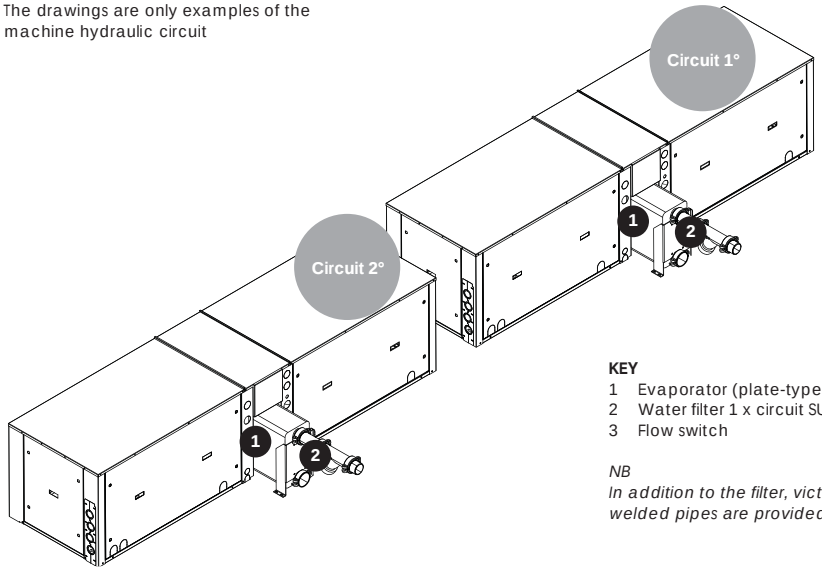
The system is loaded at a pressure between 1 and 2 bar.
It is advisable to repeat this operation once the machine has worked for some hours and to periodically check the system pressure, restoring if it drops below 1 bar. Check the hydraulic seal of the joints.

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.

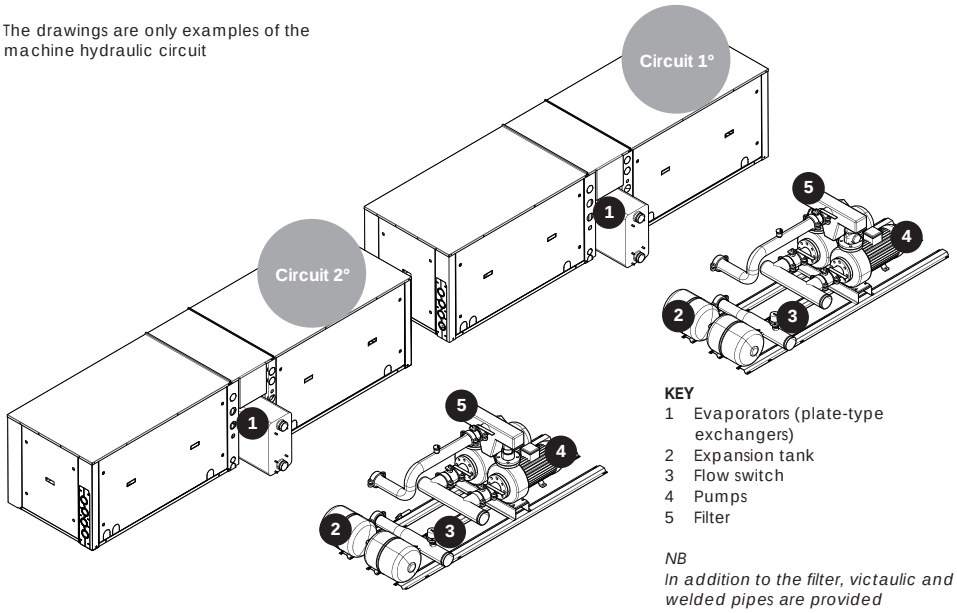
The drawings are only examples of the machine hydraulic circuit



KEY
1 Evaporator (plate-type exchangers)
2 Water filter 1 x circuit SUPPLIED
3 Flow switch

NB
In addition to the filter, victaulic and welded pipes are provided

The drawings are only examples of the machine hydraulic circuit

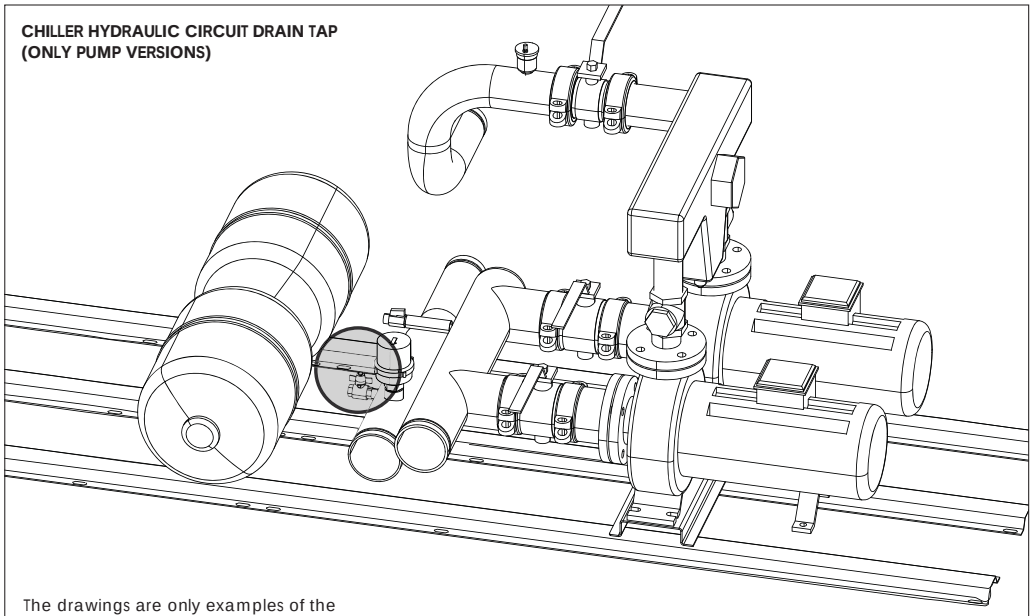


KEY

1 Evaporators (plate-type exchangers)
2 Expansion tank
3 Flow switch
4 Pumps
5 Filter

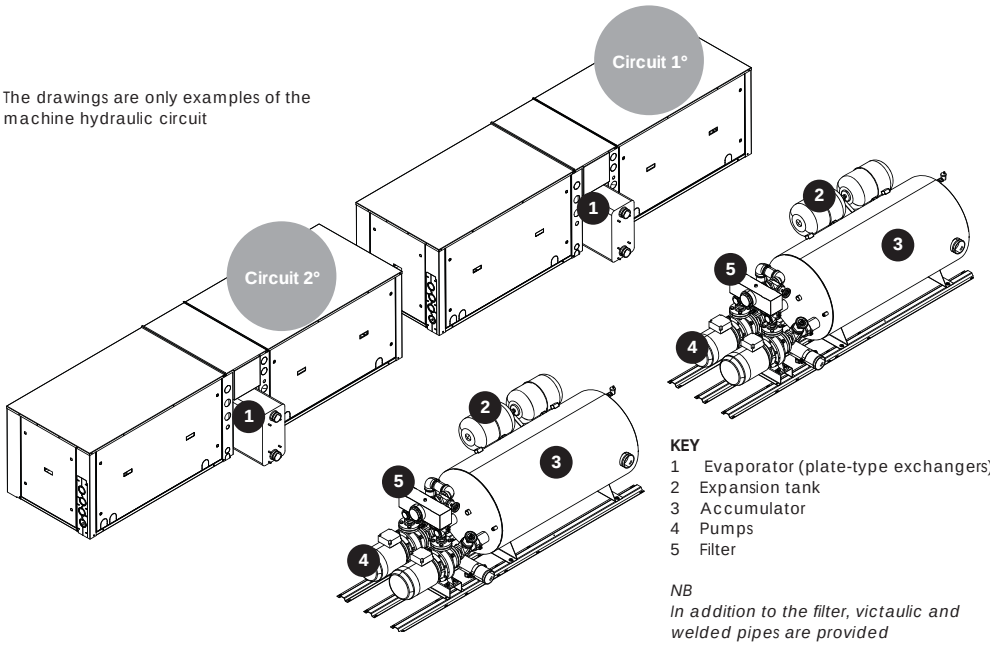
NB
In addition to the filter, victaulic and welded pipes are provided

CHILLER HYDRAULIC CIRCUIT DRAIN TAP (ONLY PUMP VERSIONS)



The drawings are only examples of the machine hydraulic circuit

The drawings are only examples of the machine hydraulic circuit

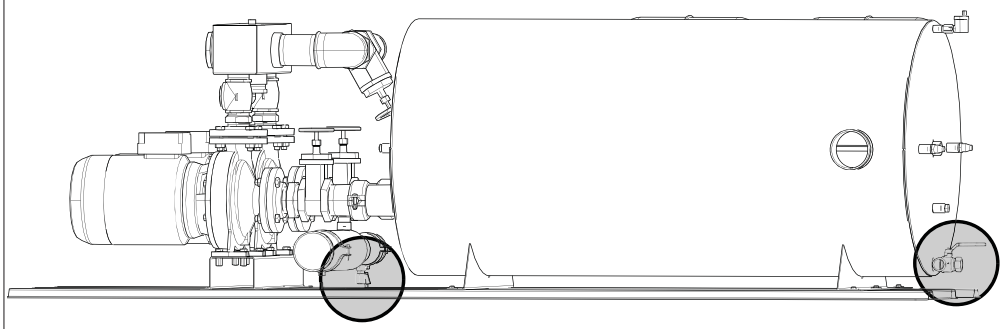


KEY

1 Evaporator (plate-type exchangers)
2 Expansion tank
3 Accumulator
4 Pumps
5 Filter

NB
In addition to the filter, victaulic and welded pipes are provided

CHILLER HYDRAULIC CIRCUIT DRAIN TAP (VERSIONS WITH ACCUMULATOR)



The drawings are only examples of the machine hydraulic circuit

fig 2

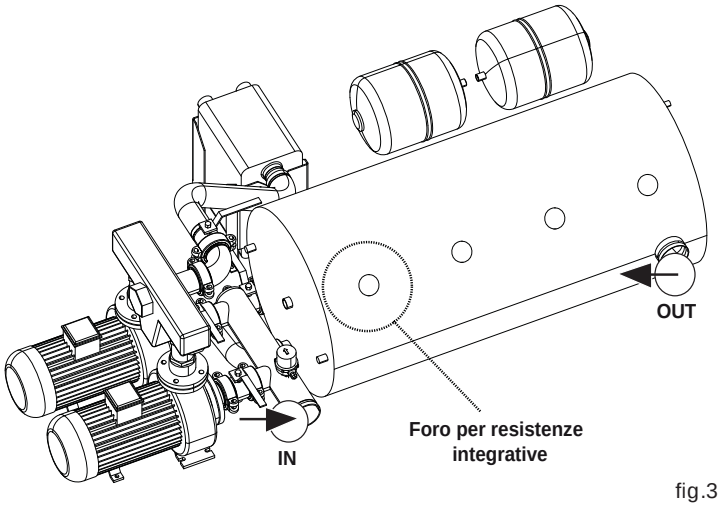


fig.3

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 ± 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 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 - sect.) for each phase	SECT. A	mm^2	2x185	2x240	3x240	3x240	3x240	4x185	4x185
	Earth	mm^2	1x185	1x240	2x185	2x185	2x185	2x185	2x185
	IL	A	630	630	630	800	800	800	800

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

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

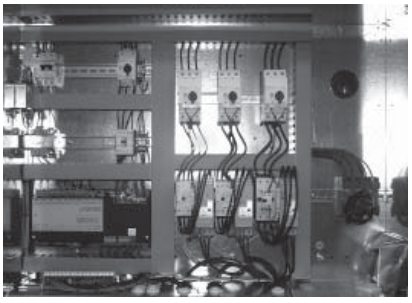


Fig.1

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.

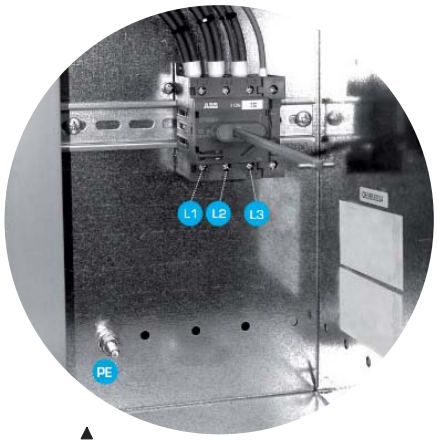
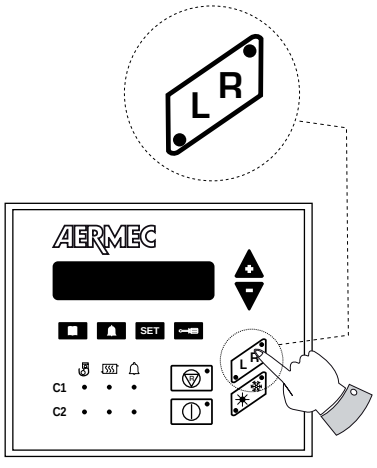


Fig.2

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)

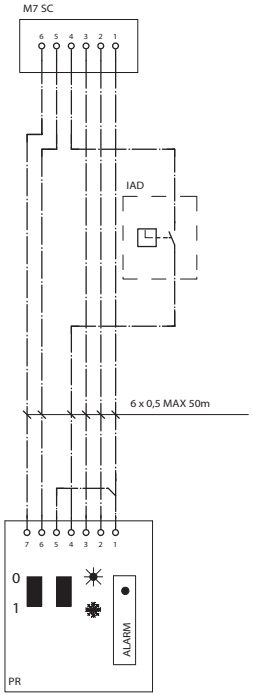
Connect the remote panel PR3 to the control board M7 SC (as shown below), remember that the maximum allowed distance is 50 m.

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 unity 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.

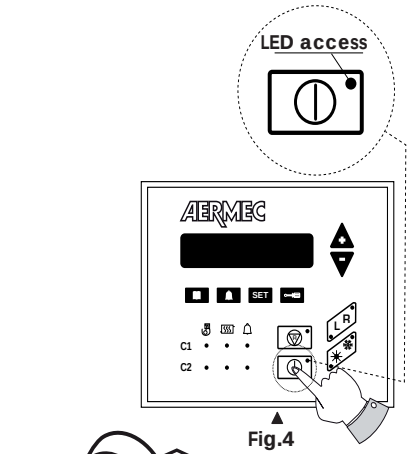


Fig.4

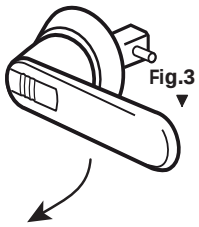


Fig.3

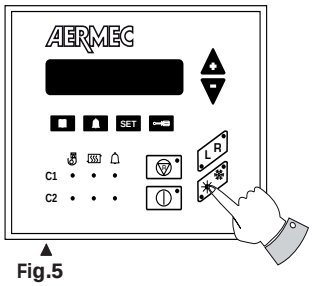
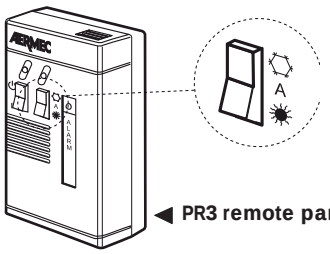


Fig.5



PR3 remote panel

25. FUNCTIONING CHARACTERISTICS

25.1. COOLING SET POINT

(Default defined) = 7°C, Δt = 5°C.

25.2. HEATING SET POINT

(Default defined) = 45°C, Δt = 5°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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air conditioning

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